

Aquatic Resources Delineation

Sunburst Avenue Class I Bike Path and Class II Bike Lanes Project

San Bernardino County, California

Prepared For:



County of San Bernardino
Department of Public Works
825 E. Third Street
San Bernardino, CA 92415

June 20, 2019



ECORP Consulting, Inc. has assisted public and private land owners with environmental regulation compliance since 1987. We offer full service capability, from initial baseline environmental studies through environmental planning review, permitting negotiation, liaison to obtain legal agreements, mitigation design, and monitoring and compliance reporting.

Citation: ECORP Consulting, Inc. 2019. Aquatic Resources Delineation for Sunburst Avenue Class I Bike Path and Class II Bike Lanes Project. San Bernardino County, California. June 2019.

CONTENTS

1.0	INTRODUCTION	1
2.0	REGULATORY SETTING	1
2.1	Waters of the United States	1
2.1.1	Wetlands	1
2.1.2	Other Waters	1
2.2	Clean Water Act	3
2.3	Clean Water Rule	3
3.0	METHODS	4
3.1	Routine Determinations for Wetlands	4
3.1.1	Vegetation	4
3.1.2	Soils	5
3.1.3	Hydrology	6
3.2	SWRCB Jurisdiction	6
3.3	CDFW Jurisdiction	6
4.0	RESULTS	6
4.1	Existing Site Conditions	6
4.1.1	National Wetlands Inventory	7
4.1.2	Watersheds and FEMA Floodplain	9
4.1.3	Soils	9
4.2	Aquatic Resources	9
4.2.1	Waters of the U.S./Wetlands	13
4.3	SWRCB Jurisdiction	13
4.4	CDFW Jurisdiction	13
4.4.1	Unvegetated Streambed	13
5.0	JURISDICTIONAL ASSESSMENT	14
6.0	IMPACTS AND RECOMMENDATIONS	15
7.0	REFERENCES	16

LIST OF TABLES

Table 1. Classification of Wetland-Associated Plant Species	5
Table 2. CDFW Jurisdiction	13

LIST OF FIGURES

Figure 1. Delineation Area Location and Vicinity	2
Figure 2. National Wetlands Inventory Mapping	8
Figure 3. HUC12 Watersheds	10

Figure 4. NRCS Soils Mapping.....	11
Figure 5. CDFW Habitat - Overview	12

LIST OF ATTACHMENTS

Attachment A – Aquatic Resources Delineation
Attachment B – OHWM Forms and Wetland Determination Data Forms – Arid West
Attachment C – Plant Species Observed Onsite
Attachment D – Representative Site Photographs

LIST OF ACRONYMS AND ABBREVIATIONS

CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Register
CWA	Clean Water Act
CWR	Clean Water Rule
DA	Delineation Area
FAC	Facultative
FACW	Facultative Wetland
FEMA	Federal Emergency Management Agency
FR	Federal Register
HUC	Hydrologic Unit Code
NHD	National Hydrography Dataset
N/L	Not Listed
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
OBL	Obligate
OHWM	Ordinary high water mark
PJD	Preliminary Jurisdictional Determination
RAFSS	Riversidean Alluvial Fan Sage Scrub
RAFSS-I/M	Riversidean Alluvial Fan Sage Scrub-Intermediate/Mature Phase
RAFSS-P	Riversidean Alluvial Fan Sage Scrub-Pioneer Phase
SR-210	State Route 210
SWRCB	State Water Resources Control Board
TNW	Traditional Navigable Waters
UPL	Upland
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1.0 INTRODUCTION

On behalf of San Bernardino County Department of Public Works, ECORP Consulting, Inc. (ECORP) conducted an aquatic resources delineation for the Sunburst Avenue Class I Bike Path and Class II Bike Lanes Project (Project) located in the City of Joshua Tree, San Bernardino County, California. The Project is located along Sunburst Avenue along the road shoulder, south of Calle Los Amigos and north of State Highway 62 (SR-62) (Figure 1. *Location and Vicinity*). The Delineation Area (DA) includes the entire Project limits, along with a buffer of 50 feet from the limits. The DA corresponds to a portion of Section(s) 24 and 25, Township 1 North, and Range 6 East (San Bernardino Base and Meridian) of the "Joshua Tree North, California" 7.5-minute quadrangle (U.S. Geological Survey [USGS] 2018). The approximate center of the DA is located at 34.19566° latitude and -116.308711° longitude within the Southern Mojave Watershed (Hydrologic Unit Code #18100100, Natural Resources Conservation Service [NRCS], USGS, and U.S. Environmental Protection Agency [USEPA] 2016).

This report describes aquatic resources identified within the DA that may be regulated by the U.S. Army Corps of Engineers (USACE) pursuant to Section 404 of the federal Clean Water Act (CWA). The information presented in this report provides data required by the USACE Sacramento District's Minimum Standards for Acceptance of Aquatic Resources Delineation Reports (USACE 2016a). The aquatic resource boundaries depicted in this report represent a calculated estimation of the jurisdictional area within the DA and are subject to modification following the USACE verification process. The purpose of this report is to provide adequate information to USACE for the issuance of a Preliminary Jurisdictional Determination (PJD).

2.0 REGULATORY SETTING

2.1 Waters of the United States

This report describes aquatic resources, including wetlands that may be regulated by USACE under Section 404 of the federal CWA. The following sections define these regulations.

2.1.1 Wetlands

Wetlands are *"those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions"* [51 Federal Register (FR) 41250, Nov. 13, 1986, as amended at 58 FR 45036, Aug. 25, 1993]. Wetlands can be perennial or intermittent.

2.1.2 Other Waters

Other waters are nontidal, perennial, and intermittent watercourses and tributaries to such watercourses [51 FR 41250, Nov. 13, 1986, as amended at 58 FR 45036, August 25, 1993]. The limit of USACE jurisdiction for nontidal watercourses (without adjacent wetlands) is defined in 33 Code of Federal Register (CFR) 328.4(c)(1) as the "ordinary high water mark" (OHWM). The OHWM is defined as the "line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" approximation of the lateral limit of USACE jurisdiction. The upstream limits of other waters are defined as the point where the OHWM is no longer perceptible.

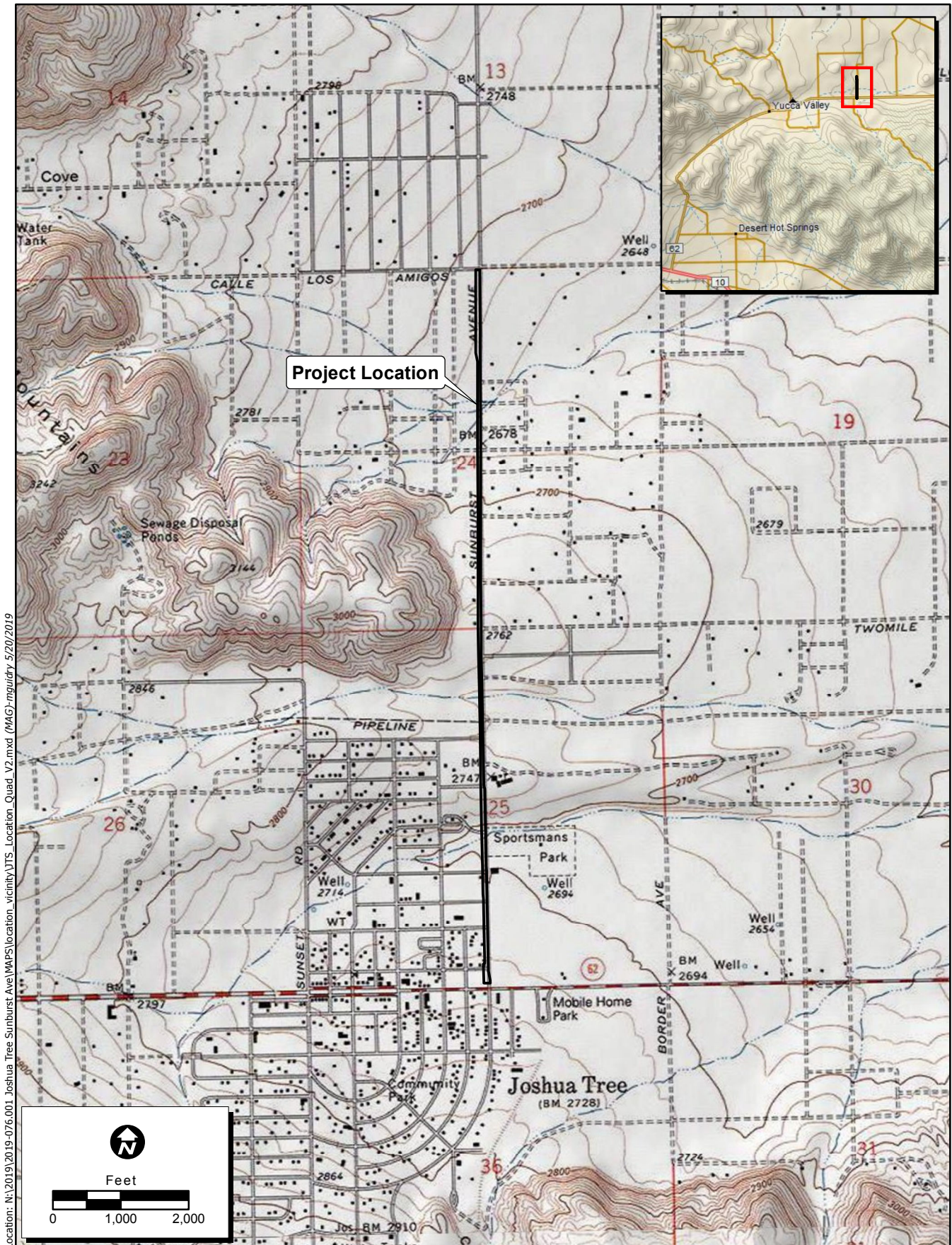


Figure 1. Project Location and Vicinity

2.2 Clean Water Act

The USACE regulates discharge of dredged or fill material into Waters of the U.S. under Section 404 of the CWA. "Discharges of fill material" is defined as the addition of fill material into Waters of the U.S., including, but not limited to the following: placement of fill necessary for the construction of any structure, or impoundment requiring rock, sand, dirt, or other material for its construction; site-development fills for recreational, industrial, commercial, residential, and other uses; causeways or road fills; and fill for intake and outfall pipes, and subaqueous utility lines [33 CFR § 328.2(f)].

In addition, Section 401 of the CWA (33 U.S. Code 1341) requires any applicant for a federal license or permit to conduct any activity that may result in a discharge of a pollutant into Waters of the U.S. to obtain a certification that the discharge will comply with the applicable effluent limitations and water quality standards. The State Water Resources Control Board (SWRCB) may independently assert jurisdiction over isolated and other waters excluded from federal jurisdiction via California's Porter-Cologne Water Quality Act. Typically, jurisdiction under Porter-Cologne is asserted where "beneficial uses" are identified for the respective resource.

Substantial impacts to wetlands, over 0.5 acre of impact, may require an individual permit. Projects that only minimally affect wetlands, less than 0.5 acre of impact, may meet the conditions of one of the existing Nationwide Permits. A Water Quality Certification or waiver pursuant to Section 401 of the CWA is required for Section 404 permit actions; this certification or waiver is issued under the purview of the SWRCB, as administered by one of nine Regional Water Quality Control Boards.

2.3 Clean Water Rule

The Clean Water Rule (CWR) was published in June 2015, but implementation of the rule was stayed until September 2018. It is currently (2018) in effect for 22 States, including California, the District of Columbia, and the U.S. territories. The CWR establishes categories of waters that are jurisdictional, waters that are excluded, and waters that require a case-specific significant nexus evaluation to determine if they are Waters of the U.S. By rule, the CWR defines Waters of the U.S. to include Traditional Navigable Waters (TNW), interstate waters, and territorial seas, impoundments of jurisdictional waters, and tributaries and adjacent (i.e. bordering, contiguous, or neighboring) waters to TNW, interstate waters, or territorial seas (USACE and USEPA 2015).

According to the CWR, neighboring is defined as waters located: within 100 feet of the OHWM of a jurisdictional feature, within the 100-year floodplain of a jurisdictional feature and within 1,500 feet of the feature, or within 1,500 feet of the high tide line of TNW, interstate water, or territorial sea. Western vernal pools in California and several other location-specific aquatic feature types are evaluated on a case-by-case basis to determine whether they have a significant nexus to TNW, interstate waters, or territorial seas (USACE and USEPA 2015).

Feature types that are categorically excluded from CWA jurisdiction include waste treatment systems, prior converted cropland, ditches with intermittent or ephemeral flow that are not relocated tributaries or excavated in a tributary, ditches that do not flow, directly or indirectly, into a jurisdictional water, artificially irrigated areas that would revert to dry land in the absence of irrigation, artificial, constructed lakes or ponds created by excavating and/or diking dry land, small ornamental waters, artificial reflecting or swimming pools created by excavating and/or diking dry land, water-filled depressions created in dry land incidental to mining or construction activities, erosional features such as gullies, rills, and other

ephemeral features that do not meet the definition of tributary, non-wetland swales, and lawfully constructed grassed waterways, and puddles (USACE and USEPA 2015).

3.0 METHODS

This aquatic resources delineation was conducted in accordance with the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Arid West Region Supplement) (USACE 2008). The boundaries of aquatic resources were delineated through standard field methods (e.g., paired sample set analyses) and aerial photograph interpretation. Field data were recorded on Wetland Determination Data Forms - Arid West Region (Attachment B). A color aerial photograph (1"=400' scale, NAIP 2018) was used to assist with mapping and ground-truthing. *Munsell Soil Color Charts* (Kollmorgen Instruments Co. 1990) and the Web Soil Survey (NRCS 2019) were used to aid in identifying hydric soils in the field. The Jepson Manual, 2nd Edition (Baldwin et al. 2012) was used for plant nomenclature and identification.

Field surveys were conducted on June 10, 2019 by ECORP biologist Scott Taylor. Mr. Taylor walked and drove the entire DA to determine the location and extent of aquatic resources. Paired locations were sampled, if wetlands were suspected, to evaluate whether or not the vegetation, hydrology, and soils data supported an aquatic resource determination. At each paired location, one point was located such that it was within the estimated aquatic resource area, and the other point was situated outside the limits of the estimated aquatic resource area. Additional non-paired locations were sampled to document marginal areas that were determined not to be aquatic resources because they lacked hydrophytic vegetation, hydric soils, and/or wetland hydrology. Aquatic resources within the DA were recorded in the field using a post-processing capable global positioning system unit with sub-meter accuracy (Trimble GeoXT).

To document the locations of OHWM, Arid West Ephemeral and Intermittent Streams OHWM Datasheets were used. These forms document the resources used to make the determination of OHWM, a cross-sectional view of the stream in question, and field characteristics at the OHWM location.

3.1 Routine Determinations for Wetlands

To be determined a wetland, the following three criteria must be met:

- A majority of dominant vegetation species are wetland-associated species;
- Hydrologic conditions exist that result in periods of flooding, ponding, or saturation during the growing season; and
- Hydric soils are present.

3.1.1 Vegetation

Hydrophytic vegetation is defined as the sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanent or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present (Environmental Laboratory 1987). The definition of wetlands includes the phrase "*a prevalence of vegetation typically adapted for life in saturated soil conditions.*" Prevalent vegetation is characterized by the dominant plant species comprising the plant community (Environmental Laboratory 1987). The dominance test is the basic hydrophytic vegetation indicator and was applied at each sampling point location. The "50/20 rule" was used to select the dominant plant species from each stratum of the community. The rule states that

for each stratum in the plant community, dominant species are the most abundant plant species (when ranked in descending order of coverage and cumulatively totaled) that immediately exceed 50 percent of the total coverage for the stratum, plus any additional species that individually comprise 20 percent or more of the total cover in the stratum (USACE 1992, USACE 2008).

Dominant plant species observed at each sampling point were then classified according to their indicator status (probability of occurrence in wetlands, Table 1), *North American Digital Flora: National Wetland Plant List* (Lichvar et al. 2016). If the majority (more than 50 percent) of the dominant vegetation on a site are classified as obligate (OBL), facultative wetland (FACW), or facultative (FAC), the site was considered to be dominated by hydrophytic vegetation.

Table 1. Classification of Wetland-Associated Plant Species		
Plant Species Classification	Abbreviation¹	Probability of Occurring in Wetland
Obligate	OBL	Almost always occur in wetlands
Facultative Wetland	FACW	Usually occur in wetlands, but may occur in non-wetlands
Facultative	FAC	Occur in wetlands and non-wetlands
Facultative Upland	FACU	Usually occur in non-wetlands, but may occur in wetlands
Upland	UPL	Almost never occur in wetlands
Plants That Are Not Listed (assumed upland species)	N/L	Does not occur in wetlands in any region.

¹Source: Lichvar et al. 2016

In instances where indicators of hydric soil and wetland hydrology were present, but the plant community failed the dominance test, the vegetation was re-evaluated using the Prevalence Index. The Prevalence Index is a weighted-average wetland indicator status of all plant species in the sampling plot, where each indicator status category is given a numeric code (OBL=1, FACW=2, FAC=3, FACU=4, and UPL=5) and weighting is by abundance (percent cover). If the plant community failed the Prevalence Index, the presence/absence of plant morphological adaptations to prolonged inundation or saturation in the root zone was evaluated.

3.1.2 Soils

A hydric soil is defined as a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (NRCS 2003). Indicators that a hydric soil is present include, but are not limited to, histosols, histic epipedon, hydrogen sulfide, depleted below dark surface, sandy redox, loamy gleyed matrix, depleted matrix, redox dark surface, redox depressions, and vernal pools.

At each sampling point a soil pit was excavated to the depth needed to document an indicator, to confirm the absence of indicators, or until refusal at each sampling point. The soil was then examined for hydric soil indicators. Soil colors were determined while the soil was moist using the *Munsell Soil Color Charts* (Kollmorgen Instruments Co. 1990). Hydric soils are formed predominantly by the accumulation or loss of iron, manganese, sulfur, or carbon compounds in a saturated and anaerobic environment. These processes and the features in the soil that develop can be identified by looking at the color and texture of the soils.

3.1.3 Hydrology

Wetlands, by definition, are seasonally or perennially inundated or saturated at or near (within 12 inches of) the soil surface. Primary indicators of wetland hydrology include, but are not limited to: visual observation of saturated soils, visual observation of inundation, surface soil cracks, inundation visible on aerial imagery, water-stained leaves, oxidized rhizospheres along living roots, aquatic invertebrates, water marks (secondary indicator in riverine environments), drift lines (secondary indicator in riverine environments), and sediment deposits (secondary indicator in riverine environments). The occurrence of one primary indicator is sufficient to conclude that wetland hydrology is present. If no primary indicators are observed, two or more secondary indicators are required to conclude wetland hydrology is present. Secondary indicators include, but are not limited to: drainage patterns, crayfish burrows, FAC-neutral test, and shallow aquitard.

3.2 SWRCB Jurisdiction

As mentioned above, the SWRCB does not publish a delineation method for identifying their jurisdictional limits, but in general their jurisdictional limits are identified. Section 401 identifies jurisdictional limits as any "surface water or groundwater, including saline waters, within the boundaries of the state." For the purposes of this delineation, the limits of SWRCB jurisdiction generally follow those of the USACE jurisdiction under Section 404. But based on the Porter-Cologne Water Quality Control Act where beneficial uses are designated or derived from areas outside of USACE jurisdiction additional areas, such as CDFW jurisdictional areas, may be mapped as well.

3.3 CDFW Jurisdiction

The delineation of CDFW jurisdiction follows the guidance and definitions contained within Section 1600 of the California Fish and Game Code, which connotes jurisdiction as a "river, stream, or lake designated by the department in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit." Delineators also used *A Review of Stream Processes and Forms in Dryland Watersheds* (Vyverberg 2010), which is a science based technical reference on dryland stream forms and processes, and MESA – Mapping Episodic Stream Activity (Vyverberg and Brady 2013) to aid in determining the CDFW jurisdictional limits for the delineation. MESA is intended to assist in identification and mapping of episodic streams when water has perhaps been absent for several years.

Based the aforementioned guidance and experience, the limits of CDFW jurisdiction were mapped where there appeared to be regular surface flow that met a broad definition of stream or lake, based on physical and vegetative characteristics. CDFW jurisdiction may include jurisdictional habitat (riparian habitat), functionally related swales, first-order streams (Strahler 1952), single-thread channels, compound channels, braided channels, discontinuous and distributary channels, drainage networks, and floodplains. CDFW streambed widths were mapped to the nearest foot along each channel.

4.0 RESULTS

4.1 Existing Site Conditions

The DA is located at approximately 2,741 feet above mean sea level (AMSL) to 2,693 feet AMSL in the Mojave Desert Subregion of the Desert Floristic Province (Baldwin et. al. 2012). Several seasonal drainages cross the DA. Vegetation within the Project Area consists primarily of creosote, bursage, and Joshua tree. The channels crossing the DA correspond with historically recorded drainages from USGS topographic

mapping and National Wetland Inventory mapping. Where larger drainages cross Sunburst Avenue, there are low-flow crossings present along with some armoring to prevent roadway erosion. Many of the smaller drainage features do not cross Sunburst Avenue but only occur along the east side, collecting runoff mostly from along the road.

The DA consists of a developed roadway and dirt shoulder, along with a buffer of approximately 50 feet into the surrounding area. The road shoulder is compacted and a small berm is present along the edge of the shoulder. In some locations, dirt roads run parallel along Sunburst Avenue. Surrounding land uses are primarily undeveloped areas along with a few rural residential lots. Development is more prevalent in the southern portions of the DA, adjacent to SR-62.

The DA is composed of disturbed areas, developed areas, and disturbed Mojave creosote bush scrub. Some portions of the DA were disturbed from unauthorized trash dumping and off-highway vehicle (OHV) use. No special-status habitats or vegetation communities were observed within or adjacent to the DA. See the biological report for the Project for additional details.

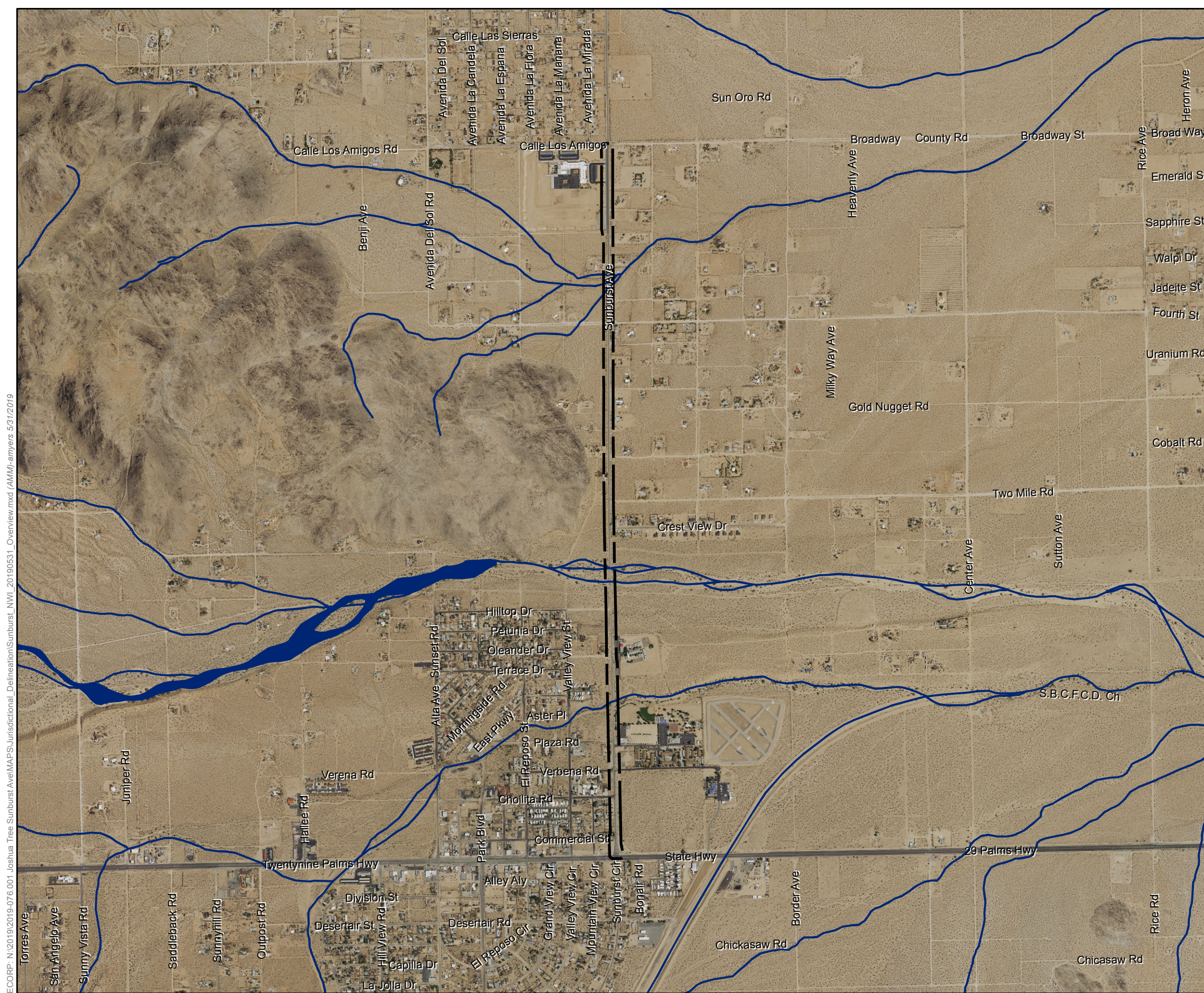
This aquatic resources delineation was conducted in the early summer, within the blooming season for some of the plant species. The survey was conducted at an acceptable time of the year to observe wetland hydrology, and although few wetland plant species would be expected to be in bloom at the time of the survey, most wetland plants were expected to be identifiable to species based upon vegetative characteristics. Temperatures during the survey were 95°F, consistent with the average summer high temperature of 94°F.

The DA is primarily fed by precipitation events in the surrounding desert and mountains. Precipitation data examined for this delineation was derived from two weather stations near Joshua Tree (IDs: US1CASR0014 and USC00044405). During the 2018-2019 year prior to the field survey (March 2018 to March 2019), 7.1 inches of rain fell at higher elevations near Joshua Tree (3,500 feet amsl) while at lower elevations (2,500 feet amsl) the recorded precipitation was 3.89 inches (NOAA 2019). The DA is better reflected by the lower elevation station data. The largest precipitation events recorded were 2.34 inches (at 3,500 feet amsl) and 1.67 inches (at 2,500 feet amsl) (NOAA 2019).


4.1.1 National Wetlands Inventory

The National Wetland Inventory (NWI) is a publicly available national dataset that provides detailed information on the abundance, characteristics, and distribution of US wetlands (USFWS 2019). NWI includes aquatic resource features mapped using a variety of remote sensing and modeling techniques. As such, these aquatic features may or may not exist as represented. In addition, NWI data varies in detail, accuracy, and age, and is meant to be used as a tool to assist with an aquatic resource delineation but not to serve as the only source of information. Data contained within the NWI can be historical in nature at times, having been modified by recent development or by other factors.


According to the NWI, there are aquatic features mapped within the DA (Figure 3. *National Wetlands Inventory*), crossing Sunburst Avenue at various locations. The locations of the mapped features correspond well with the findings of this delineation. Features mapped are classified as either R4SBJ or R4SBC (USFWS 2009). Both classifications represent Riverine (R), Intermittent (4), and Streambed (UB), but differ in predicted flood regime. The classification of "J" indicates Intermittently Flooded while the classification of "C" indicates Seasonally Flooded. Thus both classifications are similar but one is more likely to convey water each year. More detail regarding these classifications will be described below in the Results section.



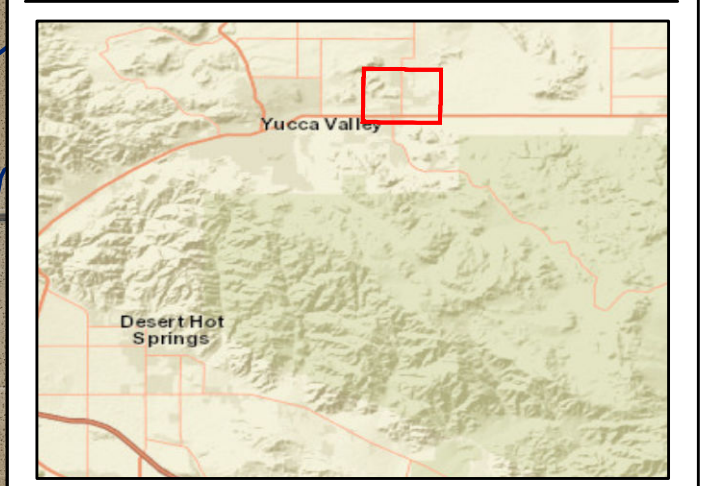
Map Features

 Study Area

NWI Type

 Riverine

Sources: NAIP 2018, NWI California (20180904)



ECORP: N:\2019\2019-076.001 Joshua Tree Sunburst Ave\MAPS\Jurisdictional_Delineation\Sunburst_NWI_20190531_Overview.mxd (AMM)-anyers 5/31/2019

4.1.2 Watersheds

All of the DA is located within the Southern Mojave Watershed (Hydrologic Unit Code [HUC] 18100100) and within portions of two subwatersheds: Joshua Cove-Coyote Lake (HUC 181001001702) and Town of Joshua Tree (HUC 181001001603). The DA traverses the lower elevation, easternmost part of the Joshua Cove-Coyote Lake Subwatershed and the upper elevation, easternmost portions of the Town of Joshua Tree Subwatershed (Figure 3. *HUC12 Watersheds*). The direction of water flow is west to east through the DA.

The Southern Mojave Watershed encompasses over 5,000,000 acres spanning desert parts of San Bernardino, and Riverside Counties. The upper portions of the watershed are near the Lucerne Valley while the lower elevations are near the Chuckwalla Mountains and near Blythe. Larger named streamcourses are generally absent from much of the watershed, favoring instead many smaller drainage courses that collect local runoff from singular isolated mountain ranges and direct them towards various playas.

Current features within the DA consist mainly of several flat-bottomed channels of varying widths with sloped sides consisting of a mixture of natural slopes and riprap protection near Sunburst Avenue. Flows into the various features originate east of the DA for the larger features and from the paved portions of Sunburst Avenue for the smaller features.

4.1.3 Soils

Soils in the area are derived from Pleistocene and Recent Quaternary alluvial sediments and Pleistocene older alluvial sediments, composed of sedimentary and volcanic rocks (Dibblee 1967). Soils within the DA are highly disturbed due to road construction and road shoulder maintenance, along with residential influences.

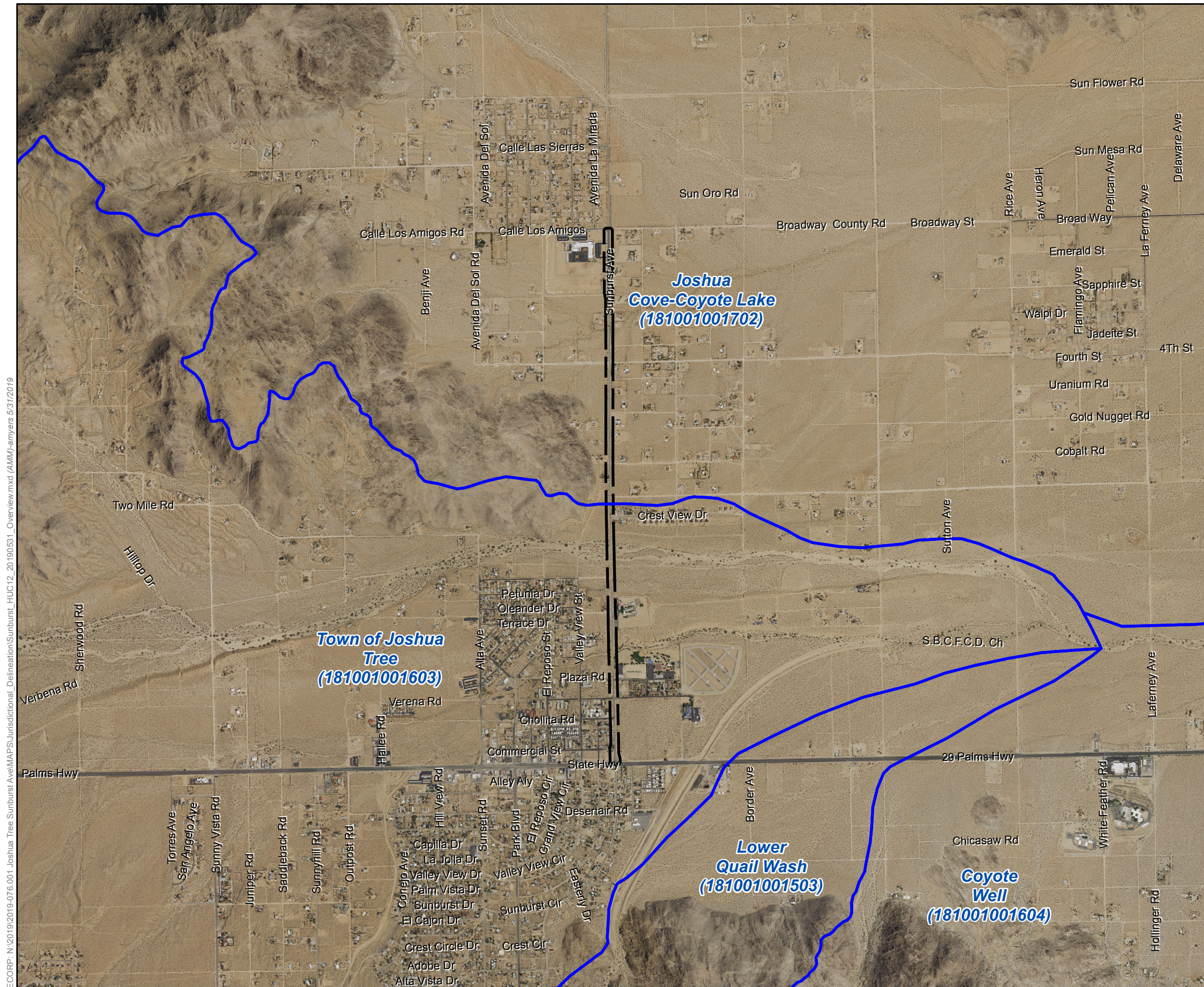
According to the Web Soil Survey (NRCS 2019a), soil data is lacking within this particular area (Figure 4). Field observations of the soils within the various features connoted a heavy presence of sands, with some smaller elements of silt. Generally larger materials such as cobbles or gravel were absent.

4.2 Aquatic Resources

A total of 1.41 acres of aquatic resources with none of the areas considered to be potentially jurisdictional to the USACE due to a lack of connection to Interstate Waters. All mapped features are considered to be state-only jurisdiction. The mapped features include two large streambeds (Streambed 1 and Streambed 2) as well as six smaller features (Drainages 1 through 6). Most of the features are located within the 50-foot buffer of the DA but appear to be outside of the area of direct Project impacts. These features are discussed in greater detail below.

Within the DA, there is a school site at the north end that incorporates a retention basin to gather and retain runoff from the school. This feature has an overflow that spills onto Sunburst Avenue and is channeled along a concrete ditch to then run along the road. This feature was not considered to be jurisdictional due to it being fully constructed and not receiving ordinary storm flows or being connected with any of the nature features that were recorded. Erosional features were also observed within some of the dirt roads adjacent to the DA or partially within the DA, but not considered jurisdictional. The wetland delineation is depicted graphically below (Figure 5) and in Attachment A, on six sheets. The OHWM forms are included in Attachment B, and a list of plant species observed within the DA is included as Attachment C. A discussion of the aquatic resources is presented below. Representative site photographs are included as Attachment D.

ECORP: N:\2019\2019-076.001 Joshua Tree Sunburst Ave\MAPS\Jurisdictional_Delineation\Sunburst_HUC12_20190531_Overview.mxd (AMM)-amyers 5/31/2019



Map Features
Study Area
HUC 12 Boundary

Sources: NAIP 2018, NWI California (20180904)

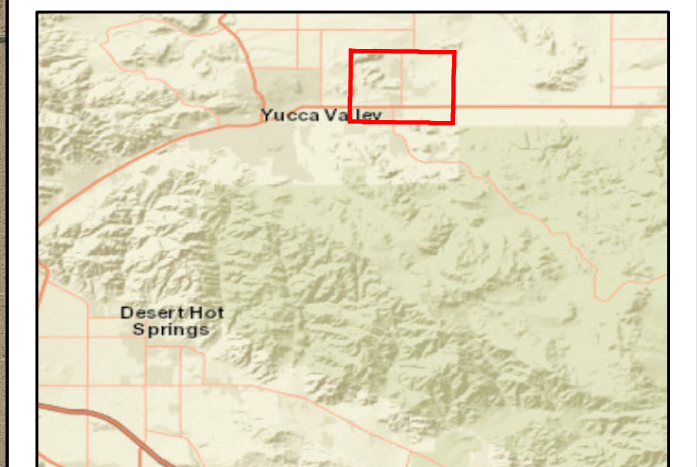


Figure 3. HUC 12 Watershed Boundaries


2019-076.001 Joshua Tree Sunburst Ave



ECORP: N:\2019\2019-076.001 Joshua Tree Sunburst Ave\MAPS\soils_and_geology\Sunburst_NRCS_20190531_Overview.mxd (AMM)-amyers 5/31/2019



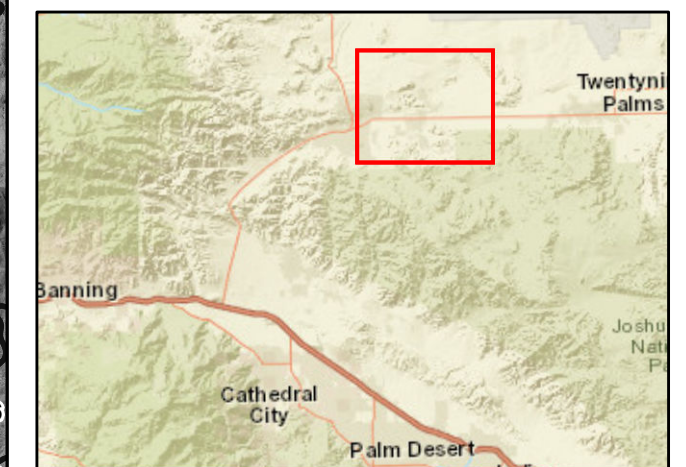
Map Features

 Study Area

Series Number - Series Description

- NOTCOM - No Digital Data Available
- 3676 - Morongo loamy sand, 2 to 4 percent slopes
- 3677 - Morongo sand, 2 to 4 percent slopes
- 3680 - Morongo loamy sand, 2 to 8 percent slopes, dry
- 4606 - Pinecity-Rock outcrop association, 4 to 15 percent slopes
- 4804 - Rock outcrop-Ironped-Pinecity association, 30 to 60 percent slopes
- 4805 - Rock outcrop-Ironped association, 8 to 15 percent slopes

Sources: NAIP 2018, NWI California (20180904)



Map Date: 5/31/2019

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

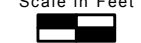
Scale in Feet

0 2,000



Figure 4. NRCS Soil Types

2019-076.001 Joshua Tree Sunburst Ave

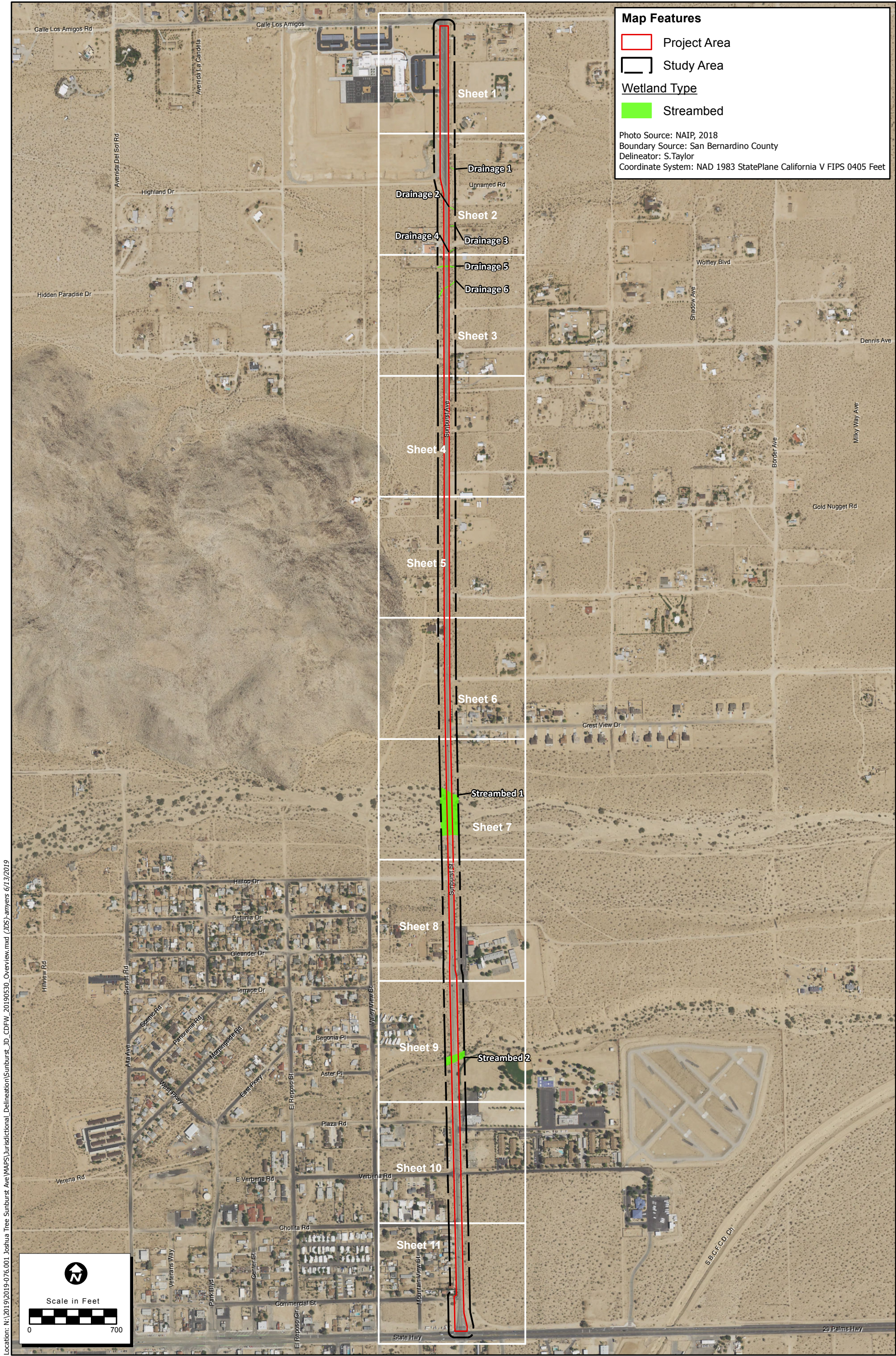


Figure 5. CDFW Habitat - Overview
2019-076.001 Joshua Tree Sunburst Ave

4.2.1 Waters of the U.S./Wetlands

Neither non-wetland Waters of the U.S. or wetland Waters of the U.S. were suspected or recorded within the DA.

4.3 SWRCB Jurisdiction

The limits of SWRCB jurisdiction are presumed to generally follow those of the Waters of the U.S., or USACE jurisdiction, under Section 404 of the CWA. As such, no jurisdiction for the SWRCB is presumed to be present. However, under the Porter-Cologne Water Quality Control Act where beneficial uses are designated or derived from areas outside of USACE jurisdiction additional areas, such as CDFW jurisdictional areas, these areas may be considered jurisdictional as well.

4.4 CDFW Jurisdiction

CDFW jurisdiction encompasses all eight features mapped within the DA, consisting of Streambeds 1 and 2 and Drainages 1 through 6. The limits of CDFW jurisdiction include the limits of the extent of each stream's larger floodplain where flows are not regular but only occur during larger storm events. The CDFW areas also include jurisdictional habitat such as riparian trees, where present, but none of these habitats were present within the DA. The breakdown of CDFW jurisdiction, in terms of acreages of habitats present within the DA, is provided below (Table 2).

Table 2. CDFW Jurisdiction	
Type	Acreage
Streambed 1	1.14
Streambed 2	0.21
Drainage 1	<0.01
Drainage 2	<0.01
Drainage 3	<0.01
Drainage 4	<0.01
Drainage 5	0.02
Drainage 6	0.02
Total	1.41

4.4.1 Unvegetated Streambed

All of the features within the DA consist of unvegetated streambeds along with some associated upland vegetation types. The hydrologic regime of each feature is considered to be ephemeral, meaning that they only flow during and immediately after storm events. Most of the year, these features are dry. There are two larger ephemeral streams located within the DA, consisting of Streambed 1 and Streambed 2. Each of these features is natural, with some developed portions associated with Sunburst Avenue and riprap or armoring along nearby channel banks. Both features are also subject to input by urban runoff along Sunburst Avenue as well as storm flows. Both features also consist of multiple channels. The smaller drainages (Drainages 1 through 6) are also considered ephemeral but consist of single, unvegetated channels. Below are additional details regarding each of these features.

Streambeds 1 and 2

Streambed 1 has an overall floodplain width of 400 feet, consisting of seven channels, plus connecting channels, and several sand bars or mounds between the channels. Surrounding vegetation, along the banks and on the mounds above the flow channels, consisted of desert willow (*Chilopsis linearis*), foothill paloverde (*Cercidium floridum*), catclaw (*Acacia greggii*), creosote (*Larrea tridentata*), Mediterranean schismus (*Schismus barbatus*), white brickelbush (*Brickelia incana*), and western ragweed (*Ambrosia psyllostachya*), interior goldenbush (*Ericameria linearifolia*), four-wing saltbush (*Atriplex canescens*), Sahara mustard (*Brassica tourneforti*) and coyote melon (*Cucurbita palmata*). Soils within the feature were sandy with several typical elements indicating regular surface flow – ripples, sediment splays, and a defined bed and bank. Wrack was evident on the branches of several of the shrub species.

Streambed 2 has an overall floodplain width of approximately 50 feet, consisting of two separate channels as well as connecting channels. Surrounding vegetation, along the banks, consisted of desert willow, foothill paloverde, catclaw, creosote, Mediterranean schismus, white brickelbush, and western ragweed. As with the other streambed, evidence of surface flow was present along with wrack.

In order to document the features within each of these streambeds, OHWM forms were prepared and are within Attachment B of this report. Each of the features, however, is not considered to support OHWM because they are not considered to be Waters of the U.S.

Project work within these features is not anticipated at this time.

Drainages 1 through 6

These features are all similar, having an unvegetated planar bottom with creosote bush scrub along the banks. The features vary in width from 3 feet to 5 feet. Of the recorded features only two, Drainages 5 and 6, cross Sunburst Avenue. The other features begin along the eastern road shoulder, where they convey runoff from the road. The channel bottoms are shallow and mostly clear of any vegetation. Plant species observed in the vicinity included creosote, cheesebush (*Hymenoclea salsola*), apricot mallow (*Sphaeralcea ambigua*) and rattlesnake weed (*Euphorbia albomarginata*).

Project work within these features is not anticipated at this time.

5.0 JURISDICTIONAL ASSESSMENT

As per Regulatory Guidance Letter 16-01, an applicant may request a PJD “in order to move ahead expeditiously to obtain a Corps permit authorization where the requestor determines *that it is in his or her best interest to do so ... even where initial indications are that the aquatic resources on a parcel may not be jurisdictional*” (USACE 2016b). A significant nexus evaluation is not necessary to obtain a PJD. The following information on connectivity of wetlands and other waters in the DA to TNW is provided should an Approved Jurisdictional Determination be necessary.

The features within the DA occur within a portion of the Mojave Desert which contains no major waterways, and none that are considered navigable. The streams in the region typically flow into playas which can seasonally be inundated but are regularly dry throughout most of the year. USACE Los Angeles District has not identified any tributary features to the DA as TNWs and therefore there is no connection to interstate waters considered present within the DA. Therefore, the aquatic resources within the DA likely do not have a significant nexus (affecting the chemical, physical, or biological integrity) with a downstream TNW, and are likely not subject to regulation under Section 404 of the CWA.

6.0 IMPACTS AND RECOMMENDATIONS

A total of 1.41 acres of aquatic resources have been mapped within the DA, consisting of several unvegetated streambeds of varying sizes. There were no suspected Waters of the U.S. (wetlands or non-wetlands) present within the DA. All mapped features are considered to be state-jurisdiction only. The Project as currently configured would entail no impacts to any of the recorded features, because the work is restricted to within the Sunburst Avenue paved portions and graded road shoulder.

Regulatory permitting is currently not anticipated to be needed since there is no placement of dredged or fill material into jurisdictional features, or alteration of streambeds, planned as a part of the Project.

7.0 REFERENCES

- Baldwin, B. G., Goldman G. H., Keil D. J., Patterson R., Rosatti T. J., Wilken D. H. 2012. *The Jepson Manual: Vascular Plants of California, Second Edition*. Berkeley, CA: University of California Press.
- Dibblee, T.W., Jr. 1967. Geologic Map of the Joshua Tree Quadrangle, San Bernardino and Riverside Counties, California.
- Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1 (On-line edition). Vicksburg, Mississippi: U.S. Army Engineer Waterways Experiment Station. P. 143. January 1987.
- Kollmorgen Instruments Company. 1990. Munsell Soil Color Charts. Baltimore, Maryland.
- Lichvar, R. W., Banks D. L., Kirchner W. N., Melvin N. C. 2016. The National Wetland Plant List: 2016 wetland ratings. *Phytoneuron*. 2016:30:1-17. April 28, 2016.
- NOAA. 2019. Climate Data Online: Daily Precipitation Summaries for Joshua Tree, California. Available Online: <https://www.ncdc.noaa.gov/cdo-web/search>. Accessed June 9, 2019.
- NRCS. 2019a. Web Soil Survey. <http://websoilsurvey.nrcs.usda.gov/>. Accessed May 2, 2019.
- _____. 2019b. Soil Data Access Hydric Soils List. <https://www.nrcs.usda.gov/wps/portal/nrcs/mail/soils/use/hydric/>. Accessed May 2, 2019.
- _____. 2003. *National Soil Survey Handbook*. <http://soils.usda.gov/technical/handbook>
- NRCS, USGS, USEPA. 2016. Watershed Boundary Dataset for California. <http://datagateway.nrcs.usda.gov>.
- USACE. 2016a. Minimum Standards for Acceptance of Aquatic Resources Delineation Reports. U.S. Army Corps of Engineers. P. 20. January 2016.
- _____. 2016b. Regulatory Guidance letter 16-01, Jurisdictional Determinations. October 2016.
- _____. 2008a. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region.
- _____. 2008b. Regulatory Guidance Letter 08-02, Jurisdictional Determinations. June 26, 2008.
- _____. 1992. Clarification and Interpretation of the 1987 Manual. Memorandum from Major General Arthur E. Williams. Dated 6 March 1992.
- USACE and USEPA. 2015. Clean Water Rule: Definition of "Waters of the United States." Federal Register Vol. 80 No. 124, 33 CFR Part 328 (USACE), 40 CFR Parts 110, 112, 116, et al. (EPA). 75 pages. June 29, 2015.
- USFWS. 2009. A System for Mapping Riparian Areas in the Western United States. Division of Habitat and Resource Conservation. November 2009.
- USFWS. 2019. National Wetlands Inventory website. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. <http://www.fws.gov/wetlands/>
- USGS. 2018. "Joshua Tree, California" 7.5-minute Quadrangle. In: Survey. G, editor. Denver, Colorado.

USGS 2019a. National Water Information System: Web Interface. <https://waterdata.usgs.gov/nwis>
Accessed on March 10, 2019

USGS. 2019b. National Hydrography Dataset website. U.S. Geological Survey, Washington D.C.
<https://www.usgs.gov/core-science-systems/ngp/national-hydrography/national-hydrography-dataset>.

LIST OF ATTACHMENTS

Attachment A – Aquatic Resources Delineation

Attachment B – OHWM Forms and Wetland Determination Data Forms – Arid West

Attachment C – Plant Species Observed Onsite

Attachment D – Representative Site Photographs

ATTACHMENT A

Aquatic Resources Delineation

ECORP: N:\2019\2019-076.001 Joshua Tree Sunburst Ave\MAPS\Jurisdictional_Delineation\Sunburst_JD_CDFW_20190530_MapBook.mxd (JDS)-amyers 6/13/2019



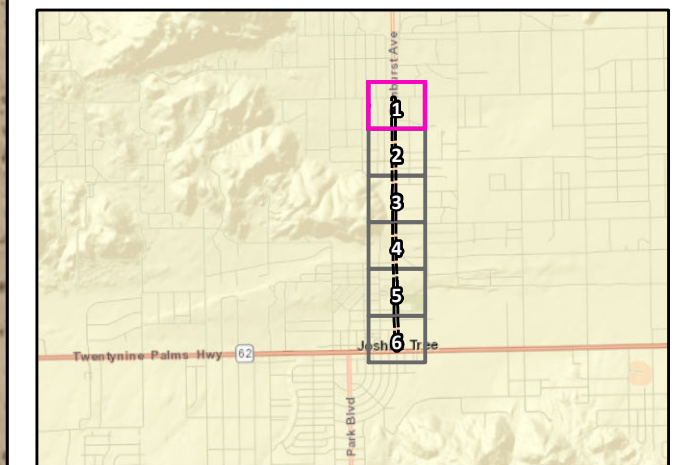
Map Features

- Project Area
- Study Area

CDFW Habitat

- Streambed (1.413 ac.)

Photo Source: NAIP, 2018
Boundary Source: San Bernardino County
Delineator: S.Taylor
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



ECORP: N:\2019\2019-076.001 Joshua Tree Sunburst Ave\MAPS\Jurisdictional_Delineation\Sunburst_JD_CDFW_20190530_MapBook.mxd (JDS)-amyers 6/13/2019



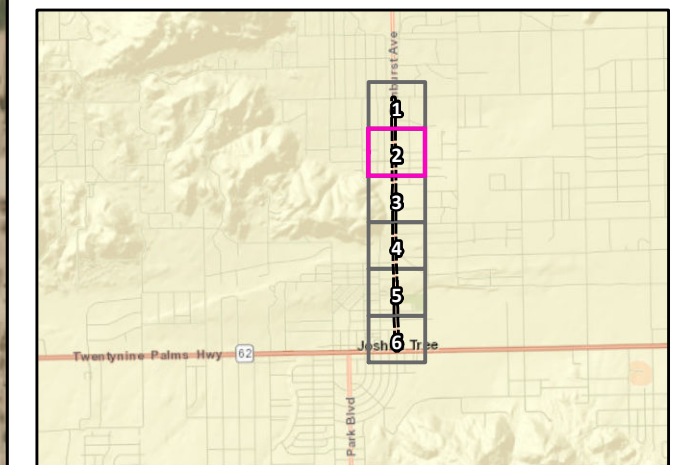
Map Features

- Project Area
- Study Area

CDFW Habitat

- Streambed (1.413 ac.)

Photo Source: NAIP, 2018
Boundary Source: San Bernardino County
Delineator: S.Taylor
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



ECORP: N:\2019\2019-076.001 Joshua Tree Sunburst Ave\MAPS\Jurisdictional_Delineation\Sunburst_JD_CDFW_20190530_MapBook.mxd (JDS)-amyers 6/13/2019



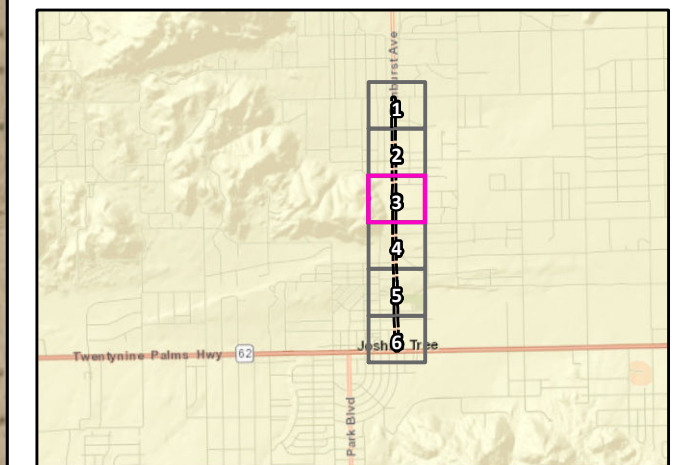
Map Features

- Project Area
- Study Area

CDFW Habitat

- Streambed (1.413 ac.)

Photo Source: NAIP, 2018
Boundary Source: San Bernardino County
Delineator: S.Taylor
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



ECORP: N:\2019\2019-076.001 Joshua Tree Sunburst Ave\MAPS\Jurisdictional_Delineation\Sunburst_JD_CDFW_20190530_MapBook.mxd (JDS)-amyers 6/13/2019



Map Features

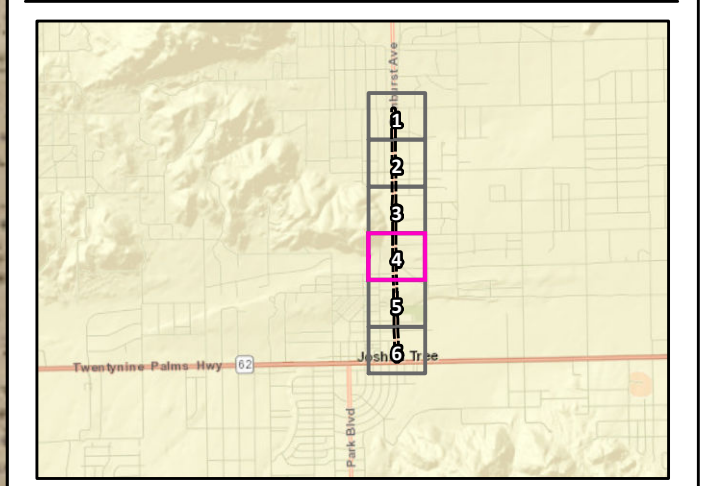
Project Area

Study Area

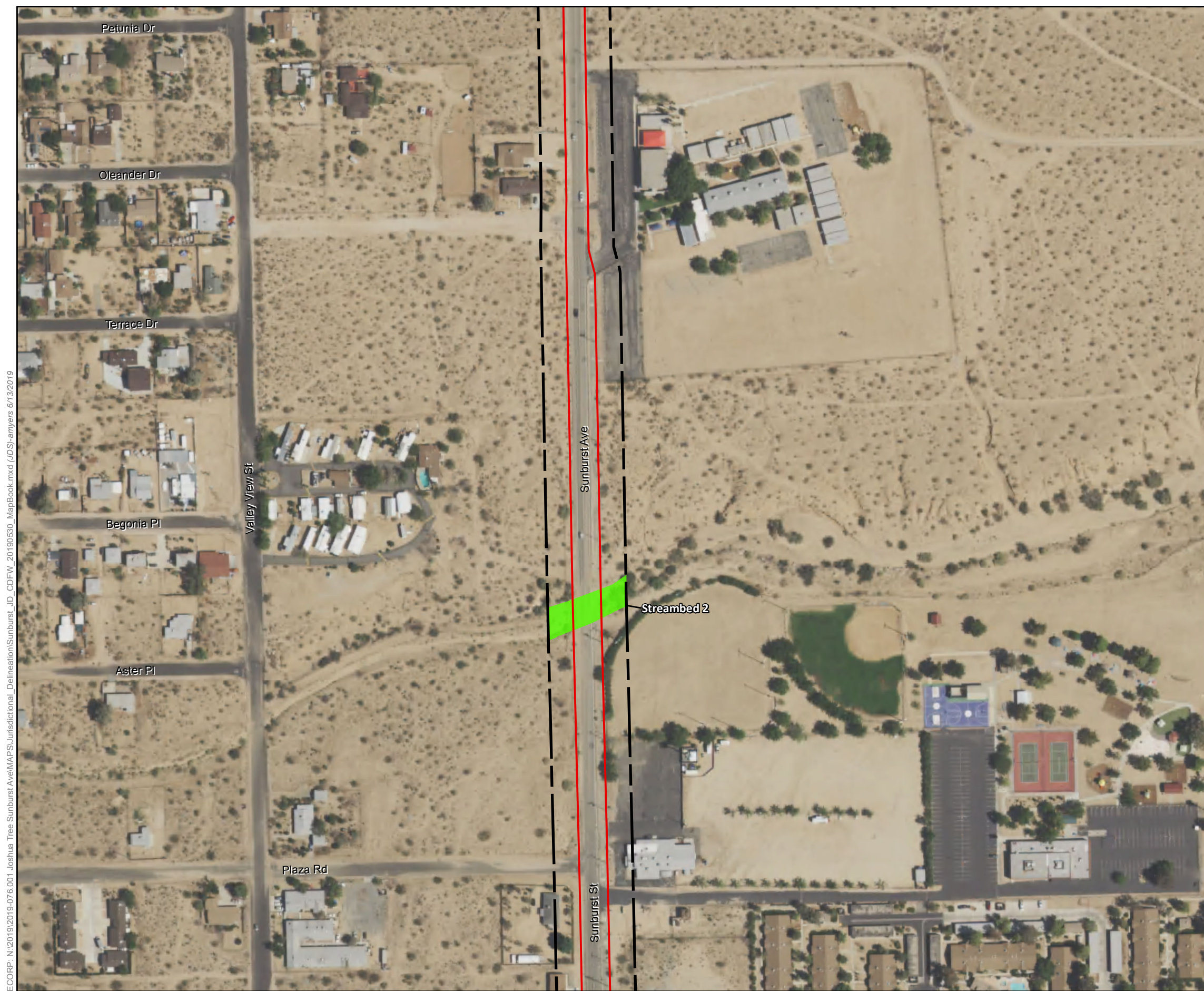
CDFW Habitat

Streambed (1.413 ac.)


Photo Source: NAIP, 2018
Boundary Source: San Bernardino County
Delineator: S.Taylor
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet




ECORP: N:\2019\2019-076.001 Joshua Tree Sunburst Ave\MAPS\Jurisdictional_Delineation\Sunburst_JD_CDFW_20190530_MapBook.mxd (JDS)-amyers 6/13/2019



Map Features

 Project Area

 Study Area

CDFW Habitat


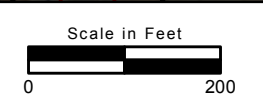
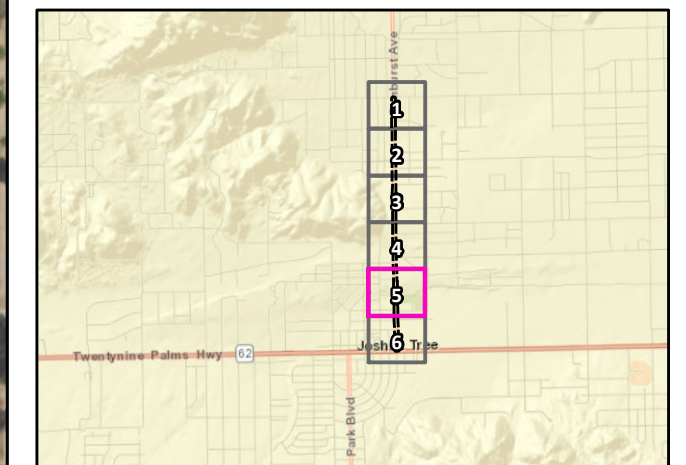
 Streambed (1.413 ac.)

Photo Source: NAIP, 2018
Boundary Source: San Bernardino County
Delineator: S.Taylor
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



ECORP: N:\2019\2019-076.001 Joshua Tree Sunburst Ave\MAPS\Jurisdictional_Delineation\Sunburst_JD_CDFW_20190530_MapBook.mxd (JDS)-amyers 6/13/2019



Map Features

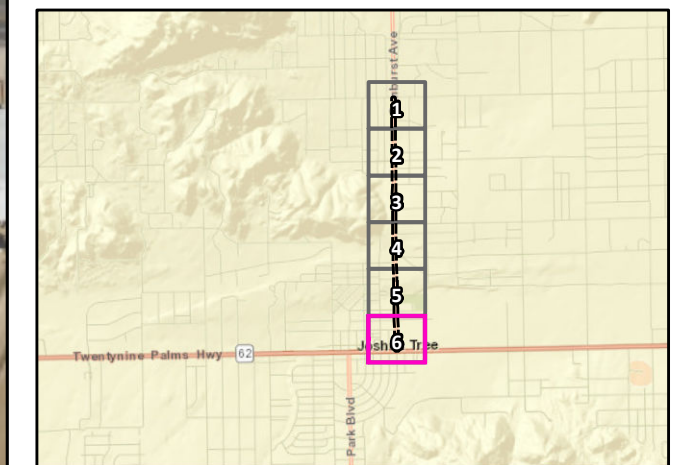
Project Area

Study Area

CDFW Habitat

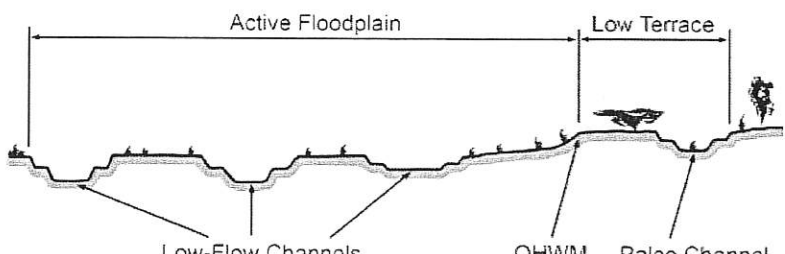
Streambed (1.413 ac.)

Photo Source: NAIP, 2018
Boundary Source: San Bernardino County
Delineator: S.Taylor
Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



OHWM Forms and Wetland Determination Data Forms – Arid West Region

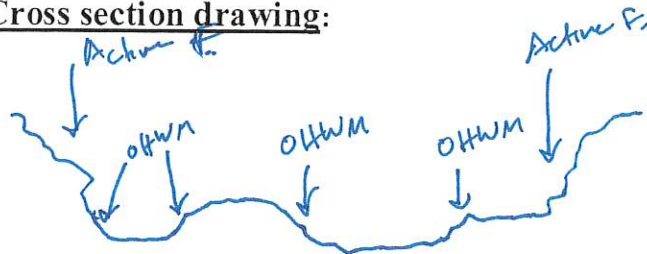
Arid West Ephemeral and Intermittent Streams OHW M Datasheet

Project: <u>Sunburst Avenue</u> Project Number: _____ Stream: <u>SB 2</u> Investigator(s): <u>Stegh</u>	Date: <u>6/10/19</u> Town: _____ Photo begin file#: _____ Time: <u>1330</u> State: <u>CA</u> Photo end file#: _____
Y <input checked="" type="checkbox"/> / N <input type="checkbox"/> Do normal circumstances exist on the site? Y <input type="checkbox"/> / N <input checked="" type="checkbox"/> Is the site significantly disturbed?	Location Details: <u>OHWM # 1</u> Projection: _____ Datum: _____ Coordinates: _____
Potential anthropogenic influences on the channel system: <div style="font-size: 1.2em; margin-top: 10px;"><u>Some trash, Road crossing</u></div>	
Brief site description:	
Checklist of resources (if available): <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <input checked="" type="checkbox"/> Aerial photography Dates: _____ <input checked="" type="checkbox"/> Topographic maps <input type="checkbox"/> Geologic maps <input checked="" type="checkbox"/> Vegetation maps <input checked="" type="checkbox"/> Soils maps <input type="checkbox"/> Rainfall/precipitation maps <input type="checkbox"/> Existing delineation(s) for site <input type="checkbox"/> Global positioning system (GPS) <input type="checkbox"/> Other studies </div> <div style="width: 45%;"> <input type="checkbox"/> Stream gage data Gage number: _____ Period of record: _____ <input type="checkbox"/> History of recent effective discharges <input type="checkbox"/> Results of flood frequency analysis <input type="checkbox"/> Most recent shift-adjusted rating <input type="checkbox"/> Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event </div> </div>	
Hydrogeomorphic Floodplain Units 	
Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM: <ol style="list-style-type: none"> 1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site. 2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units. 3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units. <ol style="list-style-type: none"> a) Record the floodplain unit and GPS position. b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit. c) Identify any indicators present at the location. 4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section. 5. Identify the OHWM and record the indicators. Record the OHWM position via: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div> <input type="checkbox"/> Mapping on aerial photograph <input type="checkbox"/> Digitized on computer </div> <div> <input type="checkbox"/> GPS <input type="checkbox"/> Other: _____ </div> </div> 	

Project ID: OHWM #1 Cross section ID: SB2

Date: 6/10/19 Time: _____

Cross section drawing:



OHWM

GPS point: _____

Indicators:

- ☒ Change in average sediment texture
- ☒ Change in vegetation species
- ☒ Change in vegetation cover

- ☒ Break in bank slope
- ☐ Other: _____
- ☐ Other: _____

Comments:

Floodplain unit:

- ☒ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: Sand

Total veg cover: 55 % Tree: 40 % Shrub: 10 % Herb: 5 %

Community successional stage:

- ☐ NA
- ☒ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☒ Drift and/or debris
- ☒ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Shrubs at times not rooted in channel

Arid West Ephemeral and Intermittent Streams OTHWM Datasheet

Project: <u>Sunburst Avenue</u> Project Number: <u>2019-076.001</u> Stream: <u>SB #1</u> Investigator(s): <u>S. Taylor</u>	Date: <u>6/10/19</u> Time: <u>1400</u> Town: <u>Joshua Tree</u> State: <u>CA</u> Photo begin file#: Photo end file#:
---	--

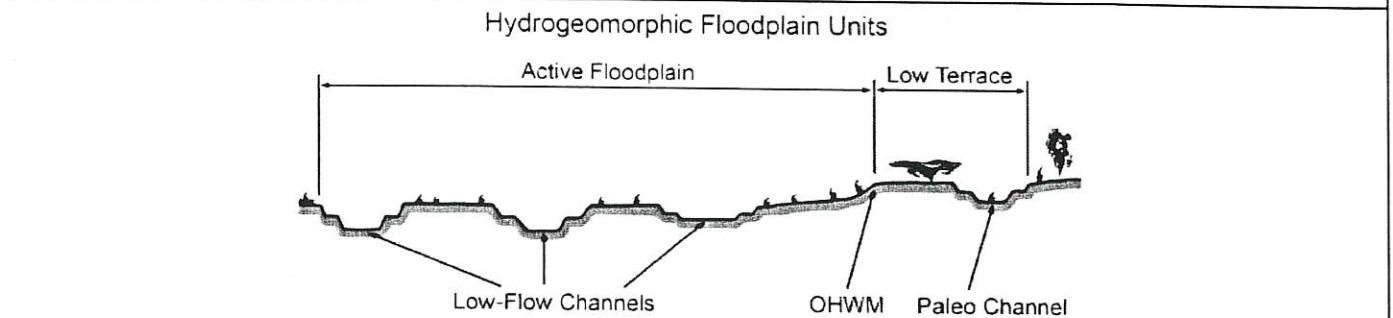
Y <input checked="" type="checkbox"/> / N <input type="checkbox"/> Do normal circumstances exist on the site? Y <input type="checkbox"/> / N <input checked="" type="checkbox"/> Is the site significantly disturbed?	Location Details: <u>OTHWM # 2</u> Projection: Datum: Coordinates:
--	--

Potential anthropogenic influences on the channel system:
Road crossing crossing

Brief site description:

Checklist of resources (if available):

<input checked="" type="checkbox"/> Aerial photography <input checked="" type="checkbox"/> Dates: <input checked="" type="checkbox"/> Topographic maps <input type="checkbox"/> Geologic maps <input checked="" type="checkbox"/> Vegetation maps <input checked="" type="checkbox"/> Soils maps <input type="checkbox"/> Rainfall/precipitation maps <input type="checkbox"/> Existing delineation(s) for site <input type="checkbox"/> Global positioning system (GPS) <input type="checkbox"/> Other studies	<input type="checkbox"/> Stream gage data Gage number: Period of record: <input type="checkbox"/> History of recent effective discharges <input type="checkbox"/> Results of flood frequency analysis <input type="checkbox"/> Most recent shift-adjusted rating <input type="checkbox"/> Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event
--	---



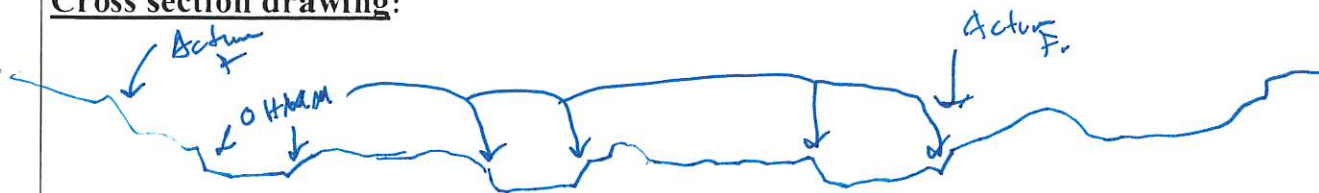
Procedure for identifying and characterizing the floodplain units to assist in identifying the OTHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
 - a) Record the floodplain unit and GPS position.
 - b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
 - c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OTHWM and record the indicators. Record the OTHWM position via:

<input type="checkbox"/> Mapping on aerial photograph	<input type="checkbox"/> GPS
<input type="checkbox"/> Digitized on computer	<input type="checkbox"/> Other:

Project ID: OHWM#20 Cross section ID: SB1 Date: 6/10/19 Time: _____

Cross section drawing:



OHWM

GPS point: _____

Indicators:

- | | |
|--|---|
| <input checked="" type="checkbox"/> Change in average sediment texture | <input checked="" type="checkbox"/> Break in bank slope |
| <input checked="" type="checkbox"/> Change in vegetation species | <input type="checkbox"/> Other: _____ |
| <input checked="" type="checkbox"/> Change in vegetation cover | <input type="checkbox"/> Other: _____ |

Comments: _____

Floodplain unit: ☒ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: Sand

Total veg cover: 10 % Tree: _____ % Shrub: _____ % Herb: 10 %

Community successional stage:

- | | |
|--|--|
| <input type="checkbox"/> NA | <input type="checkbox"/> Mid (herbaceous, shrubs, saplings) |
| <input checked="" type="checkbox"/> Early (herbaceous & seedlings) | <input type="checkbox"/> Late (herbaceous, shrubs, mature trees) |

Indicators:

- | | |
|--|--|
| <input type="checkbox"/> Mudcracks | <input type="checkbox"/> Soil development |
| <input checked="" type="checkbox"/> Ripples | <input checked="" type="checkbox"/> Surface relief |
| <input checked="" type="checkbox"/> Drift and/or debris | <input type="checkbox"/> Other: _____ |
| <input checked="" type="checkbox"/> Presence of bed and bank | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> Benches | <input type="checkbox"/> Other: _____ |

Comments: _____

Characterized by short duration flood events

ATTACHMENT C

Plant Species Observed Onsite

SCIENTIFIC NAME	COMMON NAME
<i>Abronia villosa</i>	sand verbena
<i>Acacia greggii</i>	catclaw
<i>Ambrosia psilostachya</i>	western ragweed
<i>Atriplex canescens</i>	four-wing saltbush
<i>Brassica tournefortii</i>	Sahara mustard
<i>Brickellia incana</i>	white brickelbush
<i>Chilopsis linearis</i>	desert willow
<i>Cercidium floridum</i>	foothill paloverde
<i>Conyza Canadensis</i>	horseweed
<i>Cucurbita palmata</i>	coyote melon
<i>Cylindropuntia echinocarpa</i>	silver cholla
<i>Ephedra viridis</i>	Mormon tea
<i>Ericameria linearifolia</i>	interior goldenbush
<i>Eriogonum fasciculatum</i>	California buckwheat
<i>Euphorbia albomarginata</i>	rattlesnake weed
<i>Hymenoclea salsola</i>	cheesebush
<i>Larrea tridentata</i>	creosote bush
<i>Psoralea schottii</i>	indigo bush
<i>Salsola australis</i>	Russian thistle
<i>Schismus barbatus</i>	Mediterranean schismus
<i>Salvia columbariae</i>	chia
<i>Sphaeralcea ambigua</i>	apricot mallow

ATTACHMENT D

Representative Site Photographs

Below you will find a photo compendium containing photos of each jurisdictional feature within the Delineation Area, as well as the three sample point locations and the two OHWM locations. Photos in this compendium are referenced by Appendix A, CDFW Sheets 1 through 6.

Streambed 1 / OHWM Point 2 – Photopages 1 and 2

Streambed 2 / OHWM Point 1 – Photopages 2 and 3

Drainage 1 – Photopage 4

Drainage 2 – Photopage 4

Drainage 3 – Photopage 5

Drainage 4 – Photopage 5

Drainage 5 – Photopage 6

Drainage 6 – Photopage 7

Retention Basin – Photopage 8



Photo 1: Streambed 1, East Side
(See Sheet 4)



Photo 2: Streambed 1 West Side
(See Sheet 4)



Photo 3: Streambed 1, OHWM Point 2
(See Sheet 4)



Photo 4: Streambed 2 East Side
(See Sheet 5)



Photo 5: Streambed 2, West Side
(See Sheet 5)



Photo 6: Streambed 2, OHWM Point 1
(See Sheet 5)



Photo 7: Drainage 1
(See Sheet 1)



Photo 8: Drainage 2
(See Sheet 2)



Photo 9 –Drainage 3
(See Sheet 2)



Photo 10: Drainage 4
(See Sheet 2)



Photo 11: Drainage 5 East
(See Sheet 2)



Photo 12: Drainage 5 West
(See Sheet 2)



Photo 13: Drainage 6 East
(See Sheet 2)



Photo 14: Drainage 6 West
(See Sheet 2)



Photo 15: Retention Basin



Photo 16: Retention Basin Overflow