PLUNGE CREEK CONSERVATION PROJECT
HABITAT MITIGATION AND MONITORING PLAN

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Acronyms and Abbreviations

AAs	Assessment Areas
cactus wren	California cactus wren
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations
Conservation Project	Plunge Creek Conservation Project
CRAM	California Rapid Assessment Method
CRPR	California Rare Plant Rank
EPA	United States Environmental Protection Agency
FUI	Floodplain unit indicators
gnatcatcher	coastal California gnatcatcher
HMMP	Habitat Mitigation and Monitoring Plan
MWD	Metropolitan Water District
NNG	non-native grassland
OHWM	ordinary high water mark
PAR	Property Analysis Record
RAFSS	Riversidean Alluvial Fan Sage Scrub
RWQCB	Regional Water Quality Control Board
SBKR	San Bernardino kangaroo rat
Conservation District	San Bernardino Valley Water Conservation District
SCE	Southern California Edison
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
Wash Plan HCP	Upper Santa Ana River Wash Plan Habitat Conservation Plan
waters	waters of the U.S. and waters of the state
woollystar	Santa Ana River woollystar

Chapter 1
Conservation Project Description

1.1 Conservation Project Summary

The San Bernardino Valley Water Conservation District (Conservation District) proposes to restore and preserve an approximately 1.05-mile reach of Plunge Creek (Figures 1 and 2), identified as the Plunge Creek Conservation Project (Conservation Project). The 202.9-acre project site contains a portion of the mainstem Plunge Creek, its existing floodplain, and the historic floodplain of both Plunge Creek and the Santa Ana River.

As a result of human disturbances and development within the Conservation Project site and its vicinity, the connection between Plunge Creek and the Santa Ana River and their floodplains has been altered. These land use modifications include sand and gravel mining, drainage ditches, bridges, pipeline crossings, and flood control levees. Under current conditions, floodwaters on-site are generally restricted to the mainstem Plunge Creek and its active floodplain, and infrequently overtop the channel banks and engage remnant channels located on the historic floodplains of both Plunge Creek and the Santa Ana River. The reduction in the frequency of secondary flows results in little opportunity for fluvial processes that would historically provide suitable habitats for San Bernardino kangaroo rat (SBKR) and Santa Ana River woollystar (woollystar).

The proposed project would construct flow splitters and pilot channels to divert a portion of flows from Plunge Creek onto the historic Plunge Creek/Santa Ana River wash, thus creating conditions that will enable natural fluvial processes to create new channels and reoccupy old channel remnants. The result will be a more complex channel morphology with a network of distributary channels that in turn would reestablish SBKR and woollystar habitats, waters of the U.S. and waters of the state under the jurisdiction of the U.S. Army Corps of Engineers (USACE), Santa Ana Regional Water Quality Control Board (RWQCB), and California Department of Fish and Wildlife (CDFW) (Agencies), and enhance groundwater recharge.

The Conservation Project serves to satisfy U.S. Fish and Wildlife Service (USFWS) mitigation requirements for proposed impacts on federally-listed species associated with future projects implemented by the eight participants of the Upper Santa Ana River Wash Plan Habitat Conservation Plan (Wash Plan HCP), including the Conservation District[1] (ICF 2018a). In addition, the District proposes to utilize the restoration of waters of the U.S. and waters of the state ("waters") associated with the Conservation Project in order to satisfy USACE, Santa Ana RWQCB, and CDFW mitigation requirements related to proposed impacts to waters associated with future projects implemented by the Wash Plan HCP participants, where feasible (e.g., in-kind jurisdictional impacts on ephemeral or seasonal streams). As proposed, the Conservation Project would incur 0.615 acres (559 linear feet) of permanent impacts and 0.613 acres (232 linear feet) of temporary impacts on non-wetland waters regulated by USACE, RWQCB, and CDFW, and would result in the restoration of

[1] The eight Wash Plan HCP participants include the Conservation District, San Bernardino County Flood Control, the Cities of Redlands and Highland, San Bernardino Municipal Water District, East Valley Water District, Cemex Inc., and Robertson's Ready-Mix (*Public Review Draft Upper Santa Ana River Wash Plan HCP*, SBVWCD, January 2018).

approximately 14 acres of non-wetland waters of the U.S. and approximately 80 acres of Riversidean alluvial fan sage scrub habitat (Figure 3).

1.2 Site Location

The 202.9-acre project site is located in the City of Highland in San Bernardino County, California. Specifically, the project site is within the open space east of Orange Street and south of Old Greenspot Road, and falls within the northern portion of what is referred to as the Santa Ana Wash, which contains the Plunge Creek and Santa Ana River floodplains (Figure 1). Access to the project site is gained via Abbey Way to the west and Cone Camp Road to the east.

For the purposes of this HMMP, the study area for the project is the same as the 202.9-acre project site, and is used to describe the project location, landscape context, and existing (baseline) conditions with respect to vegetation, jurisdictional aquatic resources, ecology, and special-status species. The study area contains an approximately 1.05-mile-long portion of Plunge Creek between the Metropolitan Water District (MWD) pipeline crossing at the upstream end, and the open space area south of the corner of Church Street and Abbey Way at the downstream end, approximately half a mile upstream of Orange Street Bridge (Figure 2). Land uses in the vicinity of the project site consist of dense residential and commercial development to the north, mining operations to the south, transportation and open space to the west, and open space to the east.

1.3 Responsible Parties, Roles, and Duties

Ultimately, the Conservation District and its contractors are responsible for installation, maintenance, and monitoring, in accordance with this Habitat Mitigation and Monitoring Plan (HMMP), to successfully complete the restoration program. Its roles and responsibilities, as well as those of other involved parties, are summarized below. Additional details for each role are discussed throughout the document, where applicable.

Owner/Responsible Party: The Conservation District will be the party financially responsible for (1) all negotiations and costs associated with the Conservation Project's implementation, (2) 5-year maintenance and monitoring of the Conservation Project site, and (3) costs associated with perpetual monitoring and management of the Conservation Project, as defined in this HMMP. As proposed, the San Bernardino Valley Conservation Trust[2] will be the long-term manager of the site as well as a non-wasting endowment, and the Conservation District will retain ownership over the protected Conservation Project land.

Conservation District will be responsible for contracting a qualified habitat restoration ecologist, geomorphologist, and a landscape contractor(s) for installation, maintenance, and monitoring to carry out the provisions of this HMMP. Conservation District may select separate contractors for the installation and maintenance phases. Both contractors will meet the minimum requirements

[2] The Conservation Trust is a California nonprofit benefit corporation and 501(c)(3) organization established on March 10, 2016, with the mission to directly support the protection and stewardship of lands and endowments protecting natural resources, endangered species habitats, open space, and outdoor recreational areas in the San Bernardino Valley through the Wash Plan and other future projects. The Conservation District will contract with the Conservation Trust to hold, invest, manage, and distribute proceeds of the non-wasting endowment for HCP implementation at the Conservation District's direction (SBVWCD, January 2018).

described below. Conservation District will establish contractual mechanisms to ensure the completion of installation, maintenance, and monitoring activities delineated in this HMMP. Conservation District may, with sole discretion, replace any of these parties.

Figure 1 Regional Vicinity

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Figure 2 Project Location

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Figure 3a Restoration Project Components

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Figure 3b Potential Credits, Waters of the U.S. (WoUS) and State (WoS)

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Restoration Ecologist: The restoration ecologist will be an individual or team of individuals with a degree in botany, ecology, or related field and a minimum of 10 years of experience in Southern California in successful wetland restoration (preferably riverine). The lead restoration ecologist must have knowledge of the riverine and upland vegetation associations proposed for the restoration effort as well as the nonnative species of concern. The restoration ecologist, in coordination with the contractor, will oversee the protection of existing biological resources, nonnative plant removal, maintenance and ecological monitoring, as well as reporting. The restoration will be given authority to halt work by the installation contractor at any point where the provisions of this HMMP are not being adhered to until such time when the inconsistency is resolved with Conservation District.After installation, the restoration ecologist will be responsible for monitoring and making remedial recommendations (regarding weeding, erosion control, etc.) for ongoing maintenance activities performed by the maintenance contractor after HMMP installation, as specified herein.

The restoration ecologist will be responsible for carrying out the biological monitoring and reporting program described in this HMMP. The program will include the following tasks: agency notification (as needed), qualitative and quantitative data collection as required to measure success progress, photo documentation, post-installation monitoring reports to document progress, and a final assessment of success at the end of the 5-year maintenance and monitoring program.

Geomorphologist: The geomorphologist will be an individual with a graduate degree in fluvial geomorphology. The geomorphologist will work with the project engineer to oversee installation of the pilot channels and flow diversion features (rock splitters, rock sills), as well as design and implementation of major adaptive management measures. In addition, the geomorphologist will be responsible for performing and reporting the geomorphology monitoring described in this HMMP.

Installation Contractor: The installation and maintenance contractor will be a qualified firm (or more than one firm) with successful experience in Southern California and direct experience installing and maintaining native habitat mitigation projects. The installation contractor will be responsible for site protection, grading, and contouring in accordance with the provisions of this plan and as approved by the restoration ecologist. The responsibilities of the installation contractor will end with completion of grading the pilot channels and installing the flow diversion features.

The installation contractor will verify in writing to Conservation District prior to starting work the following minimal qualifications: certification as a California Pest Control Applicator, previous successful experience with at least three prior native habitat restoration project installations of similar size and scope, and knowledge of local flora and fauna.

Maintenance Contractor: After installation is completed, a separate maintenance contractor may be hired by Conservation District to maintain the restoration site for the balance of the 5 years, according to the provisions of this HMMP. Conservation District may choose to use the same contractor for both installation and post-installation maintenance if the contractor meets both sets of qualifications. Prior to starting work, the maintenance contractor will demonstrate the same qualifications as the installation contractor, including demonstrating past maintenance experience from habitat restoration projects, previous successful experience maintaining at least three native restoration projects, and knowledge of local flora and fauna.

1.4 Regulatory Requirements and Compliance

This HMMP has been prepared in accordance with the guidelines recommended in the *Final 2015 Regional Compensatory Mitigation and Monitoring Guidelines for South Pacific Division, U.S. Army Corps of Engineers* (USACE 2015). The Conservation Project would utilize the planning framework and requirements presented in the Wash Plan HCP in order to satisfy mitigation requirements for permits issued under the federal Endangered Species Act. In addition, the project would utilize the planning framework and requirements presented in this HMMP in order to satisfy mitigation requirements on a case by case basis for permits issued under the following authorities: the Clean Water Act (Sections 404 and 401), and California Fish and Game Code Section 1600 et seq. The HMMP will also support applications for issuance of a USACE 404 permit, a CDFW 1602 streambed alteration agreement, and RWQCB 401 water quality certification for the implementation and management of the Conservation Project. USACE, Santa Ana RWQCB, and CDFW will be involved with the HMMP throughout the review and permitting phases of the project as well as the installation and 5-year monitoring.

Chapter 2
Goals and Objectives

The overarching goals of the Conservation Project include reestablishment of suitable habitats for SBKR and woollystar, reestablishment of waters of the U.S. and waters of the state (waters) under the jurisdiction of the USACE, RWQCB, and CDFW, and enhance groundwater recharge without increasing the risk of flooding or erosion on non-Conservation District owned or managed land. SBKR habitat is known to be associated with intermittent fluvial disturbance, and Conservation District seeks to design a project that uses fluvial processes to create or enhance SBKR habitat in the same way that this process occurs in nature. This approach is expected to minimize implementation costs and disturbance to existing suitable habitat, and adopts an adaptive management approach to monitor and continue habitat development and protection over the long term. The approach is to some degree experimental, and the methods developed and results achieved could be used as guidance for further habitat restoration and water conservation projects in similar alluvial fan environments. The project goals are aligned with the broader goals of the Santa Ana Watershed One Water One Watershed program, including recharge of native surface water, enhancing groundwater quality, improving endangered species habitat, working in a collaborative setting, and achieving cost effectiveness by working on Conservation District owned lands.

The Conservation Project serves to satisfy U.S. Fish and Wildlife Service (USFWS) mitigation requirements for proposed impacts on federally-listed species associated with future projects implemented by the eight Wash Plan HCP participants, including the Conservation District. In addition, the District proposes to utilize the restoration of waters associated with the Conservation Project in order to satisfy USACE, Santa Ana RWQCB, and CDFW mitigation requirements related to proposed impacts to waters associated with future projects implemented by the Wash Plan HCP participants, where feasible (e.g., in-kind jurisdictional impacts on ephemeral or seasonal streams). Reference list of proposed projects and estimated permanent impacts to waters in Table 2-1.

Table 2-1. Proposed Projects to be Covered by the HMMP

HCP ID	Project Owner	Project Name	Project Class	Project Type	Estimated Permanent Impacts (Acres)	Status
CD.08	Conservation District	New Access Roads for Spreading Basins	Water Conservation	Maintenance	0.00	Planning
Ceme.01	Mining	Haul Road Expansion	Mining	New Construction	0.59	Planning
FC.09	Flood Control	Elder/Plunge Creek Restoration	Flood Control	New Construction	0.48	Planning & Design
High.02	Highland	Alabama Street Improvements	Transportation	New Construction	0.04	Planning
High.03	Highland	Greenspot Road Improvements	Transportation	New Construction	0.03	Planning
High.04	Highland	Orange Street/Boulder Avenue Improvements	Transportation	New Construction	0.25	PA & ED
High.23	Highland	Highland/Redlands Regional Connector	Transportation/Trails	New Construction	0.19	Planning
Mine.01	Mining	Aggregate Mining	Mining	New	0.80	Planning
Redl.02	Redlands	Church Street Drainage Pipe	Flood Control	New Drainage Facility	0.60	Planning
Redl.06	Redlands	Borrow Pit South Rim Trail	Trails	New Designation	0.17	Planning
Redl.09.1	Redlands	Santa Ana River Trail	Trails	New Construction	0.57	Planning
Redl.14	Redlands	Alabama Street Improvements	Transportation	New Construction	3.24	Planning
Redl.15	Redlands	Orange Street Improvements	Transportation	New Construction	0.48	Planning
Redl.16	Redlands	Alabama Street Trail	Trails	New Designation	0.15	Planning
Redl.17	Redlands	Orange Street Trail	Trails	New Designation	0.15	Planning
VD.01	SBVMWD	Enhanced Recharge Project	Water Conservation	New Construction	Unknown	Permitting
VD.04	SBVMWD	Orange Street Connector	Wells and Water Infrastructure	New Construction	0.12	Planning
VD.05	SBVMWD	Plunge Pool Pipeline	Wells and Water Infrastructure	New Construction	0.00	Planning
VD.09	SBVMWD	Wells and Connector Pipeline	Wells and Water Infrastructure	New Construction	0.02	Planning
VD.09	SBVMWD	Wells and Connector Pipeline	Wells and Water Infrastructure	New Construction	0.59	Planning
VD.10	SBVMWD	Alabama Street Connector Pipeline	Wells and Water Infrastructure	New Construction	0.02	Planning

Chapter 3
Baseline Information

Field studies were initially conducted in 2008, and a biological technical report was prepared by Dudek (Dudek 2008) to determine the baseline conditions of the project site prior to mitigation design and implementation. More recent field studies included the jurisdictional delineation conducted by Jericho Systems in October 2017 (Jericho Systems 2017) and the CRAM assessment conducted by ICF in June and July 2018 (ICF 2018b). Land uses in the vicinity of the project site consist of dense residential and commercial development to the north, mining operations to the south, transportation and open space to the west, and open space to the east.

3.1 Vegetation Communities

Three vegetation communities and land cover types were mapped within the 203-acre study area (Table 3-1; Figure 4): Riversidean alluvial fan sage scrub (RAFSS), non-native grassland (NNG), and developed/ruderal. In addition, seral stages of Riversidean alluvial fan sage scrub have been mapped along with an indication of nonnative grass abundance, which is of particular importance to SBKR habitat quality. Vegetation community types and land cover types are described using modifications to the Holland classification system (Holland 1986).

Overall, habitat quality is high due to the dominant cover of natives, including the federally and state listed Santa Ana River woollystar and the potential for the federally listed slender-horned spineflower. The only areas within study area that appeared to have been disturbed were a Southern California Edison (SCE) service road and an area that exhibited a high degree of compaction and trash in the form of a human-made paintball field. As a result, these areas contain a bigger presence of nonnative grasses, some to the point that they are mapped non-native grassland and some within other habitat types.

Table 3-1. Vegetation Communities (Acres)

Vegetation Classification	Total Acreage
Bromus tectorum	0.0303
Non-Native Grassland (NNG)	0.5067
Central and South Coastal Californian Coastal Sage Scrub	1.4733
Developed/Ruderal	28.0488
Urban	1.6757
Riversidean Alluvial Fan Sage Scrub – Intermediate	69.5563
Riversidean Alluvial Fan Sage Scrub – Intermediate/Mature	50.0747
Riversidean Alluvial Fan Sage Scrub – Mature	7.9214
Riversidean Alluvial Fan Sage Scrub – Mature/NNG	27.9922
Riversidean Alluvial Fan Sage Scrub – Pioneer	15.4705
R4SBA – Temporarily Flooded – Streambeds	0.1514
R2UBFx – Semipermanently Flooded – Streambeds	0.0021
Total	**202.9034**

3.1.1 Native Vegetation Communities

3.1.1.1 Riversidean Alluvial Fan Sage Scrub

Riversidean alluvial fan sage scrub (Holland community code 32720) is a shrubland type that occurs in washes and on gently sloping alluvial fans. Alluvial scrub is made up predominantly of drought-deciduous soft-leaved shrubs, but with significant cover of larger perennial species typically found in chaparral (Kirkpatrick and Hutchinson 1977). Scalebroom (*Lepidospartum squamatum*) is generally regarded as an indicator of Riversidean alluvial scrub (Smith 1980, Hanes et al. 1989). Native plant species associated with this community that occur on site include deer weed (*Acmispon glaber*), California sagebrush (*Artemesia californica*), California croton (*Croton californicus*), California cholla (*Cylindropuntia californica*), brittlebush (*Encelia farinosa*), hairy yerba santa (*Eriodictyon trichocalyx*), California buckwheat (*Eriogonum fasciculatum*), Chaparral yucca (*Hesperoyucca whipplei*), scalebroom, and Vasey's prickly pear (*Opuntia vaseyi*) (Holland 1986).

The Holland (1986) classification system describes three subclassifications of RAFSS: pioneer, intermediate, and mature, with their distribution resulting from periodic scouring from frequent flooding events. These classifications are divided even further within the study area based on changes in physical characteristics and vegetation, and include an intermediate/mature stage and a mature/NNG stage.

Intermediate Riversidean Alluvial Fan Sage Scrub

Intermediate Riversidean alluvial fan sage scrub typically lies between mature and pioneer RAFSS. Areas at mid-elevated locations above the active floodplain (or terraces) tend to be much less frequently flooded and support mid-successional (or intermediate) plant species. Vegetation can be fairly dense and is composed mainly of subshrubs. Physical characteristics include coarse and fine sands with cobbles (Hanes et al. 1989). Typical species include California buckwheat (*Eriogonum californica*), prickly pear cactus (*Opuntia phaceantha*), deerweed (*Lotus scoparius*), yerba santa (*Eriodictyon trichocalyx* var. *trichocalyx*), California juniper (*Juniperus californica*), and our Lord's candle.

Intermediate RAFSS habitat is located adjacent to the active channel and downstream on the southern side of the channel in the study area where it appears relict channels from Plunge Creek once flowed.

Intermediate/Mature Riversidean Alluvial Fan Sage Scrub

Areas mapped as intermediate/mature Riversidean alluvial fan sage scrub exhibit physical and vegetative characteristics found in both intermediate and mature RAFSS. This habitat is located south of the channel in the southeastern portion of the study area in what appears to be a relict flow path from the Santa Ana River to Plunge Creek.

Figure 4 Existing Vegetation

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Mature Riversidean Alluvial Fan Sage Scrub

The highest elevated terraces are where flooding only occurs during extreme and rare events and support late-successional (or mature) plant species. Vegetation is dense and is composed of fully developed subshrubs and woody shrubs (Hanes et al. 1989). The vegetation consists of woody shrubs and fully developed subshrubs and physical characteristics include fine silty soils with few cobbles. Typical species include California juniper (*Juniperus californica*), chamise (*Adenostoma fasciculatum*), our Lord's candle, spiny redberry, holly-leaved redberry *(Rhamnus ilicifolia)*, hoaryleaf ceanothus (*Ceanothus crassifolius*), and sugarbush (*Rhus ovata*).

Mature RAFSS habitat is located in the northeast portion of the study area south of Plunge Creek and upstream from Intermediate/Mature RAFSS habitat.

Mature Riversidean Alluvial Fan Sage Scrub/Non-Native Grassland

Some areas of the study area where nonnative grasses predominate in the understory have been classified as mature RAFSS/non-native grassland. These areas are located on the north side of the channel in the northwestern portion of the study area, in between developed/ruderal habitat and pioneer RAFSS habitat.

Pioneer Riversidean Alluvial Fan Sage Scrub

The most frequently flooded areas tend to be those adjacent to the active creek channel where scouring and sediment deposits result in changing substrates, and early successional (or pioneer) plant species tend to establish and dominate the landscape. Vegetation tends to be sparse and of low species diversity and stature. Physical characteristics consist of cobbles and boulders without top soil (Hanes et al. 1989). Representative plant species of the pioneer phase include scale broom, California buckwheat (*Eriogonum fasciculatum*), and mulefat (*Baccharis salicifolia*). Other plant species observed in the pioneer RAFSS include brittlebush (*Encelia farinosa*), Santa Ana River woollystar, sweet bush (*Bebbia juncea*), and California croton (*Croton californicus*).

Within the study area, pioneer RAFSS habitat can be found adjacent to the active channel bed throughout Plunge Creek.

3.1.2 Nonnative Vegetation Communities

3.1.2.1 Non-Native Grassland

Disturbance by maintenance (e.g., mowing, scraping, discing, spraying), grazing, repetitive fire, agriculture, or other mechanical disruption may alter soils and remove native seed sources from areas formerly supporting native habitat. Within the Conservation Project site, non-native grassland is common and consists of a sparse to dense cover of annual grasses (*Avena* sp. and *Bromus* sp.) as well as native and nonnative annual forb species. Absolute cover for non-native grasses ranges between approximately 25 and 65 percent. The most dominant grasses consist of cheatgrass (*Bromus tectorum*) and red brome (*Bromus madritensis ssp. rubens*), both given an overall "Red Alert" ranking by the California Invasive Plant Council (Cal-IPC), with impact ranking of "severe" and invasiveness ranking of "moderate." In terms of habitat mapping, some portions of the study area where nonnative grasses predominate in the understory have been classified as mature RAFSS/non-native grassland. These areas are located on the north side of the channel in the northwestern portion of the study area, in between developed/ruderal habitat and pioneer RAFSS habitat. As a

separate habitat class, absent of dominant overstory species, non-native grassland habitat is occurs in a small (0.54-acre) portion of the northeastern corner of the study area where Plunge Creek crosses over a SCE service road. Physical characteristics include clay soils or fine-textured loamy soils.

3.1.2.2 Developed/Ruderal

Developed/ruderal land refers primarily to land in previously graded areas, landscaped areas, and areas actively maintained or utilized in association with existing developments. Areas identified as developed/ruderal are those that lack vegetative cover or have vegetative cover dominated by nonnative species, such as shortpod mustard (*Hirschfeldia incana*) and redstemmed filaree (*Erodium cicutarium*). These areas are generally the result of severe or repeated mechanical disturbance.

Developed/ruderal habitat is found along a SCE unpaved service road that runs along the north end of the study area.

3.2 Aquatic Resources

One feature, Plunge Creek, of potential jurisdictional waters was identified within the jurisdictional delineation study area (Jericho Systems 2017). This includes 34.30 acres (5,438 linear feet) of waters potentially under USACE/RWQCB and CDFW jurisdiction. These features and the respective jurisdictional limits are depicted on Figure 5 and summarized in Table 3-2. Plunge Creek meets the definition of a potential water of the U.S. and contains areas that meet the definition of a USACE non-wetland, as regulated by USACE under Section 404 of the Clean Water Act. As such, Plunge Creek is regulated by RWQCB under Section 401 of the Clean Water Act and would be considered a water of the state under the Porter-Cologne Water Quality Control Act. In addition, Plunge Creek is regulated as unvegetated streambed by CDFW under California Fish and Game Code Section 1600 et seq.

3.2.1 Plunge Creek

Plunge Creek is an intermittent creek that flows during and after rain events, as well as during periods of high groundwater. Flow originates from various sources in the San Bernardino Mountains where runoff from other creeks flow into Plunge Creek. The creek terminates at the confluence with the Santa Ana River.

Figure 5 Existing Aquatic Resources

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Table 3-2. Aquatic Resources Summary

Aquatic Resource	Non-Wetland Waters (acres)	Wetland Waters (acres)	CDFW Unvegetated Streambed (acres)	CDFW Riparian (acres)	U.S./State/CDFW (linear feet)
Plunge Creek	34.30	--	34.30	--	5,438

Design Element	Impacts to Waters (acres) [1]	Impacts to Waters (linear feet) [1]
Berm (Soil Disposal Area)	0.000	0.00
Lower Pilot Channel	0.147	106.49
Lower Pilot Channel - Flow Splitters/Rock Sills	0.543	461.54
Temporary Access Roads and Staging Areas	0.545	382.89
Upper Pilot Channel - Flow Splitters/Rock Sills	0.072	97.18
Upper Pilot Channel	0.188	78.10
Total	**1.496**	**1,126.21**

Waters = waters of the U.S. and waters of the state.

Note: Totals may vary from sum of reported values because of rounding of decimal places

[1] All impacts on waters are expected to be temporary, as the splitter/rock sill structures would be composed of native boulders and tree rootwads, and the excavated portions of the (2) pilot channels would be allowed to return to a more natural state of equilibrium, with the erosion/accretion and other morphological changes induced by higher flows. All access roads (types 1–4, see design plan set provided on June 20, 2018, sheet G-1) within waters of the U.S. would be temporary, and types 1–3 would be decompacted, roughened, and restored to pre-project contours. Designated staging and storage areas would be located outside of waters.

3.3 Existing Functions and Values

Current wetland conditions were assessed using the Episodic Module for the California Rapid Assessment Method (CRAM). CRAM was conducted within the mainstem Plunge Creek as well as in a secondary channel located directly north of the study area to be used as the reference site for the proposed pilot channels. Three Assessment Areas (AAs) were established within Plunge Creek, with AA1 and AA2 downstream of the proposed splitter mounds on the east end of the study area and AA3 downstream of the proposed splitter mounds in the middle of the study area. AA4 was established in the secondary channel, consisting of a non-confined single thread channel (Figure 6).

CRAM, which measures the ambient conditions of a wetland, has been in development over the last 15 years, as a collaborative effort between resource agencies and scientists throughout California. The overall goal of CRAM is to "provide rapid, scientifically defensible, standardized, cost-effective assessments of the status and trends in the condition of wetlands and related policies, programs and projects throughout California" (CWMW 2013).

The final CRAM score for each AA is composed of four main attribute scores (buffer and landscape context, hydrology, physical structure, and biotic structure), which are based on the metric and submetric scores (a measurable component of an attribute) (Table 3-3). The anticipated relationships between the CRAM attributes and metrics, as well as various ecological services expected from conceptual models of wetland form and function, are presented in Table 3-4. The CRAM practitioners assign a letter rating (A–D) for each metric/submetric, based on a defined set of condition brackets ranging from an "A" as the theoretical best case achievable for the wetland class across California to a "D," the worst case achievable. Each metric condition level (A–D) has a fixed

numerical value (A=12, B=9, C=6, D=3), which, when combined with the other metrics, results in a score for each attribute. Each metric/submetric condition level (letter rating) has a fixed numerical value, which, when combined with the other metrics, results in a raw score for each attribute. That number is then converted to a percentage of the maximum score achievable for each attribute and represents the final attribute score, ranging from 25 to 100%. The final overall CRAM score is the sum of the four final attribute scores, ranging from 25 to 100%.

Table 3-3. CRAM Attributes and Metrics

Attributes	Metrics and Submetrics
Buffer and Landscape Context	Aquatic Area Abundance Buffer: • Percent of Assessment Area with Buffer • Average Buffer Width • Buffer Condition
Hydrology	Water Source Hydroperiod Sediment Transport
Physical Structure	Structural Patch Richness Topographic Complexity
Biology	Plant Community: Number of Plant Layers • Number of Co-Dominant Species • Percent Invasion • Horizontal Interspersion Vertical Biotic Structure

Figure 6 CRAM Assessment

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Table 3-4. Expected Relationship among CRAM Attributes, Metrics, and Key Services

Attributes		Buffer and Landscape Context	Hydrology			Physical Structure		Biotic Structure				
Metrics or Submetrics		Buffer and Landscape Connectivity Metrics	Water Source	Channel Stability	Hydrologic Connectivity	Structural Patch Richness	Topographic Complexity	Number of Plant Layers	Number of Codominant Species	Percent Invasion	Horizontal Interspersion	Vertical Biotic Structure
Key Services	Short- or long-term surface water storage	√		√	√	√	√				√	√
	Subsurface water storage		√	√	√		√					
	Moderation of groundwater flow or discharge	√	√									
	Dissipation of energy					√	√	√			√	√
	Cycling of nutrients	√		√	√	√	√	√	√	√		√
	Removal of elements and compounds	√		√	√		√	√			√	
	Retention of particulates			√	√	√	√	√	√		√	
	Export of organic carbon			√	√			√		√	√	√
	Maintenance of plant and animal communities	√		√	√	√	√	√	√	√	√	√

A summary of the attribute scores for each of the CRAM assessment areas is provided in Table 3-5. For metric scores and worksheets, refer to the Baseline CRAM Assessment Memo (ICF 2018b). The overall CRAM scores within Plunge Creek ranged from 80 to 94%, indicating baseline high quality wetland conditions. A discussion of the scoring factors is provided below.

Table 3-5. Summary of CRAM Attribute Scores for Existing Wetland Features

Assessment Area (AA)	AA Length	Buffer and Landscape Context Score	Hydrology	Physical Structure	Biotic Structure	Overall CRAM Score
#1 (Episodic; Plunge Creek Upper)	200 meters	100%	83%	100%	92%	94%
#2 (Episodic; Plunge Creek Middle)	130 meters	100%	83%	100%	64%	87%
#3 (Episodic; Plunge Creek Lower)	150 meters	93%	92%	75%	61%	80%

It is important to note that these CRAM scores are applicable only to the wetlands documented on-site. Because the remaining portions of the Conservation Project site do not meet the minimum hydrologic indicators suitable for CRAM, including the locations of the proposed pilot channels, the CRAM score for those areas is considered 0 at this point.

3.3.1 Attribute 1, Buffer and Landscape Context

Maximum buffer lengths were present throughout all three AAs (an average of about 246 meters) because of their proximity to open space. With the exception of AA3, these buffers were primarily native vegetation, little soil disturbance or compaction, and a low level of intensity due to human visitation. AA3 scored lower due to higher levels of soil compaction and evidence of human visitation. In addition to high-scoring buffer metrics, all three AAs did not exhibit any non-buffer "unfavorable land" that interrupts either side of the stream corridor for up to 500 meters upstream and downstream of the AAs.

3.3.2 Attribute 2, Hydrology

Freshwater sources that affect the dry-season conditions of AA1 and AA2 are primarily unnatural urban runoff, because the immediate drainage basin upstream of the AAs consists of more than 20% developed lands, which contribute substantially to water sources affecting the AAs. Freshwater sources that affect the dry-season condition of AA3 are mostly natural, but include small effects of modified hydrology because the immediate drainage basin upstream of the AAs consists of less than 20% developed lands. All three AAs exhibited all five indicators of natural sediment transport properties and did not show any indicators of altered sediment transport. All three AAs also exhibited low-flow channels where floodwaters have mostly unrestricted access to the active floodplain and adjacent transition zones.

3.3.3 Attribute 3, Physical Structure

"Structural Patch Richness" scored high across all three AAs. AA1 and AA2 received A scores because they contained 12 patch types, respectively. AA3 received a B score because it contained 10 patch types. "Topographic Complexity" scored high for all three AAs. AA1 and AA2 were characterized as having a distinct low-flow channel within a braided network of several secondary channels and exhibit surficial features that contribute to abundant microtopographic relief. AA3 was characterized as having a dominant low-flow channel feature amongst secondary channel features

that are present, but less numerous than in AA1 and AA2. Surficial features are less distinct and varieties of surficial features are less numerous than in AA1 and AA2.

3.3.4 Attribute 4, Biotic Structure

AA1, AA2, and AA3 supported four, two, and three plant layers, respectively, with a high, low, and medium species richness, respectively. All AAs contained varying numbers of invasive species as their co-dominants, with AA1 containing 14%, AA2 containing 0%, and AA3 containing 33% invasive codominant species.

3.4 Special-Status Plants

3.4.1 Santa Ana River Woollystar

Santa Ana River woollystar is state- and federally listed as endangered and has a California Rare Plant Rank (CRPR) of 1B.1 (CNPS 2018). It is a shrubby perennial which can grow to 1 meter tall. This species blooms from June to August and produces bright blue flowers. Woollystar is associated with early- to moderate- successional alluvial scrub, and thus requires periodic flooding and silting for the creation of new habitats and colonization. Suitable habitat is composed of a patchy distribution of gravelly soils, sandy soils, rock mounds and boulder fields, with low amounts of clay and silt (USFWS 1986). These areas typically maintain a perennial plant cover of less than 50%. Associated perennial plants include California buckwheat (*Eriogonum fasciculatum*), California croton (*Croton californicus*), yerba santa (*Eriodictyon trichocalyx*), and scale-broom (*Lepidospartum squamatum*). The Santa Ana River woollystar occurs along the Santa Ana River and Lytle and Cajon Creek flood plains from the base of the San Bernardino Mountains in San Bernardino County southwest along the river through Riverside County into the Santa Ana Canyon of northeastern Orange County from about 150 to 580 meters (Munz 1974).

Santa Ana woollystar is present within the project site (Figure 7) and was observed during the CRAM assessment in June and July 2018.

3.4.2 Slender-Horned Spineflower

The slender-horned spineflower is state- and federally listed as endangered and is designated as CRPR 1B.1 (CNPS 2018). It is a small annual flower that is found in sandy soil in association with mature alluvial scrub. The ideal habitat for this species appears to be a terrace or bench that receives over-bank deposits every 50 to 100 years. This flower is endemic to southwestern California, ranging from central Los Angeles County east to San Bernardino County, and south to southwestern Riverside County in the foothills of the Transverse and Peninsular Ranges, at 200 to 700 meters elevation (Hickman 1993). Only eight areas are still known to support slender-horned spineflower populations, including two in San Bernardino County (Santa Ana River floodplain and Cajon Wash) (CNDDB 2014). Individuals are small and difficult to locate. This species is only readily detectable in the spring between April and June when in bloom. The slender-horned spineflower was listed as endangered in January 1982 by the California Fish and Game Commission. On September 28, 1987, it was federally listed as endangered.

This species was not observed during the CRAM assessment in July 2018, but has been documented just off site (Figure 7) and is assumed present within the project site. Designated critical habitat for this species is located approximately 1.2 miles to the south of the project site.

3.5 Special-Status Wildlife

3.5.1 San Bernardino Kangaroo Rat

The SBKR is one of several kangaroo rat species in its range. The Dulzura kangaroo rat (*Dipodomys simulans*), the Pacific kangaroo rat (*Dipodomys agilis*), and the Stephens kangaroo rat (*Dipodomys stephensi*) occur in areas occupied by SBKR, but these other species have a wider habitat range. The habitat of SBKR is described as being confined to primary and secondary alluvial fan scrub habitats, with sandy soils deposited by fluvial (water). Burrows are dug in loose soil, usually near or beneath shrubs. SBKR is one of three subspecies of the Merriam's kangaroo rat. Most of the areas where SBKR occur have been altered as a result of flood control efforts and the resulting increased use of river resources, including mining, off-road vehicle use, and road and housing development. This increased use of river resources has resulted in a reduction in both the amount and quality of habitat available for SBKR. The past habitat losses and potential future losses prompted the emergency listing of the SBKR as an endangered species (U.S. Fish and Wildlife Service 1998).

The entire 202.9-acre project site is within designated critical habitat for San Bernardino kangaroo rat, including areas with low, medium, and high suitability within project impact areas (Figure 8).

3.5.2 California Cactus Wren

The California cactus wren (cactus wren) is a California Special Concern species and is listed federally by the USFWS as a Bird of Conservation Concern and by the U.S. Department of Agriculture Forest Service as a sensitive species. This species is not state- or federally listed as threatened or endangered. The habitat of the cactus wren ranges from the coastal sage scrub plant community to deserts and other arid terrain with thickets, patches, or tracts of larger, branching cacti, stiff-twigged, thorny shrubs, and small trees (Grinnell and Miller 1944). It is closely associated with three species of cacti and occurs almost exclusively in thickets of cholla (*Opuntia prolifera*) and prickly pear (*Opuntia littoralis* and *Opuntia oricola*) dominated stands of coastal sage scrub below 457 meters in elevation on mesas and lower slopes of the coastal ranges (Proudfoot et al. 2000). Although it lives over a wide range from Texas to the Pacific Ocean, it is limited to regions with thorny shrubs and trees that offer nesting sites (Terres 1980). For the cactus wren, thickets of vegetation provide cover and shelter, and the nest, which is usually located in cactus, is used as a roost site as well as for breeding. The nest is usually built in cholla or other large, branching cactus, in yucca, or in a stiff-twigged, thorny shrub or small tree (American Ornithologists Union 1957).

There were 13 occurrences of cactus wren within the study area and approximately 46 cactus patches suitable for nesting throughout the study area. Nearly all of the natural habitat in the plan area is suitable cactus wren foraging habitat (Figure 8).

3.5.3 Coastal California Gnatcatcher

The coastal California gnatcatcher (gnatcatcher), a subspecies of the California gnatcatcher, is federally listed as threatened and is designated a Special Concern Species by the state of California. The gnatcatcher typically occurs in or near sage scrub habitat within the California sagebrush-dominated stands on mesas, gently sloping areas, and along the lower slopes of the coastal ranges. The breeding season of the gnatcatcher extends from mid-February through mid-August, with the peak of nesting activity occurring from mid-March through mid-May. The gnatcatcher nest is a small, cup-shaped basket usually found 1 to 3 feet above the ground in a small shrub or cactus. Gnatcatchers are persistent nest builders and often attempt multiple broods typically upon nesting failure, which is suggestive of a high reproductive potential. This is, however, typically offset by high rates of nest predation and brood parasitism by brown-headed cowbirds (Atwood 1990).

There is no critical habitat for gnatcatcher in or adjacent to the study area. The USFWS documented one gnatcatcher occurrence in 1995. The study area is predominantly composed of low quality potential foraging and dispersal habitat in addition to areas of medium quality potential wintering habitat (Figure 8).

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Figure 7 Existing Special-Status Plants

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Figure 8 Existing Special-Status Wildlife

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Chapter 4
Mitigation Work Plan

This HMMP guides the Conservation Project and is contingent on approval by the Agencies and acquisition of the related permits. Project construction is currently scheduled for summer 2019. Any deviations from the HMMP will be documented by the restoration ecologist and geomorphologist and reported promptly to Conservation District and the Agencies, as needed. Activities will include installation of pilot channels and flow diversion structures, seeding of native species around the pilot channels, and removal of nonnative species.

4.1 Pilot Channels and Flow Diversion

Two pilot channels will be excavated from the active channel of Plunge Creek, through the historic floodplain, and back to the active channel (Figure 3 and Attachment A: 90% Plans). These design elements would enable flood flows to be conveyed onto the historic floodplain and into the remnant channels currently separated from the main channel by high elevation terrace topography. The pilot channels are not envisioned to be heavily engineered features, and their dimensions would initially be much smaller than the existing active channel (average 2- to 3-foot-depth and 10-foot-wide channel bottoms). Over time, the pilot channels would naturally enlarge through fluvial scour. The upper pilot channel would be approximately 3,700 feet long and would re-converge with the active Plunge Creek channel immediately downstream of the Weaver Street Drain. The lower pilot channel would begin approximately 500 linear feet downstream of the point where the upper pilot channel re-converges with the main channel, and would be approximately 2,000 feet long, and also includes an additional 600-foot-long south branch. Native substrate derived from pilot channel excavation, conservatively estimated at 8,900 cubic yards, would be repurposed for additional project elements (ICF 2016).

An excavator would be used to dig a channel with a 10-foot bottom width. The banks would be graded to a side slope of 1.5H:1V and match the topography until positive drainage can be achieved. The resultant height of the bank would vary depending on existing ground elevations, but are typically 2–3 feet tall through most of the pilot channel sections. Bank heights up to 7 feet high would be constructed in the upper portion of the upstream pilot channel because relatively deep excavation is needed to cut through the high terrace elevations prior to connecting with the lower elevation remnant channel features. Side slopes steeper than 1.5:1, but no steeper than 1:1, may be used where the cut depth is less than 3 feet and the cut slope is stable. The 10-foot bottom width accommodates the width needed for equipment to excavate and dump trucks to travel within the pilot channels as part of the haul road system to dispose of fill material. Because the side slopes are set at the approximate angle of repose of the coarse, unconsolidated material, as the channel is excavated material will slough into the channel and the final bank side slope will largely be achieved without the need for fine-grading. This sloughed material can immediately be transported to the fill disposal areas (ICF 2016).

The gradient of the pilot channels also considers several factors. Near the split with the existing Plunge Creek channel, the pilot channels need to be relatively steep to draw water in and maintain sediment transport continuity, otherwise backwatering and sedimentation could occur in the pilot

channels, and they could potentially become plugged with sediment and no longer function. The gradient also considers the existing ground topography. If constructed too steep the pilot channels will drop down in elevation too far below the existing ground, making them too deep and also adding additional excavation work. Similarly, the pilot channels need to tie into the fixed elevations of the remnant channel features on the floodplain. The proposed longitudinal bed elevation profiles of the upper pilot channel starts just downstream of the MWD pipeline. This pilot channel gradient typically varies from 1.5 to 1.75 percent (ICF 2016).

The project components include the following:

- Installation of flow deflectors ("splitter mounds"), composed of large, native boulders (Type 1 splitter) and large, native boulders combined with logs with intact root wads (Type 2 splitter). The splitter mounds would be located at the heads of the two pilot channels and at three additional locations in the floodplain portion of the lower pilot channel (Figure 3). Native boulders would be sourced from the excavated pilot channels and adjacent terraces.
- Construction of a native rock sills at the heads of the two pilot channels to create roughness and resist channel bed degradation within the active channel.
- Construction of an approximately 4-foot-high berm along the northern (upstream) boundary of an existing quarry located adjacent to the proposed upper pilot channel using compacted native material derived from the pilot channel excavation, in order to prevent redirected flows from entering the quarry.
- Construction of temporary access routes across floodplain areas and in the existing primary channel. Additional access routes would consist of existing access roads as well as traveling through the constructed pilot channels.
- Periodic inspection and maintenance of flow splitters and rock sills through the duration of the Agencies' permit approvals.

4.2 Native Seeding

Native seeding will occur within a 20-foot buffer around the constructed pilot channels, totaling 5.63 acres. The targeted habitat to be established includes pioneer and intermediate RAFSS. Seeding native species along the newly constructed pilot channels will help jump start the development of the desired native habitats.

The specifications for seeding are described below. The seed mix (Table 4-1) incorporates native plant species that were observed or known to occur in the vicinity of the site. The species selected are typically found in pioneer and/or intermediate RAFSS. The plant species will self-sort based on the engagement and development of the pilot channels over time.

Table 4-1. Seed Mix[1,2,3]

Species	Common Name	Pounds of Pure Live Seed per Acre[4]	Pounds of Pure Live Seed per 5.63 Acres
Acmispon glaber	deerweed	0.1	0.5
Ambrosia acanthicarpa	burweed	0.6	3.5
Amsinckia menziesii	fiddleneck	0.3	1.75
Artemisia californica	California sagebrush	0.0	0.25
Artemisia dracunculus	tarragon	0.0	0.25
Baccharis salicifolia	mulefat	0.1	0.75
Bebbia juncea	rush sweetbush	8.2	46
Croton californicus	California croton	3.0	17
Deinandra fasciculata	fasciculed tarweed	0.2	1
Encelia farinosa	brittlebush	1.6	9
Ericameria pinifolia	pine goldenbush	0.3	1.5
Eriodictyon crassifolium	felt leaved yerba santa	0.1	0.5
Eriogonum fasciculatum	California buckwheat	0.6	3.25
Eriogonum gracile	slender buckwheat	0.3	1.5
Galium angustifolium	narrowleaf bedstraw	0.3	1.5
Heterotheca grandiflora	telegraph weed	0.3	1.75
Heterotheca sessiflora	goldenstar	0.3	1.75
Lepidospartum squamatum	scale broom	2.1	12
Leymus condensatus	giant wildrye	0.2	1
Mirabilis laevis	desert wishbone bush	0.3	1.5
Phacelia cicutaria	caterpillar phacelia	0.1	0.75
Salvia apiana	white sage	0.3	1.5
Salvia columbariae	chia	0.1	0.75
Senecio flaccidus	butterweed	1.2	7

[1] Seed will be applied by imprint seeding.

[2] Seeds will be collected within the watershed or within a 10-mile radius of the site to the extent feasible. Seeds that cannot be collected from the immediate vicinity will be provided from the closest available sources.

[3] Any potential substitutions or quantity adjustments must be approved by the restoration ecologist.

[4] The pounds per acre of pure live seed in this table have been rounded. The pounds per acre of seed will be adjusted to achieve the specified pounds per acre of pure live seed when actual percentage purity and germination rates are calculated.

4.2.1 Seed Specifications

Seed will be applied throughout the 20-foot buffer surrounding the pilot channels. Seed will be from Plunge Creek, or alternative sources (closest commercially available sources) approved by the restoration ecologist. If seed is not available from these areas, at minimum, seed will be obtained from within the watershed or within 10 miles of the Conservation Project. Seed that cannot be provided from the immediate vicinity will be provided from the closest commercially available sources, subject to the approval of the restoration ecologist. Seed will be delivered to the site in sealed and labeled packaging, along with a California State Agricultural Code seed certification that

includes the supplier's name, geographic location, and collection date, and the tested purity and germination percentage rates. The seeds will be ordered and delivered in separate, original containers by species, and inspected by the restoration ecologist. Seed will be labeled with the species, purity, germination, percentage live seed, and quantity of seed in pounds.

4.2.2 Seed Application

The contractor will install seed by imprint seeding in the buffer area surrounding the pilot channels. Imprinting uses a heavy and dimpled/wedged roller to "imprint" soils with patterned depressions. These depressions then become collection points for seed, water, organic matter, and wind-blown silt and clay particles, which aids in seed germination and soil building. It is understood and expected that episodic events may carry seed and deposit it outside the buffer areas. This is acceptable and desirable and will enable the site to establish more of the desired habitat in less time.

4.2.3 Timing and Irrigation

The optimal time for seeding in Southern California occurs during the winter months, generally between November and February. The contractor will need to coordinate installation efforts with any rain events to take advantage of natural precipitation and/or ensure that work is not being conducted on the site during periods of inundation. No irrigation will be used in the seeded areas. The Conservation Project will rely on natural precipitation and natural (floodwater) hydrology.

4.3 Invasive Species Control

Nonnative invasive plant removal (weeds) will consist of manual removal and manual herbicide application. Nonnative grasses and other nonnative annual species will be reduced in cover to less than or equal to 20% cover, and invasive perennial species will be eradicated from the site during implementation.

4.4 Implementation Schedule

The excavation of the two pilot channels and the installation of the flow diversion structures is expected to last approximately 1 month. Construction and grading work would occur in the dry season (May–October), following receipt of Agency permits. Should work occur in the wet season (November – April), the Conservation District would implement additional best management practices (BMPs) in order to avoid potential, indirect impacts to waters, including removal of all equipment, vehicles, and stockpiles from Plunge Creek and pilot channels a minimum of 24 hours prior to a 50+ percent rain event. Initial nonnative plants species removal will also occur within the 1-month implementation period. Seeding would take place between November and February, preferably earlier in that period to take advantage of natural rainfall patterns and restored natural hydrology.

Chapter 5
Maintenance Plan

The goal of any restoration is to create a natural, self-sustaining system that will require minimal follow-up maintenance. The maintenance program will begin when construction and installation have been completed and concentrate on the first few seasons of growth to control weeds and assist with and promote native habitat establishment. The installation contractor will be responsible for implementation, pilot channel construction, initial weeding, and seeding. The maintenance contractor will be responsible for the remainder of the scheduled 5-year maintenance and monitoring period. As a guideline, the contractor is then expected to perform maintenance approximately monthly during Year 1; every 2 months during Year 2; and quarterly during Years 3, 4, and 5. Maintenance may be needed more frequently to perform remedial measures (e.g., reseeding, erosion control). The contractor will coordinate with the restoration ecologist and geomorphologist on a regular basis to determine priority maintenance activities during different periods of the plan. The primary maintenance obligations are reviewed below.

5.1 Maintenance Duration

Short-term maintenance will take place for 5 years following completion of construction activities. If success standards are not being met, the Conservation District will consult with the Agencies to decide on the best course of action, which could include extension of the maintenance period. At the end of the maintenance period, following signoff by the Agencies, the site will enter the long-term management stage.

5.2 Responsible Parties

Short-term maintenance (through the 5 years) will be the responsibility of Conservation District or its designee. The Conservation Project will be protected and maintained in perpetuity pursuant to the Wash Plan HCP and the HMMP site protection instrument (Section 8.2).

5.3 Invasive Species Control

Nonnative weed control will consist of controlling populations of invasive weeds within the Conservation Project site by the following methods: (1) hand removal, (2) cutting or mowing, or (3) chemical herbicide application. Hand removal of weeds will be used around special-status plants. Other herbaceous weeds should be removed by hand before setting seed.

Weed species should be controlled before they set seed and before they shade and out-compete native species. With prior consent from the biologist, string trimmers may be used in certain instances. Chemical methods will be used for control of perennial weed species and in areas with large nonnative grass infestations. The contractor will coordinate with the restoration ecologist to identify specific areas where chemical herbicides may be used. Any herbicide treatment must be applied by a licensed or certified pest control applicator. Any herbicide application in proximity to

water will be approved for aquatic use by the U.S. Environmental Protection Agency (EPA) (i.e., reviewed and considered compatible with the aquatic environment when used according to label directions). A total cover of 20% of nonnative grasses and other nonnative annual weed species will be tolerated at the end of the 5-year maintenance period. All perennial invasive species will be eradicated from the site. Thus, 80% of the revegetation site will be weed free. If an annual nonnative species is determined to be locally invasive by the restoration ecologist, it will be eradicated from the site. Weed abatement work will occur as needed to allow development of native RAFSS in the Conservation Project site and follow the schedule detailed in Section 5.6, *Schedule of Maintenance*.

5.4 Supplemental Seeding

If seed germination performance standards are not met (Chapter 6, *Ecological Performance Standards*), the contractor will provide supplemental seeding for the first 3 years of maintenance. The seeding area will be reseeded as needed to meet germination goals.

5.5 Clearing and Trash Removal

Leaf litter and deadwood from native trees and shrubs will not be removed from the Conservation Project site. The decomposition of deadwood and leaf litter is essential for the replenishment of soil nutrients and minerals. Deadwood and snags provide valuable habitat for invertebrates, reptiles, small mammals, and birds. Human-made trash and debris will be removed from the mitigation areas by hand during maintenance visits.

5.6 Schedule of Maintenance

Maintenance visits by the maintenance contractor will occur monthly for the first year, every two months in Year 2, and then quarterly thereafter. Maintenance will occur frequently in the first year to ensure the newly constructed pilot channels and flow diversion structures remain as designed during the first rainy season and also to control nonnative plant species. Weed treatment will occur monthly in the first year to get a jump start on reduction and eradication of nonnative species. Concentrated weed control at the start of a project will remove nonnative seeds from the seedbank, making weed treatment easier over the life of the project. Maintenance visits will occur twice a month in Year 2 and quarterly for the remainder of the 5-year maintenance period. If remedial measures are required to correct erosion, control a new weed invasion, or provide supplemental seeding, maintenance visits may occur more frequently until the issue is resolved.

Chapter 6
Performance Standards

Success criteria have been established for mitigation. The qualitative and quantitative monitoring described in Chapter 7, *Monitoring Requirements,* will determine if the success criteria are being met. These performance standards have been designed for this HMMP as a means of monitoring the progress and performance of the physical, hydrological, and biological conditions of the mitigation site, including both the pilot channels and the existing mainstem Plunge Creek channel. The standards are divided into ecological standards (Section 6.1) and geomorphological standards (Section 6.2). Plan performance will be evaluated annually during regularly scheduled monitoring visits unless otherwise specified. If performance standards are not met in 5 years, additional maintenance and monitoring may be required until final performance standards have been met.

6.1 Ecological Standards

The ecological performance standards include multiple measures of the plan's performance and final success as well as general site requirements, native and nonnative species goals, functional assessment target scores, and evidence of re-established waters of the U.S. (Table 6-1).

Table 6-1. Ecological Performance Standards

Performance Standard	Year 1	Year 2	Year 3	Year 4	Year 5
General Site Conditions					
Trash	None				
Pilot Channel Condition					
Overall CRAM score	N/A	N/A	≥50 percent	N/A	≥ 78 percent[1]
Plunge Creek Mainstem Condition					
Overall CRAM score	≥ 87 percent[2]	N/A	≥ 87 percent[2]	N/A	≥ 87 percent[2]
Ordinary High Water Mark					
OHWM and Floodplain Unit Indicators (FUI)[3]	N/A	N/A	> 1 OHWM indicator and > 1 FUI	N/A	> 2 OHWM indicators and > 2 FUIs
Nonnative Vegetation Cover					
Absolute Cover of Invasive Perennial Species	<10%	<5%	<1%	<1%	<1%
Absolute Cover of Nonnative Grasses	<20%				
Native Vegetation Cover					
Relative Cover for Natural Recruitment	N/A	N/A	≥ 3% of total dominant native species cover	N/A	≥ 5% of total dominant native species cover
Re-establishment of Waters[4]	N/A	N/A	On trajectory to reestablish 14.15 acres	N/A	14.15 acres

[1] The CRAM surveys conducted in (post-project) year 3 and year 5 within the Upper and Lower Pilot Channels will be used to compare these constructed sites with the pilot channel reference site, including comparison of overall score, attribute and metric scores, and stressors. Target score is derived from pilot channel reference site CRAM scores (*Plunge Creek Conservation Project 2018 Baseline CRAM*, SBVWCD, August 2018).

[2] The CRAM surveys conducted in year 3 and year 5 within the main Plunge Creek channel will be used to compare post-project conditions with baseline conditions, including Sediment Transport and Hydrologic Connectivity metrics, in order to ensure that CRAM scores meet or exceed baseline conditions. Target score is derived from Plunge Creek baseline CRAM scores, average of overall scores for AA1 – AA3 (SBVWCD, August 2018).

[3] OHWM indicators and FUI will be documented using the *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the United States* (USACE ERDC, July 2010). OHWM indicators include but may not be limited to change in average sediment texture, change in vegetation species, change in vegetation cover, and break in bank slope. FUI include but may not be limited to mudcracks, ripples, drift and/or debris, presence of bed and bank, benches, soil development, and surface relief.

[4] Please reference Figure 3b, Potential Credits, Waters of the U.S. (WoUS) and State (WoS).

6.2 Geomorphological Standards

The geomorphological performance standards consist of key indicators of channel profile stability (pilot channels and mainstem) and measurements of predicted variability in pilot channel widths and sediment deposition within the mainstem Plunge Creek. Unique geomorphological performance standards will be used for the pilot channels and existing Plunge Creek main channel because these channels are expected to perform differently. These standards are described below and summarized in Table 6-2.

Table 6-2. Geomorphology Performance Standards

Performance Standard	Year 1	Year 2	Year 3	Year 4	Year 5
Pilot Channel Morphology					
Pilot channel depth	<1 foot of net channel downcutting[1]				
Pilot channel width	<30% increase in predicted widths by flood recurrence interval[1 2]				
Mainstem Plunge Creek Channel Morphology					
Mainstem channel depth	<0.75 foot of net channel downcutting[1]				
Mainstem sediment volume	<20% change in sediment volume[1]				

[1] Topography will be collected for 3 different years over the 5-year monitoring period via LiDAR or aerial photogrammetry (sub-foot vertical accuracy). The timing of when it is collected is structured to balance the need to capture flood events that have the potential to create morphologic change versus the need to conduct the monitoring within a 5-year period.

[2] Reference Table 7-2 for predicted pilot channel widths based on size of peak flood event.

6.2.1 Pilot Channels

Performance Standard: <1 foot of net channel downcutting averaged over a reach. The minimum longitudinal reach distance over which slope will be calculated is 150 feet (approximately 10 pilot channel widths). Areas that exceed this standard will be identified on both the profile charts and in the planview maps of elevation change. Discussion will be provided on the significance of these areas and their potential to create instability in the mainstem channel.

Performance Standard: Pilot channel widths, on average, will not increase beyond <30% of the predicted widths in Table 7-2. Areas that exceed this standard will be identified on the planview maps. Discussion will be provided on the significance of these areas and their potential to affect project performance.

6.2.2 Mainstem Plunge Creek Channel

Performance Standard: <0.75 foot of net channel downcutting averaged over a reach. The minimum longitudinal reach distance over which slope will be calculated is 1,000 feet (approximately 10 active low-flow channel widths). Areas that exceed this standard will be identified on both the profile charts and in the planview maps of elevation change. Discussion will be provided on the significance of these areas and their potential to create instability.

Performance Standard: <20% change in sediment volume averaged over the entire mainstem reach from the MWD pipeline to the Orange Street Bridge. Areas that exceed this standard will be identified on the planview maps of elevation change. Discussion will be provided on the significance of these areas and their potential to affect project performance.

Chapter 7
Monitoring Requirements

7.1 Monitoring Program

The monitoring program is used to identify and, where necessary, to correct problems in an efficient manner, as well as to document the performance of the project over a defined time period. For the Conservation Project, a combination of qualitative and quantitative monitoring will be used to evaluate the 203-acre study area according to the ecological and geomorphological performance standards described in Section 6.1 and Section 6.2, respectively. The ecological monitoring schedule is described in Table 7-1, and the geomorphological monitoring schedule in Section 7.1.2.1.

7.1.1 Ecological Monitoring

7.1.1.1 Implementation

The restoration ecologist will be on site weekly during grading and seeding and will prepare a brief memorandum to document seed installation, minimizing impacts of sensitive habitats, … . This will be submitted to Conservation District. The seed installation contractor will receive approval from the restoration ecologist and Conservation District, indicating a successful implementation before the start of the 5-year maintenance and monitoring program. In addition, the installation process will require the restoration ecologist to inspect and approve progress at the following times, in coordination with the project geomorphologist:

- During construction of the flow splitters and rock sills,
- During installation of the pilot channels.
- At the end of grading and contouring.
- At the time of seed delivery; the restoration ecologist will inspect to confirm the receipt of the correct species and quantities.
- When the contractor requests inspection to determine if installation is complete.

7.1.1.2 Qualitative Ecological Monitoring

The goal of qualitative monitoring is to proactively assess site conditions and address issues before they become a problem. Qualitative monitoring will include performing all required installation inspections described above. An important feature of qualitative monitoring is effective coordination between the installation contractor and maintenance contractor(s) to exchange information, provide feedback, and agree on priority maintenance items and potential remedial measures as needed. The restoration ecologist will perform qualitative monitoring throughout the installation period and the 5-year maintenance and monitoring program (Table 7-1). Each qualitative monitoring visit will focus on soil conditions (e.g., moisture and fertility), seed germination rates, the presence of native and nonnative plant species, any significant disease or pest problems, human visitation, and any erosion problems.

Table 7-1. Ecological Monitoring Schedule

Monitoring Efforts	Frequency
Installation	Weekly
Qualitative Monitoring Visits	Bi-Monthly Years 1 and 2; Quarterly Years 3–5
Quantitative Monitoring	
Permanent Photos	March and September, annually
CRAM	late spring (March/April, depending on rainfall) Years 1, 3, and 5
JD	late spring (March/April, depending on rainfall) Years 3 and 5

During installation, the restoration ecologist will inspect progress on a weekly basis. The restoration ecologist will monitor the restoration area bi-monthly during the first 2 years of the 5-year maintenance and monitoring program and then quarterly during Years 3, 4, and 5. During each qualitative monitoring visit, the restoration ecologist will conduct a site overview of the restoration area to evaluate the following:

- Overall site conditions.
- Seed germination rates.
- Native plant recruitment.
- Percent cover of nonnative grasses
- Presence of invasive nonnative species
- Presence and type of terrestrial fauna using the mitigation site.
- Potential issues, including hydrology, invasive nonnative species of concern, vandalism, and other problems that need to be addressed by the installation or maintenance contractor.

Recommendations will be included in the fall quarterly memoranda for any winter supplemental seeding.

7.1.1.3 Quantitative Ecological Monitoring

Photo-Documentation

Permanent stations for photo-documentation will be established during the installation period using a GPS unit. The locations and bearings of the photo stations will be mapped in the annual monitoring reports. The photos will be used to document the installation process in addition to the vegetation establishment. Permanent stations will ensure that photographs will be taken from the same location, at the same time of year, and in the same compass direction each year. Photos will be taken twice a year (March and September) at these fixed locations and cataloged to be included in the annual reports. Photographs will reflect material discussed in the annual monitoring report and document the progress of the site.

Episodic Riverine Condition

CRAM will be used to evaluate the wetland condition of the Conservation Project, both the existing Plunge Creek channel and the installed pilot channels. The assessment will follow the protocols found in the latest version of the *California Rapid Assessment Method for Wetlands Episodic Wetlands Field Book* at the time of the Year 1 assessment. The three AAs established for the baseline CRAM condition will be used in Plunge Creek to determine the effects of the pilot channels on the wetland condition of Plunge Creek. Three additional AAs will be established in each of the pilot channels and one in the south branch of the lower pilot channel (7 total additional AAs) to measure the change in ecosystem functions and services over the course of the monitoring program. It is expected that over time, the pilot channels will approach the episodic riverine condition of the reference site assessed during baseline assessments. CRAM will be conducted in Year 1, Year 3, and Year 5 during the late spring (March/April) when the rainy season has ended and most of the annual plant species have germinated and are easy to identify.

Waters of the U.S. and State Reestablishment

To document the reestablishment of waters of the U.S. and waters of the state, a jurisdictional delineation will be performed in Years 3 and 5 during the late spring (March/April) when the rainy season has ended. Observed indicators of ordinary high water mark (OHWM) and floodplain units will be documented using the *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the United States* (USACE ERDC, July 2010). If hydrology at the site is not reestablishing waters as expected by Year 3, adaptive management measures will be developed and submitted to the agencies for review, and may include adjustment of the rock splitters or sills. A jurisdiction delineation will be performed in Year 5 to document the acreage of waters that has been reestablished as a result of this Conservation Project.

7.1.2 Geomorphological Monitoring

7.1.2.1 Method to Detect Morphologic Change

Topography Data Source

Repeat collection of accurate topographic data will be used to evaluate performance standards related to morphologic change. The project site is well-suited for use of remotely sensed topographic data collection for three reasons: 1) topography needs to be collected over a large area (203-acre site); 2) the site does not have dense vegetation cover that could prevent the bare earth from being accurately captured by remotely sensed data; and similarly 3) since Plunge Creek goes dry for periods, topography can be collected throughout the channel without bathymetry effects.

Either LiDAR or aerial photogrammetry will be used to fly the site and collect detailed (sub-foot vertical accuracy) topography over the entire 203-acre project site to create a continuous elevation surface. The extent of topographic coverage provided by use of remotely sensed data will far exceed what could realistically be collected by field topographic surveying (e.g., total station survey).

Topography Collection Timing

A key project goal is to encourage fluvial disturbance in response to flood events. The episodic nature of floods and sediment transport at the site means the timing of when morphologic change occurs is not predictable. Table 7-2 shows the predicted volume of Plunge Creek flow that is

designed to be diverted into the pilot channels during flood events. Since the amount of diverted flow progressively increases with larger flood events, the morphologic response is expected to similarly increase with larger floods. A flood with a minimum 1.25-yr recurrence interval is required for appreciable flow to be diverted into the pilot channels with the potential to create fluvial disturbance.

Topography will be collected for 3 different years over the 5-year monitoring period. The timing of when it is collected is structured to balance the need to capture flood events that have the potential to create morphologic change versus the need to conduct the monitoring within a 5-year period.

First Collection: Late spring within first year post-construction (Year 1). Ideally, a flood with a minimum 1.25-year recurrence interval will have occurred within this period. But if not, this first collection will still be useful to document as-built conditions and any change that has occurred from lower flows.

Second Collection: Late spring within Years 2-4. If a minimum 1.25-year flood occurs after Year 1, then topography will be collected in late spring Year 2. Otherwise, data collection will wait until Year 3 or Year 4. Even if a 1.25-year flood does not occur, the second collection will be completed by Year 4.

Third Collection: The final topography collection will occur in late spring of Year 5 regardless of what flow events have occurred since the precious collection.

The USGS Plunge Creek gage (#11055500) will be used to determine the magnitude of flood events that occurred with a monitoring year. Table 7-2 shows the flow magnitudes that correspond to peak annual recurrence interval events at the gage (see ICF 2015 for description of site hydrology).

Topographic Change Analysis

A georeferenced digital elevation model (DEM) will be made from each topographic collection event that shows a continuous elevation surface for the entire site. Topographic change will be evaluated by comparing elevation differences between DEMs of different years. Maps will be created that differentiate areas and magnitudes of increased elevations (depositional) from decreased elevations (erosional). Longitudinal profiles will also be created from the DEM in the main Plunge Creek channel and the pilot channels in order to graph bed elevation and channel slope changes.

7.1.2.2 Performance Monitoring

Geomorphology performance monitoring will be conducted for the same three years as the topographic data collection. The geomorphology goals for this restoration project are rather unique in that appreciable fluvial erosion and deposition are desired outcomes. The initial magnitudes of sediment movement and morphologic change, particularly as the pilot channels evolve, are expected to exceed the magnitudes one would expect in a more traditional restoration project in which the channel is constructed with fairly stable dimensions. Because of the dynamic nature of this project, performance standards were developed that accommodate the magnitudes of change expected yet also identify limits of change so monitoring can detect unexpected instabilities and performance issues. Unique monitoring methods will be used for the pilot channels and existing Plunge Creek main channel because these channels are expected to behave differently.

Pilot Channels

The pilot channels are designed to erode and enlarge in response to high flow events (ICF 2016). The rate at which the pilot channels enlarge, and the magnitude of the enlargement, depends on the magnitude, frequency, and duration of future flood events. Since the grade lines of the pilot channels are generally uniform, tie into existing channel invert elevations at the main channels and remnant channels, and have similar slopes as the existing and remnant channel features, it is likely that future pilot channel morphologic change will include relatively more widening than deepening. Pilot channels will be constructed to an initial bottom width of approximately 10 feet. Hydraulic geometry relationships (Table 7-2) were used to predict approximately how the pilot channel width would evolve in response to flood events (ICF 2016). The analysis indicates that the pilot channels may widen to 25-30 feet in response to flood events. Widening of the pilot channels is not an indicator of instability in the braided channel network this project aims to create. However, rapid widening that well exceeds the predicted widths could indicate that the expected geomorphic response is beyond what was predicted, with the potential to deliver large volumes of sediment to downstream reaches.

Substantial headcutting of the pilot channels that could result in rapid channel downcutting is less probable than lateral erosion of the pilot channel's banks and overall channel widening. However, incision of the pilot channels that extends upstream and into the mainstem channel could be a sign of potential instability, and could have negative consequences if incision of the mainstem extends upstream to the MWD pipeline crossing.

A graphical comparison of longitudinal profiles that extend through the pilot channels and into the mainstem channel will be made from each monitoring event DEM. Reach average longitudinal channel bed slope breaks will be determined and labeled on the graphs. The minimum longitudinal reach distance over which slope will be calculated is 150 feet (approximately 10 pilot channel widths). The reach average slope will be determined from a best fit regression line through the bed elevations in each defined reach. In addition, elevation changes in the DEMs will be evaluated to determine the magnitude of change in pilot channel widths that occurred in the mainstem channel between monitoring events.

Mainstem Channel

Plunge Creek flows for approximately 1.7 miles between the MWD pipeline and the Orange Street Bridge, including through the approximately 1.05-mile-long project site. The pipeline and the bridge are important features in the fluvial landscape, as they define the fixed entrance and exit locations of the channel and limit natural channel movement and deviation from its existing alignment within the site. These fixed points have likely contributed to downcutting and incision of the existing channel and confinement of flood flow. Under existing conditions, it is not until the 10-year flood event that appreciable flow overtops the channel's banks to inundate floodplain surfaces or higher elevation channel braids (ICF 2016). Additional mainstem channel downcutting post-project construction is an undesired condition since it could further reduce flooding into the pilot channels. Deposition in the incised mainstem channel, to some extent, is a desirable condition since it could reduce the bank heights and cause more flow to go into the pilot channels with enhanced fluvial disturbance.

A graphical comparison of longitudinal profiles that extend from the MWD pipeline to the Orange Street Bridge will be made from each monitoring event DEM. Reach average longitudinal channel

bed slope breaks will be determined and labeled on the graphs. The minimum longitudinal reach distance over which slope will be calculated is 1,000 feet (approximately 10 active low-flow channel widths). The reach average slope will be determined from a best fit regression line through the bed elevations in each defined reach. In addition, elevation changes in the DEMs will be evaluated to calculate the net sediment volume change that occurred in the mainstem channel between monitoring events.

Table 7-2. Recurrence Interval Floods and Estimates of Pilot Channel Width Evolution

	Peak Annual Flood Recurrence Interval[1]			
	1.25-yr	**2-yr**	**5-yr**	**10-yr**
Plunge Creek at USGS Gage	106 cfs	355 cfs	1,120 cfs	2,010 cfs
Plunge Creek at MWD Pipeline (Project Entrance)	135 cfs	426 cfs	1,338 cfs	2,426 cfs
Flow Diverted into Pilot Channel	58 cfs	145 cfs	239 cfs	280 cfs
% of Flow Diverted into Pilot Channel	43%	34%	18%	12%
Predicted Pilot Channel Width from Hydraulic Geometry Equations[2]	15.5 ft	24.8 ft	32.0 ft	34.7 ft

[1] Source: ICF 2015
[2] Source: ICF 2016

7.2 Reporting

The results of the qualitative monitoring visits will be summarized in field memoranda that will be submitted to the Conservation District within 2 weeks following each site visit. The memoranda, when finalized, will be summarized in annual reports to be submitted to the Conservation District and the Agencies. Annual reports will detail maintenance activities, trends, and general site conditions; provide photographs spanning the year; compare quantitative data and performance criteria; and make recommendations.

Chapter 8
Mitigation Credit and Site Protection

8.1 Determination of Credit

Reestablishment credits are proposed for jurisdictional waters that are expected to develop with the installation of the pilot channels. A total of 14.15 acres of waters are expected to reestablish based on 10-year inundation modeling (Figure 3a, Restoration Project Components and Figure 3b, Potential Credits, Waters of the U.S. and State). In addition, approximately 80 acres of RAFSS is expected to develop after the installation of the pilot channels and would provide species credits for SBKR.

8.2 Site Protection Instrument

The 202.9-acre Conservation Project site will be protected through a conservation easement or other legal instrument acceptable to the Agencies as part of the Wash Plan HCP. This legal instrument will obligate Conservation District as owner of the land to retain the project site as natural open space in perpetuity. Pursuant to the Wash Plan HCP, the San Bernardino Valley Conservation Trust will be responsible as land manager and enforce the terms of the conservation easement or other preservation instrument. The instrument will ensure that the Conservation Project will be protected for the primary purposes of maintaining natural aquatic resources, including groundwater recharge, and sensitive species habitat, as targeted through the ecological performance standards in Chapter 6.

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Chapter 9
Management Plans and Financial Assurances

9.1 Long-Term Management Plan

The Wash Plan HCP and the site protection instrument referenced in Section 8.2, *Site Protection Instrument* will describe the long-term management plan, including responsible parties, long-term maintenance practices, and prohibited uses. The goals and objectives of the HCP and site protection instrument will govern the long-term management of the Plunge Creek Conservation Project.

Following successful completion of the mitigation program (i.e., achievement of ecological performance standards) and written concurrence by the Agencies, inspection and management of the mitigation site will follow the Wash Plan HCP and site protection instrument. Pursuant to the HCP and site protection instrument, the San Bernardino Valley Conservation Trust will be responsible as land manager and enforce the terms of the conservation easement or other (Agency-approved) protection instrument. The long-term management will be funded in perpetuity on an annual basis through a non-wasting endowment, also managed by the San Bernardino Valley Conservation Trust.

9.2 Adaptive Management Plan

Pursuant to 33 Code of Federal Regulations (CFR) 332.7(c) of the 2008 Mitigation Rule (33 CFR 325 and 332; 40 CFR 230), the mitigation plan must include an adaptive management strategy to account for unforeseen problems in the implementation, short-term development, and overall success of the mitigation program. The restoration ecologist will be present for imperative activities in order to make decisions about how to manage the Conservation Project design and overall goals of the project.

Weed removal and the container plant and seed installation methodology can be adjusted at the recommendation of the restoration ecologist. Minor adaptive measures, such as replanting, reseeding, increased weeding frequency, or minor modifications to the protocol, will be implemented, upon Conservation District approval, by the landscape contractor, unless the Agencies object within 30 days of receiving the annual report. The Conservation District will consult with the Agencies and the Preserve Management Committee (PMC)[3] if substantial remedial actions, such as maintenance of rock splitters or sills, are needed to achieve the performance standards. Should any of the restoration areas fail to meet the plan's final performance standards at the end of the 5-year maintenance and monitoring period, the Conservation District will consult with the Agencies to determine if any additional actions are needed to attain the 5-year ecological performance standards or if additional time is needed.

[3] The Preserve Management Committee is currently composed of the Conservation District, USFWS, CDFW, and BLM (SBVWCD, January 2018).

Interim performance standards are crucial to ensuring that performance follows a course to final project success. Although not anticipated, if these interim performance standards are not achieved during annual monitoring, the restoration ecologist will work with the Conservation Project team to readjust efforts, as well as the Agencies if the problems require substantial action.

9.3 Financial Assurance

The Conservation District, through the Wash Plan HCP, will fund long-term management and monitoring of the Conservation Project by establishing a financial instrument, such as a non-wasting endowment or other mechanism approved by the Agencies for the purposes of fulfilling the long-term responsibilities described in the long-term management plan. The amount of the endowment will be based on a Property Analysis Record (PAR) or PAR-equivalent analysis, accounting for all required management responsibilities, including monitoring, reporting, and a contingency to account for unforeseen adaptive management needs. The PAR and PAR-equivalent analysis will rely on assumptions regarding capitalization rate, market rate of labor, equipment, materials, monitoring, and maintenance requirements. Conservation District and its consultant will work collaboratively with the Agencies to ensure clear, consistent, and well-substantiated evaluation and accurate outputs of projected costs. The non-wasting endowment will be provided to the San Bernardino Valley Conservation Trust, a CDFW approved financial institution. Pursuant to the Wash Plan HCP, the Conservation Trust or successor nonprofit will segregate the endowment funds into a separate non-wasting endowment fund, consistent with the accounting standards promulgated by the Governmental Accounting Standards Board, or any successor entity. In addition, the Conservation Trust or successor nonprofit will invest and manage funding in accordance with the Statement of Investment Policy approved by the District's Board of Directors. A legal agreement between Conservation District, the Agencies, and the San Bernardino Valley Conservation Trust will be developed, if necessary, to govern how the endowment will be managed and when monies will be released to the long-term land manager.

Chapter 10
Completion of Mitigation Requirements

10.1 Notification of Completion

Upon achievement of the 5-year ecological performance standards and completion of the 5-year maintenance and monitoring period, Conservation District and its restoration ecologist will prepare a final monitoring report and notice of completion. The final report will detail whether all requirements of the Conservation Project have been met and make any necessary recommendations for modifications to the monitoring period, long-term management plan, or initial funding amount. An updated long-term management plan and PAR or PAR-equivalent analysis will be provided if required.

The final report will be submitted to the Agencies for verification of successful completion and final acceptance, and Conservation District will extend an invitation for a final agency site visit. Pursuant to Section 9.2, *Adaptive Management Plan,* the Conservation District will consult with the Agencies if substantial remedial actions, such as maintenance of rock splitters or sills, are needed to achieve performance standards. Should any of the restoration areas fail to meet the plan's final performance standards at the end of the 5-year maintenance and monitoring period, the Conservation District will consult with the Agencies to determine if any additional actions are needed to attain the 5-year ecological performance standards or if additional time is needed.

10.2 Agency Confirmation of Site Performance

Upon receipt of the final report, the Agencies will be requested to either confirm that the required performance standards have been met or accept an invitation for a site visit. If regulatory agency personnel reject terminating the 5-year monitoring and maintenance program, reasons for the objection should be clearly stated so that corrective measures may be immediately scheduled. Conservation District will set up a meeting to resolve agency concerns, which may include implementing additional adaptive management measures or extending the monitoring period. Upon acceptance of termination of the 5-year monitoring and maintenance program, Conservation District will request a letter verifying successful completion of the mitigation plan and transfer responsibilities to the long-term manager of the Wash Plan HCP.

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Chapter 11
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Attachment A
90% Construction Plans for Plunge Creek Conservation Project

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Attachment B
CRAM Datasheets for Plunge Creek Conservation Project

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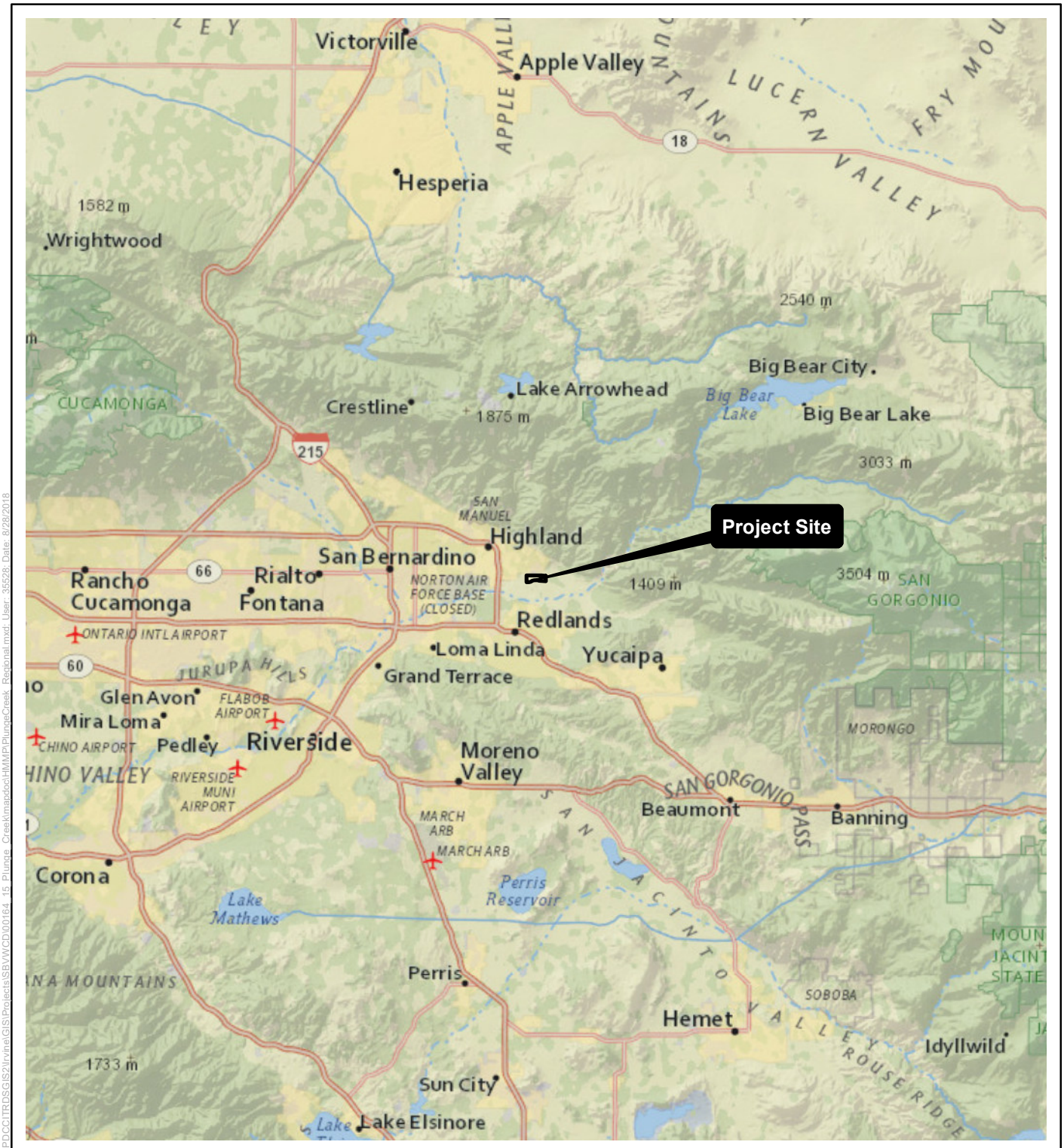

Legend

Plunge Creek Conservation Project Site

Source: ESRI; ICF 2018

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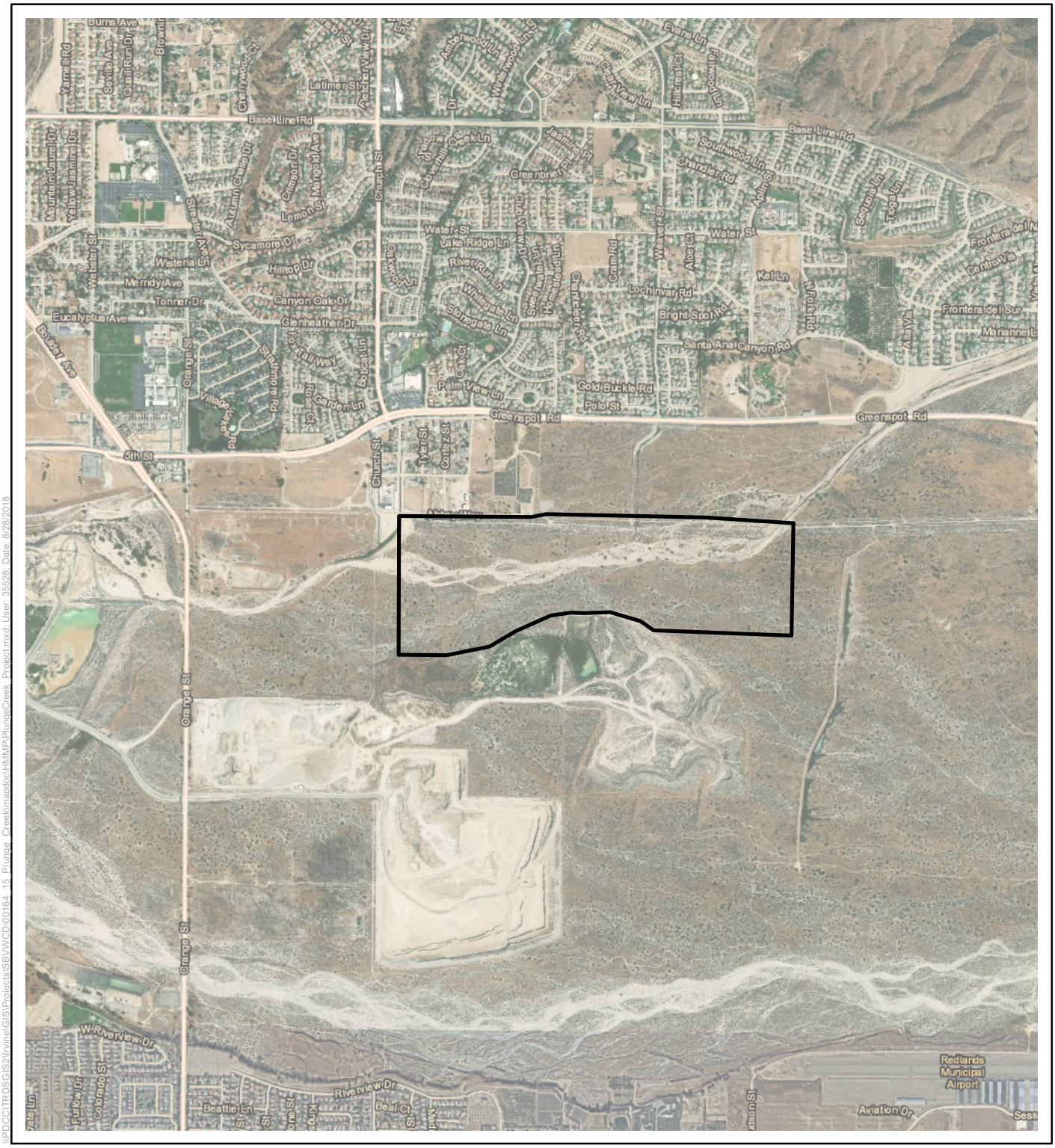
Figure 1
Project Vicinity
Plunge Creek Conservation Project



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Plunge Creek Conservation Project Site

Source: ESRI; ICF 2018

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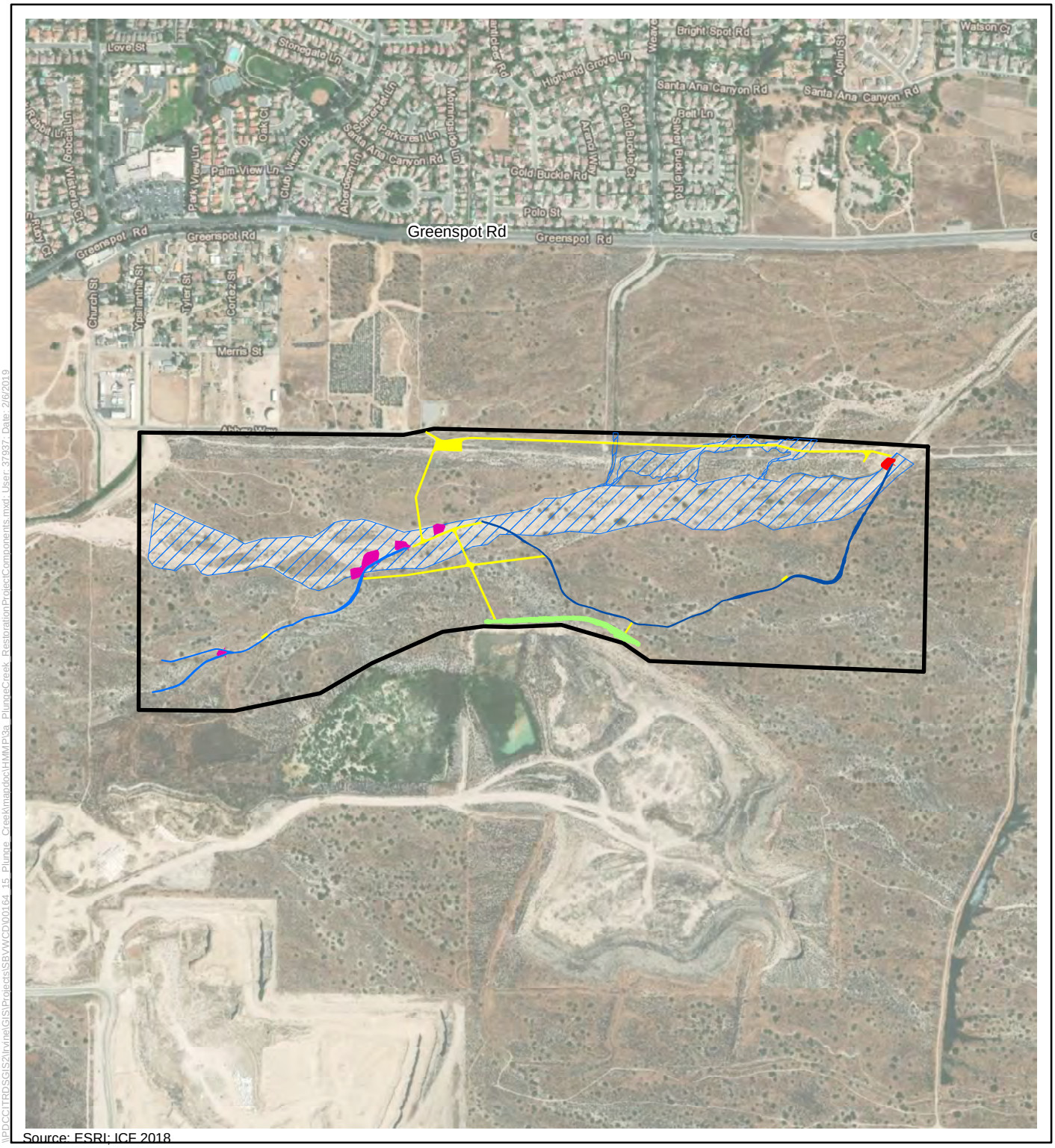
Figure 2
Project Site
Plunge Creek Conservation Project



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Legend

- Study Area (202.9 acres, 1.05 mile)
- Pre-project WoUS (USACE/RWQCB) and WoS (CDFW)

Project Components

- Berm (Soil Disposal Area)
- LPC - Flow Splitters/Rock Sills
- Lower Pilot Channel
- Temporary Access Roads and Staging Areas
- UPC - Flow Splitters/Rock Sills
- Upper Pilot Channel

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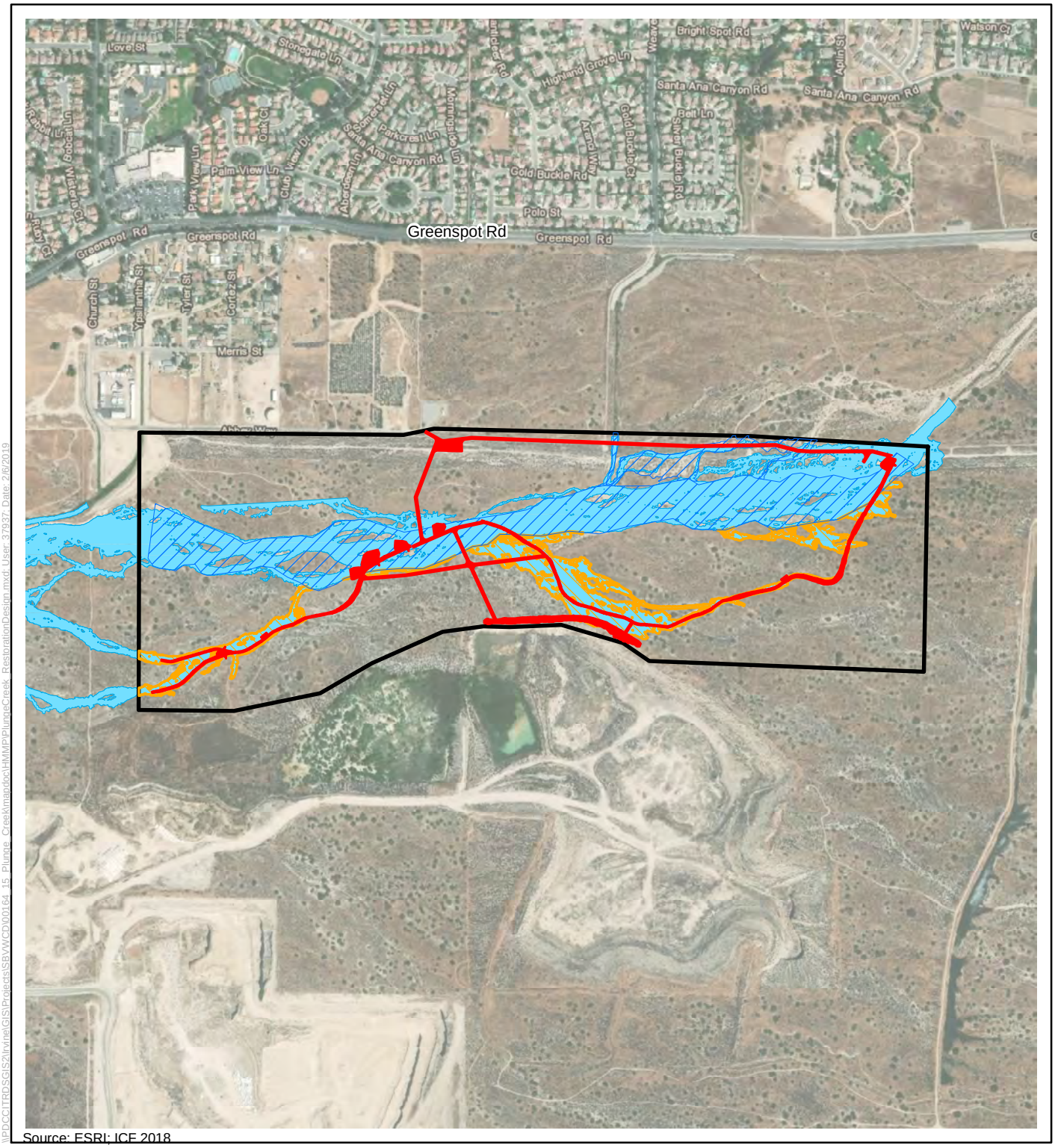
Figure 3a
Restoration Project Components
Plunge Creek Conservation Project



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Legend

- Study Area (202.9 acres, 1.05 mile)
- Pre-project WoUS (USACE/RWQCB) and WoS (CDFW)
- Post-project WoUS and WoS Re-establishment Footprint (14.15 acres potential credits)
- 10-year Event Modeled Inundation (post-project)
- Project Footprint

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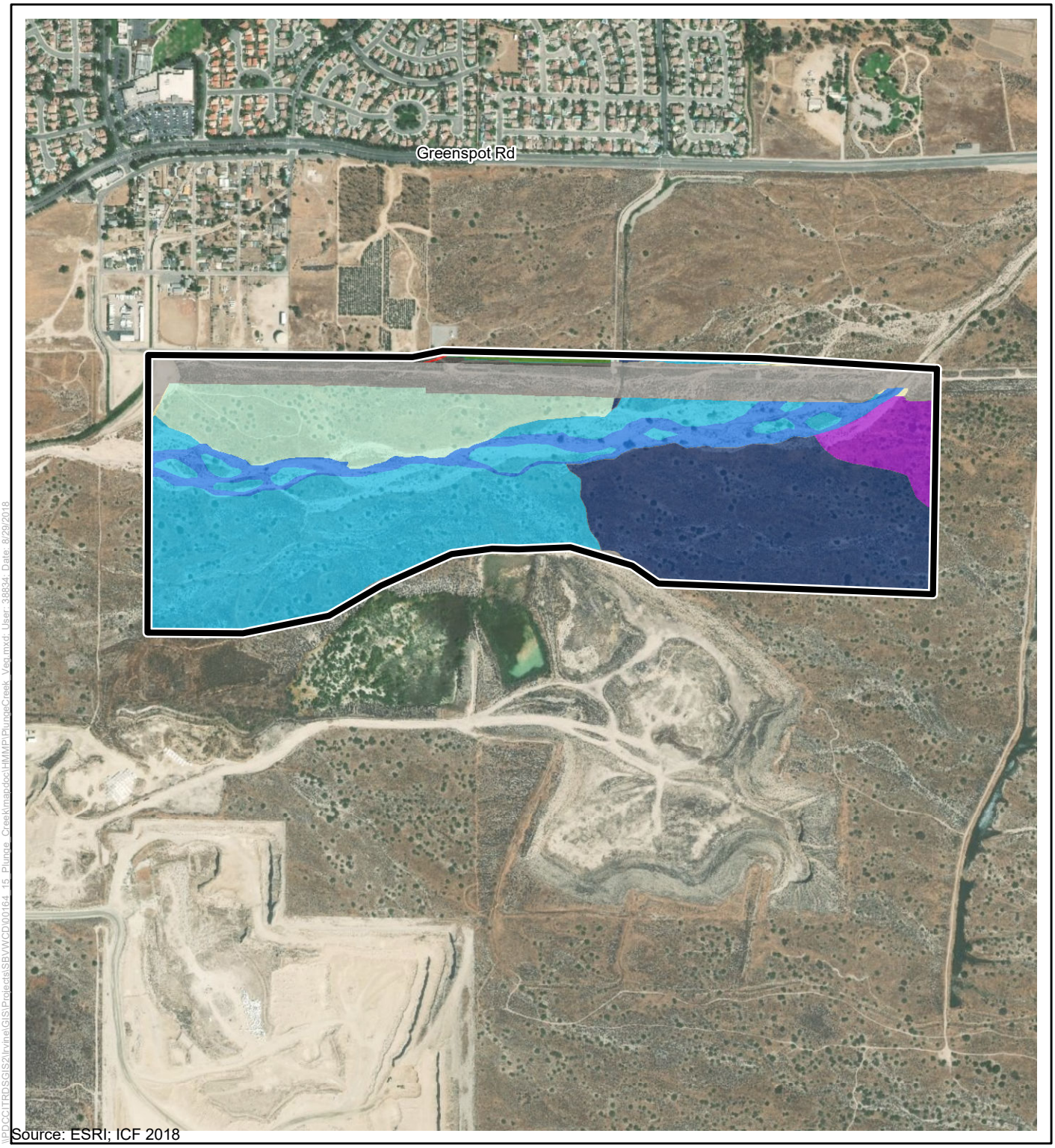
Figure 3b
Potential Credits
Waters of the U.S. (WoUS) and State (WoS)
Plunge Creek Conservation Project



Source: ESRI; ICF 2018

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Legend

- Study Area

Vegetation Communities

- Bromus tectorum
- Central and South Coastal Californian coastal sage scrub
- Developed/Ruderal
- Disturbed
- Non-Native Grassland (NNG)
- R2UBFx - Semipermanently Flooded - streambeds
- R4SBA - Temporarily Flooded - streambeds
- Riversidean Alluvial Fan Sage Scrub - Intermediate
- Riversidean Alluvial Fan Sage Scrub - Intermediate/Mature
- Riversidean Alluvial Fan Sage Scrub - Mature
- Riversidean Alluvial Fan Sage Scrub - Mature/NNG
- Riversidean Alluvial Fan Sage Scrub - Pioneer
- Urban

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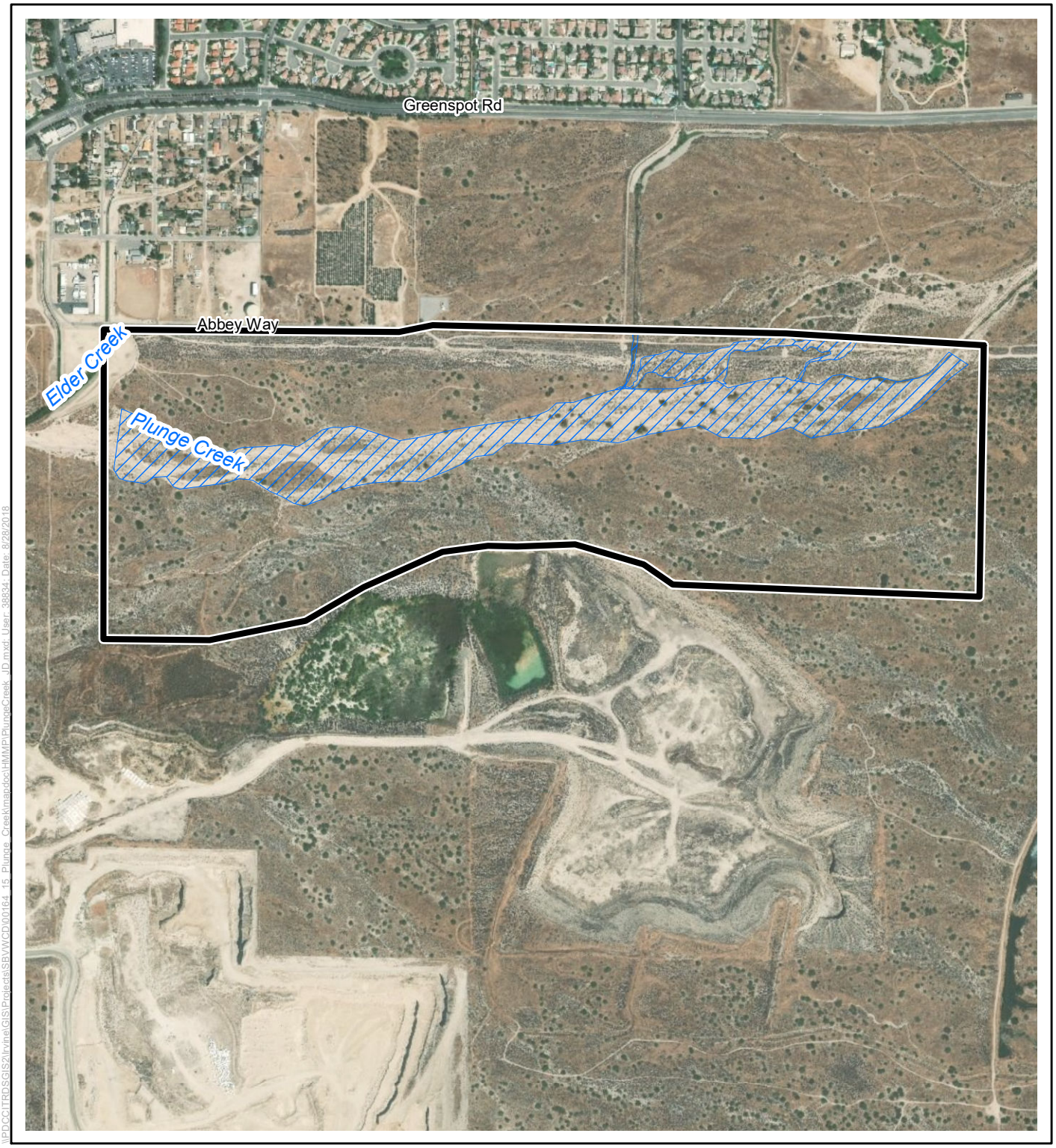
Figure 4
Existing Vegetation
Plunge Creek Conservation Project



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Legend

- Study Area
- WoUS (USACE/RWQCB) and WoS (CDFW)

Source: ESRI; ICF 2018

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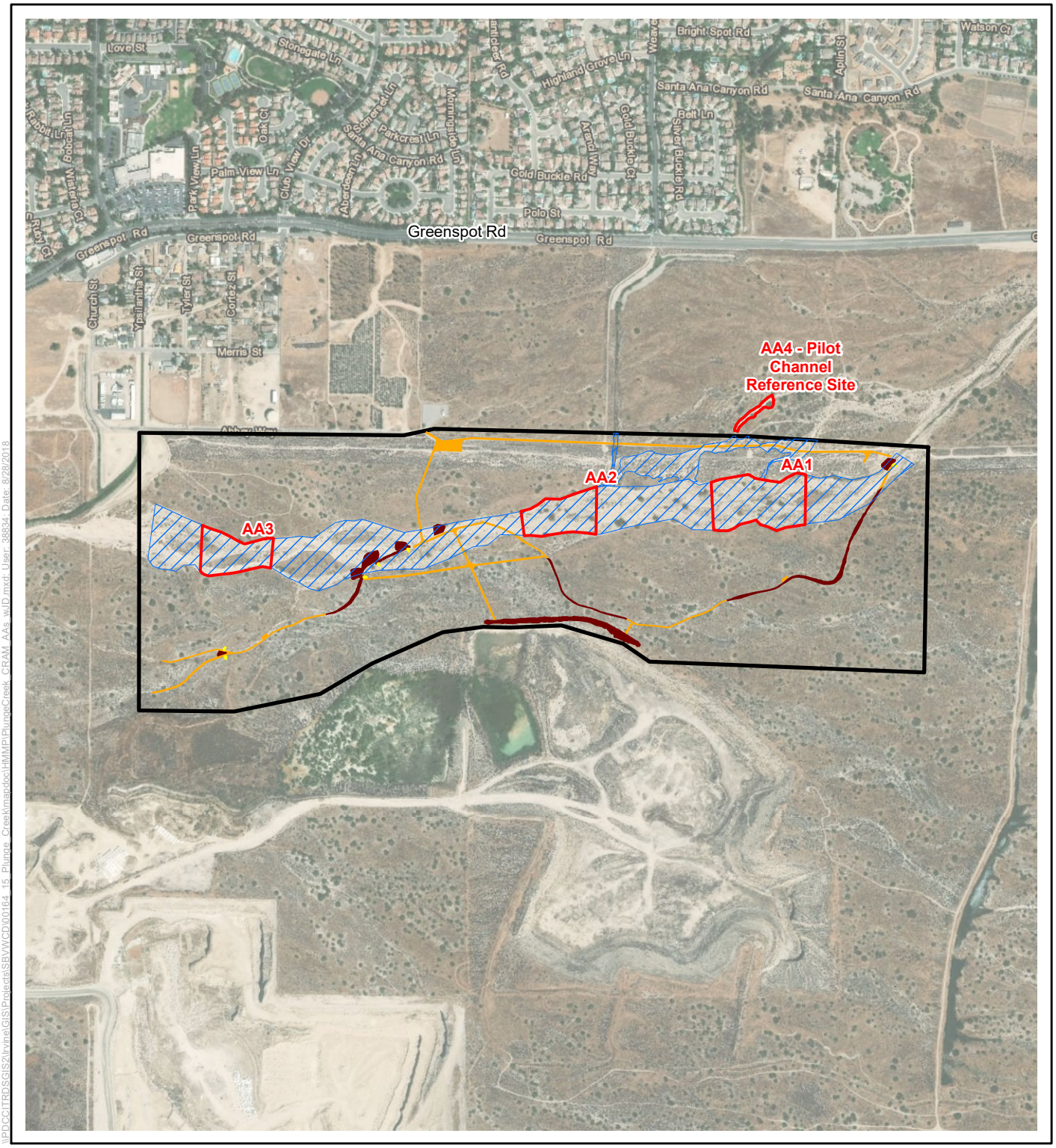
Figure 5
Existing Aquatic Resources
Plunge Creek Conservation Project



Legend

- CRAM AA's
- Study Area
- WoUS (USACE/RWQCB) and WoS (CDFW)

Project Footprint

- Permanent
- Temporary
- Temporary-Staging

Source: ESRI; ICF 2018

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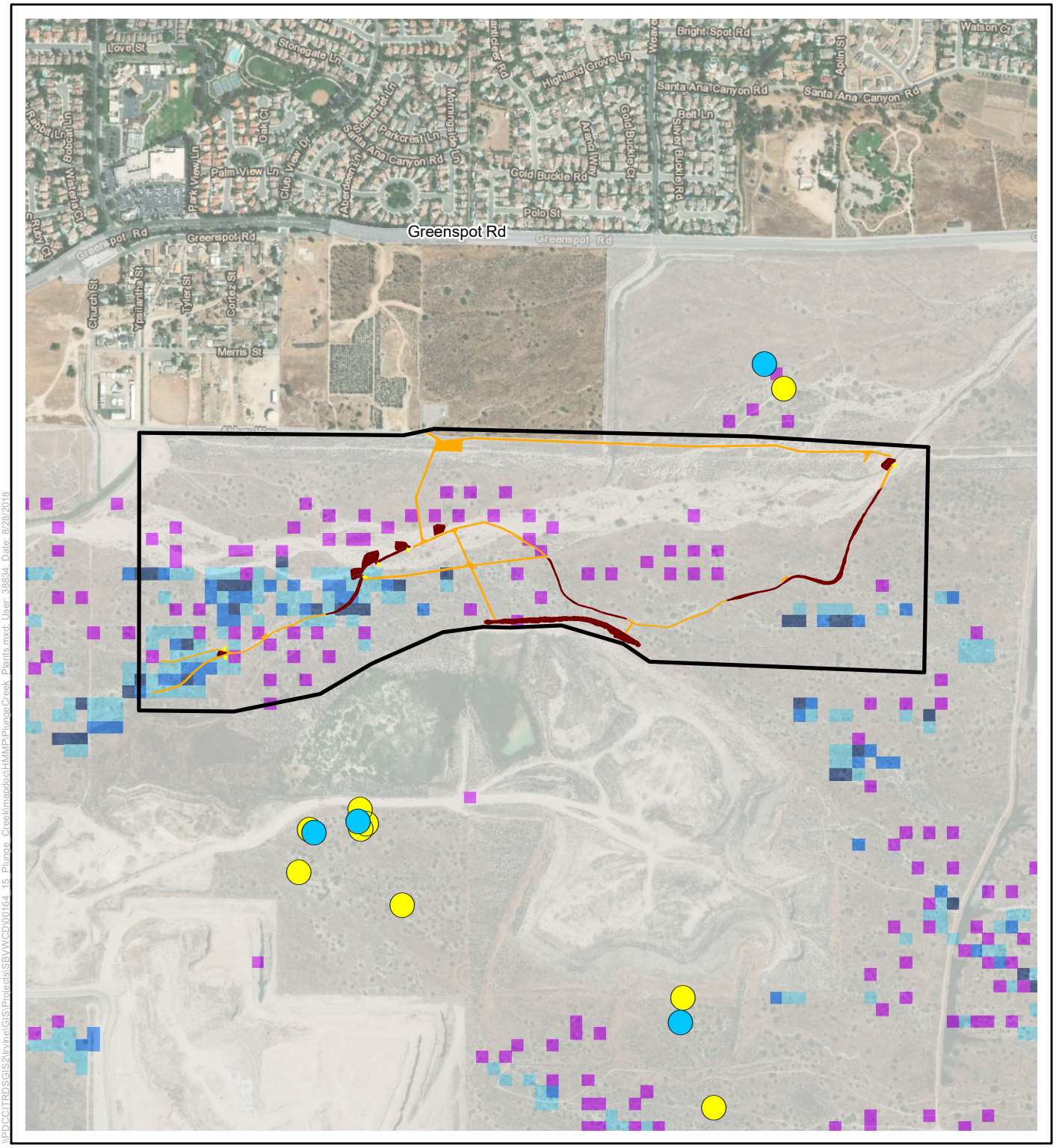
Figure 6
CRAM Assessment
Plunge Creek Conservation Project



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Legend

Study Area

Project Footprint

- Permanent
- Temporary
- Temporary-Staging

Slender-horned Spineflower Occurrences*

- CNDDB 1992, Southwest Project 1996/1997, SAIC 1997
- RBF 2012

Santa Ana Woolly-star Occurrences

Numbers of Plants Observed (2006)[1]

- 0
- 1-25
- 25-50
- >50
- Occupied, Number of Plants Unknown[2]

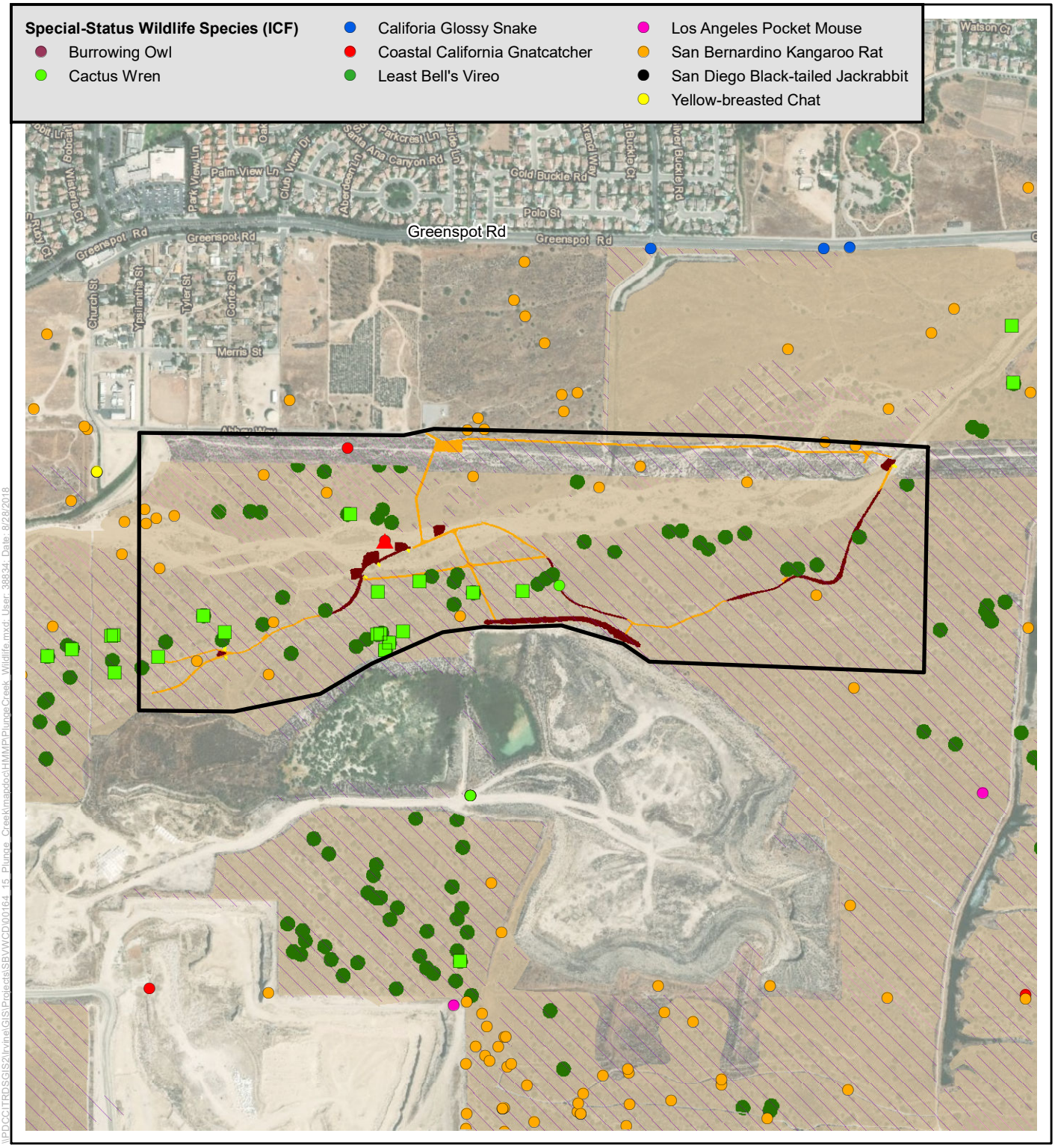
Source: ESRI; ICF 2018

N

0 500 1,000 Feet

1:12,000

Figure 7
Existing Special-Status Plants
Plunge Creek Conservation Project



Legend

Study Area

Project Footprint
- Permanent
- Temporary
- Temporary-Staging

Cactus Wren Occurrences
- Jericho Systems 2014

Potentially Suitable Cactus Wren Habitat
- Natural Habitat*

Potentially Suitable Cactus Wren Habitat
- Cactus Patches Suitable for Nesting

California Gnatcatcher Occurrences
- USFWS 1995

California Gnatcatcher Habitat Assessment (USFWS 2016)
- High Quality (potential nesting and wintering habitat)
- Medium Quality (potential wintering habitat)
- Low Quality (potential foraging and dispersal habitat)

Source: ESRI; ICF 2018

N

0 500 1,000 Feet

1:12,000

Figure 8
Existing Special-Status Wildlife
Plunge Creek Conservation Project