INITIAL STUDY

FOR THE

MOJAVE DESERT LAND TRUST PALISADES RANCH RIPARIAN RESTORATION PROJECT

Prepared for:

Mojave Desert Resource Conservation District
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Victorville, California 92392

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TABLE OF CONTENTS

Introduction 1

Environmental Factors Potentially Affected 20

Determination 21

Evaluation of Environmental Impacts 22
I. Aesthetics 24
II. Agricultural and Forestry Resources 26
III. Air Quality 28
IV. Biological Resources 38
V. Cultural Resources 64
VI. Energy 73
VII. Geology and Soils 75
VIII. Greenhouse Gas Emissions 81
IX. Hazards and Hazardous Materials 84
X. Hydrology and Water Quality 88
XI. Land Use and Planning 94
XII. Mineral Resources 96
XIII. Noise 97
XIV. Population and Housing 99
XV. Public Services 100
XVI. Recreation 102
XVII. Transportation / Traffic 103
XVIII. Tribal Cultural Resources 106
XIX. Utilities and Service Systems 110
XX. Wildfire 114
XXI. Mandatory Findings of Significance 116

Summary of Mitigation Measures 118

References 126

APPENDICES

Appendix 1 – SWCA Conceptual Riparian Restoration Plan
Appendix 2 – Air Quality / Greenhouse Gas Analyses
Appendix 3 – Draft Land Management Plan
Appendix 4 – Botanical Surveys
Appendix 5 – Surveys for Special Status Turtles and Amphibians
Appendix 6 – MGS Trapping Results
Appendix 7 – Focused Mojave River Vole Habitat Assessment & Trapping Survey
Appendix 8 – Cultural Resources

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TABLES

Table 1	Vegetation Types Specific for River Restoration and Vegetation Enhancement in the Project Area	8
Table 2	Invasive Plant Species Documented at Palisades Ranch Ranked by Cal-IPC	9
Table III-1	Ambient Air Quality Standards	29
Table III-2	Health Effects of Major Criteria Pollutants	31
Table III-3	Air Quality Monitoring Summary (2017-2020)	32
Table III-4	Daily Emissions	35
Table III-5	Annual Emissions	35
Table IV-1	Vegetation Alliance Descriptions Within the Riparian Zone at Palisades Ranch	41
Table IV-2	Observed Plant Species at Palisades Ranch	42
Table IV-3	Special Status Avian Species Known from the Region	44
Table IV-4	Biological Elements	51
Table V-1	Previously Recorded Cultural Resources Within the Scope of the Records Search	65
Table VIII-1	Construction Emissions	82
Table VIII-2	Operational Emissions	82

PHOTOS

Photo 1	Example of BDA	6
Photo 2	Example of toe wood used in restoration	7
Photo 3	Mixed perennial pepperwood at Palisades Ranch	11
Photo 4	Open perennial pepperwood at Palisades Ranch	11
Photo 5	Abandoned agricultural field dominated by prickly Russian thistle and five horn smotherweed	12

FIGURES

Figure 1	General Site Location
Figure 2	Restoration Phases
Figure 3	Overview of Planting Plan
Figure 4	Detail Wood Toe
Figure 5	Vegetation Enhancement Areas
Figure 6	Noxious Weed Ground Points and Areas
Figure II-1	Farmland Map
Figure IV-1	Open, running water and streamside growth near north boundary
Figure IV-2	One of the beaver ponds along Mojave River
Figure IV-3	Mature sands of screw bean mesquite with understory of saltbush scrub
Figure IV-4	Plant Communities Observed
Figure IV-5	Dense stands of giant reed on dry, fine sand near center of site
Figure IV-6	Salt cedar near center of site
Figure IV-7	Broad-leafed peppergrass and giant reed

Figure IV-8 Palisades Ranch Vegetation Cover
Figure IV-9 Palisades Ranch Noxious Weeds
Figure IV-10 Palisades Ranch Avian Survey Grids
Figure IV-11 Palisades Ranch Avian Distribution
Figure IV-12 Palisades Ranch Avian Distribution
Figure IV-13 Mojave River Vole Habitat Assessment
Figure IV-14 Trapping Results Overview
Figure IV-15 Proposed Restoration of OHV Impacts at Palisades Ranch

Figure V-1 Area of Potential Effect

Figure VII-1 Earthquake Fault Zones
Figure VII-2 Liquefaction & Landslides
Figure VII-3 Landslide Zones
Figure VII-4 Susceptibility to Deep-Seated Landslides in California
Figure VII-5 Palisades Ranch Soils

Figure IX-1 GeoTracker
Figure IX-2 Airport Safety & Planning Areas
Figure IX-3 Fire Hazard Severity Zones

Figure X-1 Groundwater Basins
Figure X-2 Flood Hazards

Figure XII-1 Mineral Resource Zones

Figure XVII-1 Existing Transit Routes – Desert Region

Figure XX-1 Burned Area
Figure XX-2 Full Property Scale Burn Area

LIST OF ABBREVIATIONS AND ACROYNMS

AAQS	Ambient Air Quality Standards
ACOE	Army Corps of Engineers
AJD	approved Jurisdictional Delineation
APE	Area of Potential Effect
APN	Assessor's Parcel Number
AQMD	Air Quality Management District
AQMP	Air Quality Management Plan
AVAA	Antelope Valley Adjudication Area
BACMs	Best Available Control Measures
BMPs	Best Management Practices
BRA/JD	Biological Resources Assessment/Jurisdictional Delineation
BUOW	Burrowing Owl
CAAA	Clean Air Act Amendment
CAAQS	California Ambient Air Quality Standards
CARB	California Air Resources Board
CDFW	California Department of Fish and Wildlife
CDPH	California Department of Public Health
CEQA	California Environmental Quality Act
CIP	Capital Improvement Project
CNEL	Community Noise Equivalent Level
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
DDW	Division of Drinking Water
DOI	Department of Interior
FGC	Fish & Game Code
FTA	Federal Transit Association
GCC	Global Climate Change
GHG	Greenhouse Gas
HAS	Hydrologic Sub-Area
LSA	Lake or Streambed Alteration
LST	Localized Significance Thresholds
LUST	Leaking Underground Storage Tank
MBA	Mojave Basin Area
MBTA	Migratory Bird Treaty Act
MCL	maximum contamination level
MDAB	Mojave Desert Air Basin
MDAQMD	Mojave Desert Air Quality Management District
MM	Mitigation Measure
NAAQS	National Ambient Air Quality Standards
NBP	Nesting Bird Area
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System

PPHCSD	Phelan Piñon Hills Community Services District (or District)
RL	Rural Living
RWQCB	Regional Water Quality Control Board
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCE	Southern California Edison
SIP	State Implementation Plan
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VdB	vibration-velocity decibel
VMT	vehicle miles traveled
WEAP	Worker Environmental Awareness Program
WOTUS	Waters of the United States
WQMP	Water Quality Management Plan

ENVIRONMENTAL CHECKLIST

INTRODUCTION

1. Project Title: Mojave Desert Land Trust Palisades Ranch Restoration Project

2. Lead Agency Name: Mojave Desert Resource Conservation District
   Address: 15415 W. Sand Street, #103
   Victorville, CA 92392

3. Contact Person: Charles Bell
   Phone Number: (760) 843-6882 x101

4. Project Location: Palisades Ranch is located in San Bernardino County, California, approximately 25 miles southwest of Barstow, California. The nearest cross streets are Bryman Road and Heritage Road. It consists of ±1,647 acres (21 parcels), approximately ±3.5 miles along a north-south axis and ±1.25 miles wide on an east-west axis. The project site is located within the USGS Topo 7.5-minute map for Helendale, CA and the rough center of the 1,647-acre project site is located in Section 12, Township 6 North and Range 4 West. The approximate GPS coordinates of the project site are 34.47166, -117.34820. Refer to Figure 1 for the general site location map.

   The property forms an irregular shape and varies topographically from horizonal expanses to vertical cliffs. Steep, 80-foot bluffs separate the river channel in the eastern part of the property from the alluvial flats to the west. For the most part, the property sits vacant, unimproved, and unused. Approximately 820 acres of the project site lies in the Mojave River floodplain. This means approximately 820.80 acres lie outside a floodplain. A small portion of the property had been previously used to grow hay/alfalfa and as a fruit orchard. Neither of these uses are currently operational, and the fields lie fallow. The property includes four residences, two steel buildings, an office and apartment, two open sided hay barns, wells and water tanks, and miscellaneous improvements.

5. Project Sponsor Name: Mojave Desert Land Trust
   Address: P.O. Box 1544, Joshua Tree, CA 92252

6. General Plan Designation: Open Space and Public Facility

7. Zoning: Rural Living, Helendale Community Planning Area

8. Project Description:

Introduction

The Mojave Desert Land Trust (MDLT) is a nationally accredited land trust, headquartered in Joshua Tree, that protects the unique living landscapes of the California Desert. MDLT's service area spans nearly 26 million acres—the entire California portion of the Mojave and Colorado Deserts—about 25% of the state. Since 2006, the MDLT has secured permanent and lasting protection for nearly 90,000 acres across the California Deserts. Because the MDLT is not a public agency, the Lead Agency for this project will be Mojave Desert Resource Conservation District (MDRCD or District).

The MDRCD was established in 1951 and is the largest of the 3,000 Conservation Districts across the nation. Total area that the District covers is 11,500,000 acres (17,969 square miles). The District is bounded to the north by Inyo County, to the south by Riverside County, to the east by the Arizona and Nevada borders, and to the west by Los Angeles County. The MDRCD priorities include and continue to be to address major resources concerns that face the people within the District's work area. These concerns are: wind erosion on cropland, rural and urban land conflicts, stream channel stabilization and water quality, water conservation on cropland and in urban areas, and proper range management on both private and federal leased lands. The District has also implemented an invasive weed removal (tamarisk/arundo/etc.) program for about 16 years, and has prioritized fire protection for the riparian habitat in the Mojave River bed. The MDRCD works in partnership with other government entities and various cooperators to meet the needs of economic conservation concerns throughout the District areas.[1] Given that MDLT proposes to implement a habitat restoration plan within an area of conservation, MDRCD has agreed to serve as the CEQA Lead Agency for this project.

MDLT is dedicated to ensuring access to the outdoors while preserving, protecting, and enhancing the vibrant but fragile desert ecosystem and its natural and cultural resources; expanding appreciation and support for the unique resources of the Mojave and Colorado Deserts through educational programs; increasing public engagement on important issues that could affect conserved desert lands through sound science and participation in the public review process; and advocacy for the permanent protection of important conservation lands.

MDLT is planning conservation actions for Palisades Ranch, a 1,647-acre area located along the Mojave River in San Bernardino County, California. Palisades Ranch consists of approximately 1,650 acres of upland and riparian habitat spanning over three miles of the Mojave River floodplain, between Barstow and Victorville. It is one of the few locations along the Mojave River where water is present year-round, giving rise to a diversity of habitat, including cottonwood-willow forest, arroyo willow thickets, and screwbean mesquite bosque. These riverine habitats, along with the high-quality desert scrub located on the upland portions of the property, attracts over 35 special status species including the state and federally listed desert tortoise and Least Bell's vireo. Palisades Ranch is directly adjacent to the Bureau of Land Management (BLM) designated Fremont- Kramer Area of Critical Environmental Concern (ACEC) to the west, and not far removed from both the Mojave Monkeyflower and Mojave Fishhook Cactus ACECs to the east.

MDLT's long-term conservation goals for Palisades Ranch, known as the "Jewel of the Mojave River," include natural community protection, maintenance of wildlife movement, wildlife habitat preservation, wildlife-oriented education and research, and public access and recreation

[1] https://www.mojavedesertrcd.org/about-us

consistent with conservation goals. Palisades Ranch was purchased with assistance from the CA Wildlife Conservation Board (WCB) as conservation land for the benefit of the public and WCB has also funded a restoration planning grant. As such, the responsible stewardship of this property is consistent with the State's intent when it made these grants and it is necessary to protect and maintain this significant public investment in conservation. MDLT aims to restore and protect a high conservation priority area of the Mojave River found on the Palisades Ranch by improving the resilience of important species and habitats through restoration planning and adaptive management. This Initial Study evaluates the potential effects to the environment from implementing the project.

Project Purpose and Need

The Mojave River is an important riparian lifeline for the Mojave Desert, which encompasses a quarter of the land area of California. Its waters provide the only significant corridor of riparian habitat in the western Mojave Desert and primary water source for many desert communities surrounding it. Flowing 100 miles from the San Bernardino Mountains to its terminus at Soda Lake, near the town of Baker, the Mojave River acts as the largest drainage system in the Mojave Desert with a little more than 50,000 acre-feet of water entering the system and percolating into local groundwater basins per year according to the Mojave Water Agency. The Mojave is responsible for recharging two crucial aquifers in the region used for domestic supplies and irrigation that are hydraulically linked to one another. Referred to as "an upside down and backwards river," the Mojave is unique for its inland flowing waters and predominantly subsurface baseflow, with short stretches of perennial surface flows in both the Upper and Lower Narrows, for example, this occurs in a few bedrock gorges in Victorville, Apple Valley, and outside Barstow.

These surface flows, known as transition zones, sustain permanent riparian habitats rich in biotic diversity and support critical ecological functions within desert landscapes crucial to wildlife. In fact, researchers have found that over 80% of known desert wildlife species are dependent for a portion of their life cycle on desert riparian areas for refuge and/or water access. These extensive riparian zones along the Mojave also act as important habitat linkages for migratory birds moving north out of Mexico, hosting one of the largest populations of brown-crested flycatchers *(Myiarchus tyrannulus)* in the state as well as summer tanagers *(Piranga rubra)*, the endangered least Bell's vireo (*Vireo bellii pusillus)*, and vermilion flycatcher *(Pyrocehpalus obsurus)*.

However, disturbances caused by human activities and explosive growth and expansion around the Los Angeles and Las Vegas transportation corridor are putting intense stress on this sensitive desert riparian ecosystem. Lapsed agricultural activity, land clearing, road building, unauthorized off-road vehicle use, water diversion, grazing by non-native herbivores, pollution, and fires fueled by the introduction of invasive non-native plants create disturbances that threaten the fragile Mojave River ecosystem. The Mojave Basin's groundwater aquifers have been in overdraft for decades[2], making access to critical sources of water more difficult for a wide range of vegetation and desert animals, including frogs, migrating birds, and several threatened or endangered species. Coupled with the impacts of accelerated climate change, this expansion causes desert riparian ecosystems to be less resilient to prolonged droughts and increasing temperatures, which in turn affects habitat quality, water availability, and local biodiversity. Researchers recently found that the number of bird species in the Mojave Desert has nearly halved over the last century, with 61 sites in the Mojave showing average species loss at 43%, correlating directly with habitat loss and extreme drought. Not only are birds feeling the pressure, threatened indigenous species like the Agassiz's desert tortoise (*Gopherus agassizii)* and Mohave ground squirrel *(Xerospermo-*

[2] This overdraft resulted in the entire Mojave River's adjudication in the late 1990s.

philus mohavensis) are being pushed to their physiological limits though habitat loss and other development disturbances.

Additionally, a wildfire in March 2022, dubbed the Heritage Fire, burned approximately 34 acres of riparian habitat in the southeast region of Palisades Ranch, causing extensive damage and mortality to native plants, including Fremont's cottonwoods (*Populus fremontii*), willows (*Salix* spp.), cattails (*Typha* sp.), and tule (*Schoenoplectus* spp), as well as cleared stands of invasive perennial pepperweed (*Lepidium latifolium*) and prickly Russian thistle (*Salsola tragus*). The fire occurred after MDLT had developed the conceptual restoration and design plan; while the damage from the fire does not alter restoration plans described for this project, it does contribute to the importance of restoring the property.

MDLT intends to implement a conceptual restoration and design plan for Palisades Ranch that meets state and regional priorities to identify restoration measures for critical hydrological processes and habitat health. Thirty-nine federally and state-protected wildlife species have been identified onsite, and the property includes suitable habitat for even more. Beyond the myriad listed species, the site is a biodiversity hotspot with at least 9 reptiles, 76 birds, and 7 mammal species observed onsite. A well-conceived restoration plan is essential for maintaining this Mojave oasis.

The aim of MDLT's Palisades project is to:

1. Develop a comprehensive framework with targeted priority actions to restore and protect wildlife habitat and riparian resources along a ±3.5-mile reach of the Mojave River, containing one of the most significant stands of riparian forest in the western Mojave Desert,
2. Engage the public in the issues affecting the habitats along the Mojave River and basic desert ecosystems, and
3. Create strategic partnerships at every level, from federal agencies to local entities, to ensure sustainability and coordination.

Project Description

Riparian Restoration

In 2020-2021, MDLT worked with SWCA Environmental Consultants to develop a 60% conceptual riparian restoration plan (provided as Appendix 1), which was developed using a grant from the Wildlife Conservation Board. The objectives of the restoration plan were to improve riparian and aquatic habitats for special status species (including San Emigdio blue butterfly, Mojave tui chub, southwestern willow flycatcher, western yellow-billed cuckoo, least Bell's vireo, and Lucy's warbler) while keeping in mind water allocation (groundwater/aquifer recharge, water conservation) and maintenance required for sustainable and successful restoration.

The restoration plan involves reconnecting a 170-acre abandoned agricultural field that was historically riparian habitat to the Mojave River by reestablishing a nested floodplain that resembles historic floodplain conditions. This would entail constructing a 6,600-foot main side channel, a 1,425-foot west branch side channel, and two higher elevation 5-year return interval channels within the proposed nested floodplain in the abandoned agricultural field (shown on Figures 2 and 3, which depict the proposed site modifications). This approach would restore the historic floodplain and braided channel form during annual high flows, promote natural recruitment

of riparian vegetation and beaver colonization[3], and boost groundwater storage of the floodplain aquifer. An added benefit is that the channel and wetland re-instatement on the west side of the Mojave River could absorb some storm flow for areas that have been historically subject to flooding on the east side of the River. Approximately 130 acres of riparian habitat would be restored as a result of this project. The design would also include a 2-acre pond that would provide habitat for Mojave tui chub. The design would not be hard engineering, rather the design would create a system that allows natural processes to take place, creating the greatest ecological benefit possible.

The main side channel would support perennial wetland habitats in the excavated channel and along the margins. It would route Mojave River overbank flows through the agricultural field excavated floodplain and connect to other proposed bifurcated channels. A coffer dam would be installed for two growing seasons to isolate the freshly excavated areas from the Mojave River and allow woody vegetation to establish. The main side channel is designed to have 0.5-foot-deep water at the 130 cubic feet per second (cfs) average flow that occurs during the target nesting period (Feb-April) and would be fully activated during the 1.5-year return interval Mojave River flows of 450 cfs. The main side channel would tie into the Mojave River at the downstream extents where the Mojave River conforms to a quasi-single thread channel and would be inundated from Mojave River backwater conditions during base flows for approximately 1,800 feet.

Beaver dam analogs (BDAs) would serve as temporary grade control structures in the main channel of the Mojave River to raise the head of the river and promote backwater conditions in the main side channel. The design approach is to temporarily stabilize the side channels and floodplain for the first few years after construction to initiate the restoration process, and thereafter, the design is anticipated to result in natural channel adjustments. Additional BDAs would be installed in side channels after the initial process of establishing a pilot channel; these structures would assist with fully restoring the floodplain by spreading flows across the excavated floodplain, inundating a greater area to support riparian habitats, and promoting flow in the other secondary channels.

The west branch side channel would function as a backwater channel during flows greater than the 2-year return interval and as an outlet channel for pond maintenance and/or provide irrigation water to the restored riparian areas. This channel would be tied into the proposed pond. The pond would be fed by groundwater or well water (via a groundwater pump) and refilled twice per year. It would have a maximum depth of 7 feet, a minimum depth of 4 feet and a volume of 3,386 cubic yards (CY). The pond would include an island to provide potential nesting, rearing, and basking sites for southwestern pond turtles. A continuous 100-year return interval flood elevation berm would surround the pond to prevent damage during flood event flows. A 2-foot-deep terrace would surround the south and west pond perimeter; water levels in the pond would fluctuate and inundate the terrace, creating additional shallow water habitats.

This Riparian Restoration Project would establish 13 acres of western marsh, 46 acres of willow riparian forest and shrubland, 29 acres of cottonwood riparian forest, 29 acres of wet saltbush shrubland, 13 acres of irrigated field and 60 acres of adjacent upland scrub. Revegetation would be augmented with an integrated weed management plan to minimize occurrence and spread of noxious weeds (e.g., giant reed, cheatgrass, perennial pepperweed, tamarisk, prickly Russian thistle) and increase the integrity of riparian plant communities.

[3] Beavers are not a native species to the Mojave River, but populate this stretch and other stretches of the Mojave River.

The specific details of each project component are described in Appendix 1; however, a brief explanation of each project component and phase is discussed in the section below.

Channel Wood Structures and Beaver Dam Analog Structures

The project proposes to use large wood harvested on-site to add variability in the side channels, provide cover and organic matter, promote local scour, and enhance aquatic habitats. Wood structures are planned at specific locations to help define channels, promote the establishment of a pool with overhanging cover, and provide temporary bank stability. Wood structures mimic tree roots and deadfall that would naturally occur along the stream banks and channel, aiding in soil stabilization. Over time, the woody material degrades but after vegetation has established, which will provide permanent stabilization. In addition, wood structures provide aquatic cover, provide channel bed diversity, promote stability of islands and micro-topographic features, and provide habitat for aquatic macroinvertebrates that are food sources for aquatic species.

BDA structures are planned for the mainstem of the Mojave River and the main side channel. These structures are not designed to be stable at the 100-year flood flow event and will promote the hydraulic function of the main side channel by enhancing backwater conditions during Mojave River baseflows. These structures often encourage more beaver activity. Construction of BDAs in the side channels are proposed to be installed after the initial establishment of the pilot channel and vegetation establishment of the excavated floodplain. These structures will utilize brush material harvested on-site (Photo 1).

Photo 1: Example of BDA (Wheaton et al. 2019)

Bank Structures

Bank structures are planned to provide short-term protection and promote long-term stability. Bank structures will be constructed of large toe wood, brush layering, and biodegradable materials.

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Channel Wood Structures and Beaver Dam Analog Structures

The project proposes to use large wood harvested on-site to add variability in the side channels, provide cover and organic matter, promote local scour, and enhance aquatic habitats. Based on the an assessment of the project's hydrology, the proposed channel wood structures and beaver dam analog structures are not anticipated to result in a decrease in normal or flood surface flows downstream beyond the project's boundary. Wood structures are planned at specific locations to help define channels, promote the establishment of a pool with overhanging cover, and provide temporary bank stability. Wood structures mimic tree roots and deadfall that would naturally occur along the stream banks and channel, aiding in soil stabilization. Over time, the woody material degrades but after vegetation has established, which will provide permanent stabilization. In addition, wood structures provide aquatic cover, provide channel bed diversity, promote stability of islands and micro-topographic features, and provide habitat for aquatic macroinvertebrates that are food sources for aquatic species.

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Photo 1: Example of BDA (Wheaton et al. 2019)

Bank Structures

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Toe wood structures are proposed for lateral stability and to enhance pool habitat in the Mojave River and side channels (refer to Figure 4, also to Appendix D [Mojave River Restoration 60% Design Drawings] of Appendix 1). In the Mojave River, these structures would be constructed of large wood with diameters of at least 15 centimeters (6 inches) and minimum 1.8-meter-diameter (3-foot-diameter) root balls. Toe wood structures in the side channels would be constructed of smaller branch material of at least 15 centimeters (6 inches) in diameter transplanted with intact roots placed on top of the buried logs. These structures provide lateral bank roughness and act as stable undercut bank cover for aquatic habitat. Toe wood is installed in the bank from the bottom of the pool to above the bank full water level and covered with live brush layering. Live brush layering is composed of live cuttings that take root at the toe and eventually replace the deadwood toe protection with woody growth (Photo 2).

Wood habitat clusters are proposed to be placed throughout the 2-year return interval (RI) and 5-year RI flood terrace. These structures are buried brush material; typically, plantings are incorporated into the cluster to promote hiding spaces and upland cover for terrestrial species. These structures are typically placed at the upstream side of topographic features (islands); and across the floodplain to add roughness to the freshly excavated corridor.

Weed-free non-rice straw would be worked in to the soil to provide organic material, water-holding capacity, and resistance to wind erosion.

Photo 2: Example of toe wood used in restoration

Revegetation and Plant Palette

Revegetation of the river restoration project area will involve establishing 8 vegetation types shown in Appendix D of Appendix 1: western marsh, willow riparian forest and riparian shrubland, cottonwood riparian forest, wet shrubland (saltbush), desert scrub, irrigated cottonwood field, mesic pollinator garden, and xeric pollinator garden throughout 190 acres (Table 1).

Implementation of the river restoration project will create a new surface on which to establish native plants and exclude noxious weeds, especially perennial pepperweed, tamarisk, and giant reed. The need to control perennial pepperwood is a problem throughout the reach of the Mojave River. A combination of weed-free non-rice straw and established woody riparian vegetation will provide temporary stabilization of the channels and minimize noxious weed establishment. For surfaces that are disturbed but will be disturbed again during a subsequent phase of restoration, a sterile cover crop with wildlife value would be utilized for temporary weed control.

Table 1
VEGETATION TYPES SPECIFIED FOR RIVER RESTORATION AND VEGETATION ENHANCEMENT IN THE PROJECT AREA

Vegetation Type	Flood Return Interval (years)	Area (hectares/acres)
Western marsh	≤2	5.2 / 12.9
Willow riparian forest and riparian shrubland	>2 and ≤9	18.5 / 45.8
Cottonwood riparian forest	>5 and ≤49	11.8 / 29.1
Wet shrubland (saltbush)	≥50 and <100	11.6 / 28.7
Desert scrub	≥100	19.5 / 48.1
Irrigated field	≥100	5.3 / 12.9
Mesic pollinator garden	>5 and ≤49	0.4 / 1.0
Xeric pollinator garden	≥50 and <100	4.7 / 11.5
Total		76.9 / 190.1

The recommended plant palette with plants appropriate for Palisades Ranch is provided in Appendix 1 (refer to Table 17 of Appendix 1).

Site preparation will involve clearing, weed control, and plant salvage. Soils treatment may include final grading, crimping, mulch (straw) application, and mycorrhizal inoculation. Planting methods will be specific to each vegetation type. Herbivory protection with a focus on beaver exclusion is specified for riparian forest and shrubland woody plants, including those in the mesic pollinator garden.

Riparian Enhancement

In addition to the river restoration project, the project proposes 80 acres of riparian enhancement that consists of areas identified with extensive perennial pepperweed invasion and areas where planting may result in establishment of riparian forest or shrubland (Figure 5). As stated above, the need to control perennial pepperwood is a problem throughout the reach of the Mojave River, and controlling the population of this species is of particular importance to the MDRCD, as the District promotes control of populations from the Mojave Narrows Park downstream to Palisades Ranch. Methods for controlling noxious weeds and recommended competitive native plants are discussed below. Monitoring annual weed treatment progress and effectiveness will allow adaptive management of riparian enhancement strategies.

Integrated Weed Management Plan

One of the objectives of the project is to minimize occurrence and spread of noxious weeds in riparian habitats to increase the integrity of vegetation communities. This objective is focused on avoiding monocultures to allow for diversity and habitat complexity to increase habitat for riparian and aquatic species of conservation concern.

SWCA documented 10 plant species within Palisades Ranch deemed to be invasive by the California Invasive Plant Council (Cal-IPC), including four plants listed as noxious weeds in California (refer to Table 2). The Cal-IPC invasiveness rating is based on several criteria, including the plant's ubiquity, ability to reproduce and invade new areas, and the severity of impacts on ecological systems. Cal-IPC ratings are described as follows (Cal-IPC 2020a):

High – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.

Moderate – These species have substantial and apparent, but generally not severe, ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

Limited – These species are invasive but their ecological impacts are minor on a statewide level, or there is not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of spread. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

Table 2
INVASIVE PLANT SPECIES DOCUMENTED AT PALISADES RANCH RANKED BY CAL-IPC

Species Name	Common Name	Cal-IPC Rating
*Arundo donax**	giant reed	High
Bromus tectorum	cheatgrass	High
*Lepidium latifolium**	perennial pepperweed	High
*Tamarix ramosissima**	tamarisk	High
Cynodon dactylon	Bermudagrass	Moderate
Bassia hyssopifolia	fivehorn smotherweed	Limited
Descurainia sophia	flixweed	Limited
Polypogon monspeliensis	rabbitsfoot grass	Limited
*Salsola tragus**	prickly Russian thistle	Limited
Schismus sp.	Mediterranean grass	Limited

Source: Cal-IPC (2020b)
* Indicates noxious weed listed by the California Department of Food and Agriculture (2020)

Ideally, managers would control all invasive plants present, but with finite resources, invasive plants must be prioritized based on the greatest positive ecological effect. As such, this project proposes a focus on state-listed noxious weeds but also considers plants with a Cal-IPC

invasiveness rating of high. Of the 10 invasive plants observed within Palisades Ranch, this project focuses on 5 species that are state-listed noxious weeds: giant reed, cheatgrass (*Bromus tectorum*), perennial pepperweed, prickly Russian thistle, and tamarisk. Plants rated with high invasiveness that are newly documented on Palisades Ranch and occur in small, isolated patches would be treated immediately.

The Mojave Water Agency (MWA) and MDRCD work collaboratively to control invasive plants, primarily tamarisk and giant reed, along the Mojave River. At Palisades Ranch, giant reed and tamarisk were treated using the aquatic-label imazapyr (Habitat) and the cut stump method in 2009, and from 2015 through 2019, 1,780 acres of weeds were treated throughout the Mojave River Basin. This watershed approach to weed treatment is very important to the overall success along the Mojave River because propagules often spread from upstream to downstream. For this reason, coordination between MDLT, regional agencies, and nearby landowners will be an integral component of integrated weed management planning. Integrated weed management involves using a combination of techniques, including prevention, for long-term weed management.

Giant Reed
Giant reed is a tall perennial grass that forms dense monotypic stands along riparian areas and wetlands. Within Palisades Ranch, 36 individuals and 10 large infestations containing giant reed were mapped (Figure 6). These infestations were typically observed in areas with high water saturation near active channels and open water. Giant reed was especially prevalent on the east side of the Heritage Road bridge near the levee road.

The MDRCD recommends applying imazapyr (Habitat) to giant reed using the cut stump method in late summer. MDLT will continue to cooperate with MDRCD to arrange these herbicide treatments on Palisades Ranch, if possible, at least every 5 years. Herbicide treatments for giant reed could be combined with treatments for tamarisk because the application method and recommended herbicide are the same. Establishing native plants after treatment will provide long-term control.

Cheatgrass
Cheatgrass is an annual bunchgrass native to Eurasia. Cheatgrass was not mapped during riparian plant surveys but was observed throughout Palisades Ranch. The population density of cheatgrass is low, and eradication may be feasible using the early detection rapid response (EDRR) model. The EDRR model includes identifying invasive, non-native species before a population is established (early detection) and then eradicating it while treatments are still effective (rapid response).

Perennial Pepperwood
Perennial pepperweed is an extremely competitive herbaceous perennial forb that can form dense monotypic stands. Perennial pepperweed was first documented along the Mojave River in 2012 and has spread profusely since then. MDRCD mowed perennial pepperweed and tested two herbicides for control, chlorsulfuron (Telar) and imazapyr (Polaris), and determined that imazapyr was most effective at controlling perennial pepperweed. Perennial pepperweed is the second most abundant noxious weed present within Palisades Ranch with 44 acres of dominant cover mapped (Figure 6). While the 44-acre area represents patches where perennial pepperweed is the dominant species, it does not represent the entirety of the areas infested. Perennial pepperweed varies in density throughout Palisades Ranch riparian corridor depending on soil

saturation and overstory cover. Perennial pepperweed occupies the understory of riparian forests and open areas as shown below on Photos 3 and 4.

Photo 3: Mixed perennial pepperwood at Palisades Ranch

Photo 4: Open perennial pepperwood at Palisades Ranch

Perennial pepperweed will be the most difficult weed to treat within Palisades Ranch and will require a phased approach. Best practices for controlling perennial pepperweed within mixed stands of riparian trees and shrubs, as occur within Palisades Ranch, are not well established. Three steps will be required for control: 1) removal of thatch, 2) application of herbicide, and 3) planting of competitive native plants suited to the environmental conditions of the site.

Three methods for thatch removal are recommended for trial treatments, to be conducted in the early spring when plants are bolting or budding. In more open areas, perennial pepperweed thatch would be mowed using a tracked vehicle (e.g., skidsteer) with mower attachment. In large patches of perennial pepperweed mixed with trees and shrubs, early spring grazing by goats or sheep may clear the plant biomass after thatching has been removed. MDLT will need to coordinate with local herders to discuss the feasibility of using goats to reduce thick thatch within Palisades Ranch. Manual removal with weed-eaters may also be an option in smaller patches that are nearer to surface water.

After the perennial pepperweed thatch is cleared, herbicide is necessary for control. Most of the areas dominated by perennial pepperweed within Palisades Ranch are in moist sites and will require use of an aquatic-label herbicide. Imazapyr (Habitat) has been recommended by the MDRCD which is a non-selective herbicide (treats forbs [broadleaf plants] and grasses). Application via backpack sprayer, wicking, or hand wiping to specifically target perennial pepper weed plants and avoid contact with the soil is recommended in April or May. Applicators must be careful not to apply the herbicide to native riparian plants.

Planting or seeding would occur late fall after herbicide application. Seeding with beardless wildrye (*Leymus triticoides*), especially in partially shaded sites, is one of the most effective revegetation methods. Other species should be tested for competitiveness.

It is anticipated that the treatment of 10 acres per year, starting upstream and working downstream across Palisades Ranch would be sufficient. Records of the treatments that are applied and plant species used for revegetation would be kept to assist in determining the most effective methods for use within Palisades Ranch and to inform other land managers in the Mojave

River Valley. The area and frequency of treatments would diminish over time as perennial pepperweed control becomes more successful.

Prickly Russian Thistle
Prickly Russian thistle, typically known as tumbleweed, invades disturbed substrates such as ditches, vacant lots, and agricultural fields. Prickly Russian thistle is the most abundant noxious weed present within Palisades Ranch with 164 acres mapped. The largest patch of prickly Russian thistle within Palisades Ranch is in the abandoned agricultural field within the footprint of the riparian restoration project that is currently being designed.

Photo 5: Abandoned agricultural field dominated by prickly Russian thistle and fivehorn smotherweed

Options for treatment of prickly Russian thistle and fivehorn smotherweed will depend on timing and phasing of riparian restoration implementation and the ability to irrigate. Ideally, prickly Russian thistle and fivehorn smotherweed would be treated prior to riparian restoration implementation. Exhausting the weed seed bank in the restoration site prior to construction will reduce vegetation maintenance requirements after restoration. Dense thatch could be burned, tilled in as deeply as possible, or masticated. Biomass removal would be followed by herbicide treatments for 2 years to significantly reduce the prickly Russian thistle and fivehorn smotherweed seed bank. Follow-up treatments during this period are extremely important to take advantage of the opportunity of having a “clean slate” following earthwork.

MDLT will plan for follow-up control treatments for three growing seasons to provide long-term management. Lair and Lair (2020) recommend treatment with contact herbicides with low or short residual activity in the soil, such as a mixture of fluroxypyr (e.g., Vista), which is effective on fivehorn smotherweed, and 2,4-D and/or light rates of dicamba, which is more effective on prickly Russian thistle. Other herbicide options are possible and may be evaluated in coordination with a pest control advisor. For the first year of herbicide treatment following weed residue mastication and/or tillage, certain short-residual herbicides such as chlorsulfuron (e.g., Telar XP) may also be feasible, in tank mix with the contact herbicides, providing season-long control of newly germinating annual weeds.

Depending on the feasibility of irrigation, a cover crop of sorghum sudangrass would be very effective in preventing reestablishment of prickly Russian thistle and fivehorn smotherweed, but this crop would require maintenance (e.g., clipping to prevent from going to seed). Saltbush could also be grown out with minimal irrigation to revegetate wet shrubland post-restoration.

MDLT may wish to phase the restoration project by excavating terraces for the 2- and 5-year flood RI a year or more before other implementation begins. This phasing would allow propagation of wetland vegetation for revegetation and control of prickly Russian thistle and fivehorn smotherweed.

Tamarisk
Tamarisk is a woody phreatophyte shrub or tree that has been mapped within Palisades Ranch, with 56 points and eight polygons were mapped that contained tamarisk. While tamarisk can be found near active channels, most were identified along sandbars and historic channel alignments. Tamarisk occurs as scattered individuals, especially near the island in the middle portion of Palisades Ranch, instead of large patches.

The recommended treatment method for tamarisk is the same as that for giant reed. A cut stump application of Imazapyr (Habitat) during the late summer is anticipated to be effective. MDRCD currently relies on beetles to work on the tamarisk along the river, which is an approach that MDLT may consider, if feasible for the remote stands within the Palisades Ranch footprint. MDLT would hire crews for giant reed and tamarisk control every 3 years at the onset of treatment and then every 5 years when infestations are more manageable and effective treatments identified. In more moist areas, planting willow or cottonwood poles where tamarisk is treated will provide more long-term control. Saltbush or mesquite planting may be considered for drier areas where tamarisk is treated. Planting following weed treatment will require marking locations with GPS units or flagging where tamarisk is treated.

Monitoring
Records of noxious weed treatments will be maintained to track the effectiveness of methods, especially methods for perennial pepperweed control. Vegetation mapping and monitoring to track the extent of noxious weed patches and search for potential new occurrences of noxious weeds that could become problematic if not treated swiftly would occur at least every 5 years and more frequently in recently disturbed sites. Some potential weeds to be aware of include Russian knapweed (*Acroptilon repens*), Asian mustard (*Brassica tournefortii*), Russian olive (*Elaeagnus angustifolia*), purple loosestrife (*Lythrum salicaria*), hybrid common reed (*Phragmites australis* ssp. *americanus* x ssp. *australis*), and plants rated as highly invasive by Cal-IPC. Lair and Lair (2020) suggest monitoring noxious weeds that occur in Mojave Narrows Park may indicate which species could be expected downstream on the Mojave River.

Zones of Encouragement of Public Access
MDLT is currently planning management strategies to reduce illegal OHV use. These plans are outlined below and will inform which areas in the uplands within Palisades Ranch would be available for public access. The project includes a 1.8-mile trail system to the existing Heritage Road bridge where a wildlife-viewing platform will be installed, a short loop around the pollinator gardens, as well as a long, nested loop trail system around the restoration area with a boardwalk over the restored side channel; pond overlook; and promontory overlook of the Mojave River and riparian restoration area. These areas will be the focus of public access within Palisades Ranch, providing opportunities for compatible public uses, such as hiking, bird watching, wildlife viewing, and photography.

The area surrounding the western yellow-billled cuckoo detected in 2020 was avoided in the restoration design. If this bird is detected within Palisades Ranch in the future, all efforts will be made to limit disturbance in the vicinity. The project anticipated discouragement of vehicular use from the east side along Heritage Way. Access along the levee would be further discouraged to limit potential disturbance of least Bell's vireo nesting pairs. MDLT may designate an additional site in the northern half of Palisades Ranch for Mojave River access to concentrate public use.

Project Phasing and Prioritization: Riparian Enhancement Projects, Phases of River Restoration, and Recreational Improvement

Implementing this restoration project would occur in three main phases and include the following activities (refer to Figure 2):

Phase 1: Constructing the main side channel and nested floodplain, installing BDAs in the main channel, restoring 75 acres of riparian and wet shrubland vegetation, constructing 6,991 feet of channel, installing temporary irrigation in planted areas.

Phase 2: Removing the coffer dam to activate the main side channel, constructing the Mojave tui chub pond, constructing the west branch side channel to carry outflow of the pond, restoring 39 acres of riparian and wet shrubland vegetation and 48 acres of desert scrub, constructing 4,360 feet of channel, installing temporary irrigation in planted areas.

Phase 3: Excavating the 5-year discharge channel, constructing the cottonwood field and permanent irrigation system, installing BDAs in the side channels, final grading, restoring 15 acres of riparian and wetland shrubland vegetation, constructing 1,465 feet of channel, installing temporary irrigation in planted areas.

Riparian enhancement projects, phases of river restoration, and recreational improvements are provided below in the recommended order of implementation and also in Figure 2.

Riparian Enhancement Pilot Project: Removal of some riparian trees and shrubs will be necessary to complete the river restoration project. The California Department of Fish and Wildlife (CDFW) regulates alterations to riparian vegetation through the CDFW Section 1602 Lake and Streambed Alteration Agreement. Implementation of the river restoration design will result in an overall increase in wetlands, but MDLT may establish riparian plants in the riparian enhancement pilot project prior to implementation to establish new woody plants and expedite the CDFW permitting process.

Native Plant Propagation: MDLT operates a native plant nursery, and Palisades Ranch could be used to propagate native plants for revegetation. Seed and propagule collection could begin immediately, especially for species listed in the plant palette or others that MDLT has experience propagating that would benefit habitat within Palisades Ranch. Vegetative mats are specified in the river restoration plan for temporary stability of the restored channels and weed control. A mixture of bulrush, rushes, sedges, and grasses can be used to grow the vegetative mats in a field setting.

Species-specific Bird Surveys: At least one season of species-specific surveys for least Bell's vireo, southwestern willow flycatcher, and western yellow-billed cuckoo would be conducted at Palisades Ranch prior to the implementation of restoration activities to establish baseline

distribution for each species. Surveys for each species follow standard protocols that can be easily replicated following restoration, which would inform assessments of restoration success.

Final Restoration Plan Design: The final restoration plan design will include final grading, structural details, detailed construction specifications, plant quantities, irrigation design, an engineer's estimate of costs, an operations and maintenance plan, and development of a stormwater pollution prevention plan (SWPPP) by a contractor's qualified SWPPP Developer (QSD).

Mycorrhizae Restoration: Fremont cottonwoods and willows form mycorrhizal associations, and mycorrhizae are depleted in disturbed soils. Restoring an appropriate mycorrhizal community can improve native plant survival and growth, often by 25 to 50%. This task provides for site assessments and mycorrhizal collection, rearing, and application necessary restore mycorrhizal inoculum custom-matched to the restoration site and plants.

Phase I River Restoration: Construct the main side channel and nested floodplain and install BDAs in the Mojave River at the downstream tie-in location. Phreatophytic riparian shrubs and trees will be planted to stabilize the restored area. Approximately 75 acres will be restored to riparian and wet shrubland vegetation. Temporary irrigation will be installed in areas planted with wet shrubland. 6,991 feet of channel will be constructed.

Phase II River Restoration: Actions include removal of the coffer dam to activate the main side channel, construction of the pond, and construction of the west branch side channel to carry the outflow of the pond, and re-initiation of the channel west of the island to enhance riparian vegetation. Approximately 39 acres will be restored to riparian and wet shrubland vegetation, and 48 acres will be restored to desert scrub. Irrigation of transitional and upland plantings using the pond outflow will begin. Temporary irrigation will be installed in areas planted with wet shrubland or desert scrub. 4,360 feet of channel will be constructed.

Phase III River Restoration: Actions included in the third phase of river restoration include excavation of the 5-year discharge channel, construction of the cottonwood field and permanent irrigation system, installation of BDAs in the side channels, final grading of hillocks, and installation of pollinator gardens. Approximately 15 acres will be restored to riparian and wet shrubland vegetation, and 13 acres of pollinator gardens will be planted. Temporary irrigation will be installed in areas planted with wet shrubland or pollinator gardens. 1,465 feet of channel will be constructed.

Construction of Recreation Amenities: Construction of the trail to the bridge, nested loop trail, trail through the pollinator garden, and parking lot are anticipated to occur in respective order. The trails construction is anticipated to occur during restoration implementation to avoid having to re-disturb the area and native plants that have established in the trail footprint.

Irrigation: Temporary irrigation of the restoration areas will need to continue for 1 to 3 years after revegetation depending on the success of the species planted as part of the revegetation effort.

Weed Management: Weed management tasks will be needed every year, especially following restoration implementation. In total, 80 acres of vegetation enhancement were identified for weed management with a focus on perennial pepperweed.

Monitoring: Vegetation and wildlife monitoring are anticipated to be conducted regularly to provide knowledge of the distribution and abundance of target species and evidence of restoration success in relation to project goals.

Water Needs / Evapotranspiration

Critical to implementing this restoration project is having sufficient water. Temporary irrigation of the restoration areas would need to continue for 1 to 3 years after revegetation. The greatest potential consumptive uses resulting from this project would be from evapotranspiration (ET) rates of planned willow riparian forest and riparian shrubland in the nested floodplain corridor. Rates of ET would be higher than the ET rate from existing use (i.e., an agricultural field used for alfalfa production).

However, whether ET rates for new riparian vegetation resulting from this project would be considered consumptive uses needs to be confirmed by the Watermaster for the Mojave Water Agency. Available consumptive uses for the project are estimated to be 74-acre feet (AF) (refer to Table 15 of the Conceptual Riparian Restoration Plan for Palisades. If the existing water rights are considered a transfer of use, there may be consumptive use adjustments for aquaculture (surface water times 2 meters [7 feet]). MDLT currently has the rights to 40 AF. However, under a legal adjudication of water rights for the Mojave Basin, over time MDLT will only be able to use 22 AF of the current 40 AF.

OHV Damage at Palisades Ranch

Palisades Ranch is located in the desert of southern California, where OHV Recreation is more popular than almost anywhere else in the world. The BLM's West Mojave Travel Management Plan permitted OHV Recreation to occur on land directly adjacent to Palisades Ranch. Designated OHV routes on these adjacent lands continued onto and through the Palisades Ranch property, which has not been designated for such use. This undesignated and unwanted OHV Recreation created several trails, destroyed native vegetation, and caused undue stress and harm to the wildlife on this property. The MDLT intends to stop all OHV activity on the project site and to remedy the long-term damage directly caused by OHV Recreation, and will be doing so through a separate CEQA process with California State Parks pursuant to a Grant that has been awarded to accomplish this work. As this is a separate project, it will not be evaluated as part of this Initial Study.

Construction Scenario

The Implementation of the proposed Palisades Ranch Restoration Project—which includes fence installation, habitat restoration, and installation of signage—is anticipated to require up to 5 years (60 months) with a target completion date of 3 years (36 months), with the anticipated start date of construction in October 2022. The project could be completed as early as October 2025, though it may be completed at the latest around October of 2027.

Riparian Enhancement Projects, Phases of River Restoration, and Recreational Improvement

The Riparian Enhancement Pilot Project will require utilization of the following tools and construction equipment: tool for planting willow and cottonwood cuttings (e.g., Waterjet Stinger), cutting and pruning tools, chicken wire and/or steel cloth; tracked vehicle (e.g., skidsteer) with mower attachment and manual tools (e.g., weed-eaters); grazing by sheep or goats may also be used to remove thatch;

aquatic-label herbicide applied to perennial pepperweed via backpack sprayer, wicking or hand wiping; buckets for broadcasting seed of native riparian plants.

Mycorrhizae Restoration will require 8-10 volunteers and staff utilizing the following tools and construction equipment: gardening hand tools (e.g., spade, trowel, rake, hoe); arbuscular mycorrhizal cultures.

Phase I River Restoration will require utilization of the following tools and construction equipment: survey equipment, earth-moving heavy equipment and hauling equipment (e.g., backhoe-excavator, dump truck); silt fencing; manual cutting, pruning, digging tools, buckets, Waterjet Stinger; planting containers and stakes, chicken wire and/or steel cloth, native seed, arbuscular mycorrhizal cultures; tracked vehicle (e.g., skidsteer) with mower attachment, herbicide (aquatic label for perennial pepperweed, imazapyr for giant reed and tamarisk), backpack sprayer; erosion control seed; weed-free straw; irrigation hoses, water pump.

Phase II River Restoration will require utilization of the following tools and construction equipment: survey equipment, earth-moving heavy equipment and hauling equipment (e.g., backhoe-excavator, dump truck); silt fencing; manual cutting, pruning, digging tools, hammers, mallets, buckets, Waterjet Stinger; planting containers and stakes, chicken wire and/or steel cloth, native seed, arbuscular mycorrhizal cultures; tracked vehicle (e.g., skidsteer) with mower attachment, herbicide (aquatic label for perennial pepperweed, imazapyr for giant reed and tamarisk), backpack sprayer; erosion control seed; weed-free straw; irrigation hoses, water pump, groundwater pump and utility housing; headgate outlet structure, pond liner.

Phase III River Restoration will require utilization of the following tools and construction equipment: survey equipment, earth-moving heavy equipment and hauling equipment (e.g., backhoe-excavator, dump truck); silt fencing; manual cutting, pruning, digging tools, hammers, mallets, buckets, Waterjet Stinger; planting containers and stakes, chicken wire and/or steel cloth, native seed, arbuscular mycorrhizal cultures; tracked vehicle (e.g., skidsteer) with mower attachment, herbicide (aquatic label for perennial pepperweed, imazapyr for giant reed and tamarisk), backpack sprayer; erosion control seed; weed-free straw; irrigation hoses, water pump, groundwater pump and utility housing; crusher fines, 50-foot boardwalk.

Installation of irrigation will require utilization of the following tools and construction equipment: irrigation hoses, buckets, water pump.

Construction of the trail to the bridge, nested loop trail, trail through the pollinator garden, and parking lot will require utilization of the following tools and construction equipment: earth moving equipment, native seed, manual cutting, pruning, digging tools, hammers, mallets, planting containers and stakes, buckets, chicken wire and/or steel cloth, crusher fines.

Operational Scenario

Irrigation: Temporary irrigation of the restoration areas will need to continue for 1 to 3 years after revegetation depending on the success of the species planted as part of the revegetation effort. It is anticipated that the volume of the pond is 3,386 cubic yards, equal to 2-acre feet (AF), and it would be refilled twice per year in order to use the pond water for irrigation purposes and to reduce pond salinity and temperature to maintain habitat conditions for Mohave tui chub. This is an estimate that is based on evapotranspiration rates, and is the best estimate MDLT can provide at this time.

Weed Management: Weed management tasks will be needed every year, especially following restoration implementation. In total, 80 acres of vegetation enhancement were identified for weed management with a focus on perennial pepperweed. Weed management would require visits to Palisades Ranch in the amount of an estimated 20 days per year, would be accomplished by a staff of 4-8 persons and would require the utilization of the following tools and construction equipment: tracked vehicle (e.g., skidsteer) with mower attachment and manual tools (e.g., weed-eaters); manual digging, cutting, puning tools; aquatic-label herbicide applied to perennial pepperweed via backpack sprayer, wicking or hand wiping, imazapyr applied to giant reed and tamarisk.

Monitoring: Vegetation and wildlife monitoring will be conducted regularly to provide knowledge of the distribution and abundance of target species and evidence of restoration success in relation to project goals. It is anticipated that monitoring would require visits to Palisades Ranch in the amount of an estimated 30 days per year, and would be accomplished by a staff of 2-4 persons.

Recreational Use: MDLT anticipates that, during the cooler months (6-8 months per year) Palisades Ranch may see an average of 10 visitors per day.

Daily Operations: As stated above, Palisades Ranch is currently operated by one onsite caretaker, and this onsite caretaker will continue to monitor onsite activities. Additionally, MDLT staff and volunteers may visit the site on an as needed basis (not categorized under the operational categories above) averaging 2 persons per day for 60 calendar days per year.

9. Surrounding land uses and setting: (Briefly describe the project's surroundings)

The project site is located within the Palisades Ranch, a 1,647-acre area located along the Mojave River in San Bernardino County, California. Palisades Ranch consists of approximately 1,650 acres of upland and riparian habitat spanning over three miles of the Mojave River floodplain, between Barstow and Victorville.

- To the west of the site, the land use is Resource/Land Management (RLM) and Rural Living (RL). Part of the area to the west of the site is owned by the Bureau of Land Management (BLM); this immediate area is vacant of human occupancies and consists of vegetation and habitat consistent with the much of Mojave Desert.

- To the north of the site, the land uses are RLM, RL, and Medium Density Residential. The area to the north of the site contains residences and a recreation-oriented community or is otherwise vacant consisting vegetation and landscape consistent with the much of Mojave Desert.

- To the east of the site, the land uses are RLM and RL, containing a solar field and scattered development adjacent to the original Route 66 Highway; and,

- To the south of the site, the land use uses are Public Facility (PF), RLM, and RL; this area is vacant consisting vegetation and landscape consistent with the much of Mojave Desert the Mojave Riverbed running through a portion to the south of the site, as well as other scattered development adjacent to the Route 66 Highway.

10. Other agencies whose approval is required (e.g., permits, financing approval, or participation agreement.)

Based on an evaluation of the specific project location, because the amount of area to be disturbed by the whole project will be greater than one acre, the Lead Agency will be required to file a Notice of Intent (NOI) for a General Construction permit to comply with the National Pollutant Discharge Elimination System (NPDES) requirements. The NOI is filed with the State Water Resources Control Board and enforced by the Santa Ana Regional Water Quality Control Board (RWQCB). A Stormwater Pollution Prevention Plan (SWPPP) must be implemented in conjunction with construction activities.

The U.S. Fish and Wildlife Service (USFWS) and CDFW may need to be consulted regarding threatened and endangered species documented to occur within an area of potential impact for future individual projects. This could include consultations under the Fish and Wildlife Coordination Act.

The project includes the potential discharge of fill into or alterations of "waters of the United States," "waters of the State," and stream beds of the State of California. Regulatory permits to allow fill and/or alteration activities due to project activities such as pipeline installation are likely be required from the Army Corps of Engineers (ACOE), the Regional Board, and CDFW over the life of the restoration project. A Section 404 permit for the discharge of fill material into "waters of the United States" may be required from the ACOE; a Section 401 Water Quality Certification may be required from the Regional Board; a Report of Waste Discharge may be required from the Regional Board; and a 1600 Streambed Alteration Agreement may be required from the CDFW.

Additionally, the project must comply with the San Bernardino County Fire Department, and any other responsible agency that may have discretionary authority over all or a portion of the project.

No other permits or agency requirements have been identified in association with the proposed project.

11. Have California Native American tribes traditionally and cultural affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, has consultation begun?

Yes, MDRCD sent a formal consultation letter to the San Manuel Band of Mission Indians on August 25, 2021. On September 14, 2021, the San Manuel Band of Mission Indians contact, Ryan Nordness, requested consultation with the MDRCD on this project under AB 52. Consultation concluded through the implementation of the requested mitigation measures by the San Manuel Band of Mission Indians.

> Note: Conducting consultation early in the CEQA process allows tribal governments, lead agencies, and project proponents to discuss the level of environmental review, identify and address potential adverse impacts to tribal cultural resources, and reduce the potential for delay and conflict in the environmental review process. (See Public Resources Code section 21083.3.2.) Information may also be available from the California Native American Heritage Commission's Sacred Lands File per Public Resources Code section 5097.96 and the California Historical Resources Information System administered by the California Office of Historic Preservation. Please also note that Public Resources Code section 21082.3(c) contains provisions specific to confidentiality.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☒ Air Quality
☒ Biological Resources	☒ Cultural Resources	☒ Energy
☒ Geology / Soils	☐ Greenhouse Gas Emissions	☒ Hazards & Hazardous Materials
☒ Hydrology & Water Quality	☐ Land Use / Planning	☐ Mineral Resources
☐ Noise	☐ Population / Housing	☐ Public Services
☐ Recreation	☒ Transportation	☒ Tribal Cultural Resources
☒ Utilities / Service Systems	☒ Wildfire	☒ Mandatory Findings of Significance

DETERMINATION (To be completed by the Lead Agency)

On the basis of this initial evaluation, the following finding is made:

☐	The proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
☒	Although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
☐	The proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
☐	The proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.
☐	Although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Tom Dodson & Associates — Prepared by

May 2022 — Date

Lead Agency (signature)

Date

EVALUATION OF ENVIRONMENTAL IMPACTS:

1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

2) All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3) Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

4) "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from "Earlier Analyses," as described in (5) below, may be cross-referenced).

5) Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:

   a) Earlier Analysis Used. Identify and state where they are available for review.
   b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.
   c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

7) Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

8) This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.

9) The explanation of each issue should identify:

   a) the significance criteria or threshold, if any, used to evaluate each question; and
   b) the mitigation measure identified, if any, to reduce the impact to less than significance.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
I. AESTHETICS: Except as provided in Public Resources Code Section 21099, would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☒	☐
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning or other regulations governing scenic quality?	☐	☐	☒	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

SUBSTANTIATION

a. *Less Than Significant Impact* – Palisades Ranch consists of approximately 1,650 acres of upland and riparian habitat spanning over three miles of the Mojave River floodplain, between the communities of Helendale to the north and Oro Grande to the south, in the high desert region of San Bernardino County. Although the project site includes both upland and riparian areas, the focus of this Initial Study is on the lower portion of the site along the Mojave River, which makes up approximately one-half of the Palisades Ranch property. The project site is one of the few locations along the Mojave River where water is present year-round, giving rise to a diversity of habitat, including cottonwood-willow forest, arroyo willow thickets, and screwbean mesquite bosque. However, under existing conditions, the project site also includes four residences, two steel buildings, an office and apartment, two open sided hay barns, wells and water tanks, and miscellaneous improvements. A small portion of the property had been previously used to grow hay/alfalfa and as a fruit orchard; but agricultural production has ceased and the fields lie fallow. Restoring these areas to a natural state would increase the riparian habitat such that the effect on a scenic value of the property would be improved. There would be no substantial adverse effect on the scenic vista in which the project site is located, and as such impacts under this issue would be less than significant.

b. *Less Than Significant Impact* – The project site is located along a stretch of the Mojave River between the communities of Helendale to the north and Oro Grande to the south. The area in which the project site is located is sparsely developed with a number of uses including the National Trails Highway (Historic Route 66), a County scenic highway, and the BNSF railroad right-of-way with a double track that generally run parallel to the Mojave River to the east. In addition, on the east side of National Trails Highway in the vicinity of the project site, there is a large aggregate mine site with processing facilities. On the west side of National Trails Highway and the BNSF right-of-way is a large (+120 acres) solar farm, and sparsely developed rural residential properties with some related agriculture. These features are located between the National Trails Highway and the Mojave River area where the project site is located. The defining feature when looking westward from the Highway is of the palisades–extended rock cliffs rising along the west side of the Mojave River at heights of up to 80 feet above the riverbed. Restoring the project site to riparian habitat would not significantly alter the views of the river and related palisade features from the National Trails Highway. Furthermore, no trees or rock outcroppings would be modified or altered as part of the proposed restoration project, and no historic buildings would be modified by the proposed project. Therefore, improvements would

have a less than significant potential to damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state or local scenic highway corridor.

c. *Less Than Significant Impact* – See responses to items "a" and "b" above. The proposed project is not located in an urban area. As stated above, the proposed project would restore the project site to riparian habitat, which would be an improvement to the visual character and quality of public views of the site and its surroundings. As such, the proposed project would have a less than significant impact under this issue.

d. *No Impact* – There are no new light or glare sources associated with the proposed Palisades Ranch restoration project. Therefore, the proposed project would have no potential to create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
II. AGRICULTURE AND FORESTRY RESOURCES: In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				
a) Convert Prime Farmland, Unique Farmland or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

SUBSTANTIATION

a. *No Impact* – According to the California Farmland Mapping and Monitoring Program (FMMP), San Bernardino County Important Farmland Map, 2016 (the latest map available from the FMMP), the area is classified as grazing land where existing vegetation is suited to the grazing of livestock. There is no Prime Farmland, Farmland of Statewide Importance, Unique Farmland or Farmland of Local Importance present on the Palisades Ranch restoration project site (Figure II-1). As such, the proposed project would have no potential to convert Prime Farmland, Unique Farmland or Farmland of Statewide Importance (Farmland) to non-agricultural use.

b. *No Impact* – The project site is not under a Williamson Act contract. The project site is designated as Floodway within the Mojave River, and Rural Living 5 acres (RL-5) by the County of San Bernardino, and as such, would not conflict with existing zoning for agricultural use. Impacts under this issue are considered less than significant.

c. *No Impact* – The project site is located along and immediately adjacent to the Mojave River in the high desert region of San Bernardino County. There are no forest land or timberland designation in this area, and the project site is not designated as forest land or timberland in the County's General Plan. Public Resources Code (PRC) para. 12220(g) defines "Forest Land" as "land that can support 10-percent native tree cover of any species, including hardwoods, under natural conditions, and that allows management of one or more forest resources, including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits." Under this definition certain woodland areas within and adjacent to the Mojave River within Palisades Ranch may qualify as "forest land." The proposed project is intended to restore the habitat to enable growth of the riparian woodland forest area within the project site. Thus, the proposed project would have no potential to conflict with existing zoning for, or cause rezoning of, forest land, timberland, or timberland zoned timberland production. No impacts under this issue are anticipated, and no mitigation is required.

d. *No Impact* – The project site is located along and immediately adjacent to the Mojave River in the high desert region of San Bernardino County. As stated above, definition certain woodland areas within and adjacent to the Mojave River within Palisades Ranch may qualify as "forest land." The proposed project is intended to restore the habitat to enable growth of the riparian woodland forest area within the project site. Thus, the restoration of the Palisades Ranch site would have no potential to result in the loss of forest land or conversion of forest land to non-forest use. No impacts under this issue are anticipated, and no mitigation is required.

e. *No Impact* – A small portion of the property has been previously used to grow hay/alfalfa and as a fruit orchard. However, neither of these uses are currently operational, and the fields lie fallow. In addition, as noted in II(d) above, the proposed project is intended to restore the habitat to enable growth of the riparian woodland forest area within the project site. Thus, the restoration of the Palisades Ranch site would have no potential to adversely impact forestry resources. Therefore, there would be no impact to farmland or forest land, and therefore no impacts under this issue.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
III. AIR QUALITY: Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☐	☒	☐	☐
c) Expose sensitive receptors to substantial pollutant concentrations?	☐	☒	☐	☐
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐

SUBSTANTIATION: The following information utilized in this section of the Initial Study was obtained from the "Air Quality and GHG Impact Analyses, Mojave Desert Land Trust Palisades Ranch Restoration Project, County of San Bernardino, California" prepared by Giroux and Associates dated March 24 2022. This document is provided as Appendix 2 to this document.

Background

Climate

The climate of the Victor Valley, technically called an interior valley subclimate of Southern California's Mediterranean-type climate, is characterized by hot summers, mild winters, infrequent rainfall, moderate afternoon breezes, and generally fair weather. The clouds and fog that form along the Southern California coastline rarely extend across the mountains to Victorville and surrounding high desert communities. The most important local weather pattern is associated with the funneling of the daily onshore sea breeze through El Cajon Pass into the upper desert to the northeast of the heavily developed portions of the Los Angeles Basin. This daily airflow brings polluted air into the area late in the afternoon from late spring to early fall. This transport pattern creates both unhealthful air quality as well as destroying the scenic vistas of the mountains surrounding the Victor Valley.

Air Quality Standards

Monitored air quality is evaluated and in the context of ambient air quality standards. These standards are the levels of air quality that are considered safe, with an adequate margin of safety, to protect the public health and welfare. National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) currently in effect are shown in Table III-1. Because the State of California had established Ambient Air Quality Standards (AAQS) several years before the federal action and because of unique air quality problems introduced by the restrictive dispersion meteorology, there is considerable difference between state and national clean air standards. Those standards currently in effect in California are shown in Table III-1. Sources and health effects of various pollutants are shown in Table III-2.

Of the standards shown in Table III-1, those for ozone (O3), and particulate matter (PM-10) are exceeded at times in the Mojave Desert Air Basin (MDAB). They are called "non-attainment pollutants." Because of the variations in both the regional meteorology and in area-wide differences in levels of air pollution emissions, patterns of non-attainment have strong spatial and temporal differences.

Table III-1
AMBIENT AIR QUALITY STANDARDS

Pollutant	Average Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O3)[8]	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	–	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.070 ppm (137 µg/m^3)		
Respirable Particulate Matter (PM10)[9]	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		–		
Fine Particulate Matter (PM2.5)[9]	24 Hour	–	–	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12.0 µg/m^3	15.0 µg/m^3	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	–	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	–	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		–	–	
Nitrogen Dioxide (NO2)[10]	1 Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	–	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO2)[11]	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	–	Ultraviolet Flourescense; Spectrophotometry (Paraosaniline Method)
	3 Hour	–		–	0.5 ppm (1300 µg/m^3)	
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[11]	–	
	Annual Arithmetic Mean	–		0.030 ppm (for certain areas)[11]	–	
Lead 8[12,13]	30-Day Average	1.5 µg/m^3	Atomic Absorption	–	–	–
	Calendar Quarter	–		1.5 µg/m^3 (for certain areas)[12]	Same as Primary Standard	High Volume Sampler and Atomic Absorption
	Rolling 3-Month Avg	–		0.15 µg/m^3		
Visibility Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	**No Federal Standards**		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

Footnotes

1 California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter – PM10, PM2.5, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2 National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24-hour standard is attained when the expected number of days per calendar year, with a 24-hour average concentration above 150 $\mu g/m^3$, is equal to or less than one. For PM2.5, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact U.S. EPA for further clarification and current federal policies.

3 Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4 Any equivalent procedure which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

5 National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6 National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7 Reference method as described by the EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the EPA.

8 On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

9 On December 14, 2012, the national PM2.5 primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The existing national 24-hour PM2.5 standards (primarily and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary standard of 15 $\mu g/m^3$. The existing 24-hour PM10 standards (primarily and secondary) of 150 $\mu g/m^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

10 To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

11 On June 2, 2010, a new 1-hour SO2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

12 The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

13 The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 j.tg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

14 In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

Table III-2
HEALTH EFFECTS OF MAJOR CRITERIA POLLUTANTS

Pollutants	Sources	Primary Effects
Carbon Monoxide (CO)	• Incomplete combustion of fuels and other carbon-containing substances, such as motor exhaust. • Natural events, such as decomposition of organic matter.	• Reduced tolerance for exercise. • Impairment of mental function. • Impairment of fetal development. • Death at high levels of exposure. • Aggravation of some heart diseases (angina).
Nitrogen Dioxide (NO_2)	• Motor vehicle exhaust. • High temperature stationary combustion. • Atmospheric reactions.	• Aggravation of respiratory illness. • Reduced visibility. • Reduced plant growth. • Formation of acid rain.
Ozone (O_3)	• Atmospheric reaction of organic gases with nitrogen oxides in sunlight.	• Aggravation of respiratory and cardiovascular diseases. • Irritation of eyes. • Impairment of cardiopulmonary function. • Plant leaf injury.
Lead (Pb)	• Contaminated soil.	• Impairment of blood function and nerve construction. • Behavioral and hearing problems in children.
Fine Particulate Matter (PM-10)	• Stationary combustion of solid fuels. • Construction activities. • Industrial processes. • Atmospheric chemical reactions.	• Reduced lung function. • Aggravation of the effects of gaseous pollutants. • Aggravation of respiratory and cardio respiratory diseases. • Increased cough and chest discomfort. • Soiling. • Reduced visibility.
Fine Particulate Matter (PM-2.5)	• Fuel combustion in motor vehicles, equipment, and industrial sources. • Residential and agricultural burning. • Industrial processes. • Also, formed from photochemical reactions of other pollutants, including NOx, sulfur oxides, and organics.	• Increases respiratory disease. • Lung damage. • Cancer and premature death. • Reduces visibility and results in surface soiling.
Sulfur Dioxide (SO_2)	• Combustion of sulfur-containing fossil fuels. • Smelting of sulfur-bearing metal ores. • Industrial processes.	• Aggravation of respiratory diseases (asthma, emphysema). • Reduced lung function. • Irritation of eyes. • Reduced visibility. • Plant injury. • Deterioration of metals, textiles, leather, finishes, coatings, etc.

Source: California Air Resources Board, 2002.

Baseline Air Quality

Monitoring of air quality in the MDAB is the responsibility of the Mojave Desert Air Quality Management District (MDAQMD) headquartered in Victorville, California. Existing levels of criteria air pollutants in the project area can generally be inferred from measurements conducted at the Victorville Station at 14306

Park Avenue. Although the Victorville Station monitors most of the spectrum of pollutants, data for CO is no longer monitored in the Mojave Desert. Table 4 summarizes the last four years of monitoring data from the available data at for this monitoring station. From these data one can infer that baseline air quality levels near the project site are occasionally unhealthful, but that such violations of clean air standards usually affect only those people most sensitive to air pollution exposure.

a. Photochemical smog (ozone) levels occasionally exceed standards. The 8-hour state ozone standard has been exceeded approximately nine percent of all days in the last four years while the 1-hour state standard has been exceeded less than one percent of all days. The 8-hour federal standard has been exceeded approximately four percent of all days in the past four years. Attainment of all clean air standards in the project vicinity is not likely to occur soon, but the severity and frequency of violations is expected to continue to slowly decline during the current decade

b. Respirable dust (PM-10) levels often exceed the state standard of 50 $\mu g/m^3$ but the less stringent federal PM-10 standard of 150 $\mu g/m^3$ is violated with much less frequency. However, given the high Max. 24-Hour concentrations it is clear that PM-10 is still of concern.

c. A substantial fraction of PM-10 is comprised of ultra-small diameter particulates capable of being inhaled into deep lung tissue (PM-2.5). There have only been four measured violations in the last four years and all four violations were in 2020 presumably impacted by wildfire.

Although complete attainment of every clean air standard is not yet imminent, extrapolation of the steady improvement trend suggests that such attainment could occur within the reasonably near future.

Table III-3
AIR QUALITY MONITORING SUMMARY (2017-2020)
(NUMBER OF DAYS STANDARDS WERE EXCEEDED, AND MAXIMUM LEVELS DURING SUCH VIOLATIONS)

Pollutant/Standard	2017	2018	2019	2020
Ozone				
1-Hour > 0.09 ppm (S)	0	5	3	4
8-Hour > 0.07 ppm (S)	17	55	29	35
8- Hour > 0.075 ppm (F)	7	27	13	17
Max. 1-Hour Conc. (ppm)	0.088	0.107	0.104	0.112
Max. 8-Hour Conc. (ppm)	0.082	0.096	0.081	0.094
Nitrogen Dioxide				
1-Hour > 0.18 ppm (S)	0	0	0	0
Max. 1-Hour Conc. (ppm)	0.057	0.051	0.056	0.059
Inhalable Particulates (PM-10)				
24-Hour > 50 $\mu g/m^3$ (S)	na	na	na	na
24-Hour > 150 $\mu g/m^3$ (F)	1	1	2	2
Max. 24-Hr. Conc. ($\mu g/m^3$)	182.5	165.2	170.0	261.4
Ultra-Fine Particulates (PM-2.5)				
24-Hour > 35 $\mu g/m^3$ (F)	0	0	0	4
Max. 24-Hr. Conc. ($\mu g/m^3$)	27.2	32.7	17.8	48.4

na = not available; S=State Standard; F=Federal Standard
Source: Victorville Station: Ozone, CO, NO2, PM-10, PM-2.5; data: www.arb.ca.gov/adam/

Air Quality Standards

The Mojave Desert AQMD has adopted numerical emissions thresholds as indicators of potential impact even if the actual air quality increment cannot be directly quantified. The MDAQMD thresholds are as follows:

Carbon Monoxide (CO)	548 pounds/day	100 tons/year
Nitrogen Oxides (NOx)	137 pounds/day	25 tons/year
Sulfur Oxides (SOx)	137 pounds/day	25 tons/year
Reactive Organic Gases (ROG)	137 pounds/day	25 tons/year
Particulate Matter (PM-10)	82 pounds/day	15 tons/year
Particulate Matter (PM-2.5)	65 pounds/day	12 tons/year
GHG	548,000 pounds/day	100,000 tons/year

Sensitive Uses
The project site is located in the high desert region of San Bernardino County. The area surrounding the project site is rural in nature with very little development. For the most part, the property itself sits vacant, with mostly unimproved areas that are currently unused, in addition to some partially disturbed land. There are several residences on site. There are 3 unoccupied and uninhabitable houses, one house occupied by a caretaker and an office/apartment complex where one tenant lives. The rest of the office/apt complex is empty. The house and complex are next to each other. These two occupied residences are the nearest occupied residences to the project site.

Impact Analysis

a. *Less Than Significant Impact* – Projects such as the proposed Palisades Ranch Restoration Project do not directly relate to the AQMP in that there are no specific air quality programs or regulations governing general development. Conformity with adopted plans, forecasts and programs relative to population, housing, employment and land use is the primary yardstick by which impact significance of planned growth is determined. Air quality impact significance for the proposed project has therefore been analyzed on a project-specific basis. The propose project will be fully consistent with both the Countywide Plan land use designation and Zone classification for the project site, mainly because the project involves water infrastructure, and such projects are considered land use independent. Thus, the proposed project is consistent with regional planning forecasts maintained by the Southern California Association of Governments (SCAG) regional plans. The MDAQMD, however, while acknowledging that the AQMP is a growth-accommodating document, does not favor designating regional impacts as less-than-significant only because of consistency with regional growth projections. Air quality impact significance for the proposed project has therefore been analyzed on a project-specific basis. As the analysis of project-related emissions provided below indicates, the proposed project will not cause or be exposed to significant air pollution, and is, therefore, consistent with the applicable air quality plan.

b. *Less Than Significant Impact With Mitigation Incorporated* – Air pollution emissions associated with the proposed project would occur over both a short and long-term time period. Short-term emissions include fugitive dust from construction activities (i.e., site prep, exhaust emission, etc.) at the proposed project site. Long-term emissions generated by future operation of the proposed project primarily include energy consumption required to operate the groundwater pump proposed in support of the proposed project.

The project will provide restoration measures for critical hydrological processes and habitat health. The major phases are:

1. Riparian Restoration: The restoration plan involves reconnecting a 170-acre abandoned agricultural field that was historically riparian habitat to the Mojave River by reestablishing a nested floodplain that resembles historic floodplain conditions. This would entail constructing a 6,600-foot main side channel, a 1,425-foot west branch side channel with bank structures to provide long-term stability. Finally, facilitation of vegetation of the river restoration
2. Riparian Enhancement: This will mostly involve weed management.
3. Zones of Encouragement of Public Access: The project includes a 1.8-mile trail system.

Construction of the entire project has a target completion date of 6 years (72 months), with the anticipated start date of construction in October 2022. During construction, many of the tools used will be manual tools for cutting and pruning: e.g., weed-eaters, backpack sprayers for herbicides, spades, hand trowels, rakes, hoes, buckets for manual broadcasting of erosion control seed and other manual digging tools. However, only diesel fueled equipment which can generate harmful emissions are analyzed for this study.

MDLT has identified the following equipment expected for use in almost all activities: skid steer loader with mower attachment, backhoe/loader, excavator and water pump.

As a worst case it is assumed that two of each of these pieces of equipment are used daily for the entire anticipated three years of construction. The emissions generated from this equipment was then compared to their respective MDAQMD thresholds.

Operationally, it is anticipated that there will be an additional 10 visitor trips per day as a result of project implementation. A 40-mile round trip distance was assumed. Temporary irrigation of the restoration areas is necessary for up to three years after revegetation. It is anticipated that the amount of water used per day would be approximately 66,000 gallons which would equate to 24,090,000 gallons per year if watering occurred 365 days per year.

Construction Emissions

CalEEMod was developed by the SCAQMD to provide a model by which to calculate both construction emissions and operational emissions from a variety of land use projects. It calculates both the daily maximum and annual average emissions for criteria pollutants as well as total or annual greenhouse gas (GHG) emissions. CalEEMod2020.4.0 was used to analyze project impacts.

Utilizing the equipment fleet discussed, the following worst-case daily construction emissions are calculated by CalEEMod and are listed in Table III-4 as compared to the MDAQMD thresholds. Maximum annual project-related air pollution emissions relative to the yearly MDAQMD thresholds are shown in Table III-5.

Table III-4
DAILY EMISSIONS (LBS/DAY)

Maximal Construction Emissions	**ROG**	**NOx**	**CO**	**SO_2**	**PM-10**	**PM-2.5**
2022	1.5	13.6	19.9	<0.1	0.8	0.7
2023	1.4	12.5	19.8	<0.1	0.8	0.6
2024	1.3	11.6	19.8	<0.1	0.7	0.5
2025	1.3	10.8	19.7	<0.1	0.6	0.5
2026	1.2	10.8	19.7	<0.1	0.6	0.5
2027	1.2	10.8	19.6	<0.1	0.6	0.5
2028	1.2	10.8	19.6	<0.1	0.6	0.5
Maximal Operational Emissions						
2028	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Peak Daily Project Emissions	**1.5**	**13.6**	**19.9**	**<0.1**	**0.8**	**0.7**
MDAQMD Thresholds	137	137	548	137	82	82
Exceeds Thresholds?	*No*	*No*	*No*	*No*	*No*	*No*

Table III-5
ANNUAL EMISSIONS (TONS/YEAR)

Maximal Construction Emissions	**ROG**	**NOx**	**CO**	**SO_2**	**PM-10**	**PM-2.5**
2022	0.04	0.37	0.54	<0.01	0.02	0.02
2023	0.18	1.62	2.57	<0.01	0.10	0.08
2024	0.18	1.52	2.58	<0.01	0.09	0.07
2025	0.16	1.41	2.56	<0.01	0.08	0.06
2026	0.16	1.51	2.56	<0.01	0.08	0.06
2027	0.16	1.41	2.55	<0.01	0.08	0.06
2028	0.13	1.11	2.04	<0.01	0.06	0.05
Maximal Operational Emissions						
2025	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Peak Annual Project Emissions	**0.18**	**1.62**	**2.58**	**<0.01**	**0.10**	**0.08**
MDAQMD Thresholds	25	25	100	25	15	15
Exceeds Thresholds?	*No*	*No*	*No*	*No*	*No*	*No*

Maximum project-related air pollution emissions were compared to daily and annual MDAQMD thresholds. Maximum daily and annual emissions are less than their associated CEQA thresholds.

Maximum project-related air pollution emissions were compared to daily and annual MDAQMD thresholds. Even if all activities occurred in a single calendar year and overlapped daily, maximum emissions are less than their MDAQMD thresholds.

Short-term emissions are primarily related to the construction of the project and are recognized to be short in duration and without lasting impacts on air quality. With the enhanced dust control mitigation measures listed below, construction activity air pollution emissions are not expected to exceed MDAQMD CEQA thresholds for any pollutant even if the wells are under simultaneous construction. Regardless, the PM-10 non-attainment status of the Mojave Desert area requires that Best Available

Control Measures (BACMs) be used as required by the Mojave AQMD Rule 403. Recommended construction activity mitigation includes:

AQ-1 ***<u>Dust Control</u>. The following measures shall be incorporated into project plans and specifications for implementation:***

- ***Apply soil stabilizers such as hay bales or aggregate cover to inactive areas.***
- ***Prepare a high wind dust control plan and implement plan elements and terminate soil disturbance when winds exceed 25 mph.***
- ***Stabilize previously disturbed areas if subsequent construction is delayed.***
- ***Water exposed surfaces and haul roads 3 times/day.***
- ***Cover all stockpiles with tarps.***
- ***Replace ground cover in disturbed areas quickly.***
- ***Reduce speeds on unpaved roads to less than 15 mph.***
- ***Trenches shall be left exposed for as short a time as possible.***

AQ-2 ***The following signage shall be erected no later than the commencement of construction: A minimum 48 inch high by 96 inch wide sign containing the following shall be located within 50 feet of each project site entrance, meeting the specified minimum height text, black text on white background, on one inch A/C laminated plywood board, with the lower edge between six and seven feet above grade, identifying a responsible official for the site and local or toll free number that is accessible 24 hours per day:***

"[Site Name] {four-inch text}
[project Name/project Number] {four-inch text}
IF YOU SEE DUST COMING FROM {four-inch text}
THIS PROJECT CALL: {six-inch text}
[Contact Name], PHONE NUMBER {six-inch text}
If you do not receive a response, Please Call {three-inch text} The MDAQMD at 1-800-635-4617 {three-inch text}"

AQ-3 ***During project operations a 4,000-gallon water truck shall be available on-site at all times for dust control.***

AQ-4 ***Wind breaks and/or fencing shall be installed in areas that are susceptible to high wind induced dusting.***

AQ-5 ***MDLT shall use a water truck to maintain moist disturbed surfaces and actively spread water during visible fugitive dust episodes to minimize visible fugitive dust emissions. If the site contains exposed sand or fines deposits (and if the project would expose such soils through earthmoving), water application will be required to eliminate visible dust/sand from sand/fines deposits.***

AQ-6 ***MDLT shall formulate a high wind response plan that addresses enhanced dust control if winds are forecast to exceed 25-mph in any upcoming 24-hour period.***

With the above mitigation measure, any impacts related to construction emissions are considered less than significant. No further mitigation is required.

Operational Impacts

Operational air pollution emissions will be minimal. Electrical generation of power will be used for pumping. Electricity consumption has no single uniquely related air pollution emissions source because power is supplied to and drawn from a regional grid. Electrical power is generated regionally by a combination of non-combustion (nuclear, hydroelectric, solar, wind, geothermal, etc.) and fossil fuel combustion sources. There is no direct nexus between consumption and the type of power source or the air basin where the source is located. Operational air pollution emissions from electrical generation are therefore not attributable on a project-specific basis.

Conclusion

With the incorporation of mitigation measures above, the development of the project would have a less than significant potential to result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard.

c. *Less Than Significant With Mitigation Incorporated* – The proposed project would generate minimal construction and operation related emissions. The closest sensitive use to the area in which grading and groundbreaking construction activity will occur is the onsite caretaker, who's residence is about 250 feet from the area in which groundbreaking activity will occur. Given the distance from the proposed project to nearby sensitive receptors, and the type of project proposed, the proposed project would not emit hazardous or toxic emissions that would create an excess cancer risk of more than 10 in a million or a non-cancerous health index of more than 1.0. Note that the proposed project will utilize weed abatement spray, but given that the project prioritizes protecting native plants and habitat, the types of sprays will be low-toxicity, and will be applied in accordance with federal, State, and local laws, and in accordance with mitigation measures (MMs) **HYD-2**, the implementation of which is necessary to minimize the potential for any pollution sources to be dispersed. Therefore, with the implementation of MMs **AQ-1** through **AQ-6** outlined under issue III(b) above, implementation of the District's Wells No. 15 and 16 Development Project is anticipated to have a less than significant potential to expose sensitive receptors to substantial pollutant concentrations.

d. *Less Than Significant Impact* – Substantial odor-generating sources include land uses such as agricultural activities, feedlots, wastewater treatment facilities, landfills or various heavy industrial uses. The project does propose to convert an abandoned agricultural field into restored habitat as described in the project description. This use would not consist of uses or activities that would result in potentially significant operational source odor impacts. Habitat restoration is generally not associated with odor impacts, as the activities necessary to restore the habitat at Palisades Ranch would not require use of materials with substantial odorous potential, nor would operation management activities of the site generate any such odors. Potential sources of operational odors generated by the project would include disposal of refuse at the project site, which would be minimal given that an average of 10 persons would visit the site daily, and that operational activities would require waste to be disposed off-site when generated during the scheduled weed management, vegetation and wildlife monitoring, and MDLT site visits that would occur over a period of about 60 calendar days per year. Consistent with County requirements, all project-generated refuse would be stored in covered containers and removed at regular intervals in compliance with solid waste regulations, thereby precluding substantial generation of odors due to temporary holding of refuse on-site. Moreover, SCAQMD Rule 402 acts to prevent occurrences of odor nuisances. No other sources of objectionable odors or other emissions have been identified for the proposed project. As such, the proposed project would have a less than significant potential to result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
IV. BIOLOGICAL RESOURCES: Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☒	☐	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☒	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☒	☐

SUBSTANTIATION: This subsection utilizes information contained in the following Biological Resources Reports and Draft Management Plans: (1) Draft Land Management Plan for Palisades Ranch prepared by Circle Mountain Biological Consultants, Inc., 2016 (CMBC) (Appendix 3); (2) Botanical Surveys on the Palisades Ranch Property along the Mojave River, prepared by the California Botanic Garden, 2021 (Appendix 4); (3) Surveys for Special Status Turtles and Amphibians at Mojave Narrows Regional Park and Palisades Ranch, 2020 (Appendix 5); (4) Mohave Ground Squirrel Trapping Results: Palisades Ranch, prepared by CMBC (Appendix 6); (5) Final Palisades Ranch Conceptual Riparian Restoration Plan prepared by SWCA Environmental Consultants, 2021 (Appendix 1); and (6) Results of a Focused Mojave River Vole Habitat Assessment and Trapping Survey Conducted at the Mojave Desert Land Trust Palisades Ranch, San Bernardino County, California, prepared by ECORP Consulting, Inc., 2022 (Appendix 7).

a. *Less Than Significant With Mitigation Incorporated* – The Palisades Ranch property consists of approximately 1,647 acres of upland and riparian habitat. The riparian portion of the property (project site) spans over three miles of the Mojave River floodplain, between the unincorporated communities of Helendale to the north and Oro Grande to the south.

The project site is one of the few locations along the Mojave River where water is present year-round, giving rise to a diversity of habitat, including cottonwood-willow forest, arroyo willow thickets, and

screwbean mesquite bosque. These riverine habitats, attract over 35 special status species including the State and federally listed Least Bell's vireo.

Vegetation Communities

2016 Survey Data (CMBC)
CMBC biologists conducted a series of site visits in 2016 to survey the entire property including the upland area as well as the riparian areas and adjacent floodplain to characterize the vegetative communities and potential habitat for both plant and wildlife species.

The cottonwood-willow forest that dominates the central and eastern parts of the site along channels of perennially standing and flowing water is a valuable indispensable resource that is limited to only a few places in the Mojave Desert, such as nearby Mojave Narrows to the south, Big Rock Creek to the west, Morongo Canyon to the southeast, and Amargosa River to the northeast. Along the main river channel at the project site, both stretches of flowing water (Figure IV-1) and standing water (Figure IV-2) resulting from blockage due to beaver dams were identified. In these areas, narrow-leafed willow (*Salix exigua*), arroyo willow (*Salix lasiolepis*), and red willow (*Salix laevigata*) were common, along with various species of rush (*Juncus ssp*.), sedge (*Carex ssp.*), cat-tail (*Typha latifolia*), and mulefat (*Baccharis glutinosa*). Black willow (*Salix gooddingii*) has also been reported but was not observed during the 2016 CMBC surveys.

Fremont's cottonwood (*Populus fremontii*) was present and was more common adjacent to surface water where stands of mature cottonwoods were interspersed over an understory of saltbush scrub, including four-winged saltbush, all-scale, and big saltbush. In addition to the impenetrable growths of narrow-leafed willow, rushes, sedges, and cat tails, there was a dense streamside growth of seep spring monkeyflower (*Mimulus guttatus*), desert heliotrope (*Heliotropium curvassivicum*), rabbitfoot grass (*Polypogon monspeliensis*), and salt grass (*Distichlis spicata*), among others. There was an isolated stand of mature screw bean mesquite (*Prosopis pubescens*) trees (Figure IV-3) on the western parts of the floodplain, where Emory baccharis (*Baccharis emoryi*), goldenbush (*Isocoma acradenia*), yerba mansa (*Anemopsis californica*), big saltbush, and four-winged saltbush form a dense understory. This community, is denoted as "Mesquite Bosque" on Figure IV-4 *Plant Communities Mapped in May 2016*. Figure BIO-1 shows the estimated extent of plant communities observed in the 2016 CMBC surveys.

There were two communities mapped together in the CMBC report that are considered a Community of Highest Inventory Priority (CHIP), the Fremont cottonwood forest and the arroyo willow thickets. Although not otherwise designated by either CDFW or USFWS, they are sufficiently rare that they are generally reported to CDFW when encountered. CMBC's reconnaissance surveys were not rigorous enough to determine the full extent and/or separateness of these two communities. The general locations of the two communities are situated within the Mojave River floodplain and were roughly mapped by CMBC as "scattered cottonwoods and willows: and "cottonwood-willow forest" on Figure IV-4.

The third community mapped during CMBC's 2016 survey was the area containing screw bean mesquite bosque. This community is located adjacent to the cottonwood-willow areas. The community may extend farther north than mapped, and in the Draft Land Management Plan (LMP) CMBC recommended more surveys to map the extent. Whereas mesquite bosque communities comprised of honey mesquite (*Prosopis glandulosa*) are relatively common in the region, stands of screw bean mesquite such as occurs at Palisades Ranch are less common in the Mojave Desert of California. These trees are often planted to provide shade for cattle, but the trees located within the project site appear to be growing naturally.

These communities include provide habitat for special status bird species and potential habitat for Mojave River vole and southwestern pond turtle, if they occur. The Draft LMP acknowledged that the 2016 surveys represented a baseline inventory and that further study is required to validate and

augment CMBCs findings. The LMP (Biological Element No. 3) stated that "… qualified individuals should be enlisted to use aerial photographs and ground truthing to (1) complete a comprehensive species list of all plants comprising the CHIPs; (2) use these plant lists to ascertain that the three CHIPs identified herein accurately represent the plant communities occurring; and (3) produce accurate maps of these and other CHIPs that may occur on the subject property." See discussion below under 2020 Vegetation Mapping (SWCA), for the results of this subsequent effort.

Non-native Plants

During the 2016 CMBC surveys, three highly invasive plants were also present within the Mojave River floodplain, including giant reed (*Arundo donax*; Figure IV-5, salt cedar (*Tamarix ramosissima*; Figure IV-6), and broad-leaf peppergrass (*Lepidium latifolium*; Figure IV-7), which was particularly abundant to the north. Other non-native species observed within the floodplain included rabbitfoot grass, wild lettuce (*Lactuca serriola*), common dandelion (*Taraxacum officinale*), and cocklebur (*Xanthium strumarium*). In addition, the approximately 150 acres of the site associated with historic alfalfa farming was mostly barren except for extensive piles of Russian thistle (*Salsola tragus*) located throughout the easterly portion of this area.

In the southerly portion of the site, the area disturbed by past agricultural uses consists of ruderal fields, fallow agriculture, residences and farm-related buildings, and the Heritage Way bridge over the river.

2020-2021 Survey Data (CBG)

Subsequently, staff from the California Botanic Garden (CBG) surveyed the project site over several days in 2020 and 2021 to document the botanical diversity, with special emphasis on rare and invasive plant taxa. The data provided baseline information on botanical diversity intended to support conservation and restoration efforts at the Palisades Ranch property. As with the 2016 CMBC surveys, the CBG surveys also covered the entirety of the site including the upland area.

During 2020-2021 site surveys 301 plant taxa were documented on the Palisades Ranch Property (including the upland area that is not a part of the project), including 173 native taxa, and 28 non-native taxa, with 82 taxa of the total species considered to be wetland plants. Appendix C of the CBG report provides a complete list of the vegetation found on the project site. The CBG surveys identified similar conditions to those identified four years earlier in the CMBC survey report, including a similar list of non-native species that will require eradication as part of project implementation.

2020 Vegetation Mapping (SWCA)

In addition to the vegetation surveys completed by CMBC and CBG staff, SWCA conducted patch-level vegetation mapping in January 2020 specifically to map vegetation within the riparian zone (that area at the base of the bluffs and not including the upland area which is not a part of the Palisades Ranch riparian restoration plan). Seven transects were selected based on the visual heterogeneity of the riparian zone as observed through spatial imagery. These transects were spaced 550 meters (1,800 feet) apart. Spatial imagery was used during the pedestrian surveys in order to delineate visually distinct patches with a minimum unit size of 10 x 10 meters (33 x 33 feet), and to identify all major plant species within these patches. Once identified, a canopy cover class was estimated for each species. Each vegetation patch was mapped to the greatest visual extent possible and varied depending on vegetation density and species richness.

Within the project site, 336 hectares (831 acres) were mapped with 10 dominant taxa classes and one unvegetated class. Figure IV-8, *Palisades Ranch Riparian Vegetation Map Based on Dominant Overstory Taxa*, depicts existing conditions (2020) at the project site. Table IV-1, *Vegetation Alliance Descriptions Within the Riparian Zone at Palisades Ranch*, lists species codes, vegetation alliance, and total area mapped for the project site.

Table IV-1
VEGETATION ALLIANCE DESCRIPTIONS WITHIN THE RIPARIAN ZONE AT PALISADES RANCH

Species Code	Total Acre (hectares / acres)	Vegetation Alliance	Alliance Description
ATRLEN / ATRCAN	61/150	*Atriplex lentiformis* (big saltbush) Wet Shrubland Alliance	The dominant or codominant shrub is *Atriplex lentiformis* in association with *Artemisia californica, Atriplex canescens, Baccharis pilularis, Baccharis salicifolia, Encelia californica, Bassia americana, Malosma laurina, Myoporum laetum, Pluchea sericea, Prosopis glandulosa, Rhus integrifolia, Suaeda taxifolia*, and *Tamarix* spp.
BACGLU	3.2/8	*Baccharis salicifolia* (mule-fat) Wet Shrubland Alliance	This alliance includes riparian shrublands dominated by *Baccharis salicifolia* (formerly *Baccharis glutinosa*). *Salix gooddingii* may be an emergent tree at low cover in some stands. Other associated species can include shrubs such as *Artemisia californica, Baccharis emoryi, Baccharis neglecta, Baccharis pilularis, Malosma laurina, Nicotiana glauca, Pluchea sericea, Prosopis glandulosa var. glandulosa, Rubus* spp., *Salix exigua, Salix lasiolepis*, and *Sambucus nigra ssp. canadensis*.
GLYLEP	0.4/1	N/A	The dominant species is *Glycyrrhiza lepidota.* While no community/alliance exists for this species, it is inset within the *Atriplex lentiformis* Wet Shrubland Alliance.
LEPLAT	17.8/44	N/A	The dominant species is *Lepidium latifolium.* While no community/alliance exists for this species, it is a major dominant weedy species within the Property.
POPFRE	48/119	*Populus fremontii* (Fremont cottonwood) Great Basin Riparian Forest Alliance	This alliance contains riparian woodlands dominated by *Populus fremontii*. Individuals of *Populus fremontii* are scattered or occur in groves and may reach 30 meters in height and 2 meters in diameter. Other species that may occur in the canopy/subcanopy include *Baccharis salicifolia, Celtis laevigata var. reticulata, Fraxinus berlandieriana, Fraxinus velutina, Juglans microcarpa, Populus deltoides ssp. wislizeni, Prosopis glandulosa, Prosopis pubescens, Prosopis velutina, Salix amygdaloides, Salix exigua, Salix gooddingii*, and *Salix lasiolepis*.
PROPUB	3.2/8		
SALEXI	57.5/142	*Salix gooddingii – S. laevigata* (Goodding's willow – red willow) Riparian Forest Alliance	This alliance consists of riparian woodlands and forests dominated by *Salix gooddingii* and/or *Salix laevigata*, either as single-species stands or as mixed stands. Stands may or may not include *Populus fremontii*, and if they do, it is a minor component relative to dominant overstory canopy species. Shrubs may include *Salix exigua*, *Baccharis emoryi, Baccharis salicifolia, Cornus sericea,* and *Rhus trilobata.*
SALLAE	4/10		
SALTRA	66/164	N/A	The dominant species is *Salsola tragus*. While no community/alliance exists for this species, it is a major dominant weedy species within the Property.
TYPLAT / SCHACU / SCHAME	8.5/21	*Typha domingensis – T. latifolia – Phragmites australis* ssp. *americanus* (southern cattail – broadleaf cattail – common reed) Western Marsh Alliance	This alliance contains stands dominated by native species *Typha angustifolia, Typha domingensis*, and/or *Phragmites australis ssp. americanus* either alone as monotypic stands or in combination with other tall emergent freshwater marsh species. Associated species vary widely; they include many sedges such as *Carex aquatilis, Carex pellita, Carex rostrata*, bulrushes such as *Schoenoplectus acutus, Schoenoplectus americanus*, and *Schoenoplectus heterochaetus*, and broad-leaved herbs such as *Asclepias incarnata, Impatiens capensis, Sagittaria latifolia, Scutellaria lateriflora, Sparganium eurycarpum*, and *Verbena hastata*.
UNVG	66/164	N/A	Sparse vegetation without a dominant species. Typically found within large sandbars within the Property.
Total	336/831	--	--

Table IV-2
OBSERVED PLANT SPECIES AT PALISADES RANCH

Species Binomial	Common Name	Status
Achnatherum hymenoides	Indian ricegrass	native
Ambrosia acanthicarpa	Annual bur-sage	native
Ambrosia psilostachya	Western ragweed	native
Ambrosia sp.	Ambrosia species	N/A
Amsinckia tessellata	Fiddleneck	native
Anemopsis californica	Yerba mansa	native
Artemisia sp.	Sagebrush species	native
Arundo donax	Giant reed	non-native*
Aster spp.	Asteraceous species	N/A
Atriplex canescens	Fourwing saltbush	native
Atriplex covillei	Coville's orach	native
Atriplex lentiformis	Big saltbush	native
Atriplex polycarpa	Allscale	native
Atriplex spinifera	Spiny saltbush	native
Baccharis emoryi	Emory baccharis	native
Baccharis salicifolia	Mulefat	native
Bassia hyssopifolia	Fivehorn smotherweed	non-native
Bromus tectorum	Cheat grass	non-native
Carex spp.	Carex species	N/A
Chenopodium sp.	Chenopodium species	N/A
Chrysothamnus nauseosus	Rubber rabbitbrush	native
Cirsium sp.	Thistle species	N/A
Cynodon dactylon	Bermudagrass	non-native
Descurainia pinnata	Tansy	non-native
Descurainia sophia	Flixweed	non-native
Distichlis spicata	Inland saltgrass	native
Eleocharis spp.	Spikerush species	N/A
Elymus triticoides	Beardless wildrye	native
Ephedra nevadensis	Nevada joint-fir	native
Eriogonum pusillum	Buckwheat	native
Eriogonum sp.	Buckwheat species	N/A
Eriodictyon trichocalyx	Hairy yerba santa	native
Glycyrrhiza lepidota	American licorice	native
Juncus spp.	Juncus species	N/A
Lactuca serriola	Wild lettuce	non-native
Lepidium latifolium	Perennial pepperweed	non-native*
Melilotus albus	White sweetclover	non-native
Mentzelia albicaulis	Little blazing star	native
Phragmites australis	Common reed	non-native
Plantago major	Broadleaf plantain	non-native
Polypogon monspeliensis	Rabbitsfoot grass	non-native
Populus fremontii	Fremont's cottonwood	native
Prosopis pubescens	Screwbean mesquite	native
Salix exigua	Narrow-leaf willow	native

Species Binomial	Common Name	Status
Salix laevigata	Red willow	native
Salix lasiolepis	Arroyo willow	native
Salsola tragus	Prickly Russian thistle	non-native*
Schoenoplectus acutus	Hardstem bulrush	native
Schoenoplectus americanus	Chairmaker's bulrush	native
Schismus barbatus	Mediterranean grass	non-native
Tamarix ramosissima	Tamarisk	non-native*
Typha latifolia	Broadleaf cattail	native
Urtica holosericea	Stinging nettle	native
Xanthium strumarium	Cocklebur	native

* Indicates noxious weed listed by the California Department of Food and Agriculture (2020)

Out of the 10 dominant taxa classes, seven are represented within vegetation alliances as described by the International Vegetation Classification system developed by NatureServe (2020). The remaining three are unique or invasive taxa not typically represented within North American vegetation alliances. The unvegetated class has sparse vegetation without a dominant species and is typically found on large sandbars within the project site. The vegetation map depicts bands of establishment oriented along the Mojave River that indicate successive years of establishment along past and present river channel alignments. A list of plants identified during the SWCA surveys is provided in Table IV-2, *Observed Plant Species at Palisades Ranch*.

Noxious Weeds

Prickly Russian thistle (*Salsola tragus*) is the most abundant noxious weed present within the project site and dominates 66 hectares (164 acres), primarily within the abandoned agriculture field. Perennial pepperweed (Lepidium latifolium) dominates 17.8 hectares (44 acres) and also occurs in many mixed stands throughout the Property. These areas are shown on Figure IV-9, *Palisades Ranch Riparian Noxious Weeds Map*. Perennial pepperweed varies in density throughout the Palisades Ranch riparian corridor and is more common in sites with saturated soils and partial shade. Other noxious weed species observed include giant reed) and tamarisk. Thirty-six points and 10 polygons were mapped that contained giant reed. Giant reed infestations were more localized to areas with higher soil saturation, and commonly found near an active channel. Fifty-six points and 8 polygons were mapped that contained tamarisk. While tamarisk occur near active channels, most plants were identified along sandbars. It is important to note that only noxious weeds that were observed on foot were mapped. This was due to high vegetation density, challenges with deep water, and large project footprint. As such, additional locations of the observed noxious weeds may be present within the project site.

Special Status Plants

CBG staff identified Mojave Desert fishhook cactus (*Sclerocactus polyancistrus*; California Rare Plant Rank 4.2) during their 2020 surveys. A single individual was identified during the survey in upland desert scrub dominated by creosote bush (*Larrea tridentata*) and burrobush (*Ambrosia dumosa*), west of proposed riparian restoration site but within the larger Palisades Ranch site property. Although this plant is located outside the riparian restoration site, restoration of the project site would benefit Mojave Desert fishhook cactus by reducing potential threats to its habitat through active management of invasive species within the riparian corridor and restoring the agricultural field to riparian habitat. No special status plant species were identified within the riparian restoration project site.

Wildlife

Avian Species

2016 Survey Data (CMBC)

During 2016 surveys of the project site, ornithologists identified 76 avian species including seven special status species. Focused surveys were performed during the spring migration season when migrating species would be likely to be present due to the association of cottonwoods and willows in the riparian areas. The focused bird surveys identified a number of migrating species including: lazuli bunting (*Passerina amoena*), olive-sided flycatcher (*Contopus borealis*), western wood-pewee (*Contopus sordidulus*), western tanager, western kingbird (*Tyrannus verticalis*), cliff swallow (*Hirundo pyrrhonota*), pacific slope flycatcher (*Empidonax difficilis*), Hammond's flycatcher (*Empidonax hammondii*), MacGillivray's warbler (*Oporornis tolmiei*), Wilson's warbler (*Wilsonia pusilla*), common yellowthroat (*Geothlypis trichas*), and blue grosbeak (*Guiraca caerulea*), among others. The association of cottonwoods and willows and perennial water is ideal for spring and fall migrant bird species, nesting summer residents, and year-round residents.

Still other bird species were present only because of the perennial, standing water that occurs onsite. These species included pied-billed grebe (*Podilymbus podiceps*), green heron (*Butorides virescens*), black-crowned night heron (*Nycticorax nycticorax*), Virginia rail (*Rallus limicola*), common gallinule (*Gallinula galeata*), and mallard (*Anas platyrhynchos*). Red-shouldered hawk (*Buteo lineatus*) is another species rarely observed in desert habitats and is present due to larger trees and availability of abundant prey species.

Special Status Avian Species

During 2016 surveys of the project site, CMBC listed 21 special status avian species reported from the region where the project site is located. These are listed in Table IV-3, *Special Status Avian Species Known from the Region*, along with their status, and whether they were present or absent from the site during surveys in 2016 (CMBC) and 2020 (SWCA). During the 2016 surveys, CMBC observed seven special status species. The table also includes the findings of the 2020 surveys (SWCA).

Table IV-3
SPECIAL STATUS AVIAN SPECIES KNOWN FROM THE REGION

American Coot	Double-crested Cormorant*	Red Crossbill
American Crow	Downy Woodpecker	Red-breasted Nuthatch
American Kestrel	Dusky Flycatcher	Red-shouldered Hawk
Anna's Hummingbird	Eurasian Collared-Dove	Red-tailed Hawk
Ash-throated	European Starling	Red-winged Blackbird
Flycatcher Barn Owl	Gray Flycatcher	Rock Wren
Bell's Vireo (BEVI)	Great Blue Heron	Ruby-crowned Kinglet
Belted Kingfisher	Great Egret*	Say's Phoebe*
Bewick's Wren	Great Horned Owl	Song Sparrow
Black Phoebe	Great-tailed Grackle	Sora
Black-chinned Hummingbird	Green Heron Hermit	Spotted Sandpiper
Black-crowned Night Heron	Thrush House Finch	Spotted Towhee
Black-headed Grosbeak	House Wren	Summer Tanager (SUTA)
Black-throated Gray Warbler*	Killdeer	Swainson's Hawk (SWHA)
Black-throated Sparrow*	Lawrence's Goldfinch	Townsend's Warbler

Blue Grosbeak	Lazuli Bunting	Turkey Vulture
Blue-gray Gnatcatcher	Lesser Goldfinch	Verdin
Brewer's Sparrow*	Lesser Nighthawk	Virginia Rail
Brown-headed	Lincoln's Sparrow	Warbling Vireo
Cowbird Bullock's Oriole	Lucy's Warbler (LUWA)	Western Bluebird
Bushtit	MacGillivray's Warbler Mallard	Western Kingbird
California Quail	Marsh Wren	Western Tanager
California Thrasher	Mourning Dove	Wilson's Snipe
Canada Goose	Northern Flicker	Wilson's Warbler
Cassin's Vireo	Northern Rough-winged Swallow	White-breasted Nuthatch
Cinnamon Teal	Nuttall's Woodpecker	White-throated Swift
Common Raven	Olive-sided Flycatcher	Yellow Warbler (YEWA)
Common Yellowthroat	Orange-crowned Warbler	Yellow-billed Cuckoo (YBCU)
Cooper's Hawk (COHA)	Pacific-slope Flycatcher	Yellow-breasted Chat (YBCH)
Costa's Hummingbird*	Pied-billed Grebe*	Yellow-rumped Warbler

* Indicates species recorded incidentally while on Property, but not recorded during surveys
Note: Red font indicates special-status species.

2020 Survey Data (SWCA)

SWCA's avian surveys were completed in April and July 2020. Because riparian ecosystems are the main focus of the Palisades Ranch restoration project, surveys were rapid assessment, grid surveys to determine what species were using the property and where they were located. SWCA established 32 grid each 200 meters square (0.05 acres or approximately 2,200 square feet) within the southern half of the project site. Figure IV-10, *Rapid Assessment Survey Grids*, shows the location for each of the grids laid out for the avian surveys and identifies the overstory (vegetation alliances) within each grid. Figures IV-11 and IV-12, *Special-status Species Detections at the Palisades Ranch Site* (2020), shows the grid survey areas and identifies the species detected and the overstory where they were located. Descriptions of the vegetation alliances (overstory) are included in Table IV-1. To see the distribution and habitat use for specific species refer to Figures 23-37 in SWCA's Conceptual Riparian Restoration Plan (Initial Study Appendix 1).

Invertebrates

No sensitive butterfly species were identified at the Palisades Ranch project site. However, SWCA has identified the potential for two species to potentially be at the site in the future under certain conditions.

Monarch Butterfly (*Danaus plexippus plexippus*)

This migratory butterfly has a range between central Mexico and southern Canada. The species is a candidate for listing under ESA but has no CESA listing. The species is listed as sensitive by the US Forest Service. The western population overwinters in the coastal woodlands of California. Monarch butterflies rely on the presence of milkweed (*Asclepias spp.*) on which they lay their eggs. Caterpillars eat the milkweed leaves exclusively, but adult butterflies use a variety of food sources. The project site supports several nectar species important for adult Monarchs such as baccharis (*Baccharis spp.*), rabbitbrush (*Chrysothamnus* spp.), and a variety of sunflower species (*Asteraceae*). While milkweed has not been documented within Palisades Ranch, two species, narrow leaf milkweed (*Asclepias fascicularis*) and desert milkweed (*Asclepias erosa*), have been observed near Victorville and Barstow, California, respectively by others.

San Emigdio Blue Butterfly (*Plebejulina emigdionis*)
This species is a California endemic. The species is not listed under the ESA or CESA but is listed by USFS as sensitive. San Emigdio blue butterflies rely on the presence of fourwing saltbush (*Atriplex canescens*) as a food source for their caterpillars. They also rely on protection from the field ant (*Formica francoeuri*) from parasitoids and predators. The overlap of these two obligate species is uncommon as saltbush is a desert shrub and the field ant is uncommon in the desert. At the project site, fourwing saltbush often occurs in mixed patches with quailbush (*Atriplex lentiformis*), a facultative wetland plant, which may indicate higher likelihood of obligate species overlap for the San Emigdio blue butterfly.

Mammal Species
2016 Survey Data (CMBC): Mohave Ground Squirrel
Mohave Ground Squirrel (MGS) (*Xerospermophius mohavensis*). The 2016 LMP documented MGS as occurring in 1983 just north of the community of Helendale, approximately six miles north of the project site and in 1987 in northern Adelanto, approximately six miles south project site. There have been no known occurrences at the project site because no focused trapping surveys have been conducted previously at Palisades Ranch for MGS.

The LMP identified specific tasks to address special status mammal species. First Tier, Biological Goal 1 states: “Ascertain presence and status of special status mammal species on the subject property, and if present, manage the site for sustained populations.” Task 1 was further identified as: “Perform species-specific inventories to determine the occurrence of Mojave River vole and Mohave ground squirrel on the subject property.” In June 2020, CMBC biologists conducted a trapping study for MSG, in part, to implement Task 1 for Biological Element 5 of the LMP.

2020 Survey Data (CMBC): Mohave Ground Squirrel
Rather than conducting protocol surveys for MGS, CMBC conducted regional exploratory surveys as allowed by CDFW when sites being trapped are not intended for development, and therefore are not required to be as rigorous. Nevertheless, the surveys were still typically performed over five days between mid-March and mid-July. For the Palisades Ranch project, the five days of surveys occurred in mid-June 2020.

CMBC placed 100 12-inch Sherman traps spaced 35 meters (115 feet) apart on a north-south axis within the upland area of the project site. This is an area that is not included in the Palisades Ranch riparian restoration project area. However, in order to provide a more complete picture of biological resources at the Palisades Ranch site, a summary of the survey findings is included herein. The configuration was chosen to (a) cover as much of the site and as wide an area as possible; (b) to place traps in habitats most likely to support MGS; and (c) to avoid barren areas, mountainous areas, etc. that are not ideal for MGS.

No MGS were captured during the 2020 survey. However, CMBC believes that the absence of MGS during the survey period does not necessarily mean that MGS are absent from the trap area. Nor was all of the Palisades Ranch area managed by MDLT trapped. There are both upland areas and riparian areas that may harbor MGS and should be targeted in future surveys in an ongoing effort to seek MGS on the site. CMBC recommended additional surveys but did not identify a schedule or establish a standard as to how often such surveys should be performed. CMBC suggested that future surveys be performed during dry years when there is limited germination of annual plants, which may result in increased likelihood of capturing squirrels that are attracted to the bait when available forage is at reduced levels.

2016 Survey Data (CMBC): Other Mammal Species
No surveys for mammal species were conducted in 2016. The following summary is from the LMP with recommendations for future surveys.

Mojave River Vole (*Microtus californicus mohavensis*). This species is a State Species of Special Concern but has no federal status. The species is restricted to the stretch of the Mojave River between Victorville and Helendale, placing the project site near the center of the species known range. Suitable habitat for the species is associated with ponds and irrigation canals, but they may also inhabit meadows, freshwater marshes, and irrigated pastures. No Mojave River voles were observed during 2016 surveys. The LMP Biological Element 5, Special Status Mammal Species identified the goal to ascertain presence and status of the species at the project site and if present, manage the site for sustained populations.

American badger (*Taxidea taxus*). This species is a State Species of Concern but has no federal status. The species is found throughout the state with the exception of the extreme northwest. During the 2016 surveys CMBC observed several potential badger digs in the upland area of the site outside the boundaries of the Palisades Ranch riparian restoration project site. Additional surveys are necessary to determine if the species occurs at the project site. This species is also covered under LMP Biological Element 5 where additional surveys were recommended.

The LMP identified four species that have been reported from the region these are Silver-haired bat (*Lasionycteris noctivagans*), Spotted bat (*Euderma maculatum*), Pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Plecotus townsendii*). All are State Species of Special Concern and BLM Sensitive Species with the exception of Townsend's big-eared bat which is a State Candidate for Threatened species. The LMP did not provide management goals for bats.

2020 Survey Data (SWCA): Other Mammal Species

No surveys for mammal species were conducted in 2020. The following summary is from the Final Conceptual Riparian Restoration Plan (SWCA) with recommendations for future surveys.

Mojave River Vole. The Mojave River Vole (MRV) is a California Department of Fish and Wildlife (CDFW) Species of Special Concern (SSC) and a member of the rodent family Cricetidae, which is endemic to southwestern California.

Habitat within the Palisades Ranch project area is so varied, that there are varying degrees of habitat suitability throughout the site (refer to Figure IV-13. Mojave River Vole Habitat Assessment). The trapping survey, consisting of two two-night trapping sessions, was conducted across five different trapping areas. The trapping survey yielded six MRV captures. All of the MRV captures were recorded within Trapping Area 1 and Trapping Area 2, and included adults, sub-adults, and juveniles (refer to Figure IV-14. Trapping Results). A total of 390 trap nights (one trap-night is one trap set for one night) yielded 105 animal captures, including six rodent species: MRV, San Diego pocket mouse (*Chaetodipus fallax*), deer mouse (*Peromyscus maniculatus*), house mouse (*Mus musculus*), desert woodrat (*Neotoma lepida*), and western harvest mouse (*Reithrodontomys megalotis*). Except for the MRV, the other species captured during the survey are very common throughout San Bernardino County and are typically found in habitats like those identified on Palisades Ranch.

Bats. Palisades Ranch, in particular, contains a variety of landforms, water features, and vegetation types that likely provide suitable roosting and foraging habitat for several bat species. In addition to the LMP for Palisades Ranch, SWCA believes that the western mastiff bat (*Eumops perotis*) may also occur within the project site.

Aquatic Species

2016 Survey Data (CMBC)

Special status species reported from the region and described in the LMP include Arroyo toad (*Anaxyrus californicus*) a California Species of Concern, and federally endangered; and southwestern pond turtle (*Emys marmorata*), a California Species of Concern by no federal status.

Southwestern pond turtle
The pond turtle was formerly identified as the western pond turtle. No surveys for either species were conducted during the CMBC's 2016 surveys. The LMP states that the species was last observed near Victorville in 1954. Although these species are presumed to be absent from the project site, the LMP identified Biological Element 6 for southwestern pond turtle and arroyo toad, to perform focused surveys for each species in appropriate habitats. CMBC concluded that the many beaver ponds occurring along the main channel through the project site comprise the most likely habitat for focused surveys.

Arroyo toad
Habitats for arroyo toad encompass both inundation areas for eggs, tadpoles, and adults as well as contiguous areas for active and aestivating adults. For both species, it is important that the surveys be extensive enough and performed over multiple seasons to ensure that they are either present or absent from the subject property.

2020 Survey Data (USGS): Special Status Turtles and Amphibians
Research Ecologists from the US Geological Survey (USGS) Southwest Biological Center conducted a number of field surveys for arroyo toad, California red-legged frogs and southwestern pond turtles at the Mojave Narrows Regional Park and Palisades Ranch to determine presence/absence of these special status species. Surveys occurred in years 2017 through 2020.

Southwestern pond turtle (Actinemys pallida)
Turtle trapping sessions were performed in ponded areas created by beaver dams within the riparian corridor. These ponded areas were located near and around the old Heritage Road bridge on the east side of the property, as well as along the unmaintained, flooded road running east-west through the property from the bridge. Hoop traps set in pools of water where the depth exceeded 1 meter (3.28 feet) were set afloat with two pool noodles. Traps remained in place for a minimum of 18 hours. Over the course of all the trapping sessions, traps were rotated among different sites in the riparian area to cover as much of the habitat as possible and identify areas where turtles were located. A preliminary trapping session (using only two traps) was performed on one day in October 2017 to evaluate for trapping potential and trap locations. More extensive trapping was then conducted periodically beginning in June 2019 and continuing through June 2020. All of the additional trap sessions were performed during the turtle activity season of May – September and utilized up to three traps during each session.

In addition, up to two game cameras were periodically set at turtle trap locations during trapping season to capture video of any turtles swimming in the trap area or to capture terrestrial movements over land. Camera traps remained in place for the entire hoop trapping session and recorded footage during both daytime and nighttime hours; however, the cameras would periodically turn off or lose battery life, resulting in partial recordings of some trapping sessions. Camera trapping was conducted on three days in July 2019, on 31 July and 01 August 2019, and four days in June 2020. Camera traps remained in place for the entire hoop trapping session and recorded footage during both the daytime and nighttime hours.

No Southwestern pond turtles were captured or observed within the study areas at Palisades Ranch since trapping efforts and observations were initiated in 2017, with a total effort of 479.9 trap hours (116.5 trap hours in 2020) since initiation in 2017. Trapping efforts were conducted within the active season for pond turtles, and water temperatures recorded during every trap session were always above the feeding activity threshold of about 15°C for most semi-aquatic turtles in North America. A single male red-eared slider turtle (*T. s. elegans*) captured in 2019 in a hoop trap set in the large pond adjacent and just upstream of the old bridge is the only aquatic turtle observation made at the site since trapping efforts were initiated in 2017. This turtle was removed at the request of CDFW and placed in the care of a herpetological sanctuary.

USGS ecologists conducting the surveys concluded that failure to detect pond turtles at Palisades Ranch is unexpected because of the presence of what appears to be excellent habitat for the species. However, they noted that they could find no previous records of pond turtles at Palisades Ranch. Given the dense riparian vegetation, it is more likely that pond turtles are present in places where they were unable to trap rather than them being absent from the area. USGS ecologists determined that bullfrogs and human modification of the environment at the project site have also been implicated in the decline of pond turtles, and that a future detection of pond turtles would not be unexpected.

California red-legged frog (Rana draytonii) and arroyo toad (Anaxyrus californicus)
Due to travel restrictions imposed by the State and USGS as a result of the ongoing Covid-19 pandemic, ecologists were unable to maintain the original schedule of presence/absence surveys that followed the recommended protocols set forth by the USFWS and CDFW. However, amphibian surveys and site assessments were completed for a total of two-day surveys and three-night surveys for California red-legged frogs in March during the breeding season.

Habitat site assessments were performed each day surveys were undertaken in order to assess current habitat quality and changes from previous survey sessions, especially related to water levels. A total of two days surveys and two nights surveys were also completed for arroyo toads in June (an additional four nights surveys and four days surveys were not performed but are recommended by USFWS). Ecologists did not observe California red-legged frogs or arroyo toads in any life stage during the field surveys. Additionally, a Wildlife Acoustics Song Meter was deployed from 3 June to 21 July to take daily recordings and increase the opportunity to detect anuran calls and strengthen efforts to determine presence/absence while travel was restricted. Of the 295 recordings made on the song meter, no evidence of either target species was heard.

Ecologists concluded that because no red-legged frogs or arroyo toads were observed, coupled with the fact that there are no historical records of either within the survey protocol-mandated 1.6 km of Palisades Ranch, a strong argument can be made that either species is absent. The best arroyo toad habitat was observed in March when water was flowing over the sandy, braided channel of the river near the disused airstrip located in the northern portion of the project site, where less water is available than further south near the old bridge. Successful reproduction and recruitment are not possible in ephemeral streams unless water is available for a minimum of 4-5 months of the year, and that does not normally occur in this reach of the Mojave River.

USGS ecologists believe that habitat may appear to be suitable for red-legged frogs from a purely abiotic perspective because the species uses a wide variety of wetland types as found at the ranch but the presence of introduced bullfrogs (see below) compromises habitat quality. The presence of bullfrogs and some invasive fish species (e.g., *Gambusia* and *Lepomis*) has been demonstrated to have negative effects on the survival and condition of red-legged frogs due to predation and more complex interactions. In addition, recent modelling research suggests that the distribution of both pond turtles and arroyo toads exhibit a negative relationship with increased stream temperatures. Therefore, the effects of global warming may need to be considered in future conservation strategies at the project site.

Other Amphibians Detected at Palisades Ranch
American bullfrogs (*Lithobates catesbeianus*) and Baja California tree frogs (*Pseudacris hypochondriaca*) in most life stages (tadpoles, metamorphs, juveniles, and adults) with the exception of egg masses were observed within the project site. Baja California tree frogs in a variety of colorations were by far the most common amphibian seen and heard during field surveys as well as on the song meter recordings.

American bullfrogs were seen in smaller numbers but heard frequently. Both of these species were detected auditorily for the entire duration of the study. No African clawed frogs (*Xenopus laevis*) were observed however ecologists could not rule out their presence due to their ubiquity elsewhere in Mojave Desert and coastal southern California wetlands. Acoustic detection suggested the

occurrence of the western toad (*Anaxyrus boreas*) on three separate occasions in June 2020, and one metamorph was observed during field surveys on 16 June 2020.

Other Species (Beavers)
Although beavers (*Castor canadensis*) are not special-status species, their beneficial activities, particularly dam building, in the Mojave River have many conservation implications. During surveys at the project site, beaver dams were abundant in the upstream half of the project site, an area of high biodiversity. Beavers prefer riparian trees for dam building. Foraging has been demonstrated to increase red willow growth rate but can be detrimental to cottonwoods, especially where cottonwoods are already limited by flow regulation. Non-native plants such as perennial pepperweed may also benefit from the increased stability provided by beaver dams. Beaver dam breaching and re-building creates disturbance that riparian shrubs and trees such as willows and cottonwoods are adapted to; however, this disturbance could also benefit tamarisk, especially if it occurs during summer when willows and cottonwoods are no longer releasing seeds.

Beaver dams also increase fluvial geomorphic diversity (i.e., increase type and abundance of landforms) and surface water extent. Their ponds are associated with a higher diversity of riparian birds and small mammals, including some non-native, invasive species such as bullfrogs and crayfish that are predators and competitors of special-status species such as the arroyo toad. Beaver dams can reduce channel incision if dams persist long enough for sediment to accumulate, and beaver introductions and beaver dam analogs (BDAs) are commonly used in stream and river restoration.

Project Impacts

2016 Land Management Plan
The 2016 Land Management Plan was prepared as a guide for the operation and maintenance activities at the Palisades Ranch including both the upland and riparian portions of the property. Only the riparian portion of the property is considered in this Initial Study as the project site. Habitat protection and enhancement actions at the project site and general maintenance provisions are the focus of this plan. The physical changes to the project site that would result from restoration activities are the subject of the 2021 Final Palisades Ranch Riparian Restoration Plan which is evaluated further below.

The LMP identified a set of biological elements consisting of species, habitats, or communities for which specific management goals were developed in order to minimize impacts associated with future restoration efforts at the project site. Within each element biological and public use management goals were specified and described. Criteria used to identify these elements were determined by CDFW and included: (1) the presence of any listed, candidate or sensitive species or species of special concern known or suspected to occur on or to use the property; (2) essential habitat for one or more listed species must be specified as a biological element; (3) manipulated habitats that are intensively managed for fish and wildlife values must be specified as biological elements; and (4) restoration efforts that may restore an extirpated species or habitat or maintenance efforts that may avoid the threat of extirpation. The biological elements identified in the LMP that would apply to the proposed Palisades Ranch Riparian Restoration Plan are Biological Elements 3 through 7. Biological Elements 1 and 2 pertain to species or communities that were located in the upland area of the Palisades Ranch property that is not a part of this project. Table IV-4*, Biological Elements* reiterates the findings of the 2016 surveys in order to identify threats, goals and impacts associated with the restoration of the project site.

Table IV-4
BIOLOGICAL ELEMENTS

Biological Element	Species or Community	Species Known On-site
3	Communities of Highest Inventory Priority (CHIPS)	Fremont cottonwood forest arroyo willow thickets screw bean mesquite bosque
4	Special Status Bird Species	southwestern willow flycatcher least Bell's vireo yellow-breasted chat yellow warbler summer tanager brown- crested flycatcher vermilion flycatcher Cooper's hawk
5	Special Status Mammal Species	Mojave River vole
6	Southwestern Pond Turtle and Arroyo Toad	Absent
7	Mojave Tui Chub	Absent

Source: Circle Mountain Biological Consultants, Inc., June 2016, Draft Land Management Plan for Palisades Ranch, San Bernardino County, California Helendale Community Service District and Western Rivers Conservancy, Section IV.

Biological Element 3 - Community of Highest Inventory Priority

The LMP identified threats to the three Communities of Highest Inventory Priority (CHIPS) that occur on site as wildfires and human caused fires especially in the mature cottonwood and mesquite stands that are somewhat removed from flowing and standing water. Depending on the amount and extent of groundwater extraction associated with urban uses and agriculture in the area, the riparian habitats could be adversely affected if overdraft conditions exceed current levels or prolonged drought affects the Mojave River aquifer. In addition to distance from flowing or standing water and the effects of prolonged drought, three invasive plant species were identified that may threaten these riparian communities including broad-leaf peppergrass, giant reed, and salt cedar which can displace native plants and may also serve as fuel for fires. Peppergrass is listed as a noxious weed of great ecological concern by the California Department of Food and Agriculture (CDFA) and the California Invasive Plant Council (Cal-IPC). Finally, during 2016 surveys, biologists observed motorcycles trespassing across the site particularly along the existing bridge, providing another potential fire risk.

Three biological goals, referred to in the LMP as first, second and third tier goals, were identified for the protection and enhancement of CHIPs.

First Tier, Goal 1 – protect special status plant communities on parcels already acquired and manage those lands in such a way as to promote the health of these woodland communities in the region. The accomplishment of this goal is on-going and related to restricting access (e.g., locked gates and caretaker oversight), particularly recreational vehicles from the project site. The purpose is to reduce trespassing that may have resulted in inadvertent or intentional setting fire to natural fuels in the riparian areas where the CHIPs occur. For future operations/maintenance activities the LMP recommended continuance of business as usual with regard to caretaker oversight and maintenance of locked gates (First Tier Task 1).

Under Task 2 the LMP recommended enlisting qualified biologists, particularly botanists to identify plants and map the full extent and distribution of CHIPs. This task has been accomplished as part the effort to complete the Final Palisades Ranch Conceptual Riparian Restoration Plan. Botanists from SWCA and the California Botanical Gardens completed extensive surveys and mapped plant communities in 2020 and 2021.

Second Tier, Goal 1 – Protect CHIPs on the subject property by minimizing the prevalence and spread of exotic plants, particularly broad-leafed peppergrass, salt cedar and giant reed. Task 1 under this goal is to continue to remove or otherwise control salt cedar and giant reed in the floodplain and initiate a program to eradicate broad-leaf peppergrass from the project site. This task would be accomplished through implementation of the Integrated Weed Management Plan set forth in the Final Palisades Ranch Conceptual Riparian Restoration Plan (see discussion below).

Third Tier, Goal 1 - Re-establish riparian habitats in areas where they have been removed through active riparian restoration including planting of cottonwood, willow, mesquite and other riparian species if needed (Task 1). Re-establishment of native saltbush and riparian habitats in fallow agricultural areas would be considered a beneficial environmental impact so long as the cost to restore these lands does not detract from other management actions identified in the LMP. The Final Palisades Ranch Conceptual Riparian Restoration Plan includes a restoration design plan that addresses the revegetation of the former agricultural field and the creation of new side and back channels to ensure the success of revegetation activities (see discussion below).

Task 2 addresses the water source by engaging with the Mojave Water Agency and others to discuss the reservation of water for conservation purposes, status of the Mojave aquifer, and transfers of water rights. The success of any LMP or riparian restoration plan depends on the availability of water to and through the project site. As discussed under the project description, in the event that the Watermaster determines that ET rates for new riparian vegetation are consumptive uses, MDLT will purchase or lease additional water rights to support the planting design and ensure there is sufficient water to support the long-term management of the property. The planting design may be adjusted or implemented in phases, depending on when opportunities to purchase additional water rights become available.

Biological Element 4 – Special Status Bird Species

Threats to special status bird species that occur on site are the same as listed above for CHIPs. The prevalence of non-native plant species that may outcompete native plant species or facilitate spread of fire are a threat. This Biological Element contains only one Tier/Goal. The goal of this element is to protect foraging and nesting habitats for special status bird species on parcels already acquired and manage those lands in such a way as to promote the health of native habitats present on the project site.

Task 1 addresses the management of legal and illegal OHV activities, removal of non-native weed species, implementation of fire-preventative measures, and other protection of riparian vegetation (e.g., prevent harvest of standing trees for wood) will all benefit special status bird species. The LMP encouraged additional focused breeding bird surveys to be conducted to determine species that occur and to establish a baseline to see if management actions are facilitating the persistence of targeted species at the project site. Additional surveys were conducted in 2020 by SWCA biologists (see Table IV-3). The LMP suggested that narrow footpaths be created in the dense riparian understory in order to facilitate future bird inventories. These trails should not be established during the breeding season from March through September, nor should the trails provide new access to trespassing recreational vehicles but provide room for foot traffic only.

Task 2 addresses whether the brown-headed cowbird whose parasitism is a significant impact to breeding special status bird species, are present at the project site. No previous focused surveys were conducted for this species and the LMP states that baseline inventories along with focused parasitism studies would need to be completed over multiple seasons. The results would be used to determine the need to implement a trapping program for the species.

Biological Element 5 - Special Status Mammal Species

The LMP indicated that threats to special status mammal species depend on their occurrence and prevalence at the project site. As shown in Table IV-4, no special status mammal species were observed during 2016 surveys. However, the LMP assumed that threats affecting CHIPs would be

the same as those affecting the Mojave River vole and any sensitive bat species should they occur on site in the future. This Biological Element contains only one Tier/Goal; to ascertain presence and status of special status mammal species at the project site, and if present, manage the site for sustained populations. In particular, the focus would be to determine the occurrence of Mojave River vole and Mohave ground squirrel on the subject property. No focused surveys had been performed for either species prior to 2016, and no surveys were conducted at that time. The LMP concluded that such surveys should be performed, and these were completed in 2020 for Mohave ground squirrel (CMBC) and Mojave River vole in 2022 (ECORP). No sign of Mohave ground squirrel was observed during the 2020 focused survey. However, suitable habitat for MRV exists in various areas throughout the Palisades Ranch footprint. Habitat suitability within the property was varied and heavily dependent on soil moisture, with the highest quality habitat located within the Mojave River floodplain in the southern end of the property on both the north and south sides of Heritage Way (old Bryman Road). All the MRV captured during the survey were recorded in Trapping Area 1 and Trapping Area 2 (Figure IV-14. Trapping Results). The habitat within these two trapping areas was similar and both areas contained the following habitat characteristics that were ideal for MRV:

- Dense grass cover
- Moist friable soils
- Dense canopy cover
- Adjacent to flooded or ponded marsh habitat
- Downed logs present
- Brush piles and woodrat middens present

No MRV were captured in Trapping Areas 3, 4, and 5. Although these drier portions of the river contained some structural characteristics that were suitable for the species, the lack of suitable soil moisture and associated vegetation likely precludes MRV from these drier northern reaches of the river. However, it is possible that MRV could disperse into and occupy these areas with the right conditions and/or during periods of heavy rain and flooding.

MRV Management Recommendations
The following are management actions to consider that could benefit MRV and increase their presence on the property.

Invasive Plant Species Removal. A focused giant reed and salt cedar removal program could help increase soil moister and benefit the MRV and other special-status wildlife species that are dependent on riparian habitat. Because of the relatively closed nature of the riparian habitat at the ranch, it's likely that an Arundo and Tamarisk eradication program could succeed in just a few years of successive treatments. It's important to note that such removal efforts be staged with native riparian enhancement to prevent temporal loss of nesting habitat for riparian-breeding birds.

Nonnative herbaceous grasses and forbs were also present within Trapping Areas 1 and 2. Although it is usually preferable to have nonnative species replaced by native species, it was evident based on the capture locations that MRV are existing within and utilizing some of these nonnative herbaceous species, especially the grasses, and removal nonnative herbaceous species could reduce the available habitat for MRV and replacing non-native herbaceous species with appropriate native species in riparian systems is exceedingly difficult.

> *Impact Analysis:* The proposed Palisades Ranch Restoration Project would include invasive species removal that would benefit MRV habitat. Thus, with MM **BIO-1**, which enforces the Conceptual Riparian Restoration Plan design drawing requirements to ensure minimal impact on special status species and their habitats, MRV would be greater protected under the proposed project than that which would occur under the existing conditions.

Discourage or Eliminate OHV Use. OHV recreation was prevalent in the surrounding areas and some evidence of OHV use was observed within the survey area and on the property. Negative impacts of OHVs can include noise disturbance, damage to vegetation, soil compaction, increased runoff, soil

erosion, and degradation of water quality. Therefore, discouraging or eliminating OHV use on the property could benefit to MRV and other native plant and wildlife species.

Impact Analysis: As stated in the Project Description, designated OHV routes on these adjacent BLM lands has continued onto and through the Palisades Ranch property, which has not been designated for such use. The MDLT intends to stop all OHV activity on the project site and to remedy the long-term damage directly caused by OHV Recreation and will be doing so through a separate CEQA process with California State Parks pursuant to a Grant that has been awarded to accomplish this work. As this is a separate project, it will not be evaluated as part of this Initial Study, however, it is important to note here that this work will contribute to protection of MRV and other species found within the Palisades Ranch.

Hydrologic Considerations. It is also recommended that MDLT talk to a hydrologist familiar with western water conditions and dynamics, specifically in the Project area, to provide insights on how to effectively improve the soil moisture and expansion of wetland habitat within the river system. Actions to evaluate could include the following:

- Mechanisms for increasing the local ground water levels;
- Mechanisms for increasing local soil moisture;
- Evaluate additional ways to impound water to be released into the streambed slowly over
- time during dry periods;
- Mechanisms to laterally spread water out from the steam bed to expand the size of the
- wetland; and
- Ways to create denser and broader riparian habitat conditions around ponded areas.

Impact Analysis: The proposed Palisades Ranch Restoration Project would include improvement and expansion of the wetland and riparian area adjacent to and within the Mojave River, which would benefit MRV habitat. Thus, with MM **BIO-1**, which enforces the Conceptual Riparian Restoration Plan design drawing requirements to ensure minimal impact on special status species and their habitats, MRV would be greater protected under the proposed project than that which would occur under the existing conditions.

American Bullfrog Removal. American bullfrogs (bullfrog; Lithobates catesbeianus) and bullfrog tadpoles were abundant within the ponded areas of Trapping Area 1 and Trapping Area 2, which is common in areas ponded as a result of beaver activity. Both tadpoles and adult bullfrogs are voracious feeders and can consume benthic algae and the eggs or offspring of many species of native invertebrates and vertebrates including fishes, reptiles, amphibians, water birds, and small mammals. It is also believed that bullfrogs, once established, can compete directly with native birds, reptiles, amphibians, and fishes for limited food resources. It has been confirmed that there is bullfrog predation on California voles (ECORP 2017). Bullfrogs have also been documented preying on the federally listed (endangered) arroyo toad (Anaxyrus californicus) and native fish species (ECORP 2017). Because the property contains suitable habitat for arroyo toad and the state and federally listed (endangered) Mohave tui chub (Siphateles bicolor mohavensis), a coordinated bullfrog removal project could provide a benefit to MRV, arroyo toad, Mohave tui chub, and numerous other native fish, reptiles, amphibians, birds, and small mammals.

Impact Analysis: The proposed Palisades Ranch Restoration Project does not, at this time, include American Bullfrog Removal, but through the implementation of MM **BIO-2**, the MDLT will consider adapting the Palisades Ranch Restoration Project to include removal of this species from the pertinent project areas. A program to remove this species could bolster the restoration efforts and special status species habitat restoration and rehabilitation program already proposed by MDLT, but doing so is not vital to the success of the proposed restoration project. As such, this component is not required to reduce a significant impact from occurring as a result of implementation of the Palisades Ranch Restoration Project.

Biological Element 6 - Southwestern Pond Turtle and Arroyo Toad
The LMP concluded that the two species share a common characteristic in that they are unlikely to occur at the project site and stated that finding an individual of either species on site would be a significant discovery. This Biological Element contains only one Tier/Goal; to ascertain presence and status of special status reptile and amphibian species on the subject property, and if present, manage the site for sustained populations by conducting focused surveys. These surveys were completed in 2020 with negative results. In addition to the Southwestern pond turtle and Arroyo toad, biologists also focused the survey on the red-legged frog; no individuals of this species were observed. However, the LMP concluded that for Southwestern pond turtles the many beaver ponds occurring along the main river channel comprise the most likely habitat.

Biological Element 7 - Mojave Tui Chub
Mojave Tui chubs historically occurred in this stretch of the Mojave River but have since been extirpated. Given that the species does not presently occur onsite, there were no threats identified. However, the LMP concluded that care must be exercised that the source population(s) is not adversely affected by removal of individuals to establish a refugium at Palisades Ranch Riparian Restoration project site.

This Biological Element contains only one Tier/Goal; to consider the feasibility of establishing, operating, and managing a Mojave Tui chub refugium at the project site. Task 1 is to establish, operate, and manage a Mojave Tui chub refugium if conditions are favorable. For this species, the LMP concluded that it beyond the scope to fully describe how such a refugium would be established, except to say that the Managing Partners must work closely with agency biologists and others to establish, operate, and manage it.

Operations/Maintenance impacts associated with the implementation of the LMP were considered to be beneficial in that they would curtail existing negative impacts such as trespassing by motor vehicles, particularly motorcycles, and illegal dumping. Installing gates/locks and ensuring that existing locks are functional along existing roads would control trespassing and dumping. Removal of existing dumped material would eliminate this impact and reduce the likelihood of continued dumping. Finally, implementation includes the continuing employment of an on-site caretaker to control access and keep the site clean.

2021 Conceptual Riparian Restoration Plan
In 2020, SWCA completed a comprehensive assessment of the project site in order to develop the Conceptual Riparian Restoration Plan for the project site. Work included completing collecting and interpreting ecological data related to the Mojave River and riparian zone soils, hydrology, groundwater levels, hydraulic condition, geomorphology, vegetation, history, and avian community to understand ecosystem processes and inform river channel and riparian restoration planning within the project site. SWCA and others also completed a number of focused surveys as recommended in the LMP and compiled information about special status species birds, butterflies, mammals, reptiles, amphibians, and the Mohave tui chub to develop criteria for riparian enhancement and restoration to benefit special status species. The primary focus of these studies was to assist in the development of 60 percent design drawings to restore aquatic and riparian habitat within the 69-hectare (170-acre) abandoned agricultural field and the Mojave River channel adjacent to the agricultural field with an additional 8.1 hectares (20 acres) for a total of 77.1 hectares (190 acres).

In addition, SWCA mapped 336 hectares (831 acres) riparian vegetation of which 84 hectares (208 acres) was dominated by noxious weeds (perennial pepperweed and prickly Russian thistle). Big saltbush, red willow, and Fremont cottonwood were dominant in other areas. Tamarisk and giant reed occurred in isolated patches throughout the project site. This information was then used to identify areas for integrated weed management and to create a plant palette for riparian revegetation and enhancement.

Upon completion of surveying and mapping tasks, SWCA synthesized the information to develop the Conceptual Riparian Restoration Plan. The plan focuses on the restoration of the abandoned agricultural field and adjacent Mojave River channel to restore the floodplain channel and bench with a side channel, cottonwood field, and pond to increase riparian and aquatic habitats. SWCA developed design drawings for the preferred alternative to restore the abandoned agricultural field that would result in approximately 30 hectares (75 acres) of riparian forest expansion. The 60 percent design is included in its entirety in Appendix D of the Conceptual Restoration Plan (Initial Study Appendix 1). The Project Description provides a detailed description of the Plan.

Restoration activities include: (1) riparian enhancement actions such as planting, soil amendments, irrigation, weed treatments, placement of small woody debris; (2) riparian restoration actions such as river channel alignment, terrace cutting, grading, installation of in-channel structures, and other construction actions that require heavy equipment; (3) implementation of best management practices (BMPs) during construction and long-term management and maintenance of restored habitats to address threats as they arise. Such threats to the restored habitats and associated special status species as those identified in the LMP and reiterated in the Conceptual Restoration Plan are off-highway vehicle trespass and exotic plant species (noxious/invasives), as well as pathogens and soil contaminants. The Plan includes metrics for determining restoration success and assumes that long-term management and maintenance would include provisions to allow supplementary measures to be initiated to promote healthy riparian habitat such as supplemental plantings, controlled flooding to assist in the establishment of vegetation, and erosion control.

Restoration would include planting cottonwoods, willows and shrubland to support the southwestern willow flycatcher, and several other species including least Bell's vireo, western yellow-billed cuckoo, Cooper's hawk, Lucy's warbler, summer tanager, yellow warbler, and yellow-breasted chat. Additionally, plantings of mesquite would enhance habitat complexity and provide potential foraging and/or nesting habitat for least Bell's vireo, western yellow-billed cuckoo, and Lucy's warbler.

In addition, restoration of aquatic habitat would involve reconnecting the abandoned agricultural field to the river by reestablishing a nested floodplain that resembles historic floodplain conditions and creating a pond. The creation of the pond and channels could provide habitat for the Southwestern pond turtle and Arroyo toad.

Construction

Restoration activities will be completed in phases beginning with a pilot project, a 15-acre pilot project with deep planting of willow and cottonwoods. Construction equipment would consist of a Waterjet Stinger, cutting and pruning tools, chicken wire and/or steel cloth; tracked vehicle such as a skidsteer (e.g., bobcat) with mower attachment and manual tools (e.g., weed-eaters); grazing by sheep or goats may also be used to remove thatch; aquatic-label herbicide applied to perennial pepperweed via backpack sprayer, wicking or hand wiping; buckets for broadcasting seed of native riparian plants. A Waterjet Stinger is a steel tube attached to a hose and generator designed to develop a small shaft to groundwater to allow willows and cottonwoods to be planted.

The restoration project will be completed in three phases and will utilize the following tools and equipment: survey equipment, earth-moving heavy equipment and hauling equipment (e.g., backhoe-excavator, dump truck); silt fencing; manual cutting, pruning, digging tools, buckets, Waterjet Stinger; planting containers and stakes, chicken wire and/or steel cloth, native seed, arbuscular mycorrhizal cultures; tracked vehicle (e.g., skidsteer) with mower attachment, herbicide (aquatic label for perennial pepperweed, imazapyr for giant reed and tamarisk), backpack sprayer; erosion control seed; weed-free straw; irrigation hoses, water pump.

Installation of the irrigation system will require utilization of the following tools and construction equipment: irrigation hoses, buckets, water pump. Construction of the trail to the bridge, nested loop trail, trail through the pollinator garden, and parking lot will require utilization of the following tools and construction equipment: earth moving equipment, native seed, manual cutting, pruning, digging tools,

hammers, mallets, planting containers and stakes, buckets, chicken wire and/or steel cloth, crusher fines.

Operation

On-going During Operation. Maintenance activities would include temporary irrigation of the restoration areas for up to three years after revegetation depending on the success of the species planted. Weed management will also be ongoing, especially following restoration implementation. In total, 80 acres of vegetation enhancement were identified for weed management with a focus on perennial pepperweed. Weed management would require visits to Palisades Ranch in the amount of an estimated 20 days per year, would be accomplished by a staff of 4-8 persons and would require the utilization of the following tools and construction equipment: tracked vehicle (e.g., skidsteer) with mower attachment and manual tools (e.g., weed-eaters); manual digging, cutting, puning tools; aquatic-label herbicide applied to perennial pepperweed via backpack sprayer, wicking or hand wiping, imazapyr applied to giant reed and tamarisk.

Monitoring Activities. Such activities will also be on-going to measure success of the project. Vegetation and wildlife monitoring will be conducted regularly to provide knowledge of the distribution and abundance of target species and evidence of restoration success in relation to project goals. In addition, records of noxious weed treatments should be maintained to track the effectiveness of methods, especially methods for perennial pepperweed control. Vegetation mapping and monitoring to track the extent of noxious weed patches and search for potential new occurrences of noxious weeds that could become problematic if not treated swiftly should occur at least every 5 years and more frequently in recently disturbed sites. It is anticipated that monitoring would require visits to Palisades Ranch in the amount of an estimated 30 days per year and would be accomplished by a staff of 2-4 persons.

Recreational Use. Recreational use would be passive and consist of walking/hiking around established trails within the project site. MDLT anticipates that, during the cooler months (6-8 months per year) Palisades Ranch may see an average of 10 visitors per day.

Daily Operation. Daily operations would consist of a caretaker monitoring on-site activities, with volunteers visiting the site on an as-needed basis, anticipated to average two persons per day for 60 calendar days per year.

Construction activities would result in changes in existing conditions through the removal of stands of noxious weeds including giant reed, tamarisk, cheatgrass and Russian thistle, some of which provide nesting and foraging opportunities for special status species. USFWS and CDFW may need to be consulted regarding threatened and endangered species documented to occur within an area of potential impact for future individual projects. Prior to initiation of construction activities for future projects, focused surveys for special status species shall be conducted, and if present, management actions could include consultations under the Fish and Wildlife Coordination Act and Section 2081 of the State Fish and Game Code.

Based on an evaluation of the specific project location, because the amount of area to be disturbed by the whole project will be greater than one acre, the Lead Agency will be required to file a Notice of Intent (NOI) for a General Construction permit to comply with the National Pollutant Discharge Elimination System (NPDES) requirements. The NOI is filed with the State Water Resources Control Board and enforced by the Santa Ana Regional Water Quality Control Board (RWQCB). A Stormwater Pollution Prevention Plan (SWPPP) must be implemented in conjunction with construction activities. This is discussed in further detail in previous Subsection X, Hydrology and Water Quality.

The project includes the potential discharge of fill into or alterations of “waters of the United States,” “waters of the State,” and stream beds of the State of California. Regulatory permits to allow fill and/or alteration activities due to project activities such as pipeline installation are likely be required

from the Army Corps of Engineers (ACOE), the Regional Water Quality Control Board, and CDFW over the life of the restoration project. A Section 404 permit for the discharge of fill material into "waters of the United States" may be required from the ACOE; a Section 401 Water Quality Certification may be required from the Regional Board; a Report of Waste Discharge may be required from the Regional Board; and a 1600 Streambed Alteration Agreement may be required from the CDFW.

Project Design Requirements

The Conceptual Riparian Restoration Plan design drawing include a number of requirements to ensure minimal impact on special status species and their habitats. These requirements shall be enforced through the implementation of the following mitigation measures:

BIO-1 ***Design drawings Sheet 3 include the following relevant requirements to protect biological resources during construction that shall be implemented by the project:***

8. Construction of work shall occur outside of conservation species nesting periods, aquatic spawning, and other time periods as described in said permits.

18. Initial construction staking of protect in place (pip) trees, biological habitats, and special aquatic habitat areas shall be staked by the project biologist prior to construction. Protect in place areas shall be maintained by the contractor during the duration of the project.

38. Engineer and the project biologist shall mark all trees for removal and selective clearing and pruning for equipment access and site restoration.

Protect in Place (PIP)

39. Contractor guarantees that care, caution and best management techniques are implemented to maximize the survivability of native mature trees not designated for removal.

a. All PIP vegetation shall have a minimum of 99 percent success rate, showing vigor and general health, for 24 months after pip measures are conducted.

b. During construction additional pruning, irrigation, or fertilizer to restore health to the PIP vegetation shall be conducted at the contractor's expense.

d. USFWS/DWR aquatic personnel shall be notified two weeks prior to construction of the project. All coffer dams and in-stream work shall coordinate with the project biologist at least two weeks prior to construction of the project. Initial in-stream construction shall have a project biologist monitor construction at the start of in-stream construction areas. Contractor shall notify at all times if there are any observed aquatic species trapped in residual pools or near the designated in-stream construction areas. The handling and relocation of aquatic and terrestrial species shall be done by the project biologist under special provisions outlined in permit approvals.

g. Any and all riparian areas and riparian vegetation outside of the limits of disturbance shall be protected in place.

h. No construction supplies, fuels nor oils shall be stored in riparian areas, no vehicles nor heavy equipment shall be allowed into riparian areas other than the designated channel access sites, and routes. No discharge of any unspecified materials shall be allowed into any riparian areas. Riparian areas outside of designated equipment areas shall be traversed only by foot and leak free hoses

may cross riparian vegetation. Any incidentally disturbed riparian areas shall be restored to pre-construction conditions.

Vegetation Maintenance

43. ***Temporary irrigation (1-2 years) using drip and sprinkler system is anticipated and will be included in the final design.***
44. ***The Contractor shall perform continuous weed control and warranty all plantings for 24-month period.***

Design drawings Sheet 4 include the following relevant requirements to protect biological resources during construction:

2. ***The Project is anticipated to be permitted under CEQA and a USACE nationwide 27. Final plans for construction shall adhere to all special provisions outlined in said permits. The Contractor shall finalize a stormwater pollution prevention plan.***
3. ***The Contractor shall obtain local construction permits and adhere to all provisions and requirements.***
4. ***No heavy equipment shall operate in the vegetation enhancement areas. Areas shall be traversed by foot traffic only.***
5. ***Construction equipment shall access riparian areas at designated locations only.***
6. ***Construction activities in the designated riparian areas shall be directed by field biologist.***
7. ***Work in riparian areas shall only occur during base flow conditions. Contractor shall monitor weather and plan each day's work according to conditions. Contractor shall stabilize areas to anticipate for storm flow during off work hours. Flows in the Mojave River are variable and flash flood may occur during the construction period. Areas may need additional temporary best management practices to isolate the working area from storm water event flows. Coffer dam to be placed upstream of the constructed side channel work area.***
7. ***Select tree removal and transplanting of existing riparian plants shall be directed by field biologist.***
8. ***All large branch and root cuts to protect in place trees in the designated riparian areas shall be performed by a state of ca certified arborist.***
9. ***Construction of boardwalk piers, overlook wall, and pump utilities shall isolate areas from flowing water. Any pumped ground water shall be filtered prior to discharging to the Mojave River. Concrete washout shall be disposed offsite.***
10. ***Equipment fueling and maintenance areas shall be in designated upland staging area only.***
11. ***Equipment shall not be left in riparian areas during off-work hours and shall be stored in upland staging area only.***
12. ***Contractor shall have signs and barriers to prevent public entry during construction activities.***
13. ***All areas shall be restored with adequate cover and temporary stabilization techniques until conditions warrant.***
14. ***Contractor shall maintain/repair/replace best management practices as needed until adequate vegetation cover is established.***
15. ***Silt fencing shall be placed down gradient of earth work at all times.***

Additional Restoration Efforts
Where appropriate, small diameter limbs collected from the restoration efforts shall be salvaged to create small brush piles in the upper portion of the Palisades Ranch to provide cover for species such as quail, etc.

These requirements shall be appended to the project's Mitigation Monitoring and Reporting Program (MMRP) to ensure compliance in order to minimize impacts on existing special status species and habitats to the extent feasible.

Mitigation Measures

In addition to MM **BIO-1**, above, the following mitigation measures shall be implemented to reduce impacts to MRV, arroyo toad, and Mohave tui chub from American Bullfrog presence within the Mojave River at Palisades Ranch. No other mitigation measures will be required beyond the Project Design Requirements listed above.

BIO-2 MDLT shall consider the modification of the Restoration Plan to include removal of American Bullfrog from the stretch of the Mojave River that traverses through Palisades Ranch (refer specifically to the areas shown on Figure IV-13 and IV-14). A qualified biologist shall be retained, should an American Bullfrog Removal Program be included in the Restoration Plan, to draft and administer the provisions of the Removal Program.

b. *Less Than Significant With Mitigation Incorporated* – MDLT's intent in proposing the restoration of riparian habitat at the project site is to reduce the impacts associated with previous agricultural uses, as well as neglect of the site once agriculture activities ceased. Riparian enhancement actions include planting, soil amendments, irrigation, weed treatments, and placement of small woody debris. Riparian restoration actions include river channel alignment, terrace cutting, grading, installation of in-channel structures, and other construction actions that require heavy equipment.

Restoration would include planting cottonwoods, willows and shrubland to support the southwestern willow flycatcher, and several other species including least Bell's vireo, western yellow-billed cuckoo, Cooper's hawk, Lucy's warbler, summer tanager, yellow warbler, and yellow-breasted chat. Additionally, plantings of mesquite would enhance habitat complexity and provide potential foraging and/or nesting habitat for least Bell's vireo, western yellow-billed cuckoo, and Lucy's warbler.

In addition, restoration of aquatic habitat would involve reconnecting the abandoned agricultural field to the river by reestablishing a nested floodplain that resembles historic floodplain conditions and creating a pond. The creation of the pond and channels could provide habitat for the Southwestern pond turtle and Arroyo toad.

Project design features and mitigation measures identified in the previous section would ensure that the proposed restoration plan would not have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by CDFW or USFWS. Furthermore, implementation of the following mitigation measure will further ensure that construction efforts required to implement the proposed restoration project would not pose any harm to sensitive natural communities or riparian habitat on site.

BIO-3 Plastic mono-filament netting (erosion-control matting) or similar material will not be used in erosion control materials to prevent potential harm to wildlife. Materials such as coconut coir matting or tackified hydroseeding compounds will be used as substitutes.

Implementation of the above mitigation measure, as well as MM **BIO-1**, above, would ensure that the proposed project would not result in any significant adverse impacts under this issue.

c. *Less Than Significant With Mitigation Incorporated* – The proposed project would result in the creation and maintenance of riparian (river channels) and aquatic (pond) functions at the project site. Enhancement of riverine functions to support special status invertebrate, bird and mammal species and the creation of a pond to support aquatic species would have a beneficial effect. Although as described in the Project Description and in Section IV(a), above, riparian and restoration activities would result in the direct removal and filling of some areas within the Mojave River and adjacent floodplain locally, it would not result in a substantial adverse effect to State or federally protected wetlands. Project design features and mitigation measures to be implemented during construction would ensure that impacts would be less than significant. Furthermore, activities that occur within the jurisdictional limits of the Mojave River would be subject to the Clean Water Act (CWA) and Fish and Game Code (FGC) under the jurisdictions of United States Army Corps of Engineers (USACE), Regional Water Quality Control Board (RWQCB), and CDFW, respectively. Therefore, any proposed permanent or temporary impacts to this feature would require a Streambed Alteration Agreement from the CDFW, as well as CWA Sections 401/404 permits from the RWQCB and USACE, respectively.

USACE 404 Permit

The proposed activity will require a section 404 of the CWA permit for discharges of dredged or fill material into Waters of the U.S (WoUS). It is likely this project will fall under the nation-wide permit (NWP) #27 – Aquatic Habitat Restoration, Enhancement, and Establishment Activities (Reauthorized 2-25-22). There are no acreage or linear foot limits in this NWP. A Pre-Construction Notification will be required.

Regional Water Quality Control Board: 401 Certification/State Waste Discharge Requirements (WDR):

The project area is within the jurisdiction of the Lahontan RWQCB. Under Section 401 of the CWA, the RWQCB must certify that the discharge of dredged or fill material into WoUS does not violate state water quality standards. The RWQCB also regulates impacts to Waters of the State of California under the Porter Cologne Water Quality Act through the issuance of State General Waste Discharge Order, or Waste Discharge Requirements, depending upon the level of impact and the waterway. In addition to the formal application materials and fee (based on area of impact), a copy of the appropriate California Environmental Quality Act (CEQA) documentation must be included with the application.

CDFW Lake or Streambed Alteration Agreement

A Lake or Streambed Alteration Agreement (LSAA) is required for all activities that alter streams and lakes and their associated riparian habitat. In addition to the formal application materials and fee (based on cost of the project), a copy of the appropriate CEQA documentation must be included with the application. The project will impact CDFW jurisdictional streambed as part of the restoration, enhancement, and creation plan where the project proposes to remove berms, non-native tree species, install faux beaver dams, and other flow modifications. The proposed activities associated with the in-river projects will require a LSAA.

State Water Resources Control Board: Section 402 NPDES

Any destabilization greater than 1 acre will require coverage for NPDES under the State General Construction Permit. In order to apply for coverage, a Stormwater Pollution Prevention Plan (SWPPP) will need to be developed and used as part of the Notice of Intent filed with the State Water Resources Control Board. In addition to the formal application materials a fee (based on area of impact) will be required.

The following mitigation measure shall ensure that the above permits are obtained by the Applicant to minimize impacts to jurisdictional waters:

BIO-4 ***The Applicant shall prepare and submit a Regional Water Quality Control Board 401 Certification, a Fish and Game Code Section 1602 Lake or Streambed Alteration Agreement, and a State Water Resources Control Board: Section 402 NPDES. No ground disturbance within jurisdictional waters shall occur until the MDLT obtains the above permits and provides the District verification of permit acquisition. Note that the final compensation package contained in the permit shall be implemented by the MDLT. If the permit conditions are different than the mitigation listed in this document to protect biological resources, the MDLT shall implement the mitigation identified in the permits, which must be equivalent or more effective in mitigating or avoiding potential significant effects and the substitution of any mitigation measure will not cause any potentially significant effect on the environment.***

With implementation of MM **BIO-4**, above, the proposed project would comply with USACE and RWQCB under Sections 404/401 of the CWA and therefore result in less than significant impacts to state or federally protected wetlands.

d. *Less Than Significant Impact* – The Palisades Ranch restoration project site is located within the historic reach of the Mojave River near the community of Helendale in the County of San Bernardino. The project site provides habitat for a variety of native and migratory species. The Palisades Ranch Conceptual Riparian Restoration Plan has been prepared to restore and enhance the project site by restoring the abandoned agricultural field and adjacent Mojave River channel and bench with a side channel, cottonwood field, and a pond to increase riparian and aquatic habitats. The intent is to increase the use of the site by native and migratory species for nesting and foraging. The MDLT does intend to install fencing along the western edge of Palisades Ranch, outside of the limits of the proposed project site. This fencing is intended to control off-highway vehicle impacts at Palisades Ranch and will be analyzed under a separate CEQA approval. This fence would be located west of the top of the Palisades, and would therefore have no potential to interfere with wildlife movement within the restoration area, which provides access to the Mojave River. Furthermore, the proposed fencing would not include entire site coverage, and therefore would ultimately not serve to impede all wildlife from accessing the site at the edges of the proposed fence line (shown on Figure IV-15). Therefore, the proposed project would not interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

e&f. *Less Than Significant Impact* – The project site is located in an unincorporated area of the County of San Bernardino along a stretch of the Mojave River.

The project site is not located in an area governed by an adopted Habitat Conservation Plan or Natural Community Plan. However, although the County of San Bernardino is not the lead agency for the project, and the San Bernardino County Flood Control District (SBCFCD) manages the floodway of the Mojave River at Palisades Ranch. SBCFCD has expressed an interest in participating in the restoration project. Therefore, compliance with Section 88.01.080 of the County's Development Code would be applicable to the project.
Section 88.01.080, reads as follows:

This Section provides regulations to promote healthy and abundant riparian habitats that protect watersheds; control transmission and storage of natural water supplies; provide unique wildlife habitats for rare, endangered and threatened plants and animals; provide attractive environments; control natural soil erosion and sedimentation to protect stream banks subject to erosion and undercutting; and provide sufficient shade to reduce temperature and evaporation and the growth of

algae in streams. The provisions of this Section are intended to augment and coordinate with the responsibilities of the California Department of Fish and Game (Wildlife).

Section 88.01.050 is the County Development Code section that relates to the issuance of a native tree or plant removal permit.

(a) Applicability.
- *(1) Applicable Areas. The provisions of this Section shall apply to all riparian areas located on private land in all zones within the unincorporated areas of the County and to riparian areas on public land owned by the County, unless exempt as specified by § 88.01.030 (Exempt Activities) and by Subdivision (2) (Exemptions), below.*
- *(2) Exemptions. The provisions of this Section shall not apply to:*
  - *(A) Emergency Flood Control District operations or water conservation measures established and authorized by an appropriate independent Special District.*
  - *(B) An area that has an existing man-made impervious structure, which is greater than 120 square feet in roof area, between the area proposed to be disturbed by a development permit and the bank of a subject stream, as measured in a straight line perpendicular to the centerline of the stream.*

(b) Regulated Riparian Plants.
- *(1) Vegetation Described. The removal of vegetation within 200 feet of the bank of a stream, or in an area indicated as a protected riparian area on an overlay map or Specific Plan, shall require approval of a Tree or Plant Removal Permit in compliance with § 88.01.050 (Tree or Plant Removal Permits) and shall be subject to environmental review.*
- *(2) Streams. For the purposes of this Section, streams include those shown on United States Geological Survey Quadrangle topographic maps as perennial or intermittent, blue or brown lines (solid or dashed), and river wash areas.*

(c) Preconstruction Inspections. Preconstruction inspections shall include the verification of the presence of riparian vegetation.

(d) Conditions of Approval. Conditions of approval for removal of riparian vegetation may be imposed in addition to, and in combination with, any condition imposed in compliance with § 88.01.050 (Tree or Plant Removal Permits).

The proposed project would be required to comply with the County's Code of Ordinances, and as this is a mandatory requirement, no mitigation is required to enforce compliance thereof. Ultimately, the potential for the proposed project to conflict with local policies or ordinances pertaining to biological resources would be considered a less than significant impact, and implementation of the proposed project would therefore not result in a significant impact to any Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. Impacts are less than significant and no mitigation is required.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
V. CULTURAL RESOURCES: Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	☐	☒	☐	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☒	☐	☐
c) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☒	☐	☐

SUBSTANTIATION: A cultural resources report has been prepared to evaluate the potential for cultural resources to occur within the project area of potential effect titled "Identification and Evaluation of Historic Properties, Palisades Ranch Ecological Restoration Project, Helendale Area, San Bernardino County, California" prepared by CRM TECH dated April 21, 2022 (Appendix 8). The following summary information has been abstracted from this report. It provides an overview and findings regarding the cultural resources found within the project area.

Regulatory/Statutory Framework

Section 106 of the National Historic Preservation Act mandates that federal agencies take into account the effects of their undertakings on historic properties and seek ways to avoid, minimize, or mitigate any adverse effects on such properties (36 CFR 800.1(a)). "Historic properties," as defined by the Advisory Council on Historic Preservation, include "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior" (36 CFR 800.16(l)). The eligibility for inclusion in the National Register is determined by applying the following criteria, developed by the National Park Service as per provision of the National Historic Preservation Act:

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and
> (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
> (b) that are associated with the lives of persons significant in our past; or
> (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
> (d) that have yielded, or may be likely to yield, information important in prehistory or history. (36 CFR 60.4)

Results and Findings of the Cultural Resources Report

Cultural Resource Studies In the Vicinity of the Project

According to the South Central Coastal Information Center (SCCIC) records, portions of the area of potential effect (APE) have been subject to at least 12 cultural resources studies completed as early as 1940 and as recent as 2014 (Figure V-1). As a result of the previous survey efforts in the vicinity, two historical/archaeological sites, designated 36-000184 (CA-SBR-184) and 36-026214 in the California Historical Resources Inventory, have been recorded as lying partially within the APE boundaries. Site 36-000184 was described in the 1940s-1960s as a prehistoric—i.e., Native American—habitation area with possible burials, and Site 36-026214 was recorded in 2013 as a steel Pratt pony truss bridge that had been relocated from the City of Grand Terrace in 1988-1989 (Smith 1941; Vititow 1963; Glentis 2013).

Within the one-mile scope of the records search, SCCIC records identified at least 15 other previous studies on various tracts of land and linear features (Figure V-1). In all, more than half of the land within the one-mile radius has been surveyed, resulting in the recordation of 14 additional historical/ archaeological sites and one isolate—i.e., a locality with less than three artifacts—as listed in Table V-1. Two of the sites and the one isolate were prehistoric in nature, with the isolate consisting of a single chert flaked tool. One of the sites was a village site originally recorded roughly 0.26 mile to the east as scatters of artifacts, numerous house pits, and multiple burials, while the other was recorded as a sparse lithic scatter containing six pieces of flaked stone (see Table V-1).

The other 12 sites all dated to the historic period and represented six buildings or groups of buildings, including a farmstead, three refuse scatters, and three linear features, namely the Mojave Trail, the former U.S. Route 66, and a power transmission line (see Table V-1). None of these 15 additional cultural resources was found in the immediate vicinity of the APE, and thus none of them requires further consideration during this study.

Table V-1
PREVIOUSLY RECORDED CULTURAL RESOURCES WITHIN THE SCOPE OF THE RECORDS SEARCH

Site No.	Recorded by/Date	Description
36-000183	Various 1909-2015	Village site with scattered artifacts, house pits, and burials
36-000184*	Smith 1941	Prehistoric habitation site with possible burials
36-002074	Smith 1973	Sparse lithic scatter
36-002910	Various	Former U.S. Highway 66/National Old Trails Highway
36-003033	Various	Segments of the Mojave Trail
36-010317	Various 1993-2016	Barstow to Victorville 34.5kV transmission line
36-020970	Brunzell and Leonard 2009	Farmstead with associated structures and other features
36-020971	Brunzell and Leonard 2009	Historic-period refuse scatter
36-020972	Brunzell and Leonard 2009	Historic-period refuse scatter
36-020973	Brunzell and Leonard 2009	Historic-period refuse scatter
36-025616	Castells 2013	Two single-family residences, circa 1957 and 1968
36-025617	Castells 2013	Two single-family residences, circa 1922 and 1968
36-025618	Castells 2013	Single-family residence, circa 1930
36-025619	Castells 2013	Ranch-style single-family residence, circa 1948
36-025620	Castells 2013	Minimal Traditional-style single-family residence, circa 1965
36-026214*	Glentis 2013	Grand Terrace Bridge
36-028539	HDR, Inc. 2015	Isolate: chert flaked tool

Geoarchaeological Profile of the Project Area
Geologic mapping by Dibblee (1967; 2008) shows the APE to be situated primarily upon alluvial sediments derived from the Mojave River or adjacent higher ground. Subject to frequent flooding and constant erosion, these sediments in the Mojave River floodplain would not have presented a favorable setting for long-term human habitation in prehistoric times, nor are they conducive to the preservation of archaeological deposits *in situ*. The deeper sediments in the Victorville area, underneath the Mojave River alluvium, are generally considered to be of Pleistocene age. Deposited more than 11,700 years ago, these older sediments predated the proliferation of human settlements in southern Mojave Desert and are likely to be culturally sterile.

Past archaeological findings in the Victor Valley region (Tang et al. 2005; Dahdul et al. 2007) and ethnohistorical literature (Bean and Smith 1978) indicate that longer-term residential settlement of the

Native population in prehistoric times was more likely to occur on elevated terraces, hills, and finger ridges, in proximity to natural waterways but outside the active floodplain, which would have been used mainly for resource procurement and travel. Given its geomorphologic profile, the subsurface sediments in the APE appears to relatively low in sensitivity any intact, potentially significant archaeological remains of prehistoric origin, except at higher elevations.

Historical Overview
Historical sources consulted for this study demonstrate that the APE lies within a half-mile from what was historically the main transportation corridor across the Victor Valley, where the Mojave/Salt Lake Trail, and Santa Fe Railway, and U.S. Highway 66 were all routed through (Exhibits V-1 to V-3). However, development in the project vicinity was evidently dictated much more by the closer presence of the Mojave River and its floodplain, as little evidence of settlement activities was observed in the APE during the historic period except at the headquarters of the Palisades Ranch in the southwestern corner, with the rest of the property used solely as farmlands (Exhibits V-1 to V-3; UCSB 1929-1973; NETR Online 1952-1969).

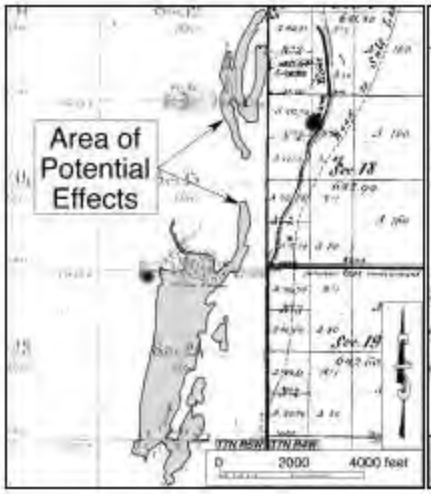

Exhibit V-1: The APE and vicinity in 1853-1855. (Source: GLO 1855; 1856)

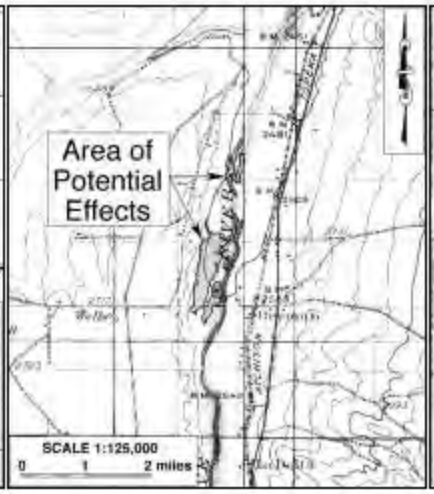

Exhibit V-2: The APE and vicinity in 1920-1932. (Source: USGS 1934)

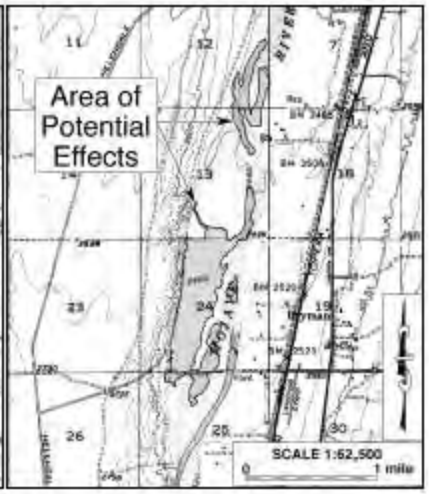

Exhibit V-3: The APE and vicinity in 1952-1956. (Source: USGS 1956)

Most of the farmlands of the ranch, lying on level terrain along the western side of the Mojave River channel, falls within the boundary of a 160-acre homestead patent that George Washington Decrow obtained from the U.S. government in 1892 (BLM n.d.). A life-long farmer, George Decrow (1841-1902) and his wife Lucy (1849-1921; nee Pollock) were both former Midwesterners who settled in California at least ten years before (Ancestry n.d.).

After George Decrow's death in 1902, one of their six children, a son named Jesse, apparently continued the family's farming operations in the Helendale area to at least 1930 (Ancestry n.d.). However, it is unclear whether these operations involved George Decrow's former homestead claim in the APE, which comprised the east half of the west half of Section 24. According to historical maps and aerial photographs, no buildings or cultivated fields were present on that property in the 1920s-1930s era (Exhibit V-3; UCSB 1929).

In 1946, the U.S. government issued to Harold Howard Hill a 40-acre patent under provisions of the Desert Land Act, which covered the southwest quarter of the southwest quarter of Section 24, immediately to the west of the former Decrow homestead claim (BLM n.d.). Also, a life-long farmer and a Midwest native, Harold Hill (1895-1963) was known to be farming in Van Nuys, California, in the 1910s (Ancestry.com n.d.). After his wife Edna Marguerite Bucklin (1900-1938), a fellow Minnesota transplant, died in 1938, Harold Hill moved to the Oro Grande-Helendale area sometime before 1942, where he died in 1963 (*ibid.*).

Correspondingly, by 1952 a group of buildings had appeared in the southwestern corner of the APE, around the old farmhouse that is still extant today, representing the first notable development effort in the APE (Fig. 8; NETR Online 1952; UCSB 1952-1959). To the north and east of the buildings, a large expanse of cultivated farmlands had been established along the riverbank, which included much of the former Decrow property, now evidently under same ownership (NETR Online 1952; UCSB 1952-1959). The history of the Palisades Ranch, thus, can be traced to Hill's acquisition in 1946.

In 1976, Robert T. and Barbara T. Older acquired the property from an entity known as Lake World (County Assessor n.d.), which ushered in another growth spurt in the history of the ranch. County records indicate that additional construction occurred on the property in that same year and again in 1989-1990 (*ibid*.). Aerial photographs show that between 1973 and 1994, a number of buildings were added in the vicinity of the older farmhouse, including three additional residences, two large storage buildings, and an open-sided pole barn (NETR Online 1968-1994; UCSB 1973). All of these buildings, however, are located outside the APE boundary and further to the west (*ibid.*).

Robert Theodore Older (1921-1995), a southern California native and a World War II veteran, was well-known locally and is remembered today for serving as San Bernardino County Supervisor from the First District in 1980-1982 (Findingagrave.com n.d.). In 1990, he filed for non-profit status for the Palisades Ranch Museum (State of California 1990). It was around that time that the steel bridge at Site 36-026214 was moved to the property from Grand Terrace (Glentis 2013). No other man-made features were identified within or adjacent to the APE from any of the historical sources consulted.

Cultural Resources Recorded in the APE and Resource Evaluation

As stated above, two historical/archaeological sites were previously recorded as lying partially within the APE. During the field survey, four additional cultural resources, including one site and three isolates, were identified and recorded in the APE. These six cultural resources are listed below:

Identification Number	**Description**
Site 36-000184 (CA-SBR-184)	Prehistoric habitation remains with possible burials
Site 36-026214	Grand Terrace Bridge (relocated)
Isolate 3579-1*	Glass Coca-Cola bottle fragment
Isolate 3579-2*	55-gallon metal drum
Isolate 3759-3*	Small glass bottle
Site 3579-4*	Palisades Ranch complex

**Temporary designations, pending assignment of primary numbers in the California Historical Resources Inventory*

Site 36-000184 (Prehistoric Habitation Site)
Located in the general vicinity of the Palisades Ranch headquarters in the southwestern portion of the APE, Site 36-000184 was originally recorded in 1941 as a prehistoric village site with stone clusters indicating circular houses, fire pits, projectile points, and faunal remains (Smith 1941). A site record update from 1963 noted rich surface deposits of charcoal with "burnt bones laying around," interpreted as burials, as well as pottery sherds and many other unspecified artifacts on the surface (Vititow 1963). Few further details were provided about the cultural deposits in these early records, and the exact locations of the features and artifacts were unclear.

During the field survey, no prehistoric cultural remains could be found on the ground surface in the general area of the site, as depicted on maps provided by the SCCIC. As historical aerial photographs demonstrate, the area has been extensively disturbed since 1963 and is now the site of four buildings constructed between 1973 and 1994, including one of the residences, the two storage buildings, and the pole barn (NETR Online 1968-1994; UCSB 1968; 1973). However, the field survey did not yield sufficient data to ascertain whether any buried archaeological remains may survive in the site area. Further archaeological investigations will be necessary to determine the presence or absence of any subsurface components of the site.

Results: This prehistoric archaeological site was first recorded in 1941 and last updated in 1963, when extensive archaeological deposits were observed on the surface, representing the remains of a village or at least habitation area with possible human burials (Smith 1941; Vititow 1963). None of the features or artifacts reported in 1941 or 1963 could be found on the surface in the general area of the site during the current survey. In light of the extent of ground disturbance in the vicinity and the presence of four buildings constructed between 1973 and 1994 at this location, the site may no longer exist.

However, at this time there is insufficient evidence to rule out the possibility of buried cultural remains surviving in the site area. Further archaeological investigations will be necessary to ascertain the presence or absence of such remains below the surface, especially at less disturbed—both by recent human activities and by past fluvial processes in the Mojave River wash—locations in the site. Given the well-established sensitivity of the Mojave River Valley for prehistoric archaeology and the special cultural significance of human remains to the Native American community, any buried archaeological deposits similar to what was originally recorded on the surface at the site, if present, would need to be evaluated as potential "historic properties."

Site 36-026214 (Grand Terrace Bridge)
Site 36-026214 represents the Grand Terrace Bridge, situated on Heritage Way and across the Mojave River at the southeastern end of the APE. As discussed above, Robert Older, then owner of the Palisades Ranch, relocated this steel Pratt pony truss bridge to its current site from the City of Grand Terrace in 1988-1989 (Glentis 2013). When it was recorded in 2013, the bridge was described as being approximately 80 feet long and 22 feet wide, with a roughly 18-foot-wide roadway base built of 2x8-inch wood planks and resting on poured concrete abutments (*ibid.*). At the time, the bridge was no longer functional for vehicular travel due to a severe earthen blowout at the eastern approach (*ibid.*).

As a part of the field survey for this study, an attempt was made to inspect the current condition of the bridge, but it was found to be inaccessible as raised water level in the river has submerged Heritage Way on both sides. The western approach was additionally too overgrown with thick vegetation to be accessible. However, the bridge was inspected during a preliminary field visit of the APE on January 13, 2020. At that time, it was observed that the bridge had been impacted by rust and graffiti, and several planks were missing from the deck. Additionally, the earthen blowout described in 2013 had progressed to cover Heritage Way completely west of the unnamed dirt road where the Palisades Ranch sign is located.

Results: Site 36-026214, known as the Grand Terrace Bridge, represents a standard steel truss highway bridge of historical—albeit undocumented—origin that has been moved to this location in the modern era. When first recorded in 2013, the site was found to be ineligible for listing in the National Register (Glentis 2013). Due to its lack of any documented association with persons or events of recognized historic significance, of any special quality in design, engineering, construction, technology, or aesthetics, and of any potential for important historical/archaeological data, the current study concurs with the previous assessment that Site 36-026214 does not appear eligible for the National Register. Therefore, it does not qualify as a "historic property" under Section 106 provisions.

Isolates 3579-1, -2, and -3 (Refuse Items)
The three isolates recorded during this study represent a single historic-period artifact at each locality. Isolate 3579-1 consists of an aqua blue glass Coca-Cola bottle fragment. The body fragment, which includes a portion of the embossed logo, is heavily degraded. Isolate 3579-2 consists of a 55-gallon metal drum. A closed lid is present, and a hose port is found in the side near the top. The drum is heavily rusted. Isolate 3579-3 consists of a clear glass bottle with a maker's mark representing a 1960s-era Ball Corporation logo. Based on the shape and the presence of coagulated soap inside, this was a dish soap bottle. A rusted single thread closure cap is present. All three of the isolates appear to have been deposited at their present locations along the river terrace by fluvial processes during periods of high-water flow and thus out of their original depositional context.

Results: These historic-period isolates each consist of a single item of common domestic refuse. Such isolates, or localities with fewer than three artifacts, by definition do not qualify as archaeological sites

due to the lack of contextual integrity. In particular, these artifacts appear likely to have been redeposited at their current locations by water flow in the Mojave River and thus out of the original depositional context entirely. As such, Isolates 3579-1, -2, and -3 do not constitute potential "historic properties" and require no further consideration in the Section 106 compliance process.

Site 3579-4 (Palisades Ranch)
Site 3579-4 consists primarily of the older portion of the Palisades Ranch, featuring the 1940s-1950s farmhouse, the foundation of a second building, two pump stations, a Dayton capacitor-start AC motor on what appears to be a well, three refuse items, and associated agricultural fields, basin, and roads, but also includes a prehistoric jasper flake and modern features such as the pole barn, which was constructed between 1985 and 1994 (NETR Online 1984-1994). The site is located on relatively level terrain between the Mojave River to the east and a stretch of palisade bluffs to the west, covering an area of approximately 1.1 miles (north-south) by 0.3 mile (east-west).

The primary feature of the site is the now-dilapidated farmhouse, a simple one-story wood-frame building with a poured concrete foundation, stucco-clad exterior walls, and a low-pitched front-gable roof covered with composition shingles, typical of the modest vernacular farmhouses of utilitarian character from the mid-20th century. Originally rectangular in shape, the house has been altered with a number of additions to the front, rear, and side. The windows are all modern replacements, featuring mainly aluminum-framed double-hungs, as is the glazed and paneled front door set in a screened porch. According to historical aerial photographs, several other buildings surrounded the farmhouse in the 1950s, but currently only one concrete foundation exists in the vicinity (NETR Online 1952; UCSB 1953).

There are approximately 144 acres of agricultural fields within the site boundaries, along with a basin and what remains of the access roads that bordered each of the agricultural fields. Much of the former agricultural areas and associated roads are overgrown, essentially no longer accessible, and only vaguely discernable. A few scattered artifacts were observed at the site, including the prehistoric jasper lithic flake mentioned above, an aqua glass insulator fragment, a milk glass fragment, and two metal-and-rubber awls. These artifacts were all found in the former agricultural fields.

As outlined in the "Historical Overview" section, the Palisades Ranch was developed in several distinctive phases after Harold Hill acquired the land where the buildings stand from the U.S. government in 1946. The first development evidently occurred between 1946 and 1952, which resulted in the farmhouse, another building nearby at the location of the surviving foundation, the AC pump motor, one of the pump stations, and a large expanse of agricultural fields. In 1953-1959, the agricultural fields were further expanded, and the second pump station was added.

The next major growth spurts in the history of the ranch took place in 1976 and in 1989-1990, after Robert T. and Barbara T. Older became the property owners. By 1994, three additional residences, two large storage buildings, and the open-sided pole barn had been built in the general vicinity of the old farmhouse. Most of these modern buildings are located to the west of the historic-period features, across the main access road that serves as the site boundary in that area. Only the pole barn stands on the east side of the road and is included in the site boundary.

Results: Site 3579-4 represents the portion of the Palisades Ranch that is historical in origin, dating evidently to the 1940s-1950s era, although an isolated prehistoric artifact and modern features such as the pole barn are also included in the site boundary. The results of this study have yielded no evidence that the ranch and its various features were closely associated with any persons or events of recognized significance during the historic period. While one of the past owners, Robert T. Older, did earn some local prominence during his time on the ranch, his association with the property is limited to the modern era, and his contribution in history appears to fall short of the level required by the National Register criteria.

The ranch and its various contributing components, such as the farmhouse and the surviving agricultural equipment, do not represent important or particularly notable examples of any style, type,

period, region, or method of construction, nor are they known to embody the work of any prominent architect, designer, builder, or engineer. As common features from the post-WWII era, a period that is well documented in historical literature, contemporary accounts, as well as archival records, the ranch and its contributing components hold little potential for any important historical or archaeological data. Based on these considerations, the present study concludes that Site 3579-4 does not appear to meet any of the criteria for listing in the National Register of Historic Places, and does not constitute a "historic property."

Conclusions and Recommendations

In conclusion, among the six cultural resources identified within or partially within the APE, the two historic-period sites, 36-026214 and 3579-4, and the three historic-period isolates, 3579-1 to 3579-3H, do not appear the meet the statutory definition of "historic properties," as provided in Section 106 of the National Historic Preservation Act and associated federal regulations (36 CFR 800.16(l)). The sole prehistoric cultural resource in the APE, Site 36-000184, was originally recorded in the 1940s-1960s and could not be found in the field during this study, as recent development activities in the area since the 1960s have evidently removed all surface manifestations of the site. However, due to the well-established sensitivity of the Mojave River Valley for prehistoric archaeology and the reported presence of human remains at the site prior to the disturbances, the possibility of potentially significant archaeological deposits surviving subsurface cannot be ruled out.

Based on these findings, it is recommended to the MDRCD and the United States Army Corps of Engineers that preliminary subsurface testing procedures consistent to an Extended Phase 1 archaeological study, such as excavation of backhoe trenches and shovel test pits, be implemented in the general vicinity of Site 36-000184 to determine the presence or absence of any buried components of the site. Further recommendations for Section 106 compliance will be formulated and presented on the basis of the testing results and significance evaluation of the findings, if any.

Impact Analysis

a&b. *Less Than Significant With Mitigation Incorporated* – CEQA establishes that "a project that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment" (PRC §21084.1). "Substantial adverse change," according to PRC §5020.1(q), "means demolition, destruction, relocation, or alteration such that the significance of a historical resource would be impaired."

Per the summary provided above, the results of the research procedures performed by CRM TECH indicate that two historical/archaeological sites were previously recorded as lying partially within the APE, and four additional cultural resources, including one on site and three isolates, were identified in the APE during the cultural resources exploration detailed in Appendix 8. Two of the three sites in the APE, 36-026214 and 3579-4, date to the historic period, as do all three of the isolates. The two sites have been found not to meet any of the criteria for listing in the National Register of Historic Places, and thus neither of them qualifies as a "historic property" under Section 106 provisions. The isolates, or localities with fewer than three artifacts, by definition do not constitute archaeological sites due to the lack of depositional context. Therefore, they are not considered potential "historic properties" and require no further consideration in the Section 106 compliance process.

The sole prehistoric—i.e., Native American—cultural resource in the APE, Site 36-000184, was first recorded in 1941 and last updated in 1963. During the field survey, no prehistoric cultural remains could be found on the ground surface in the general area of the site. The area has been extensively disturbed since 1963 and is now occupied by four buildings constructed between 1973 and 1994. However, the field survey did not yield sufficient data to ascertain whether any buried components of the site may survive. Given the well-established sensitivity of the Mojave River Valley for prehistoric archaeology and the special cultural significance of human remains to the Native American

community, any buried archaeological deposits similar to what was originally recorded on the surface at the site, if present, would need to be evaluated as potential "historic properties."

Based on these findings, a preliminary subsurface testing procedures consistent to an Extended Phase 1 archaeological study, such as excavation of backhoe trenches and shovel test pits, shall be implemented in the general vicinity of Site 36-000184 to determine the presence or absence of any buried components of the site. Further recommendations for Section 106 compliance will be formulated and presented on the basis of the testing results and significance evaluation of the findings, if any.

CUL-1 ***An Extended Phase 1 archaeological study shall be implemented in the general vicinity of Site 36-000184 to determine the presence or absence of any buried components of the site. This study shall include field exploration in the general vicinity of Site 36-000184 utilizing methods such as excavation of backhoe trenches and shovel test pits.***

For any resources that are uncovered that prove to be significant under the appropriate CEQA criteria, as determined by a qualified archaeologist meeting Secretary of Interior standards, mitigation of potential project impact is required. These measures may focus on the following procedures, aimed at the preservation of physical and/or archival data about a significant cultural resource that would be impacted by the project:

- ***Data recovery through further excavation at an archaeological site or a paleontological locality to collect a representative sample of the identified remains, followed by laboratory processing and analysis as well as preparation for permanent curation;***
- ***Comprehensive documentation of architectural and historical data about a significant building, structure, or object using methods comparable to the appropriate level of the Historic American Buildings Survey (HABS) and the Historic American Engineering Record (HAER) for permanent curation at a repository or repositories that provides access to the public;***
- ***Adjustments to project plans to minimize potential impact on the significance and integrity of the resource(s) in question.***

Section 106 compliance shall be formulated and presented on the basis of the testing results and significance evaluation of the findings at the recommendation of the qualified archaeologist meeting Secretary of Interior standards.

Additionally, the San Manuel Band of Mission Indians (SMBMI or Tribe), as part of the AB 52 consultation process for this project, has requested that specific mitigation measures to protect both cultural and tribal cultural resources be implemented to ensure the protection of cultural and Tribal resources during earthmoving operations for the expansion project. As such, the following mitigation measures will ensure that impacts to any cultural materials that may be discovered during ground disturbing activities are less than significant:

CUL-2 ***<u>Archaeological Monitoring and Testing</u>***

At least one archaeologist with at least 3 years of regional experience in archaeology and a Tribal monitor representing the San Manuel Band of Mission Indians shall conduct subsurface archaeological testing on the project site via the employ of a number of subsurface investigative methods, including shovel test probes, remote sensing, and/or deep testing via controlled units or trenching of appropriate landscapes, with a

sample size of at least 25% of the area of concern dug and dry-sifted through 1/8-inch mesh screens, prior to any ground-disturbing activity. A Testing Plan shall be created by the archaeologist and submitted to the San Manuel Band of Mission Indians Cultural Resources Department (SMBMI) and the Lead Agency for review at least 10 business days prior to implementation, so as to provide time to review/modify the Plan, if needed. The Plan shall outline the protocol of presence/absence testing and contain a Treatment Plan detailing that 1) no collection of artifacts or excavation of features shall occur during testing, and 2) all discovered resources shall be properly recorded and reburied in situ.

If the results of testing, as approved by SMBMI, are positive, then SMBMI and the Lead Agency shall, in good faith, consult concerning appropriate treatment of the finding(s), guidance for which is outlined in TCR-1.

If the results of testing, as approved by SMBMI, are negative, then SMBMI will conclude consultation unless any discoveries are made during project implementation. Any and all discoveries made during project implementation shall be subject to the Treatment Plan outlined within the Testing Plan developed as described above and the guidelines contained in TCR-1.

If resources are identified during testing as described above, an archaeological monitor and a Tribal monitor from SMBMI with at least 3 years of regional experience in archaeology shall be present for all ground-disturbing activities that occur within the proposed project area (which includes, but is not limited to, tree/shrub removal and planting, clearing/grubbing, grading, excavation, trenching, compaction, fence/gate removal and installation, drainage and irrigation removal and installation, hardscape installation [benches, signage, boulders, walls, seat walls, fountains, etc.], and archaeological work). A sufficient number of monitors shall be present each work day to ensure that simultaneously occurring ground disturbing activities receive thorough levels of monitoring coverage. A Monitoring and Treatment Plan that is reflective of the project mitigation ("Cultural Resources" and "Tribal Cultural Resources") shall be completed by the archaeologist and submitted to the Lead Agency for dissemination to the San Manuel Band of Mission Indians Cultural Resources Department (SMBMI). Once all parties review and approve the plan, it shall be adopted by the Lead Agency – the plan must be adopted prior to permitting for the project. Any and all findings will be subject to the protocol detailed within the Monitoring and Treatment Plan.

With the above mitigation incorporation, as well as the MMs **TCR-1** and **TCR-2** identified under Tribal Cultural Resources below, the potential for impacts to cultural resources will be reduced to a less than significant level.

c. *Less Than Significant With Mitigation Incorporated* – As noted in the discussion above, MMs **CUL-1** through **CUL-5** would further protect the potential for the sole prehistoric—i.e., Native American—cultural resource in the APE, Site 36-000184, which may contain human remains. Human remains discovered during the project will need to be treated in accordance with the provisions of HSC §7050.5 and PRC §5097.98, which is mandatory. State law (Section 7050.5 of the Health and Safety Code) as well as local laws requires that the Police Department, County Sheriff and Coroner's Office receive notification if human remains are encountered. Compliance with these laws is considered adequate mitigation for potential impacts, however, the San Manuel Band of Mission Indians requested the implementation of MM **TCR-2**, which would protect finds should inadvertent discoveries

of human remains or funerary objects occur. With the incorporation of the MM **TCR-2**, potential for impact to discovery and treatment of human remains will be reduced to a less than significant level. No additional mitigation is required.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
VI. ENERGY: Would the project:				
a) Result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operations?	☐	☐	☒	☐
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☒	☐

SUBSTANTIATION

a. *Less Than Significant Impact* – The proposed project operations consist of irrigating for 1 to 3 years after revegetating the project area with a permanent irrigation system to be installed so that pond water irrigation can be gravity fed to the cottonwood field, weed management including use of some mechanical tools for about 20 days per year, monitoring of the vegetation and wildlife by staff, and recreational use by visitors. The goal of the project is to complete various riparian enhancement projects, complete the three phases of river restoration, and construct recreational improvements to enable visitors to appreciate and utilize the site for recreational purposes. There is electricity onsite that serves the existing residences onsite. The proposed project as described would not require substantial energy to operate, as there are no structures or facilities onsite that would be constructed requiring energy. However, the proposed project will require use of energy through the pumping of groundwater required to irrigate the project site in both the short- and the long-term to enable the revegetation efforts to be successful and for the cottonwood to be successful. Ultimately, the water pumping activities on the site would be minimal, and well within available energy capacities in the project area, as no other sources of energy, beyond mobile sources as a result of visitor and staff visits to the site.

Energy consumption encompasses many different activities. For example, construction can include the following activities: delivery of equipment and material to a site from some location (note it also requires energy to manufacture the equipment and material, such as harvesting, cutting and delivering wood from its source); employee trips to work, possibly offsite for lunch (or a visit by a catering truck), travel home, and occasionally leaving a site for an appointment or checking another job; use of equipment onsite (electric or fuel); and sometimes demolition and disposal of construction waste. For the proposed project the number of construction workers will be limited due to the scope and type of project and the length of time required to complete construction of the project (up to 5 years). To minimize energy costs of construction debris management, laws are in place that require diversion of all material subject to recycling. Energy consumption by equipment will be reduced by requiring shutdowns when equipment is not in use after five minutes and ensuring equipment is being operated within proper operating parameters (tune-ups) to minimize emissions and fuel consumption. Furthermore, a majority of construction would be accomplished utilizing smaller construction equipment intended to protect the environment, as well as by use of hand tools that do not require electricity to operate. These requirements are consistent with State and regional rules and regulations. Under the construction scenario outlined in the project description, the proposed project will not result in wasteful, inefficient, or unnecessary energy consumption during construction.

The project will be supplied power from Southern California Edison (SCE). Additionally, no permanent backup generators will be installed at the site. As such, the project is not anticipated to require a significant amount of electricity in the context of existing available power sources. The proposed MDLT Palisades Rach Restoration Project must be constructed in conformance with a variety of existing energy efficiency regulatory requirements or guidelines including, but not limited to the following:

- Compliance with diversion of construction and demolition materials from landfills.
- Compliance with AQMD Mandatory use of low-pollutant emitting finish materials.
- Compliance with AQMD Rules 431.1 and 431.2 to reduce the release of undesirable emissions.
- Compliance with diesel exhaust emissions from diesel vehicles and off-road diesel vehicle/equipment operations.

Compliance with these regulatory requirements for operational energy use and construction energy use would not be wasteful or unnecessary use of energy. Further, SCE is presently in compliance with State renewable energy supply requirements and SCE will supply electricity to the project. The proposed project does not include any substantive new stationary or mobile sources of emissions, and therefore, by its very nature, will not generate substantive amounts of energy demand from project operations. The project does not propose a substantive daily trip-generating land use other than those trips that would result from visitors of the project site or facilities that would generate an estimated 20 trips per day when the restoration is completed any substantive amount of on-going energy demands. While it is anticipated that the project would require intermittent maintenance, monitoring, and survey trips to the site, such visits would be minimal requiring a negligible amount of traffic trips on an annual basis. As such, under the operational scenario for the proposed project, the proposed project will not result in wasteful, inefficient, or unnecessary energy consumption that could result in a significant adverse impact to energy issues based on compliance with the referenced laws, regulations and guidelines. No mitigation is required.

b. *Less Than Significant Impact* – Based on the analysis in the preceding discussion, the proposed project will not conflict with current State energy efficiency or electricity supply requirements or any local plans or programs for renewable energy or energy efficiency requirements. No mitigation is required.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
VII. GEOLOGY AND SOILS: Would the project:				
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
(i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☒
(ii) Strong seismic ground shaking?	☐	☐	☒	☐
(iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
(iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☒	☐	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in onsite or offsite land-slide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☒	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☒	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☒	☐	☐

SUBSTANTIATION

a. i. Ground Rupture

No Impact – According to the San Bernardino Countywide Plan Earthquake Fault Zone Map (Figure VII-1), the proposed project site is located in an area that has not been mapped as containing earthquake fault zone hazards, and is not located within an Alquist Priolo Earthquake Fault Zone. The nearest fault zone is approximately about 3 miles from the project site to the north, or 8 miles to the east/southeast as the Helendale fault traverses the Helendale area in which the project is located from northwest to southeast. As such, the project site and general area do not contain any known faults, active or inactive. Therefore, no potential exists for the proposed project to experience any fault rupture along a delineated active fault.

ii. Strong Seismic Ground Shaking

Less Than Significant Impact – The proposed project sites, as with most of southern California, are located in a seismically active area and will most likely be subject to substantial ground shaking during the life of the project. Due to the proximity of the nearby faults, located about 8 miles to the east/southeast of the project site, the project area can be exposed to significant ground shaking during major earthquakes on either of these regional faults. This is illustrated on the San Bernardino Countywide Plan Earthquake Fault Zone Map (Figure VII-1). The proposed restoration project does not include the development of any habitable structures. The project operations scenario would occur in outdoor spaces, and no new structures would be developed to support the proposed recreational component of the proposed project, which therefore presents minimal hazards from strong seismic ground shaking to humans working at and visiting the site. Therefore, impacts associated with strong ground shaking will be less than significant without mitigation.

iii. Seismic-related Ground Failure Including Liquefaction

No Impact – The proposed project is located between Victorville and Barstow along the Mojave River. According to the San Bernardino Countywide Plan Liquefaction & Landslides Map (Figure VII-2), the project does not contain any land area with any liquefaction susceptibility. Furthermore, the California Department of Conservation has not mapped the project area as having significant potential for liquefaction. Additionally, given that the proposed project would occur in outdoor spaces with no proposed habitable structures to be developed by the proposed project, minimal hazards related to liquefaction would occur to humans working at or visiting the project site. Therefore, it is not anticipated that the proposed project would be susceptible to seismic-related ground failure, including liquefaction. No impacts are anticipated and no mitigation is required.

iv. Landslides

Less Than Significant Impact – The project area is relatively flat, sloping slightly from north to south. No hills or other significant topographic features exist on the project sites. According to the San Bernardino Countywide Plan Liquefaction & Landslides Map (Figure VII-2), the project is not located in an area that is susceptible to landslides. However, Palisades Ranch is located in an area that has been identified as containing deep seated landslide potential by the California Department of Conservation (Figure VII-3). This is because the Palisades Ranch contains slopes to the west of the Mojave River that present landslide potential. Deep seated landslide potential is determined by rock strength and slope. According to the Susceptibility to Deep-Seated Landslides in California 2011 Map provided as Figure VII-4, the deep-seated landslide index indicates that on very low slopes, landslide susceptibility is low even in weak materials, and that landslide susceptibility increases with slope and in weaker rocks. Furthermore, very high landslide susceptibility—classes VIII, IX, and X—occur on very steep slopes in hard rocks and moderate to very steep slopes in weak rocks. Palisades Ranch exhibits area susceptible to landslides in the following classes (many are very high): classes VII, VIII, IX, and X. While Palisades Ranch as a whole has been identified as containing very high landslide potential, the majority of the proposed project (shown on Figure 2 and 3) is not located within the area that has been delineated as containing landslide potential. However, the proposed project area is located adjacent to the areas containing landslide potential. Regardless, given the type of project proposed, the potential for a landslide hazard to impact humans working at or visiting the project site is less than significant as visits will be intermittent, and set back from the nearby hillsides. With no structures proposed that could pose a hazard to human life, landslide potential at the proposed project footprint within Palisades Ranch would be limited, and as such the project would have a less than significant potential to result in adverse effects from landslides or cause landslides that could expose people or structures to such an event as a result of project implementation.

b. *Less Than Significant With Mitigation Incorporated* – During construction, the project site has a potential for soil erosion. The potential for soil erosion, loss of topsoil, and/or developing the site on unstable soils is anticipated to be marginally possible at the site during ground disturbance associated

with construction. Heavy earth-moving equipment will be required during Phases II and III of the river restoration. This will occur generally in areas within the limits of the Mojave River floodplain. This project will result in the disturbance of more than one acre of land and will require filing a Notice of Intent (NOI), securing a National Pollutant Discharge Elimination System (NPDES), general construction stormwater discharge permit, and preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP will include but not be limited to the following measures to mitigate potential impacts associated with erosion and surface water quality degradation during construction:

GEO-1 ***Stored backfill material shall be covered with water resistant material during periods of heavy precipitation to reduce the potential for rainfall erosion of the material. If covering is not feasible, then measures such as the use of straw bales or sand bags shall be used to capture and hold eroded material on the project site for future cleanup.***

GEO-2 ***Excavated areas shall be properly backfilled and compacted and other disturbed areas are returned to as near the pre-project condition as is feasible.***

GEO-3 ***All exposed, disturbed soil (trenches, stored backfill, etc.) will be sprayed with water or soil binders twice a day or more frequently if fugitive dust is observed migrating from the site.***

The following mitigation measure will be implemented to ensure the discharge of surface runoff from the project related restoration sites does not result in significant soil erosion or loss of topsoil.

GEO-4 ***The District shall identify any additional BMPs to ensure that the discharge of surface water does not cause erosion downstream of the discharge point. This shall be accomplished by reducing the energy of any site discharge through an artificial energy dissipater or equivalent device. If any substantial erosion or sedimentation occurs, any erosion or sedimentation damage shall be restored to pre-discharge conditions.***

This project is unique in that it intends to install devices that would minimize erosion that could occur within the project site. Much of the erosion that could occur as a result of the project site would occur as a result of water movement, not as a result of soil erosion. However, alluvial soils may be subject to erosion by wind and water when disturbed. Soils with high to moderate potential for water erosion include the soil types that underlie the project area shown on Figure VII-5. Soil controls such as limited grading, creation of impermeable surfaces, establishment of windbreaks and other erosion control techniques are advisable to protect these fragile desert topsoil layers from both water and wind erosion. This would be ensured through mitigation measures (MMs) **GEO-1** through **GEO-4**, above, in addition to the fugitive dust control measures that have been addressed under Subsection III, Air Quality (MMs **AQ-1** through **AQ-6**). Additionally, MM **BIO-2** addresses the types of soil erosion prevention methods that are acceptable to be utilized during construction to avoid harm to the riparian habitat within the project site. As such, implementation of the above measures in conjunction with mitigation measures identified in the Hydrology/Water Quality Section will adequately mitigate potential impacts associated with the water-related erosion of soil.

c. *Less Than Significant Impact* – Please refer to the discussion under issue VII(a[iv]), above, as the potential impacts associated with landslide at Palisades Rach have been analyzed, and the impacts were determined to be less than significant due to the proposed project's location outside of a delineated very high landslide susceptibility zone, and due to the nature of the proposed project as it would not develop any new structures that would pose a hazard to persons visiting or working at the site. Additionally, general liquefaction potential at the site is considered low, particularly in the areas outside of the Mojave River-bed. Furthermore, as with landslides, no structures are proposed as part

of this project, and as such, do not pose a significant hazard to persons working at or visiting the project site.

Additionally, in the areas that are proposed to be developed as channels, beaver dam analogs (BDAs) are planned to serve as temporary grade control structures in the main channel of the Mojave River to raise the head of the river and promote backwater conditions in the main side channel. The proposed BDA structures are not sustainable and are anticipated to partially fail during large flood events. The proposed design approach is to temporarily stabilize the side channels and floodplain for the first few years after construction to initiate the restoration process, and thereafter, the design is anticipated to result in natural channel adjustments. Some localized erosion and deposition are anticipated around BDAs which does not pose a risk to infrastructure. Additional BDAs are planned to be installed after the initial process of establishing a pilot channel; these structures would assist with fully restoring the floodplain by spreading flows across the excavated floodplain, inundating a greater area to support riparian habitats, and promoting flow in the other secondary channels. Temporary channel and bank stabilization structures are proposed to be installed to promote the process-based restoration approach. As such, this part of the proposed project has in place soil stability measures that would ensure that onsite or offsite landslide, lateral spreading, subsidence, liquefaction or collapse would not occur, particularly given that no habitable structures would be installed as part of the proposed project.

The remainder of the proposed Restoration Project would be installed on sandy, alluvial soils. Best management practices (BMPs) have been identified in the preceding discussion to manage the wind and water erosion issues. As stated under issues VII(a[iii]) and VII(a[iv]) above, the project footprint traverses is not located in areas that are susceptible liquefaction. This indicates that the project footprint and general area are unlikely to be underlain by unstable soils, or be affected by subsidence, lateral spreading, or collapse. Furthermore, given that no habitable structures would be installed as part of the proposed project, the potential for soil instability to cause a significant hazard to the public and persons working at this site are less than significant. Therefore, due to the nature of the proposed project, and the type of soil unit underlying the project site, the proposed project has a less than significant potential to be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in onsite or offsite landslide, lateral spreading, subsidence, liquefaction or collapse. No further mitigation is required.

d. *Less Than Significant Impact* – The proposed project operations consist of providing support irrigation for 1 to 3 years after revegetating the project area with a permanent irrigation system to be installed so that pond water irrigation can be gravity fed to the cottonwood field, weed management including use of some mechanical tools for about 20 days per year, monitoring of the vegetation and wildlife by staff, and recreational use by visitors. The goal of the project is to complete various riparian enhancement projects, complete the three phases of river restoration, and construct recreational improvements to enable visitors to appreciate and utilize the site for recreational purposes. Appendix 1, the Conceptual Riparian Restoration Plan for Palisades Ranch, has mapped the soils at the project site (Figure VII-5). Additionally, the following soil descriptions have been extracted from Appendix 1:

- Alluvial Terrace 1 (115 hectares [284 acres]): This landform is the most low-lying terrace above the riparian corridor, located along the east and west sides of the Mojave River. Soils are deep, loamy to sandy in texture, and mostly non-effervescent. Evidence of previous soil saturation along this terrace was observed, with oxidized soil matrices and root channels within the upper 30 cm (12 inches) of soil.
- Alluvial Terrace 2 (131 hectares [324 acres]): This upland terrace is at a higher elevation than the riparian corridor and Alluvial Terrace 1. The soils are slightly effervescent and have textures of sandy clay loam and loamy fine sands overlying fine sands.
- Agricultural Field (80 hectares [197 acres]): The abandoned agricultural field is a remnant feature from previous ranching and agricultural activity at Palisades Ranch and is located on an old alluvial terrace. Soils are deep, sandy, and largely non-effervescent, with loamy-textured soils overlying sand and coarse sand.

- Disturbed Agricultural Field (6.5 hectares [16 acres]): This soil map unit occurs within a human-disturbed area along the same alluvial terrace as the agricultural field. Soils are deep, sandy-textured soils with slight effervescence.
- Palisades Alluvial Fan (14 hectares [35 acres]): This alluvial fan formed from surface runoff concentrated along the base of the palisades. Human disturbance within the abandoned agricultural field and in nearby areas is visible in historic aerial imagery. Soils are deep with loamy and sandy textures and are largely non-effervescent.
- Cajon Sand (Below Palisades) (166 hectares [409 acres]): This upland terrace is located along the base palisades, above the historic alluvial terraces and active riparian corridors. Soils loamy sand to sand in texture, strongly effervescent, and support a creosote (*Larrea tridentata*) vegetation community.
- Palisades (159 hectares [393 acres]): The map unit includes the badlands that form the face of the palisades. Gypsum salts were observed throughout the soil profile. Soils are characterized by sandy clay loam to sandy loam textures and are non-effervescent throughout. Soils have platy to subangular blocky structure and overlie a restrictive gypsum layer at approximately 79 cm (31 inches) in depth. This area is generally outside of the limits of the disturbance required to implement the project.
- Palisades Summit (35 hectares [87 acres]): This map unit is located along the shoulder of Palisades Summit. The strongly effervescent soils contain carbonate concretions (approximately 1.3 cm [0.5 inches] in diameter) and smaller nodules of carbonates throughout the profile. Soils have an argillic horizon from 22.9 to 43 cm (9 to 17 inches) and a root-restrictive petrocalcic horizon at 43 cm (17 inches). This area is generally outside of the limits of the disturbance required to implement the project.
- Cajon Sand (Above palisades) (136 hectares [336 acres]): This soil map unit is located elevationally above the Palisades Summit map unit and includes gently undulating alluvial landforms. Soil characteristics vary between alluvial fan remnants and lower-lying ephemeral drainages. The alluvial fan remnants are loamy- and sandy-textured soils, are strongly effervescent, and have subangular blocky structure. Soils formed within ephemeral drainages are loamy and sandy in texture, are slightly effervescent, and have single-grained structure. This area is generally outside of the limits of the disturbance required to implement the project.

The above describes the soil characteristics within Palisades Ranch, while the soil types are described below:

- Mojave Riverwash
- Villa loamy sand, floodplains of the Mojave River
- Victorville sandy loam, 0-2% slopes
- Cajon sand, 2-9% slopes
- Badlands, cliffs and bluffs and intersected with many drainage ways 106: Bryman loamy fine sands, 2-5% slopes
- Helendale loamy sand, 2-5% slopes
- Kimberlina loamy fine sand, 2-5% slopes

The above indicates that the majority of the project is underlain by sand, and loamy soils. None of these soil types are classified as being expansive under Table 18-1-B of the Uniform Building Code (1994), particularly as expansive soils are typically in the clay soil family. While clay like soils can be found within the Alluvial Terrace 2 and are shown on Figure VII-5, the proposed project would not install any new structures within the area. The only area that will regularly be occupied with humans is the recreational trail, which would be generally located outside of the clay like soils. However, ultimately, without any structures located within areas containing expansive soils, these soil types would not pose any harm to passive users of the areas within the site containing these soils. Given the above, the proposed project would have a less than significant potential to create substantial risks to life or property as a result of being located on expansive soils. No mitigation is required.

e. *No Impact* – The project does not propose any new septic tanks or alternative wastewater disposal systems. Therefore, determining if the project site soils are incapable of adequately supporting the

use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater does not apply. No impacts are anticipated. No mitigation is required.

f. *Less Than Significant With Mitigation Incorporated* – The Mojave River has supported known Paleontologic sites upstream, which would suggest that such resources may exist in the vicinity of the proposed project, particularly given the size of the proposed project. MMs **CUL-1** through **CUL-6** would require an extended Phase I to explore a prehistoric site that has been documented on the project site. The deeper sediments in the Victorville area, underneath the Mojave River alluvium, are generally considered to be of Pleistocene age. Deposited more than 11,700 years ago, these older sediments predated the proliferation of human settlements in southern Mojave Desert. However, because the project has not been surveyed at depth in recent history, and the fact that these resources are located beneath the surface and can only be discovered as a result of ground disturbance activities; therefore, the following measure shall be implemented:

GEO-6 Should any paleontological resources be encountered during construction of these facilities, earthmoving or grading activities in the immediate area of the finds shall be halted and an onsite inspection should be performed immediately by a qualified paleontologist. Responsibility for making this determination shall be with the District's onsite inspector. The paleontological professional shall assess the find, determine its significance, and determine appropriate mitigation measures within the guidelines of the California Environmental Quality Act that shall be implemented to minimize any impacts to a paleontological resource.

With incorporation of this contingency mitigation, the potential for impact to paleontological resources will be reduces to a less than significant level. No additional mitigation is required.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
VIII. GREENHOUSE GAS EMISSIONS: Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

SUBSTANTIATION: The following information utilized in this section of the Initial Study was obtained from the "Air Quality and GHG Impact Analysis, Mojave Desert Land Trust Palisades Ranch Restoration Project, County of San Bernardino, California" prepared by Giroux and Associates dated March 24, 2022. This document is provided as Appendix 2 to this document.

a&b. *Less Than Significant Impact* – Global Climate Change (GCC) is defined as the change in average meteorological conditions on the earth with respect to temperature, precipitation, and storms. Many scientists believe that the climate shift taking place since the industrial revolution (1900) is occurring at a quicker rate and magnitude than in the past. Scientific evidence suggests that GCC is the result of increased concentrations of greenhouse gases in the earth's atmosphere, including carbon dioxide, methane, nitrous oxide, and fluorinated gases. Many scientists believe that this increased rate of climate change is the result of greenhouse gases resulting from human activity and industrialization over the past 200 years.

An individual project like the project evaluated in this GHG analysis cannot generate enough greenhouse gas emissions to effect a discernible change in global climate. However, the project may participate in the potential for GCC by its incremental contribution of greenhouse gasses combined with the cumulative increase of all other sources of greenhouse gases, which when taken together constitute potential influences on GCC.

Significance Thresholds

In response to the requirements of SB97, the State Resources Agency developed guidelines for the treatment of GHG emissions under CEQA. These new guidelines became state laws as part of Title 14 of the California Code of Regulations in March 2010. The CEQA Appendix G guidelines were modified to include GHG as a required analysis element. A project would have a potentially significant impact if it:

- Generates greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?
- Conflicts with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Section 15064.4 of the Code specifies how significance of GHG emissions is to be evaluated. The process is broken down into quantification of project-related GHG emissions, making a determination of significance, and specification of any appropriate mitigation if impacts are found to be potentially significant. At each of these steps, the new GHG guidelines afford the lead agency with substantial flexibility.

Emissions identification may be quantitative, qualitative or based on performance standards. CEQA guidelines allow the lead agency to "select the model or methodology it considers most appropriate."

The most common practice for transportation/combustion GHG emissions quantification is to use a computer model such as CalEEMod, as was used in the ensuing analysis.

The significance of those emissions then must be evaluated; the selection of a threshold of significance must take into consideration what level of GHG emissions would be cumulatively considerable. The guidelines are clear that they do not support a zero net emissions threshold. If the lead agency does not have enough expertise in evaluating GHG impacts, it may rely on thresholds adopted by an agency with greater expertise.

The MDAQMD has published thresholds for Greenhouse Gases emissions (CO_2e). The daily threshold is 548,000 lbs/day and the annual threshold is 100,000 metric tons (MT)/year.

Project Construction Activity GHG Emissions

The project is assumed to require at least three years for construction to be completed. During project construction, the CalEEMod2020.4.0 computer model predicts that the construction activities will generate the annual CO_2e emissions identified in Table VIII-1.

Table VIII-1
CONSTRUCTION EMISSIONS (CO_2e)

Year 2021	CO_2e Daily (lbs/day)	CO_2e Annual (MT/year)
Construction 2022	3,126.1	77.7
Construction 2023	3,122.6	366.7
Construction 2024	3,119.4	369.2
Construction 2025	3,116.0	292.8
Construction 2026	3,110.2	366.8
Construction 2027	3,106.9	366.4
Construction 2028	3,104.2	290.4
Max Project Emissions	**3,123.7**	**416.6**
Threshold	548,000	100,000
	Threshold Exceeded?	**No**

CalEEMod Output provided in appendix

GHG impacts from construction are considered individually less than significant.

Project Operational Activity GHG Emissions

The CalEEMod2016.3.2 computer model predicts that the operational activities will generate the annual CO_2e emissions identified in Table VIII-2.

Table VIII-2
OPERATIONAL EMISSIONS (CO_2e)

Year 2021	CO_2e Daily (lbs/day)	CO_2e Annual (MT/year)
Operational 2025	<0.1	47.7
Threshold	548,000	100,000
	Threshold Exceeded?	**No**

CalEEMod Output provided in appendix

GHG impacts from operations are considered individually less than significant. Note that even if the construction emissions were amortized over a 30-year period, and were added to the operational annual total (an addition of 416 MT/year), the proposed project would still generate emissions well below significance thresholds. As such, GHG emissions impacts would be less than significant.

Consistency with GHG Plans, Programs and Policies

In March 2014, the San Bernardino Associated Governments and Participating San Bernardino County Cities Partnership (Partnership) created a final draft of the San Bernardino County Regional Greenhouse Gas Reduction Plan (Reduction Plan). This Reduction Plan was created in accordance to AB 32, which established a greenhouse gas limit for the state of California. The Reduction Plan seeks to create an inventory of GHG gases and develop jurisdiction specific GHG reduction measures and baseline information that could be used by the 21 Partnership Cities of San Bernardino County, including the County of San Bernardino.

Projects that demonstrate consistency with the strategies, actions, and emission reduction targets contained in the Reduction Plan would have a less than significant impact on climate change. The project will generate GHG emissions below the 100,000 Metric Ton (MT) CO_2e significance threshold, as shown in Table VIII-1 and VIII-2, and as such, it is consistent with the Reduction Plan.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
IX. HAZARDS AND HAZARDOUS MATERIALS: Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☒	☐	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☒	☐	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☒	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☒	☐
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☒	☐	☐
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☒	☐	☐

SUBSTANTIATION

a&b. *Less Than Significant With Mitigation Incorporated* – The project should not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials; but it may create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment during construction. The proposed project would consist of irrigating for 1 to 3 years after revegetating the project area with a permanent irrigation system to be installed so that pond water irrigation can be gravity fed to the cottonwood field, weed management including use of some mechanical tools for about 20 days per year, monitoring of the vegetation and wildlife by staff, and recreational use by visitors. The goal of the project is to complete various riparian enhancement projects, complete the three phases of river restoration, and construct recreational improvements to enable visitors to appreciate and utilize the site for recreational purposes. During construction there is a potential for accidental release of petroleum products in sufficient quantity to pose a significant hazard to people and the environment. The following mitigation measure will be incorporated into the Storm Water Pollution Prevent Plan (SWPPP) prepared for the project and implementation of this measure can reduce this potential hazard to a less than significant level.

HAZ-1 All accidental spills or discharge of hazardous material during construction and/or operational activities shall be reported to the Certified Unified Program Agency and shall be remediated in compliance with applicable state and local regulations regarding cleanup and disposal of the contaminant released. The contaminated waste will be collected and disposed of at an appropriately a licensed disposal or treatment facility. This measure shall be incorporated into the SWPPP prepared for the proposed MDLT Palisades Ranch Restoration Project. Prior to accepting the site as remediated, the area contaminated shall be tested to verify that any residual concentrations meet the standard for future residential or public use of the site.

Operation of the proposed project would not involve the use of a substantial amount of hazardous materials. This is particularly because the project does not propose any new structures that would require use of hazardous materials such as household or commercial cleaning supplies, and does not propose any uses that would routinely use hazardous materials. The only hazardous materials that may be used during operation would be petroleum and mechanical equipment repair solvents, as well as weed abatement sprays in support of the weed management on site. Construction equipment would include: visits to Palisades Ranch in the amount of an estimated 20 days per year, would be accomplished by a staff of 4-8 persons and would require the utilization of the following tools and construction equipment: tracked vehicle (e.g., skidsteer) with mower attachment and manual tools (e.g., weed-eaters); manual digging, cutting, puning tools; aquatic-label herbicide applied to perennial pepperweed via backpack sprayer, wicking or hand wiping, imazapyr applied to giant reed and tamarisk. Compliance with all Federal, State, and local regulations governing the storage and use of hazardous materials is required, and will ensure that the project operates in a manner that poses no substantial hazards to the public or the environment. Additionally, the following mitigation measures shall address the handling of hazardous materials during operation, and the potential for accidental spills or contamination during operation:

HAZ-2 Where the operation of the Restoration Plan would handle hazardous materials or generate hazardous waste, the Hazardous Materials Business Plan prepared and submitted to the Certified Unified Program Agency shall incorporate best management practices designed to minimize the potential for accidental release of such chemicals and shall meet the standards required by California law for Hazardous Materials Business Plans. The facility managers shall implement these measures to reduce the potential for accidental releases of hazardous materials or wastes. The Hazardous Materials Business Plan shall be approved prior to operation of the given facility.

HAZ-3 The Hazardous Materials Business Plan shall assess the potential accidental release scenarios and identify the equipment and response capabilities required to provide immediate containment, control, and collection of any released hazardous material. Prior to issuance of the certificate of occupancy, each facility shall ensure that necessary equipment has been installed and training of personnel has occurred to obtain sufficient resources to control and prevent the spread of any accidentally released hazardous or toxic materials.

With implementation of the above mitigation measures, the proposed project would have a less than significant potential to create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials or create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. No further mitigation is required.

c. *No Impact* – The project will not emit hazardous emissions or utilize or produce any acutely hazardous materials, substances, or waste. There are no proposed or existing schools within one-quarter mile

of the project footprint; therefore, no impacts under this issue are anticipated, and no mitigation is required.

d. *Less Than Significant Impact* – The project site is located on that has not experienced significant development. The project site includes the abandoned agricultural field, Mojave River, and several existing structures, including the rock house, the caretakers house, two unoccupied residences, and steel buildings (refer to Appendix 3, page 12). The project will not be located on a site that is included on a list of hazardous materials sites. The State Water Resources Control Board GeoTracker records were reviewed (consistent with Government Code Section 65962.5) and no open cases of contaminated sites are located within 2,500 feet of the project site (Figure IX-1). There is only one case in the vicinity of the project site; about two miles to the west of Palisades Ranch a Department of Toxic Substance Control (DTSC) Cleanup Site has been identified. This site currently is inactive, and poses no hazards to construction and operational activities at the Palisades Ranch. Therefore, the proposed modifications and improvements to the Facility have no potential to create a significant hazard to the population or to the environment from their implementation. No significant impacts are anticipated. No mitigation is required.

e. *Less Than Significant Impact* – According to the San Bernardino Countywide Plan Airport Safety & Planning Map (Figure IX-2), the closest airport to the project site is the Southern California Logistics Airport (SCLA), which is located about 3 miles to the south of the project site. The Hazard Overlays Map indicates that the proposed project is located just outside of the Airport Safety Review Area, and as such further development of this site will not exacerbate any hazards from operation of Palisades Ranch due to the proximity to the nearby airport. Furthermore, the project does not propose any structures that would interfere with Airport operations. Based on this information, implementation of the project will not result in a safety hazard for people residing or working in the project area. No impacts are anticipated and no mitigation is required.

f. *Less Than Significant With Mitigation Incorporated* – The proposed Palisades Ranch Restoration Project will be confined to Palisades Rach, and is not anticipated to impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. The proposed project would consist of irrigating for 1 to 3 years after revegetating the project area with a permanent irrigation system to be installed so that pond water irrigation can be gravity fed to the cottonwood field, weed management including use of some mechanical tools for about 20 days per year, monitoring of the vegetation and wildlife by staff, and recreational use by visitors. No impairment of roadways within and adjacent to the proposed project is anticipated to occur, as the proposed project does not require construction within any roadways. The proposed project would require the use of internal and adjacent roadways to deliver construction materials to the project site, and also to provide access to visitors of the project site once the recreational improvements are complete. The proposed project would not conflict with Countywide Plan identified evacuation routes (Highway 395 and the I-15 are the closest mapped evacuation routes to the project site), and the roadways providing access to the site are not heavily traveled as they mainly serve to provide access to Palisades Ranch. However, MM **WF-1** would ensure that evacuation routes are clearly marked for both on-road and on-foot visitors of the Palisades Rach. With the implementation of MM **WF-1**, the proposed project would have a less than significant potential to impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. No mitigation is required.

g. *Less Than Significant With Mitigation Incorporated* – The proposed project would not expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands. The proposed project area is located about 20 miles north of the San Bernardino Mountains. According to the San Bernardino Countywide Plan Fire Hazard Severity Zones Map (Figure IX-3), the proposed project is not located in a high or very high fire hazard severity zone. The fire threat throughout most of the Helendale Community Plan area is considered moderate. The proposed project would not expose people or structures to a significant risk of loss, injury or death involving wildland fires as the

site is not located in the vicinity of the high wildland fire hazard area and furthermore is located in an area without sufficient fuel load to pose a significant wildland fire hazard. However, as stated in Appendix 3, Mojave River regulation increases fire frequency and intensity in riparian ecosystem due to increased fuel loads. Currently, wildfires along the Mojave River are not common. There have been no documented wildfires within the boundaries of Palisades Ranch from the years 1999–2016. Disturbance in northern abandoned agricultural field appears to be a burn based on satellite imagery and evidence of burn during field surveys in 2020. Most wildfires in the upper Mojave River Basin occur in the San Bernardino Mountains, although according to the California Department of Forestry and Fire Protection 2020 in 2002 a 32-acre wildfire burned the Mojave River floodplain. In March of 2022, a wildfire in the southern portion of Palisades Ranch burned about 50 acres along the Mojave River demonstrating that while wildfire is not a common occurrence in this area, it is possible. The burn area in the context of the Palisades Ranch property is shown on Figure XX-1 and XX-2; it burned riparian area and also included a prescribed burn in the agricultural field to enable the fire crews to get ahead of the fire. The MDRCD noted increasing concern about the probability of wildfires, particularly in reference to abandoned agricultural fields along the Mojave River dominated by prickly Russian thistle. As such, the MDLT should consider controlled burns should be considered for enhancement of the riparian zone, especially if future floods are not large or frequent enough to create erosional or depositional surfaces. This shall be enforced through the following mitigation measures:

HAZ-4 MDLT, in consultation with the MDRCD, shall evaluate the project site for fire potential on a regular basis. Where MDLT and the District determine that a controlled burn would be beneficial for enhancement of the riparian zone, and would minimize potential for an unexpected wildfire, MDLT shall initiate the controlled burn, and shall obtain authorization to proceed from the appropriate agencies (i.e., the San Bernardino County Fire Department, the Mojave Desert Air Quality Management District, etc.), where required and applicable.

With implementation of the above mitigation measure, long term fire hazard at the project site would be minimized to a level of less than significant.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
X. HYDROLOGY AND WATER QUALITY: Would the project:				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?	☐	☒	☐	☐
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such the project may impede sustainable groundwater management of the basin?	☐	☒	☐	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
(i) result in substantial erosion or siltation onsite or offsite?	☐	☒	☐	☐
(ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding onsite or offsite?	☐	☒	☐	☐
(iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?; or,	☐	☒	☐	☐
(iv) impede or redirect flood flows?	☐	☐	☒	☐
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☒	☐	☐
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☒	☐

SUBSTANTIATION

a. *Less Than Significant With Mitigation Incorporated* – The proposed project would consist of irrigating for 1 to 3 years after revegetating the project area with a permanent irrigation system to be installed so that pond water irrigation can be gravity fed to the cottonwood field, weed management including use of some mechanical tools for about 20 days per year, monitoring of the vegetation and wildlife by staff, and recreational use by visitors. The goal of the project is to complete various riparian enhancement projects, complete the three phases of river restoration, and construct recreational improvements to enable visitors to appreciate and utilize the site for recreational purposes. The proposed project is located within the planning area of the Lahontan Regional Water Quality Control Board (RWQCB). The process of implementing the Palisades Ranch Restoration Plan may result in limited erosion and sedimentation as a result of the three phases of river restoration. Compliance with the following mitigation measure will control future nonpoint source pollutant discharges from the project site. Implementation of this measure in conjunction with the State Water Resources Control Board and NPDES program would reduce the impact to the issue of erosion and sedimentation to less than significant. The most critical component of the SWPPP that will be implemented is to control all runoff during construction and operation to ensure that no sediment or any pollutant discharges

are released into the general environment, which includes the Mojave River. With no materials that are considered pollutants being stored on site, the potential to impact the Mojave River is even further reduced to a level of less than significant. With no potential to discharge stormwater or polluted stormwater, or otherwise degrade the water quality of the Mojave River, the project would not severely impair or conflict with the beneficial use of any water resources in the Lahontan Region. Furthermore, the proposed project would ultimately provide greater beneficial use of the Mojave River within Palisades Ranch as a result of the proposed restoration efforts by this project described in the Project Description.

The following shall be implemented in conjunction with the mitigation identified in the Geology/Soil Section, MM **GEO-4**. These measures are intended to be complementary, not incremental.

HYD-1 ***The construction contractor shall prepare and implement a Storm Water Pollution Prevention Plan (SWPPP), which specifies Best Management Practices (BMPs) that will be implemented to prevent construction pollutants from contacting stormwater with the intent of keeping all products of erosion from moving offsite. The SWPPP shall be developed with the goal of achieving a reduction in pollutants both during and following construction to control storm water runoff to the maximum extent practicable based on available, feasible best management practices.***

The following BMPs or comparable measures shall be included in the SWPPP:

- ***Stockpiled material should not be stored in areas which are subject to the erosive flows of water.***
- ***Measures such as the use of straw bales, sandbags, silt fencing or detention basins shall be used to capture and hold eroded material for future cleanup.***
- ***Rainfall will be prevented from entering material and waste storage areas and pollution-laden surfaces.***
- ***Construction-related contaminants will be prevented from leaving the site and polluting waterways.***
- ***A spill prevention control and countermeasures and remediation plan shall be in place and implemented to control release of hazardous substances.***

Additionally, to address stormwater and accidental spills within this environment, any new project must ensure that site development implements a Storm Water Pollution Prevention Plan (SWPPP) and a National Pollutant Discharge Elimination System (NPDES) to control potential sources of water pollution that could violate any standards or discharge requirements during construction and a Water Quality Management Plan (WQMP) to ensure that project-related after development surface runoff meets discharge requirements over the short- and long-term. The WQMP would specify stormwater runoff permit Best Management Practices (BMPs) requirements for capturing, retaining, and treating on site stormwater once the Restoration Project has been developed. The proposed Restoration Project is unique in that it does not propose any new structures, but would install a new parking lot, and would install a 2-acre pond to be used as irrigation water and potential to support Mohave tui chub conservation. Generally, some of the weed abatement sprays may be hazardous, and as such must be used during dry periods, and applied carefully in accordance with use directions. This shall be enforced as follows to prevent any hazardous substances from violating any water quality standards or waste discharge requirements:

HYD-2 ***Weed abatement sprays shall be applied as directed in the Conceptual Riparian Restoration Plan (Appendix 1, pages 96-101), and shall specifically comply with the directions specified by each individual product label (including ambient temperature/wind speed/etc.). Weed abatement shall only occur during dry periods, in which no rain is forecast to occur for at least 48 hours.***

The above measure will ensure that the appropriate weed abatement sprays and solutions are applied correctly, to the correct plants, and during dry periods to avoid contamination from weed abatement sprays that may be toxic to fish and other Mojave River Habitat. Generally, the proposed project intends to complete various riparian enhancement projects, complete the three phases of river restoration, and construct recreational improvements. As such, the use of weed abatement sprays would only be employed in a manner that would not harm the environment, and have been selected as the least harmful types of weed abatement sprays to the environment so as to allow restoration of the project area once the weeds have been eradicated.

As such, MMs **HYD-1** and **HYD-2**, as well as the BMPs specified in the SWPPP and WQMP would ensure that all potential water pollutants of concern are prevented, minimized, and/or otherwise appropriately treated prior to being discharged from the subject property. Therefore, with implementation of these mandatory Plans and their BMPs, as well as MMs **GEO-4, HAZ-1** through **HAZ-3** and **HYD-1** and **HYD-2** above, the development of proposed MDLT Palisades Ranch Restoration Project would not cause a violation of any water quality standards or waste discharge requirements.

b. *Less Than Significant With Mitigation Incorporated* – The proposed project would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a substantial lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted). The Palisades Ranch's has access to groundwater from the Upper Mohave River Valley Groundwater Basin (refer to Figure X-1), specifically in the Alto subbasin. This Groundwater Basin is part of the Mojave Basin Area (MBA). The MBA was adjudicated by the Mojave Basin Area Judgment (MBA Judgment) that was settled in 1996 due to rapid growth within the area and overdraft issues. The MDLT is subject to the MBA Judgement, and as such, if it exceeds the allotted Free Production Allowance, payment of a Replacement Water Assessment to the Mojave Water Agency (MWA)—the Watermaster of the MBA—is required.

Critical to implementing this restoration project is having sufficient water. Temporary irrigation of the restoration areas would need to continue for 1 to 3 years after revegetation, this would occur by a groundwater pump to provide water to the proposed onsite pond. The volume of the pond is 3,386 cubic yards, equal to 2 acre feet (AF), and it would be refilled twice per year in order to use the pond water for irrigation purposes and to reduce pond salinity and temperature to maintain habitat conditions for Mohave tui chub. The greatest potential consumptive uses resulting from this project would be from evapotranspiration (ET) rates of planned willow riparian forest and riparian shrubland in the nested floodplain corridor. Rates of ET would be higher than the ET rate from existing use (i.e., an agricultural field used for alfalfa production). However, whether ET rates for new riparian vegetation resulting from this project would be considered consumptive uses needs to be confirmed by the Watermaster for the Mojave Water Agency. Available consumptive uses for the project are estimated to be 74 AF. If the existing water rights are considered a transfer of use, there may be consumptive use adjustments for aquaculture (surface water times 2 meters [7 feet]). MDLT currently has rights to 40 AF. However, under a legal adjudication of water rights for the Mojave Basin, over time MDLT will only be able to use 22 AF per year of the current 40 AF. The proposed Restoration Project will be required to either work within their water rights, or, as stated above, pay a Replacement Water Assessment fee to the MWA or acquire a transfer of unused water by another producer. The planting design may be adjusted or implemented in phases, depending on when opportunities to purchase additional water rights become available. Additionally, another goal of the proposed project is to promote groundwater recharge of the floodplain aquifer, which would contribute greater groundwater recharge over the whole of the Palisades Ranch site over time.

While the above discusses the potential for impact to the groundwater basin as a whole, another potential for impact is for the greater use of the onsite well by way of the new groundwater pump to

interfere with private wells located within the same aquifer. As such, the following mitigation measure shall be implemented by the District to ensure that other wells within this local aquifer do not incur a significant adverse impact from greater pumping of the onsite well anticipated to be required to support project irrigation and filling of the proposed pond.

HYD-3 If any private wells are adversely impacted by future groundwater extractions from the increased pumping from the onsite well, MDLT shall offset this impact through provision of water service; or adjusting the flow rates or hours of operation to mitigate adverse impacts.

Regardless, given that the proposed project would operate within their legal rights as a producer under the MWA and Judgement thereof, and with the implementation of MM **HYD-3**, the proposed project would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a substantial lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted). No further mitigation is required.

c. i-iii

Less Than Significant With Mitigation Incorporated – As previously stated, the proposed project would complete three phases of river restoration. In order to accomplish the goal of restoration at Palisades Ranch, the proposed project must alter the course of the floodplain. The phases, described in the project description, are as follows:

- **Phase 1:** Constructing the main side channel and nested floodplain, installing BDAs in the main channel, restoring 75 acres of riparian and wet shrubland vegetation, constructing 6,991 feet of channel, installing temporary irrigation in planted areas.
- **Phase 2:** Removing the coffer dam to activate the main side channel, constructing the Mojave tui chub pond, constructing the west branch side channel to carry outflow of the pond, restoring 39 acres of riparian and wet shrubland vegetation and 48 acres of desert scrub, constructing 4,360 feet of channel, installing temporary irrigation in planted areas.
- **Phase 3:** Excavating the 5-year discharge channel, constructing the cottonwood field and permanent irrigation system, installing BDAs in the side channels, final grading, restoring 15 acres of riparian and wetland shrubland vegetation, constructing 1,465 feet of channel, installing temporary irrigation in planted areas.

Fluvial geomorphic processes that are driven by flood disturbance create the template for aquatic and riparian biodiversity which, in turn, alters the response of fluvial landforms to future flood disturbance. For example, flood deposition of a sandbar creates bare sediment where early successional plants (e.g., willows, cottonwoods) can establish. If these plants persist for 15 years or more without a flood scouring the sandbar, future floods will be ineffective at removing vegetation, which could cause channel incision. River regulation in the form of dams, diversions, and inter-basin water transfers alter disturbance regimes (flood frequency, magnitude, timing, and duration) and change the distribution and abundance of fluvial landforms and riparian plants and animals. Floods in the Mojave River at the Palisades Ranch diminished significantly after construction of the Mojave Forks Dam which has allowed riparian vegetation to expand as depicted by historical aerial imagery (see Chapter 2.5.6 of Appendix 1). Future floods capable of scour and erosion will therefore need to be of higher magnitude to uproot riparian plants, and long-term persistence of early successional riparian plants requires forces of erosion or deposition to maintain ecosystem integrity. Other types of disturbance may play this role in the future along regulated rivers such as the Mojave River.

This expansion of riparian vegetation at the Property, especially willows and cottonwoods, has allowed colonization by beavers and construction of beaver ponds, creating a positive feedback whereby riparian vegetation expands further as water spreads out along the floodplain. Beaver dams have shaped the upstream stretch of the Mojave River through Palisades Ranch, first allowing

channel avulsion and more recently creating a multi-thread channel and have alleviated some of the effects of channelization.

BDAs are planned to serve as temporary grade control structures in the main channel of the Mojave River to raise the head of the river and promote backwater conditions in the main side channel. The proposed BDA structures are not sustainable and are anticipated to partially fail during large flood events and, therefore, would not impact the BFEs. The proposed design approach is to temporarily stabilize the side channels and floodplain for the first few years after construction to initiate the restoration process, and thereafter, the design is anticipated to result in natural channel adjustments. Some localized erosion and deposition are anticipated around BDAs which does not pose a risk to infrastructure. Additional BDAs are planned to be installed after the initial process of establishing a pilot channel; these structures would assist with fully restoring the floodplain by spreading flows across the excavated floodplain, inundating a greater area to support riparian habitats, and promoting flow in the other secondary channels. Temporary channel and bank stabilization structures are proposed to be installed to promote the process-based restoration approach.

Given the above, while the intent is to enhance the existing drainage pattern of Palisades Ranch to enable riparian enhancement and river restoration, the project would enhance and thereby alter the course of the Mojave River by enabling side channels that would promote the restoration efforts proposed by this project. However, as stated in the preceding discussion, some erosion is anticipated to occur as a result of future flooding and river flows within the new side channels, but this type of erosion is anticipated and the river restoration efforts would not result in substantial erosion or siltation that is not intended or anticipated to occur within the project site and would not prevent the proposed restoration efforts from being successful. Furthermore, while the proposed Palisades Ranch Restoration Project would alter the site, such new side channels are formed and riparian restoration is facilitated and encouraged, the proposed project would not introduce a substantial new source of water that could result in increasing the rate or amount of surface runoff that would cause flooding on or offsite, particularly because the proposed project would leverage the existing floodplain area to enable the side channels to be successful, thus created a greater defined river area in which to handle flooding within this section of the Mojave River. Finally, as discussed under issue X(a), above, the proposed project would not handle many hazardous materials that could result in pollution on or off-site. However, as the proposed project would install a parking lot that would receive visitors, and would employ use of low-toxicity weed abatement sprays, MMs **HYD-1** or **HYD-2** are necessary to minimize the potential for any pollution sources to pollute stormwater runoff. Given that the proposed project would enhance the drainage systems and result in riparian restoration, and also facilitate river restoration, the project contribution to existing and planned stormwater drainage systems is anticipated to be minimal or non-existent as flows within the site will either percolate, be directed to the proposed onsite pond, or be directed to the new side channels. Therefore, with the implementation of MMs **HYD-1** through **HYD-2**, as well as MMs **GEO-4** and **HAZ-1**, the proposed project would have a less than significant impact under these three issues.

c. iv

Less Than Significant Impact – As previously stated, the proposed project would complete three phases of river restoration, described above. In order to accomplish the goal of restoration at Palisades Ranch, the proposed project must modify the floodplain. The proposed project would alter the existing drainage pattern to accomplish the proposed restoration efforts. Much of the project footprint is located within a Federal Emergency Management Agency 100-year floodplain, or 500-year floodplain (refer to Figure X-2), as the proposed project is adjacent to the existing Mojave River channel, which is subject to flooding as a result of intense rain and weather. There are no structures proposed buy this project, and as such no structures would be subject to flooding. However, there are existing structures within Palisades Ranch, though these structures are located outside of the floodplain. The proposed project would provide greater flood management over the long term as a result of the riparian habitat and vegetation that would be established as part of this project; as stated under issue X(c[i-iii]), above, the proposed project would create a positive feedback

whereby riparian vegetation expands further as water spreads out along the floodplain. Additionally, beaver dams have shaped the upstream stretch of the Mojave River through Palisades Ranch, first allowing channel avulsion and more recently creating a braided channel and have alleviated some of the effects of channelization. The proposed project would contribute even greater alleviation of the effects of channelization. Thus, the channel and wetland re-instatement on the west side of the Mojave River could absorb some storm flow for areas that have been historically subject to flooding on the east side of the River. Based on the an assessment of the project's hydrology, a decrease in normal or flood surface flows downstream beyond the project's boundary is not anticipated to occur. As such, it is anticipated that the proposed project would not significantly impede or redirect such that flooding would be exacerbated, thus causing a significant effect on the environment. Impacts under this issue would be less than significant.

d. *Less Than Significant With Mitigation Incorporated* – Please refer to the discussion under X(c[i-iv]), above. As stated above, the proposed project would be located within a 100-year and 500-year floodplain. The proposed project is not located within an area containing nearby large bodies of water, such as a lake, and as such would not be subject to seiche. Furthermore, the proposed project is located more than 75 miles from the Pacific Ocean and at an elevation of over 2,500 feet, as such would not be subject to tsunami. As previously stated, the proposed project would not handle many hazardous materials that could result in pollution on or off-site. However, as the proposed project would install a parking lot that would receive visitors in automobiles, and would employ use of low-toxicity weed abatement sprays, MMs **HYD-1** or **HYD-2** are necessary to minimize the potential for any pollution sources to be dispersed in the event of project inundation. Flows within the site will either percolate, be directed to the proposed onsite pond, or be directed to the new side channels. Therefore, with the implementation of MMs **HYD-1** through **HYD-2**, as well as MMs **GEO-4** and **HAZ-1** through **HAZ-3**, the proposed project would have a less than significant impact potential to risk release of pollutants due to project inundation as a result of the project's location within a flood hazard.

e. *Less Than Significant Impact* – Please refer to the discussion under issue X(b) above. The Sustainable Groundwater Management Act (SGMA) "requires governments and water agencies of high and medium priority basins to halt overdraft and bring groundwater basins into balanced levels of pumping and recharge. Under SGMA, these basins should reach sustainability within 20 years of implementing their sustainability plans. For critically over-drafted basins, that will be 2040. For the remaining high and medium priority basins, 2042 is the deadline."[4] The San Bernardino Countywide Plan Groundwater Basin Map indicates that the Mojave River Basin is under very low priority (Figure X-1). As the Mojave River Basin is under very low priority, it is currently not required to prepare a sustainable groundwater management plan and the project will not interfere with the overall water quality of the MBA as discussed above. As stated above under issue X(b), the MWA Watermaster manages transfers from the Groundwater Basin and assesses a fee commensurate with the amount of water extracted. Though the Groundwater Basin has several sub-basins that have experienced overdraft in the last 10 years, the Watermaster replaces overdrafts through fees collected from water users that is used to purchase additional water supplied through the State Water Project. MDLT currently has rights to 40 AF. However, under a legal adjudication of water rights for the Mojave Basin, over time MDLT will only be able to use 22 AF per year of the current 40 AF. The proposed Restoration Project will be required to either work within their water rights, or, as stated above, pay a Replacement Water Assessment fee to the MWA or acquire a transfer of unused water by another producer. As such, the payment of this fee will ensure that the proposed project is in compliance with the MWA Watermaster, and as such, it is not anticipated that the proposed Palisades Ranch Restoration Project would have a significant potential to conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

[4] https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XI. LAND USE AND PLANNING: Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☒	☐

SUBSTANTIATION

a. *No Impact* – Restoring the former agricultural use to riparian and aquatic habitats for special status species while keeping in mind water allocation (groundwater/aquifer recharge, water conservation) and maintenance required for sustainable and successful restoration, including removing some of the buildings would not result in the physical division of an established community. The project site is located in an area along the Mojave River between the unincorporated communities of Helendale on the north and Oro Grande on the south but is not located within an established community. Currently, the property includes four residences, two steel buildings, an office and apartment, two open sided hay barns, wells and water tanks, and miscellaneous improvements, associated with past use of a portion of the site for agriculture. Therefore, there would be no adverse impact on an established community associated with the implementation of the proposed Palisades Ranch Restoration Project.

b. *Less Than Significant Impact* –

State

Palisades Ranch was purchased with assistance from the CA Wildlife Conservation Board (WCB) as conservation land for the benefit of the public and WCB has also funded a restoration planning grant. As such, the responsible stewardship of this property is consistent with the State's intent when it awarded these grants, and it is necessary to protect and maintain this significant public investment in conservation. MDLT aims to restore and protect a high conservation priority area of the Mojave River found on the Palisades Ranch by improving the resilience of important species and habitats through restoration planning and adaptive management. Therefore, the proposed Palisades Ranch Restoration project would be consistent with the State's conservation goals.

Regional

As discussed below in Subsection XIV, Population and Housing, there are no permanent employees or residents associated with the proposed Palisades Ranch Restoration Project beyond the onsite caretaker who currently looks after the site. Therefore, the project would not conflict with the Southern California Association of Governments (SCAG) Regional Transportation Plan/Strategic Communities Strategies (RTP/SCS) goals for reducing traffic and related air quality/greenhouse gas emissions commonly associated with development projects. Likewise, because there are no residential, commercial or industrial uses that would be developed as part of this project, the project is not subject to the requirements of the County's Climate Action Plan, though as stated under Subsection VIII, Greenhouse Gas, the proposed project demonstrates consistency with the strategies, actions, and emission reduction targets contained in the County's Greenhouse Gas Reduction Plan.

San Bernardino County General Plan

The project site has a general plan designation of Open Space and Public Facility. MDLT's long-term conservation goals for Palisades Ranch Restoration project include wildlife-oriented education and research, and public access and recreation consistent with conservation goals. These goals will be met through the restoration of the former agricultural site to riparian and aquatic habitats.

The proposed Palisades Ranch Restoration project is consistent with San Bernardino County goals and policies for the Open Space (OS) land use designation. The proposed project is consistent with the County's Resources and Conservation Goal NR-3, Open Space, Parks, and Recreation which identifies "a system of well-planned and maintained parks, trails, and open space that provides recreation opportunities for residents, attracts visitors from across the region and around the country, and preserves the natural environment." Related polices include the following:

Policy NR-3.1 Open space preservation. We regulate land use and coordinate with public and nongovernmental agencies to preserve open space areas that protect natural resources, function as a buffer against natural hazards or between land uses, serve as a recreation or tourist destination, or are central to the identity of an unincorporated community.

Policy NR-3.5 Private conservation efforts. We support nongovernmental organizations and private entities who purchase, own, maintain, and expand areas for conservation and preservation. We also support the voluntary transition of privately held lands within a larger boundary designated by the state or federal government for open space and resource conservation to public ownership.

The proposed Palisades Ranch Restoration project is consistent with the applicable Goal and Policies by restoring the former agricultural use to riparian and aquatic habitats for special status species while keeping in mind water allocation (groundwater/aquifer recharge, water conservation) and maintenance required for sustainable and successful restoration.

The Public Facility (PF) designation is used for public and quasi-public uses and facilities to meet current and future needs for protection from natural hazards including:

- Protect and ensure the continued operation of public facilities and systems during times of flooding, fire, or other hazardous events
- Prevent the loss of life or property caused by flooding by preserving areas and capacity to carry/discharge flood flow
- Protect floodways from encroachment by land uses that could be endangered during times of flooding; prohibit occupancy or encroachment of any improvement that would unduly affect the capacity of floodways.

The proposed Palisades Ranch Restoration Project is consistent with the PF designation because the intent is to restore channels and drainage areas within the Mojave River and adjacent floodplain to enhance riparian and aquatic habitats for special status species, and to maintain the functionality of the river within the boundaries of the project site.

San Bernardino County Development Code

The project site has a Zoning designation of Rural Living, Helendale Community Planning Area. According to County Development Code Section 82.04, Table 82-7 *Allowed Land Uses and Permit Requirements for Residential Land Use Zoning Districts*, a nature preserve such as that proposed by MDLT at the Palisades Ranch site is allowed with approval of a Minor Use Permit (M/C) for accessory uses.

According to the County Land Use Services Hazards Overlay Map, the project site is not located within any of the following Hazard Safety Overlay Districts: Airport Safety, Fire Safety, or Noise. The project site is within the Floodplain Safety (FP) Overlay District for the Mojave River, and a Dam Inundation Overlay District. The site is located in FP1 (Zone A – Inside 100-Year Floodplain) for areas within the Mojave riverbed, and in FP2 (Zone X – Inside 500-Year Floodplain) for areas adjacent to the riverbed. Subsection X, Hydrology and Water Quality, above, provides an evaluation of impacts associated with the potential flooding of restoration areas and related infrastructure (e.g., trails, bridges). There are no residential or other uses proposed that would generate an on-site population that could be adversely affected by potential flooding of the project site. This is the standard upon which impacts associated with natural hazards would apply. Therefore, the proposed

Palisades Ranch Restoration Project would not conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XII. MINERAL RESOURCES: Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

SUBSTANTIATION

a. *No Impact* – According to San Bernardino Countywide Plan Program EIR, Figure 5-11-1, Mineral Resource Zones 2 and 3 in the Southwest Quadrant of the County (Figure XII-1), the project site and vicinity are not located in a Mineral Resource Zone (MRZ) as designated by the California Department of Conservation, Divisions of Mines and Geology. The nearest MRZ to the project is the Oro Grande MRZ located southeast of the project site. Therefore, the restoration of the Palisades Ranch site to protect wildlife habitat and riparian resources along a 3.5± mile reach of the Mojave River, would not result in the loss of availability of a known mineral resource.

b. *No Impact* – The project site has a San Bernardino Countywide Plan designation of Open Space (OS) and Public Facility (PF) and a Zoning Designation of Rural Living (RL), Helendale Community Planning Area. As discussed above in XII(a), the project site is not located in an MRZ area. Therefore, implementation of the project would not result in the loss of availability of a locally important mineral resource recovery site.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XIII. NOISE: Would the project result in:				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of a project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b) Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

SUBSTANTIATION

a. *Less Than Significant Impact –*

Construction

Construction of the proposed Palisades Ranch Restoration project would include habitat restoration, fence installation, and installation of signage. The construction scenario is between 3 to 5 years, with a target completion of 3 years (36 months). The anticipated start date of construction is October 2022. The project could be completed as early as October 2025, though it may be completed at the latest around October of 2027.

The removal of some of the existing structures, restoration of the river and construction of the trail to the existing bridge would be completed in phases but tools and equipment would be similar between phases. Tools and construction equipment include survey equipment, earth-moving heavy equipment and hauling equipment (e.g., backhoe-excavator, dump truck); silt fencing; manual cutting, pruning, digging tools, buckets, Waterjet Stinger, planting containers and stakes, chicken wire and/or steel cloth, native seed, arbuscular mycorrhizal cultures; tracked vehicle (e.g., skidsteer) with mower attachment, herbicide (aquatic label for perennial pepperweed, imazapyr for giant reed and tamarisk), backpack sprayer; erosion control seed; weed-free straw; irrigation hoses, water pump, groundwater pump and utility housing, crusher fines. Not all equipment will operate all day, every day during construction, but intermittently throughout the construction schedule. In addition, restoration is a linear process so the center of the construction area would change as restoration moves along the river within the project site.

Construction would occur during days and hours as allowed in the San Bernardino County Development Code Section 83.01.080, Noise, subsection (g) Exempt Noise. The following sources of noise shall be exempt from the regulations of this Section:

(1) Motor vehicles not under the control of the commercial or industrial use
(2) Emergency equipment, vehicles, and devices.
(3) Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.

The intent of the County's noise standards is to limit excessive noise near sensitive receptors such as residences, schools, hospitals, etc. The project site is located in a rural area where no sensitive

receptors are located in close proximity to the area designated for restoration. Therefore, intermittent noise associated with construction activities would be less than significant.

Operation

Weed Management
Operation of the project site would consist largely of monitoring the project's success, conducting weed management, and allowing visitors to tour the site. MDLT anticipates that weed management activities would occur approximately 20 days per year with a crew of 4-8 persons. Tools and equipment would consist of tracked vehicle (e.g., skidsteer) with mower attachment and manual tools (e.g., weed-eaters); manual digging, cutting and pruning tools; and aquatic-label herbicide applied to perennial pepperweed via backpack sprayer, wicking or hand wiping, imazapyr applied to giant reed and tamarisk.

Monitoring
Vegetation and wildlife monitoring would be conducted regularly to provide knowledge of the distribution and abundance of target species and evidence of restoration success in relation to project goals. It is anticipated that monitoring would require an estimated 30 visits to Palisades Ranch with a crew of 2-4 persons.

Recreational Use
MDLT anticipates that, during the cooler months (6-8 months per year) Palisades Ranch may see an average of 10 visitors per day.

Daily Operation
Palisades Ranch is currently operated by one onsite caretaker who monitors onsite activities. Additionally, MDLT staff and volunteers may visit the site on an as needed basis averaging 2 persons per day for 60 calendar days per year. Under future conditions, daily operations would continue to average 2 persons per day for 60 calendar days per year.

In summary, during on-going operation of the Palisades Ranch site, noise generating activities would be minimal and largely consist of weed management activities occurring approximately 20 days per year. Therefore, noise associated with the operation of the Palisades Ranch Restoration project would be less than significant.

b. *Less Than Significant Impact* – As described above, construction of the proposed Palisades Ranch Restoration project would include habitat restoration, fence installation, and installation of signage. Habitat restoration and construction of a trail to the existing bridge are examples of construction activities that may require the use of earth-moving heavy equipment and hauling equipment (e.g., backhoe-excavator, dump truck). This type of equipment could be the source of vibration however such equipment would not operate all day, every day during construction, but intermittently throughout the construction schedule. In addition, restoration is a linear process so the center of the construction area where vibration causing equipment may be used would change as restoration moves along the river at the project site.

Although vibration causing heavy equipment would be used intermittently, such equipment is still subject to the County's vibration standards as set forth in County Development Code Section 83.01.090 that states the following:

(c) Exempt vibrations. The following sources of vibration shall be exempt from the regulations of this Section.
(1) Motor vehicles not under the control of the subject use.

(2) Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.

In summary, during the construction period, vibration generating activities would be intermittent and only during restoration and trail building activities. Construction contractors will be directed to comply with the County's noise and vibration standards to limit construction hours to the hours of 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays where no construction activities are to occur. Therefore, vibration associated with construction activities for the Palisades Ranch Restoration project would be less than significant.

c. *No Impact* – This threshold applies to projects where new residents or employees would be occupying the site and that are within close proximity to an airport. The proposed project does not include new residences or permanent employees that would add to the local population. In addition, as discussed in Subsection X, Land Use and Planning, the project site is not located within an Airport Safety Overlay District or a Noise Overlay District. Therefore, exposure of people residing or working in the project area would not be subjected to excessive noise levels associated with airports.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XIV. POPULATION AND HOUSING: Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☒	☐

SUBSTANTIATION

a. *No Impact* – The project site is located within the unincorporated community of Helendale, per the Helendale Community Action Guide, prepared as part of the San Bernardino Countywide Plan. The projected 2020 community population was estimated to be 5,908, an increase of 114 residents or roughly a 2 percent increase over the 2014 population of 5,794 individuals. The community had 2,841 total dwelling units, for an average household size of 2.5 individuals. The vacancy rate stood at 18.6 percent, however as noted in the Community Profile (Appendix A of the Community Action Guide), this rate likely includes seasonal households.

The proposed project is the restoration of the riparian portion of the Palisades Ranch site to protect wildlife habitat and riparian resources along a 3.5± mile reach of the Mojave River. There are no new homes or businesses associated with the restoration project, nor would the extension of roads or infrastructure be required that might induce new substantial population growth in the area. Therefore, implementation of the proposed project would not cause a significant impact to population and housing.

Although no permanent employees would be located at the site during long-term operation beyond the onsite caretaker who oversees the property at present, there will be temporary employees on site at intervals to monitor restoration success and for weed management. There may also be docents on-site to lead educational tours for small groups of visitors. However, these functions would be intermittent and would not result in any new permanent employees at the site.

In summary, during on-going operation of the Palisades Ranch site, employees would be on site intermittently throughout the year for short periods for monitoring and maintenance activities. These activities would not result in the inducement of substantial growth in the area.

b. *Less Than Significant Impact* – Under existing conditions, the project site includes four residences, two steel buildings, an office and apartment, two open sided hay barns, wells and water tanks, and miscellaneous improvements. These structures would remain in place and operation of the project would not result in the displacement of any existing people or housing that would necessitate the construction of replacement housing elsewhere. Therefore, this impact would be less than significant.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XV. PUBLIC SERVICES: Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
a) Fire protection?	☐	☐	☒	☐
b) Police protection?	☐	☐	☒	☐
c) Schools?	☐	☐	☐	☒
d) Parks?	☐	☐	☐	☒
e) Other public facilities?	☐	☐	☐	☒

SUBSTANTIATION

a. *Less Than Significant Impact* – According to the Countywide Plan Program EIR, the San Bernardino County Fire Protection District (County Fire) provides emergency mitigation and management for fire suppression, emergency medical services (paramedic and non-paramedic), ambulance services, hazardous materials (HAZMAT) response, arson investigation, technical rescue, winter rescue operations, hazard abatement, and terrorism and weapons of mass destruction. County Fire's services and programs include helicopter rescue, a dozer, fire abatement hand crews, an inmate hand crew specialized program, and an honor guard. County Fire also provides for the management of community safety services such as fire prevention, building construction plans and permits, household hazardous waste, and local oversight and collection program for hazardous materials.

The proposed Palisades Ranch Restoration Project would not add any new residences or residents, nor any new permanent employees that would require emergency response services. However, should such services be required (e.g., fire, EMT) the project site is within the service area of Silver Lakes/Helendale Fire Station #4, located at 27089 Helendale Road, approximately 4 miles north of the Palisades Ranch project site. As such, impacts under this issue would be less than significant.

b. *Less Than Significant Impact* – The project area is served by the San Bernardino County Sheriff's Department from its Victor Valley station located at 11613 Bartlett St. in the City of Adelanto. The project site is located approximately 9 miles northeast of the Victor Valley station.

The Victor Valley station provides law enforcement services to a wide area of the high desert including the communities of Adelanto, Helendale, Oro Grande, Silver Lakes, El Mirage, Spring Valley Lake, Oak Hills, Wrightwood and the unincorporated areas of the Victor Valley area not serviced by the cities of Hesperia, Victorville and the Town of Apple Valley.

The proposed Palisades Ranch Restoration Project would not add any new residences or residents, nor any new permanent employees that would require law enforcement services. However, should such services be required (e.g., after-hours access issues), sheriff's deputies would come from the Victor Valley station. This is considered to be a less than significant impact due to the project site's relatively remote location and would not be considered an attractive nuisance.

c. *No Impact* – The proposed Palisades Ranch Restoration Project would not generate any permanent residences/residents or employees that would result in any new students. As discussed under Subsection XIV, Population and Housing, the proposed project would not induce population growth, as it will neither construct housing, nor result in a growth in employment opportunities within the area. Thus, the proposed project would not generate an increase in elementary, middle, or high school population. Therefore, school impacts would be less than significant. No mitigation is required.

d. *No Impact* – The proposed Palisades Ranch Restoration Project would not generate any permanent residences/residents or employees that would result in the need for new park facilities in the area. The proposed project itself will create a trail system within the Palisades Ranch for public use, and thus would be a benefit to the region as a hiking destination. Thus, implementation of the proposed project would not cause a substantial adverse physical impact to any parks within the area. No impacts are anticipated and no mitigation is required.

e. *No Impact* – Other public facilities include library and general municipal services. The proposed Palisades Ranch Restoration Project would not generate any permanent residences/residents or employees that would result in the need for new or altered public facilities such as a library. Since the project will not directly induce substantial population growth, it is not forecast that the use of such facilities will increase as a result of the proposed project. As a result, the implementation of the project will not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities; need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts in order to maintain acceptable service ratios, response times or other performance objectives for public services to include other public facilities. Thus, no impacts are anticipated and no mitigation is required.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XVI. RECREATION:				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☒	☐

SUBSTANTIATION

a. *No Impact* – The project site is located within the planning area for the Community of Helendale. However, there is no population associated with the proposed restoration project that would require the use of neighborhood or regional parks. As stated under Subsection XV, Public Services, the proposed project would create a trail system within the Palisades Ranch for public use, and thus would be a benefit to the region as a hiking destination. Therefore, the proposed project would not result in an increase in the demand for parks and other recreational facilities, particularly given that the proposed project would provide additional facilities regional access. Impacts are less than significant and no mitigation is required.

b. *Less Than Significant Impact* – The restoration of the Palisades Ranch would result in the protection of wildlife habitat and riparian resources along a 3.5± mile reach of the Mojave River, that would result in a positive physical effect on the environment. The project proposes to install a trail system that would be available for public use. As stated throughout this Initial Study, the proposed project would not result in significant impacts under any issue. As such, though the proposed project would install a trail system that would serve as a type of recreational facility, project implementation would not have an adverse physical effect on the environment. Thus, the project would have a less than significant impact on local and regional parks and recreational facilities.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XVII. TRANSPORTATION: Would the project:				
a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☒	☐
b) Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	☐	☐	☒	☐
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous inter-sections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐
d) Result in inadequate emergency access?	☐	☐	☒	☐

SUBSTANTIATION

a. *Less Than Significant Impact* – Implementation of the proposed project will not conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system. The proposed project is located along Heritage Way, which can be accessed from Bryman Road to the east and west of the proposed project site. Site access will likely occur along Bryman Road to the east near the terminus of the roadway, and Bryman Road is accessible via Route 66 (east) and via Highway 395 (west). Bryman Road is delineated as a Major Highway serving the Community of Helendale, Route 66 is delineated as a Major Divided Highway, and Highway 395 is delineated as a Freeway.

The proposed project would generate the following types of trips:

- Recreational visitors: 10 persons, limited to 6-8 months per year
- Weed management staff: 8 persons, 20 days per year
- Monitoring staff: 4 persons, 20 days per year
- MDLT staff and volunteers: 2 persons, 60 days per year
- Onsite caretaker: 1 person, daily (this is an existing trip)
- TOTAL roundtrips if all visitors and staff arrived on the same day: **25 trips per day**

The additional trips are not anticipated to exceed the maximum 25 trips during either the AM or PM Peak Hour, particularly given that park use is generally spread throughout the daylight hours. The project will also generate construction traffic, which is temporary; during construction, the project is anticipated to generate no more than 50 round truck trips per day, and a maximum of 60 employee roundtrips per day; these trips will be spread throughout the day during construction.

The project site is currently accessible by car, but no sidewalk or bike lanes exist in the vicinity of the project site, this is due to the project's rural location with a limited population. The site will continue to be accessible by the above means of transport once the Palisades Ranch Restoration Project has been implemented.

The Victor Valley Transit Authority bus routes provide service to unincorporated communities in the County. The NTC Commuter provides service to Fort Irwin's National Training Center with stops in Hesperia, Victorville, Helendale, and Barstow. The NTC Commuter can be accessed in the community of Helendale with stops north of the project at the intersection of Vista Road and Helendale Road. The proposed Palisades Ranch Restoration Project is not anticipated to conflict with the circulation of any alternative modes of transportation.

Based on a review of the circulation in the vicinity of Palisades Ranch Restoration Project, the minimal peak hour traffic that would be generated over the short- and long-term by the proposed project, and that will contribute to off- and on-site improvements to area roadways and sidewalks, this project would have a less than significant potential to conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities. No mitigation is required.

b. *Less Than Significant Impact* – The proposed project would implement a restoration plan at Palisades Ranch, and will also provide a path for future passive recreation within the Palisades Ranch site, which is located in the unincorporated Community of Helendale in the North Desert Region of San Bernardino County.

As discussed under Response (a) above, construction vehicles on local roadways would be temporarily increased during project construction due to the presence of construction vehicles and equipment. Increases in vehicle miles traveled (VMT) from construction would be short-term, minimal, and temporary. The duration of the potential significant impacts would be limited to the period of time needed to construct individual projects. As such, VMT standards, which are intended to monitor and address long-term transportation impacts resulting from future development, do not apply to temporary impacts associated with construction activities. Therefore, no construction impact associated with VMT per CEQA Guidelines Section 15064.3 would occur.

The proposed project would not cause substantial long-term/ongoing transportation effects, because proposed project facilities, once constructed, would only generate minimal trips per day and no increase in permanent employees due to the implementation of the proposed project is forecast to occur, though several visits to the site by staff will occur at incremental timeframes discussed under issue XVII(a), above. The Governor's Office of Planning and Research Technical Advisory on Evaluating Transportation Impacts in CEQA (2018) states, "Projects that generate or attract fewer than 110 trips per day generally may be assumed to cause a less-than-significant VMT impact." Scheduled maintenance visits would also occur in the future with one trip per maintenance event, with occasional trips also occurring when unforeseen circumstances arise that would require maintenance or repair of certain facilities. As such, the proposed project would generate less than 110 trips per day, which is the recommended VMT screening threshold. Therefore, the proposed project would not result in a substantial addition of VMT per service population or induce additional roadway vehicle travel by increasing physical roadway capacity or adding new roadways to the network. Therefore, no operational impact associated with VMT per CEQA Guidelines Section 15064.3 would occur.

Thus, implementation of the Palisades Ranch Restoration Project is not anticipated to result in significant impact related to vehicle miles travelled, and thus would not conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b). Impacts under this issue are considered less than significant.

c&d. *Less Than Significant Impact* – The proposed project will occur entirely within the boundaries of Palisades Ranch, and is not anticipated to result in any significant modifications to area roadways providing access to the site. Furthermore, while the proposed project will be accessible via automobile, the only area in which visitor automobiles will be allowed is the parking area proposed at the southwest corner of the project site. The proposed project would consist of irrigating for 1 to 3 years after revegetating the project area with a permanent irrigation system to be installed so that pond water irrigation can be gravity fed to the cottonwood field, weed management including use of some mechanical tools for about 20 days per year, monitoring of the vegetation and wildlife by staff, and recreational use by visitors. No impairment of roadways within and adjacent to the proposed project is anticipated to occur, as the proposed project does not require construction within any roadways. The proposed project would require the use of internal and adjacent roadways to deliver construction materials to the project site, and also to provide access to visitors of the project site once the recreational improvements are complete. Given that the proposed project would not conflict with

Countywide Plan identified evacuation routes (Highway 395 and the I-15 are the closest mapped evacuation routes to the project site), and that the roadways providing access to the site are not heavily traveled as they mainly serve to provide access to Palisades Ranch, the proposed project would have a less than significant potential to result in inadequate emergency access. The proposed project would enhance and restore vegetation systems and the Mojave River floodplain within the project site. These improvements would not fundamentally alter the use at the project site, with the exception of the trail system that will be installed at the project site to enable recreational use of the site. Given the minimal number of visitors anticipated on a daily basis, and the availability of evacuation routes in the event of an emergency, the implementation of the Palisades Ranch Restoration Project would have a less than significant potential to result in an inadequate use of the site such that increased hazards would occur. No mitigation is required.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XVIII. TRIBAL CULTURAL RESOURCES: Would the project cause a substantial change in the significance of tribal cultural resources, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to the California Native American tribe, and that is:				
a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☐	☒	☐	☐
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in sub-division (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☒	☐	☐

SUBSTANTIATION: A cultural resources report has been prepared to evaluate the potential for cultural resources to occur within the project area of potential effect titled “Identification and Evaluation Of Historic Properties, Palisades Ranch Ecological Restoration Project, Helendale Area, San Bernardino County, California” prepared by CRM TECH dated April 20, 2022 (Appendix 8). The following summary information has been abstracted from this report. It provides an overview and findings regarding the cultural resources found within the project area.

Native American Input

In response to CRM TECH’s inquiry, the NAHC replied in a letter dated January 23, 2020, that the Sacred Lands File search yielded negative results for Native American cultural resources in the vicinity. Noting that the absence of specific information does not preclude the presence of cultural resources, the NAHC recommended that local Native American groups be contacted for additional information and provided a list of 10 potential contacts representing six tribal organizations for that purpose (see App. 2).

Upon receiving the NAHC’s response, CRM TECH initiated consultation with the four tribal organizations of Serrano and/or Vanyume heritage, whose ancestral territories are located in the Victor Valley-Mojave Desert region (see App. 2), while the two organizations of Kawaiisu, Tubatulabal, and/or Koso heritage in Kern County were not contacted. For the Morongo Band of Mission Indians, the designated spokesperson on cultural resources issues was contacted in lieu of the tribal political leader on the list, as recommended in the past by the tribal government staff. In all, five tribal representatives were contacted in writing and by telephone, as listed below:

- Travis Armstrong, (then) Tribal Historic Preservation Officer, Morongo Band of Mission Indians;
- Donna Yocum, Chairperson, San Fernando Band of Mission Indians;
- Ryan Nordness, Cultural Resources Director, San Manuel Band of Mission Indians;
- Mark Cochrane, Co-Chairperson, Serrano Nation of Mission Indians;
- Wayne Walker, Co-Chairperson, Serrano Nation of Mission Indians.

As of this time, three of the tribal organizations contacted have responded in writing, and one other has provided their comment by telephone. Among them, Travis Armstrong of the Morongo Band stated that the Morongo Band had no comments to provide at the time but might provide additional information to the lead agencies during future government-to-government consultation process. Mark Cochrane of the Serrano Nation requested immediate notification should any inadvertent discoveries be made during the undertaking.

Donna Yocum of the San Fernando Band and Alexandra McCleary, tribal archaeologist for the San Manuel Band, found the APE to be part of a sensitive area for Native American cultural resources, and both of them noted the presence of known village sites in the surrounding area. Ms. Yocum requested that tribal monitor(s) from the San Fernando Band be present during ground-disturbances in the APE, while Ms. McCleary expressed the San Manuel Band's desire for further consultation regarding this undertaking. During later follow-up on the initial contact, Ryan Nordness, cultural resource analyst for the San Manuel Band, reiterated Ms. McCleary's comments and emphasized that the area was of "great concern" to the tribe.

Additionally, the MDRCD sent a formal consultation letter to the San Manuel Band of Mission Indians on August 25, 2021. On September 14, 2021, the San Manuel Band of Mission Indians contact, Ryan Nordness, requested consultation with the MDRCD on this project under AB 52. Mr. Nordness requested that the District provide the cultural resources report for the project, and this report was provided on April 21, 2022. Mr. Nordness responded on May 3, 2022 requesting that the following mitigation be implemented, in addition to MM **CUL-2** provided under Subchapter V, Cultural Resources, above:

TCR-1 ***Treatment of Cultural Resources***

If a pre-contact cultural resource is discovered during archaeological presence/absence testing, the discovery shall be properly recorded and then reburied in situ. A research design shall be developed by the archaeologist that shall include a plan to evaluate the resource for significance under CEQA criteria. Representatives from the San Manuel Band of Mission Indians Cultural Resources Department (SMBMI), the archaeologist/applicant, and the Lead Agency shall confer regarding the research design, as well as any testing efforts needed to delineate the resource boundary. Following the completion of evaluation efforts, all parties shall confer regarding the archaeological significance of the resource, its potential as a Tribal Cultural Resource (TCR), avoidance (or other appropriate treatment) of the discovered resource, and the potential need for construction monitoring during project implementation. Should any significant resource and/or TCR not be a candidate for avoidance or preservation in place, and the removal of the resource(s) is necessary to mitigate impacts, the research design shall include a comprehensive discussion of sampling strategies, resource processing, analysis, and reporting protocols/obligations. Removal of any cultural resource(s) shall be conducted with the presence of a Tribal monitor representing the Tribe, unless otherwise decided by SMBMI. All plans for analysis shall be reviewed and approved by the applicant and SMBMI prior to implementation, and all removed material shall be temporarily curated on-site. It is the preference of SMBMI that removed cultural material be reburied as close to the original find location as possible. However, should reburial within/near the original find location during project implementation not be feasible, then a reburial location for future reburial shall be decided upon by SMBMI, the landowner, and the Lead Agency, and all finds shall be reburied within this location. Additionally, in this case, reburial shall not occur until all ground-disturbing activities associated with the project have been completed, all monitoring has ceased, all cataloguing and basic recordation of cultural resources have been completed, and a final monitoring report has been issued to Lead Agency, CHRIS, and SMBMI. All reburials are subject to a reburial agreement that shall

be developed between the landowner and SMBMI outlining the determined reburial process/location, and shall include measures and provisions to protect the reburial area from any future impacts (vis a vis project plans, conservation/preservation easements, etc.).

Should it occur that avoidance, preservation in place, and on-site reburial are not an option for treatment, the landowner shall relinquish all ownership and rights to this material and confer with SMBMI to identify an American Association of Museums (AAM)-accredited facility within the County that can accession the materials into their permanent collections and provide for the proper care of these objects in accordance with the 1993 CA Curation Guidelines. A curation agreement with an appropriate qualified repository shall be developed between the landowner and museum that legally and physically transfers the collections and associated records to the facility. This agreement shall stipulate the payment of fees necessary for permanent curation of the collections and associated records and the obligation of the Project developer/applicant to pay for those fees.

All draft records/reports containing the significance and treatment findings and data recovery results shall be prepared by the archaeologist and submitted to the Lead Agency and SMBMI for their review and comment. After approval from all parties, the final reports and site/isolate records are to be submitted to the local CHRIS Information Center, the Lead Agency, and SMBMI.

TCR-2 ***Inadvertent Discoveries of Human Remains/Funerary Objects***

In the event that any human remains are discovered within the project area, ground disturbing activities shall be suspended 100 feet around the resource(s) and an Environmentally Sensitive Area (ESA) physical demarcation/barrier constructed. The on-site lead/foreman shall then immediately who shall notify SMBMI, the applicant/developer, and the Lead Agency. The Lead Agency and the applicant/developer shall then immediately contact the County Coroner regarding the discovery. If the Coroner recognizes the human remains to be those of a Native American, or has reason to believe that they are those of a Native American, the Coroner shall ensure that notification is provided to the NAHC within twenty-four (24) hours of the determination, as required by California Health and Safety Code § 7050.5 (c). The NAHC-identified Most Likely Descendant (MLD), shall be allowed, under California Public Resources Code § 5097.98 (a), to (1) inspect the site of the discovery and (2) make determinations as to how the human remains and funerary objects shall be treated and disposed of with appropriate dignity. The MLD, Lead Agency, and landowner agree to discuss in good faith what constitutes "appropriate dignity" as that term is used in the applicable statutes. The MLD shall complete its inspection and make recommendations within forty-eight (48) hours of the site visit, as required by California Public Resources Code § 5097.98.

Reburial of human remains and/or funerary objects (those artifacts associated with any human remains or funerary rites) shall be accomplished in compliance with the California Public Resources Code § 5097.98 (a) and (b). The MLD in consultation with the landowner, shall make the final discretionary determination regarding the appropriate disposition and treatment of human remains and funerary objects. All parties are aware that the MLD may wish to rebury the human remains and associated funerary objects on or near the site of their discovery, in an area that shall not be subject to future subsurface

disturbances. The applicant/developer/landowner should accommodate on-site reburial in a location mutually agreed upon by the Parties.

It is understood by all Parties that unless otherwise required by law, the site of any reburial of Native American human remains or cultural artifacts shall not be disclosed and shall not be governed by public disclosure requirements of the California Public Records Act. The Coroner, parties, and Lead Agencies, will be asked to withhold public disclosure information related to such reburial, pursuant to the specific exemption set forth in California Government Code § 6254 (r).

AB 52 concluded by requiring the provision of the above measures to be enforced. In order to address the comments provided by other tribal representatives, the following mitigation measures shall also be implemented:

TCR-3 Mark Cochrane of the Serrano Nation and Donna Yocum of the San Fernando Band shall be notified should any inadvertent discoveries be made during the undertaking to ensure that these tribes are also afforded an opportunity to provide input on the nature of the discovery.

Furthermore, the provisions of MM **CUL-1** and MMs **TCR-1** through **TCR-3** would accomplish the intent of the request for a tribal monitor from the San Fernando Band to be present during construction, as the San Manuel Band of Mission Indians are more culturally affiliated with this project area, and the monitoring required by MM **CUL-1** and MM **TCR-1** would ensure protection of any inadvertent discoveries. Furthermore, MM **TCR-3** will provide the San Fernando Band with an opportunity to provide input on any and all such discoveries. As such, with implementation of MMs **CUL-1** through **CUL-2**, and the mitigation measures identified above, the project is not anticipated to cause a change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape, or object with cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American Tribe. No further mitigation is required.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XIX. UTILITIES AND SERVICE SYSTEMS: Would the project:				
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment, or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☒	☐
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☒	☐
c) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☒	☐	☐
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☒	☐	☐

SUBSTANTIATION

a. Water

Less Than Significant Impact – The proposed project is a habitat, river, and floodplain Restoration Project within San Bernardino County. The implementation of the proposed project would connect to an existing well on site to provide the water necessary to implement the proposed project. A new groundwater pump will be installed, which would be considered construction of new water infrastructure. As discussed in the preceding sections, the proposed project would not have a significant impact on the environment. As discussed under Hydrology and Water Quality issue X(b), the proposed groundwater pump will extract groundwater from the Upper Mojave River Valley Groundwater Basin. The amount of water the proposed project would extract from the Basin is minimal compared to the overall amount of water extracted the Groundwater Basin. Payment of fees to MWA will ensure that impacts related to water supply are minimized. As such, though the project would extract water from the Upper Mojave River Valley Groundwater Basin, the project would not result in a significant impact. Therefore, impacts under this issue are considered less than significant.

Wastewater

No Impact – The proposed project would consist of irrigating for 1 to 3 years after revegetating the project area with a permanent irrigation system to be installed so that pond water irrigation can be gravity fed to the cottonwood field, weed management including use of some mechanical tools for about 20 days per year, monitoring of the vegetation and wildlife by staff, and recreational use by visitors. The goal of the project is to complete various riparian enhancement projects, complete the three phases of river restoration, and construct recreational improvements to enable visitors to appreciate and utilize the site for recreational purposes. The proposed Palisades Ranch Restoration Project is not anticipated to require expansion or development of new wastewater treatment facilities. This project would not require connection to wastewater treatment collection services once in

operation. As such, this project is not anticipated to require or result in the relocation or construction of new or expanded wastewater treatment facilities, the construction or relocation of which could cause significant environmental effects. No impacts under this issue are anticipated.

Stormwater

Less Than Significant Impact – The proposed project will manage stormwater within the whole of the project site. Given that the Palisades Ranch Restoration Project would generally consist of habitat, river, and floodplain restoration, and that the proposed project would enhance the drainage systems and result in riparian restoration, and also facilitate river restoration, the project contribution to existing and planned stormwater drainage systems is anticipated to be minimal or non-existent as flows within the site will either percolate, be directed to the proposed onsite pond, or be directed to the new side channels, and with excess runoff ultimately returning to the main to the Mojave River channel. Given the above, the proposed project's contribution to area stormwater systems would not result in the relocation or construction of new or expanded stormwater drainage facilities. The proposed project will enhance drainage within Palisades Ranch, and will effectively manage stormwater runoff internally within the site with the only flows leaving the site as runoff in the Mojave River, which is what occurs at present within the site without the proposed project. As such, the project is not anticipated to result in, the construction or relocation of which could cause significant environmental effects. Impacts under this issue are considered less than significant.

Electric Power

Less Than Significant Impact –The proposed project as described would not require substantial energy to operate, as there are no structures onsite that would be constructed requiring energy. There is existing electric power onsite that serves the existing residences onsite. The proposed project will require use of energy through the pumping of groundwater required to irrigate the project site in both the short- and the long-term to enable the revegetation efforts to be successful and for the cottonwood field to be successful. Ultimately, the water pumping activities on the site would be minimal, and well within available energy capacities in the project area, as no other sources of energy, beyond mobile sources as a result of visitor and staff visits to the site. The project area is served by Southern California Edison (SCE), and is not anticipated to require extension of electricity in order to operate as the site is currently connected to the electrical system with available supply of electricity at the site. The project will install internal electricity, to enable power to the groundwater pump. Given that the project will not require additional construction or relocation of electrical power facilities, and that the project is not anticipated to result in a significant impact under any issue, the proposed project would have no potential to require or result in the relocation or construction of new or expanded electric power facilities, the construction or relocation of which could cause significant environmental effects. No significant adverse impacts are anticipated under this issue.

Natural Gas

No Impact – Development of the Palisades Ranch Restoration Project would not create demand natural gas. Therefore, the project would not result in a significant environmental effect related to the relocation or construction of new or expanded natural gas facilities. No impacts are anticipated.

Telecommunications

No Impact – Development of the Palisades Ranch Restoration Project would not require installation of wireless internet service or phone serve. Therefore, the project would not result in a significant environmental effect related to the relocation or construction of new or expanded telecommunication facilities. No impacts are anticipated.

b. *Less Than Significant Impact* – Please refer to issue X(b), Hydrology and Water Quality, above. The proposed project will access groundwater from the Upper Mojave River Valley Groundwater Basin. The Palisades Ranch already has access to groundwater from the Upper Mohave River Valley Groundwater Basin (refer to Figure X-1), specifically in the Alto subbasin. This Groundwater Basin is part of the MBA. The MBA was adjudicated by the Mojave Basin Area Judgment (MBA Judgment) that was settled in 1996 due to rapid growth within the area and overdraft issues. The MDLT is subject

to the MBA Judgement, and as such, if it exceeds the allotted Free Production Allowance, payment of a Replacement Water Assessment to the MWA—the Watermaster of the MBA—is required. The Groundwater Basin has several sub-basins that experienced overdrafts (total water use was greater than the supply) in 2019-2020, and for the Alto sub-basin, the demand exceeded supply by 7,931 AF or by 12% of the available supply[5]. The MWA Annual Report (2019-2020) indicates that pumping in depleted areas of the regional system may result in long-term local negative impacts such as declining yields and water quality problems. Water levels in near river wells, particularly in the south part of Alto, experienced a trend of decline for 6 years consistent with limited recharge due to drier than average conditions. Water supply conditions for the past 9 years have been dry (47% of Base Period average). Continuation of dry conditions will result in water level declines.

Critical to implementing this restoration project is having sufficient water. Temporary irrigation of the restoration areas would need to continue for 1 to 3 years after revegetation, this would occur by a groundwater pump to provide water to the proposed onsite pond. The volume of the pond is 2 AF, and it would be refilled twice per year in order to use the pond water for irrigation purposes and to reduce pond salinity and temperature to maintain habitat conditions for Mohave tui chub. As such 4 AF would be utilized per year in support of this aspect of the proposed project.

As described under Subchapter X(b), The greatest potential consumptive uses resulting from this project would be from evapotranspiration (ET) rates of planned willow riparian forest and riparian shrubland in the nested floodplain corridor; however, whether ET rates for new riparian vegetation resulting from this project would be considered consumptive uses needs to be confirmed by the Watermaster for the Mojave Water Agency. Available consumptive uses for the project are estimated to be 74 AF. If the existing water rights are considered a transfer of use, there may be consumptive use adjustments for aquaculture (surface water times 2 meters [7 feet]). MDLT currently has rights to 40 AF. However, under a legal adjudication of water rights for the Mojave Basin, over time MDLT will only be able to use 22 AF per year of the current 40 AF. The proposed Restoration Project will be required to either work within their water rights, or, as stated above, pay a Replacement Water Assessment fee to the MWA or acquire a transfer of unused water by another producer. Based on this information, it is anticipated that there will be available water supply within the MBA to meet the water demands of the proposed Palisades Ranch Restoration Project. Therefore, the proposed project is anticipated to have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years. Impacts under this issue are less than significant. No mitigation is required.

c. *No Impact* – Please refer to the discussion under XIX(a) above. The proposed Palisades Ranch Restoration Project will not require installation of restroom facilities; construction will require portable toilets that will be handled by the provider of such facilities. As such, given that operation will not require any new connection to wastewater treatment services, it is not anticipated that the project would result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments. No impacts under this issue are anticipated.

d. *Less Than Significant With Mitigation Incorporated* – The proposed project would not require municipal solid waste collection services. All solid waste that is currently generated on site is delivered to nearby landfill and transfer stations. The nearest landfill to the proposed project site is the Victorville Sanitary Landfill, which has a permitted capacity of 83,200,000 Cubic Yards (CY), while its remaining capacity is 81,510,000 CY. The Victorville Sanitary Landfill can accept 3,000 tons per day. Additionally, the Victor Valley MRF Transfer Station located in Victorville accepts 500 tons per day, while the nearby Barstow Sanitary Landfill has a remaining capacity of 71,481,660 CY, with a maximum daily throughput of 1,500 tons per day. During operation of the proposed project, it is anticipated that no trash would be collected, as the visitors would “pack out” with their trash, as opposed to disposing of it onsite.

[5] https://www.mojavewater.org/files/27AR1920_Revised.pdf

Construction would not require demolition of any structures, though it would require vegetation removal which can be removed and transported to a green waste collection facility. There is adequate capacity at the nearest landfill as well as in other landfills that serve the area to handle construction waste from the proposed project. Any hazardous materials collected on the project site during construction or utilized in support of the weed abatement at the project site during operation of the project will be transported and disposed of by a permitted and licensed hazardous materials service provider. Considering the availability of landfill capacity and the amount of solid waste generation from the proposed project during both construction and operations, project solid waste disposal needs can be adequately met without a significant impact on the capacity of the nearest landfills. However, to further reduce potential impacts to solid waste facilities due to the large scale of the materials that may require disposal or recycling, the following mitigation measure will be implemented:

UTIL-1 ***The contract with construction contractors / vegetation removal professionals shall include the requirement that all materials that can feasibly be recycled shall be salvaged and recycled, including weeds and site vegetation that must be removed. The contractors / vegetation removal professionals shall submit a recycling plan to the MDLT and the District for review and approval prior to the start of construction activities to accomplish this objective.***

Therefore, with the above mitigation measure, it is expected that implementation of the Palisades Ranch Restoration Project will be served by landfills with sufficient permitted capacity to accommodate the project's solid waste disposal needs. Any impacts under this issue are considered less than significant. No mitigation is required.

e. *Less Than Significant With Mitigation Incorporated* – All collection, transportation, and disposal of any solid waste generated by the proposed project is required to comply with all applicable federal, state, and local regulations. As previously stated, the proposed project would not require municipal solid waste collection services. All solid waste that is currently generated on site is delivered to nearby landfill and transfer stations. The area is served by several nearby landfills, though the closest are the Victor Valley MRF Transfer Station, Barstow Sanitary Landfill, and the Victorville Landfill, which, as stated under issue XIX(d) above, have adequate capacity to serve the project. Additionally, any hazardous materials collected on the project site during either construction or operation of the project will be transported and disposed of by a permitted and licensed hazardous materials service provider, as stated under issue IX, Hazards and Hazardous Materials above. All woods and other vegetation that is reusable shall be recycled or composted, where applicable.

Thus, with the implementation of MM **UTIL-1**, and the amount and types of wastes that will be generated both during construction and operation of the project, the potential impacts to the waste disposal systems are considered less than significant. Therefore, the project is expected to comply with all regulations related to solid waste under federal, state, and local statutes. No further mitigation is necessary.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XX. WILDFIRE: If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☒	☐	☐
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of wildfire?	☐	☒	☐	☐
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☒	☐	☐
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☒	☐	☐

SUBSTANTIATION

a-d. *Less Than Significant With Mitigation Incorporated* –. The proposed project area is located about 20 miles north of the San Bernardino Mountains. According to the San Bernardino Countywide Plan Fire Hazard Severity Zones Map (Figure IX-3), the proposed project is not located in a high or very high fire hazard severity zone. As such the proposed project would not have a significant potential to be located on lands that have been classified as very high fire hazard severity zones, such that the project would (a) substantially impair an adopted emergency response plan or emergency evacuation plan; (b) exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of wildfire; (c) require the installation or maintenance of associated infrastructure that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment; or (d) expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.

The fire threat throughout most of the Helendale Community Plan area is considered moderate. As stated under issue IX(g), under Hazards and Hazardous Materials, wildfires along the Mojave River are not common, and while there have been no documented wildfires within the boundaries of Palisades Ranch from the years 1999–2016, disturbance in northern abandoned agricultural field appears to be a burn based on satellite imagery and evidence of burn during field surveys in 2020. In March of 2022, a wildfire in the southern portion of Palisades Ranch burned about 50 acres along the Mojave River demonstrating that, while wildfire is not a common occurrence in this area, it is possible. The burn area in the context of the Palisades Ranch property is shown on Figures XX-1 and XX-2; it burned riparian area and also included a prescribed burn in the agricultural field to enable the fire crews to get ahead of the fire. The MDRCD noted increasing concern about the probability of wildfires, particularly in reference to abandoned agricultural fields along the Mojave River dominated by prickly Russian thistle, which has been partially burned by the recent Heritage fire, providing a benefit to the restoration project proposed herein. The MDLT should consider controlled burns should be considered for enhancement of the riparian zone, especially if future floods are not large or frequent enough to create erosional or depositional surfaces. This shall be enforced through the MM **HAZ-4**, provided under Subsection IX, Hazards and Hazardous Materials. Ultimately, the

proposed project will introduce greater habitat into this area that will be supported with sufficient water, thus resulting in a minimized potential for wildfire. Furthermore, the proposed project would introduce persons into the project area, a maximum of 25 persons in a given day, through the development of the proposed trail system and through introduction of staff that would perform the required maintenance to implement the restoration project; however, the project shall be required to ensure evacuation routes are carefully marked to ensure appropriate communication with the public in the event of a wildfire. The proposed project is located along Heritage Way, which can be accessed from Bryman Road to the east and west of the proposed project site. Site access will likely occur along Bryman Road to the east near the terminus of the roadway, and Bryman Road is accessible via Route 66 (east) and via Highway 395 (west). Given the above, the site access is considered adequate, in conjunction with the mitigation measure below, to ensure safe evacuation of the project site, thus protecting visitors and employees at the site should a wildfire threat occur.

WF-1 MDLT shall incorporate into the project design signage that indicates designated evacuation routes. Evacuation routes shall be confirmed with the San Bernardino County Fire Department.

Therefore, given that the propose project site is located outside of a very high fire hazard severity zone, and the nature of the proposed project would not include activities that would exacerbate fire risk in the project area, with the implementation of MM **HAZ-4** and **WF-1**, the proposed project would have a less than significant impact under issues (a) through (d) outlined above.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact or Does Not Apply
XXI. MANDATORY FINDINGS OF SIGNIFICANCE:				
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☒	☐	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☒	☐	☐

SUBSTANTIATION: The analysis in this Initial Study and the findings reached indicate that the proposed project can be implemented without causing any new project specific or cumulatively considerable unavoidable significant adverse environmental impacts. Mitigation is required to control potential environmental impacts of the proposed project to a less than significant impact level. The following findings are based on the detailed analysis of the Initial Study of all environmental topics and the implementation of the mitigation measures identified in the previous text and summarized in this section.

a. *Less Than Significant With Mitigation Incorporated* – The project has been designed to avoid significant impacts to any biological resources, and extensive mitigation shall be implemented to ensure that the restoration project would ensure protection of biological species. Furthermore, extensive mitigation has been identified to protect cultural resources that have been identified as having a potential to exist within the boundaries of the project site. The project has been identified as having no potential to degrade the quality of the natural environment, substantially reduce habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, or reduce the number or restrict the range of a rare or endangered plant or animal, particularly given that the purpose of the proposed project is to enhance these very things. The project requires mitigation to prevent significant impacts from occurring as a result of implementation of the project. Based on the data contained in the Cultural Resources Report (Appendix 8), there is a potential for cultural resources to exist within the project site, though project activities may avoid these resources due to the types of construction activities that would be required to implement the proposed restoration project, and the location of these activities. Mitigation to address the adjacent sensitive cultural resources is required, but will ensure that these sensitive resources are protected and will not be impacted by the proposed Project. Additionally, because it is not known what could be unearthed upon any excavation activities, mitigation measures are provided to ensure that, in the event that any resources are found, they are protected from any potential impacts. These measures include a requirement that archaeological and Native American monitoring occur during ground disturbing activities, and treatment of any resources that are found. Please see biological and cultural sections of this Initial Study.

b. *Less Than Significant With Mitigation Incorporated* – The project has 10 potential impacts that are individually limited, but may be cumulatively considerable The issues of Air Quality, Biological Resources, Cultural Resources, Geology and Soils, Hazards and Hazardous Materials, Hydrology and Water Quality, Transportation, Tribal Cultural Resources, Utilities and Service Systems, and Wildfire require the implementation of mitigation measures to reduce impacts to a less than significant level and ensure that cumulative effects are not cumulatively considerable. The project is not considered growth-inducing, as defined by *State CEQA Guidelines*, as it would implement a restoration plan to enhance Palisades Ranch and enable future recreation at the site by area visitors. The above issues require the implementation of mitigation measures to reduce impacts to a less than significant level and ensure that cumulative effects are not cumulatively considerable. All other environmental issues were found to have no significant impacts without implementation of mitigation. The potential cumulative environmental effects of implementing the proposed project have been determined to be less than considerable and thus, the project's contribution to significant cumulative impacts would be less than significant.

c. *Less Than Significant With Mitigation Incorporated* – The project will achieve long-term community goals by providing additional recreational facilities to the High Desert Region of San Bernardino County. The short-term impacts associated with the project, which are mainly construction-related impacts, are less than significant with mitigation, and the proposed project is compatible with long-term environmental protection. The issues of Air Quality, Geology and Soils, Hazards and Hazardous Materials, and Wildfire require the implementation of mitigation measures to reduce human impacts to a less than significant level. All other environmental issues were found to have no significant impacts on humans without implementation of mitigation. The potential for direct human effects from implementing the proposed project have been determined to be less than significant.

Conclusion

This document evaluated all CEQA issues contained in the latest Initial Study Checklist form. The evaluation determined that either no impact or less than significant impacts would be associated with the issues of Aesthetics, Agriculture and Forestry Resources, Energy, Greenhouse Gas, Land Use, Mineral Resources, Noise, Population/Housing, Public Services, and Recreation. The issues of Air Quality, Biological Resources, Cultural Resources, Geology and Soils, Hazards and Hazardous Materials, Hydrology and Water Quality, Transportation, Tribal Cultural Resources, Utilities and Service Systems, and Wildfire require the implementation of mitigation measures to reduce impacts to a less than significant level. The required mitigation has been proposed in this Initial Study to reduce impacts for these issues to a less than significant impact.

Based on the findings in this Initial Study the Mojave Desert Resource Conservation District (MDRCD or District) proposes to adopt a Mitigated Negative Declaration (MND) for the Mojave Desert Land Trust Palisades Ranch Restoration Project. A Notice of Availability/Notice of Intent to Adopt a Mitigated Negative Declaration (NOA/NOI) will be issued for this project by the District. The Initial Study and NOA/NOI will be circulated for 30 days of public comment because this project involves the state as either a responsible or trustee agency. At the end of the 30-day review period, a final MND package will be prepared and it will be reviewed by the District for a possible adoption at a future District Board hearing, the date for which has not yet been determined. If you or your agency comments on the MND/NOA/NOI for this project, you will be notified about the meeting date in accordance with the requirements in Section 21092.5 of CEQA.

Note: Authority cited: Sections 21083 and 21083.05, Public Resources Code. Reference: Section 65088.4, Gov. Code; Sections 21080(c), 21080.1, 21080.3, 21083, 21083.05, 21083.3, 21093, 21094, 21095, and 21151, Public Resources Code; *Sundstrom v. County of Mendocino*,(1988) 202 Cal.App.3d 296; *Leonoff v. Monterey Board of Supervisors*, (1990) 222 Cal.App.3d 1337; *Eureka Citizens for Responsible Govt. v. City of Eureka* (2007) 147 Cal.App.4th 357; *Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th at 1109; San *Franciscans Upholding the Downtown Plan v. City and County of San Francisco* (2002) 102 Cal.App.4th 656.
Revised 2019
Authority: Public Resources Code sections 21083 and 21083.09
Reference: Public Resources Code sections 21073, 21074, 21080.3.1, 21080.3.2, 21082.3/ 21084.2 and 21084.3

SUMMARY OF MITIGATION MEASURES

Air Quality

AQ-1 Dust Control. The following measures shall be incorporated into project plans and specifications for implementation:

- Apply soil stabilizers such as hay bales or aggregate cover to inactive areas.
- Prepare a high wind dust control plan and implement plan elements and terminate soil disturbance when winds exceed 25 mph.
- Stabilize previously disturbed areas if subsequent construction is delayed.
- Water exposed surfaces and haul roads 3 times/day.
- Cover all stockpiles with tarps.
- Replace ground cover in disturbed areas quickly.
- Reduce speeds on unpaved roads to less than 15 mph.
- Trenches shall be left exposed for as short a time as possible.

AQ-2 The following signage shall be erected no later than the commencement of construction: A minimum 48 inch high by 96 inch wide sign containing the following shall be located within 50 feet of each project site entrance, meeting the specified minimum height text, black text on white background, on one inch A/C laminated plywood board, with the lower edge between six and seven feet above grade, identifying a responsible official for the site and local or toll free number that is accessible 24 hours per day:

"[Site Name] {four-inch text}
[project Name/project Number] {four-inch text}
IF YOU SEE DUST COMING FROM {four-inch text}
THIS PROJECT CALL: {six-inch text}
[Contact Name], PHONE NUMBER {six-inch text}
If you do not receive a response, Please Call {three-inch text} The MDAQMD at 1-800-635-4617 {three-inch text}"

AQ-3 During project operations a 4,000-gallon water truck shall be available on-site at all times for dust control.

AQ-4 Wind breaks and/or fencing shall be installed in areas that are susceptible to high wind induced dusting.

AQ-5 MDLT shall use a water truck to maintain moist disturbed surfaces and actively spread water during visible fugitive dust episodes to minimize visible fugitive dust emissions. If the site contains exposed sand or fines deposits (and if the project would expose such soils through earthmoving), water application will be required to eliminate visible dust/sand from sand/fines deposits.

AQ-6 MDLT shall formulate a high wind response plan that addresses enhanced dust control if winds are forecast to exceed 25-mph in any upcoming 24-hour period.

Biological Resources

BIO-1 Design drawings Sheet 3 include the following relevant requirements to protect biological resources during construction that shall be implemented by the project:

8. Construction of work shall occur outside of conservation species nesting periods, aquatic spawning, and other time periods as described in said permits.
18. Initial construction staking of protect in place (pip) trees, biological habitats, and special aquatic habitat areas shall be staked by the project biologist prior to construction. Protect in place areas shall be maintained by the contractor during the duration of the project.
38. Engineer and the project biologist shall mark all trees for removal and selective clearing and pruning for equipment access and site restoration.

Protect in Place (PIP)

39. Contractor guarantees that care, caution and best management techniques are implemented to maximize the survivability of native mature trees not designated for removal.
    a. All PIP vegetation shall have a minimum of 99 percent success rate, showing vigor and general health, for 24 months after pip measures are conducted.
    b. During construction additional pruning, irrigation, or fertilizer to restore health to the PIP vegetation shall be conducted at the contractor's expense.
    d. USFWS/DWR aquatic personnel shall be notified two weeks prior to construction of the project. All coffer dams and in-stream work shall coordinate with the project biologist at least two weeks prior to construction of the project. Initial in-stream construction shall have a project biologist monitor construction at the start of in-stream construction areas. Contractor shall notify at all times if there are any observed aquatic species trapped in residual pools or near the designated in-stream construction areas. The handling and relocation of aquatic and terrestrial species shall be done by the project biologist under special provisions outlined in permit approvals.
    g. Any and all riparian areas and riparian vegetation outside of the limits of disturbance shall be protected in place.
    h. No construction supplies, fuels nor oils shall be stored in riparian areas, no vehicles nor heavy equipment shall be allowed into riparian areas other than the designated channel access sites, and routes. No discharge of any unspecified materials shall be allowed into any riparian areas. Riparian areas outside of designated equipment areas shall be traversed only by foot and leak free hoses may cross riparian vegetation. Any incidentally disturbed riparian areas shall be restored to pre-construction conditions.

Vegetation Maintenance

43. Temporary irrigation (1-2 years) using drip and sprinkler system is anticipated and will be included in the final design.
44. The Contractor shall perform continuous weed control and warranty all plantings for 24-month period.

Design drawings Sheet 4 include the following relevant requirements to protect biological resources during construction:

2. The Project is anticipated to be permitted under CEQA and a USACE nationwide 27. Final plans for construction shall adhere to all special provisions outlined in said permits. The Contractor shall finalize a stormwater pollution prevention plan.
3. The Contractor shall obtain local construction permits and adhere to all provisions and requirements.
4. No heavy equipment shall operate in the vegetation enhancement areas. Areas shall be traversed by foot traffic only.
5. Construction equipment shall access riparian areas at designated locations only.
6. Construction activities in the designated riparian areas shall be directed by field biologist.
7. Work in riparian areas shall only occur during base flow conditions. Contractor shall monitor weather and plan each day's work according to conditions. Contractor shall stabilize areas to anticipate for storm flow during off work hours. Flows in the Mojave River are variable and flash flood may occur during the construction period. Areas may need additional temporary best management practices to isolate the working area from storm water event flows. Coffer dam to be placed upstream of the constructed side channel work area.
7. Select tree removal and transplanting of existing riparian plants shall be directed by field biologist.
8. All large branch and root cuts to protect in place trees in the designated riparian areas shall be performed by a state of ca certified arborist.
9. Construction of boardwalk piers, overlook wall, and pump utilities shall isolate areas from flowing water. Any pumped ground water shall be filtered prior to discharging to the Mojave River. Concrete washout shall be disposed offsite.

10. Equipment fueling and maintenance areas shall be in designated upland staging area only.
11. Equipment shall not be left in riparian areas during off-work hours and shall be stored in upland staging area only.
12. Contractor shall have signs and barriers to prevent public entry during construction activities.
13. All areas shall be restored with adequate cover and temporary stabilization techniques until conditions warrant.
14. Contractor shall maintain/repair/replace best management practices as needed until adequate vegetation cover is established.
15. Silt fencing shall be placed down gradient of earth work at all times.

Additional Restoration Efforts
Where appropriate, small diameter limbs collected from the restoration efforts shall be salvaged to create small brush piles in the upper portion of the Palisades Ranch to provide cover for species such as quail, etc.

BIO-2 MDLT shall consider the modification of the Restoration Plan to include removal of American Bullfrog from the stretch of the Mojave River that traverses through Palisades Ranch (refer specifically to the areas shown on Figure IV-13 and IV-14). A qualified biologist shall be retained, should an American Bullfrog Removal Program be included in the Restoration Plan, to draft and administer the provisions of the Removal Program.

BIO-3 Plastic mono-filament netting (erosion-control matting) or similar material will not be used in erosion control materials to prevent potential harm to wildlife. Materials such as coconut coir matting or tackified hydroseeding compounds will be used as substitutes.

BIO-4 The Applicant shall prepare and submit a Regional Water Quality Control Board 401 Certification, a Fish and Game Code Section 1602 Lake or Streambed Alteration Agreement, and a State Water Resources Control Board: Section 402 NPDES. No ground disturbance within jurisdictional waters shall occur until the MDLT obtains the above permits and provides the District verification of permit acquisition. Note that the final compensation package contained in the permit shall be implemented by the MDLT. If the permit conditions are different than the mitigation listed in this document to protect biological resources, the MDLT shall implement the mitigation identified in the permits, which must be equivalent or more effective in mitigating or avoiding potential significant effects and the substitution of any mitigation measure will not cause any potentially significant effect on the environment.

Cultural Resources

CUL-1 An Extended Phase 1 archaeological study shall be implemented in the general vicinity of Site 36-000184 to determine the presence or absence of any buried components of the site. This study shall include field exploration in the general vicinity of Site 36-000184 utilizing methods such as excavation of backhoe trenches and shovel test pits.

For any resources that are uncovered that prove to be significant under the appropriate CEQA criteria, as determined by a qualified archaeologist meeting Secretary of Interior standards, mitigation of potential project impact is required. These measures may focus on the following procedures, aimed at the preservation of physical and/or archival data about a significant cultural resource that would be impacted by the project:

- Data recovery through further excavation at an archaeological site or a paleontological locality to collect a representative sample of the identified remains, followed by laboratory processing and analysis as well as preparation for permanent curation;
- Comprehensive documentation of architectural and historical data about a significant building, structure, or object using methods comparable to the appropriate level of the Historic American Buildings Survey (HABS) and the Historic American Engineering Record

(HAER) for permanent curation at a repository or repositories that provides access to the public;
- Adjustments to project plans to minimize potential impact on the significance and integrity of the resource(s) in question.

Section 106 compliance shall be formulated and presented on the basis of the testing results and significance evaluation of the findings at the recommendation of the qualified archaeologist meeting Secretary of Interior standards.

CUL-2 Archaeological Monitoring and Testing

At least one archaeologist with at least 3 years of regional experience in archaeology and a Tribal monitor representing the San Manuel Band of Mission Indians shall conduct subsurface archaeological testing on the project site via the employ of a number of subsurface investigative methods, including shovel test probes, remote sensing, and/or deep testing via controlled units or trenching of appropriate landscapes, with a sample size of at least 25% of the area of concern dug and dry-sifted through 1/8-inch mesh screens, prior to any ground-disturbing activity. A Testing Plan shall be created by the archaeologist and submitted to the San Manuel Band of Mission Indians Cultural Resources Department (SMBMI) and the Lead Agency for review at least 10 business days prior to implementation, so as to provide time to review/modify the Plan, if needed. The Plan shall outline the protocol of presence/absence testing and contain a Treatment Plan detailing that 1) no collection of artifacts or excavation of features shall occur during testing, and 2) all discovered resources shall be properly recorded and reburied in situ.

If the results of testing, as approved by SMBMI, are positive, then SMBMI and the Lead Agency shall, in good faith, consult concerning appropriate treatment of the finding(s), guidance for which is outlined in TCR-1.

If the results of testing, as approved by SMBMI, are negative, then SMBMI will conclude consultation unless any discoveries are made during project implementation. Any and all discoveries made during project implementation shall be subject to the Treatment Plan outlined within the Testing Plan developed as described above and the guidelines contained in TCR-1.

If resources are identified during testing as described above, an archaeological monitor and a Tribal monitor from SMBMI with at least 3 years of regional experience in archaeology shall be present for all ground-disturbing activities that occur within the proposed project area (which includes, but is not limited to, tree/shrub removal and planting, clearing/grubbing, grading, excavation, trenching, compaction, fence/gate removal and installation, drainage and irrigation removal and installation, hardscape installation [benches, signage, boulders, walls, seat walls, fountains, etc.], and archaeological work). A sufficient number of monitors shall be present each work day to ensure that simultaneously occurring ground disturbing activities receive thorough levels of monitoring coverage. A Monitoring and Treatment Plan that is reflective of the project mitigation ("Cultural Resources" and "Tribal Cultural Resources") shall be completed by the archaeologist and submitted to the Lead Agency for dissemination to the San Manuel Band of Mission Indians Cultural Resources Department (SMBMI). Once all parties review and approve the plan, it shall be adopted by the Lead Agency – the plan must be adopted prior to permitting for the project. Any and all findings will be subject to the protocol detailed within the Monitoring and Treatment Plan.

Geology and Soils

GEO-1 Stored backfill material shall be covered with water resistant material during periods of heavy precipitation to reduce the potential for rainfall erosion of the material. If covering is not feasible, then measures such as the use of straw bales or sand bags shall be used to capture and hold eroded material on the project site for future cleanup.

GEO-2 Excavated areas shall be properly backfilled and compacted and other disturbed areas are returned to as near the pre-project condition as is feasible.

GEO-3 All exposed, disturbed soil (trenches, stored backfill, etc.) will be sprayed with water or soil binders twice a day or more frequently if fugitive dust is observed migrating from the site.

GEO-4 The District shall identify any additional BMPs to ensure that the discharge of surface water does not cause erosion downstream of the discharge point. This shall be accomplished by reducing the energy of any site discharge through an artificial energy dissipater or equivalent device. If any substantial erosion or sedimentation occurs, any erosion or sedimentation damage shall be restored to pre-discharge conditions.

GEO-6 Should any paleontological resources be encountered during construction of these facilities, earthmoving or grading activities in the immediate area of the finds shall be halted and an onsite inspection should be performed immediately by a qualified paleontologist. Responsibility for making this determination shall be with the District's onsite inspector. The paleontological professional shall assess the find, determine its significance, and determine appropriate mitigation measures within the guidelines of the California Environmental Quality Act that shall be implemented to minimize any impacts to a paleontological resource.

Hazards and Hazardous Materials

HAZ-1 All accidental spills or discharge of hazardous material during construction and/or operational activities shall be reported to the Certified Unified Program Agency and shall be remediated in compliance with applicable state and local regulations regarding cleanup and disposal of the contaminant released. The contaminated waste will be collected and disposed of at an appropriately a licensed disposal or treatment facility. This measure shall be incorporated into the SWPPP prepared for the proposed MDLT Palisades Ranch Restoration Project. Prior to accepting the site as remediated, the area contaminated shall be tested to verify that any residual concentrations meet the standard for future residential or public use of the site.

HAZ-2 Where the operation of the Restoration Plan would handle hazardous materials or generate hazardous waste, the Hazardous Materials Business Plan prepared and submitted to the Certified Unified Program Agency shall incorporate best management practices designed to minimize the potential for accidental release of such chemicals and shall meet the standards required by California law for Hazardous Materials Business Plans. The facility managers shall implement these measures to reduce the potential for accidental releases of hazardous materials or wastes. The Hazardous Materials Business Plan shall be approved prior to operation of the given facility.

HAZ-3 The Hazardous Materials Business Plan shall assess the potential accidental release scenarios and identify the equipment and response capabilities required to provide immediate containment, control, and collection of any released hazardous material. Prior to issuance of the certificate of occupancy, each facility shall ensure that necessary equipment has been installed and training of personnel has occurred to obtain sufficient resources to control and prevent the spread of any accidentally released hazardous or toxic materials.

HAZ-4 MDLT, in consultation with the MDRCD, shall evaluate the project site for fire potential on a regular basis. Where MDLT and the District determine that a controlled burn would be beneficial for enhancement of the riparian zone, and would minimize potential for an unexpected wildfire, MDLT shall initiate the controlled burn, and shall obtain authorization to proceed from the appropriate agencies (i.e. the San Bernardino County Fire Department, the Mojave Desert Air Quality Management District, etc.), where required and applicable.

Hydrology and Water Quality

HYD-1 The construction contractor shall prepare and implement a Storm Water Pollution Prevention Plan (SWPPP), which specifies Best Management Practices (BMPs) that will be implemented to prevent construction pollutants from contacting stormwater with the intent of keeping all products of erosion from moving offsite. The SWPPP shall be developed with the goal of achieving a reduction in pollutants both during and following construction to control storm water runoff to the maximum extent practicable based on available, feasible best management practices.

The following BMPs or comparable measures shall be included in the SWPPP:

- Stockpiled material should not be stored in areas which are subject to the erosive flows of water.
- Measures such as the use of straw bales, sandbags, silt fencing or detention basins shall be used to capture and hold eroded material for future cleanup.
- Rainfall will be prevented from entering material and waste storage areas and pollution-laden surfaces.
- Construction-related contaminants will be prevented from leaving the site and polluting waterways.
- A spill prevention control and countermeasures and remediation plan shall be in place and implemented to control release of hazardous substances.

HYD-2 Weed abatement sprays shall be applied as directed in the Conceptual Riparian Restoration Plan (Appendix 1, pages 96-101), and shall specifically comply with the directions specified by each individual product label (including ambient temperature/wind speed/etc.). Weed abatement shall only occur during dry periods, in which no rain is forecast to occur for at least 48 hours.

HYD-3 If any private wells are adversely impacted by future groundwater extractions from the increased pumping from the onsite well, MDLT shall offset this impact through provision of water service; or adjusting the flow rates or hours of operation to mitigate adverse impacts.

Tribal Cultural Resources

TCR-1 Treatment of Cultural Resources

If a pre-contact cultural resource is discovered during archaeological presence/absence testing, the discovery shall be properly recorded and then reburied in situ. A research design shall be developed by the archaeologist that shall include a plan to evaluate the resource for significance under CEQA criteria. Representatives from the San Manuel Band of Mission Indians Cultural Resources Department (SMBMI), the archaeologist/applicant, and the Lead Agency shall confer regarding the research design, as well as any testing efforts needed to delineate the resource boundary. Following the completion of evaluation efforts, all parties shall confer regarding the archaeological significance of the resource, its potential as a Tribal Cultural Resource (TCR), avoidance (or other appropriate treatment) of the discovered resource, and the potential need for construction monitoring during project implementation. Should any significant resource and/or TCR not be a candidate for avoidance or preservation in place, and the removal of the resource(s) is necessary to mitigate impacts, the research design shall include a comprehensive discussion of sampling strategies, resource processing, analysis, and reporting protocols/obligations. Removal of any cultural resource(s) shall be conducted with the presence of a Tribal monitor representing the Tribe, unless otherwise decided by SMBMI. All plans for analysis shall be reviewed and approved by the applicant and SMBMI prior to implementation, and all removed material shall be temporarily curated on-site. It is the preference of SMBMI that removed cultural material be reburied as close to the original find location as possible. However, should reburial within/near the original find location during project implementation not be feasible, then a reburial location for future reburial shall be decided upon by SMBMI, the landowner, and the Lead Agency, and all finds shall be reburied within this location. Additionally, in this case, reburial shall not occur until all ground-disturbing activities associated with the project have been completed,

all monitoring has ceased, all cataloguing and basic recordation of cultural resources have been completed, and a final monitoring report has been issued to Lead Agency, CHRIS, and SMBMI. All reburials are subject to a reburial agreement that shall be developed between the landowner and SMBMI outlining the determined reburial process/location, and shall include measures and provisions to protect the reburial area from any future impacts (vis a vis project plans, conservation/preservation easements, etc.).

Should it occur that avoidance, preservation in place, and on-site reburial are not an option for treatment, the landowner shall relinquish all ownership and rights to this material and confer with SMBMI to identify an American Association of Museums (AAM)-accredited facility within the County that can accession the materials into their permanent collections and provide for the proper care of these objects in accordance with the 1993 CA Curation Guidelines. A curation agreement with an appropriate qualified repository shall be developed between the landowner and museum that legally and physically transfers the collections and associated records to the facility. This agreement shall stipulate the payment of fees necessary for permanent curation of the collections and associated records and the obligation of the Project developer/applicant to pay for those fees.

All draft records/reports containing the significance and treatment findings and data recovery results shall be prepared by the archaeologist and submitted to the Lead Agency and SMBMI for their review and comment. After approval from all parties, the final reports and site/isolate records are to be submitted to the local CHRIS Information Center, the Lead Agency, and SMBMI.

TCR-2 Inadvertent Discoveries of Human Remains/Funerary Objects

In the event that any human remains are discovered within the project area, ground disturbing activities shall be suspended 100 feet around the resource(s) and an Environmentally Sensitive Area (ESA) physical demarcation/barrier constructed. The on-site lead/foreman shall then immediately who shall notify SMBMI, the applicant/developer, and the Lead Agency. The Lead Agency and the applicant/developer shall then immediately contact the County Coroner regarding the discovery. If the Coroner recognizes the human remains to be those of a Native American, or has reason to believe that they are those of a Native American, the Coroner shall ensure that notification is provided to the NAHC within twenty-four (24) hours of the determination, as required by California Health and Safety Code § 7050.5 (c). The NAHC-identified Most Likely Descendant (MLD), shall be allowed, under California Public Resources Code § 5097.98 (a), to (1) inspect the site of the discovery and (2) make determinations as to how the human remains and funerary objects shall be treated and disposed of with appropriate dignity. The MLD, Lead Agency, and landowner agree to discuss in good faith what constitutes "appropriate dignity" as that term is used in the applicable statutes. The MLD shall complete its inspection and make recommendations within forty-eight (48) hours of the site visit, as required by California Public Resources Code § 5097.98.

Reburial of human remains and/or funerary objects (those artifacts associated with any human remains or funerary rites) shall be accomplished in compliance with the California Public Resources Code § 5097.98 (a) and (b). The MLD in consultation with the landowner, shall make the final discretionary determination regarding the appropriate disposition and treatment of human remains and funerary objects. All parties are aware that the MLD may wish to rebury the human remains and associated funerary objects on or near the site of their discovery, in an area that shall not be subject to future subsurface disturbances. The applicant/developer/landowner should accommodate on-site reburial in a location mutually agreed upon by the Parties.

It is understood by all Parties that unless otherwise required by law, the site of any reburial of Native American human remains or cultural artifacts shall not be disclosed and shall not be governed by public disclosure requirements of the California Public Records Act. The Coroner, parties, and Lead Agencies, will be asked to withhold public disclosure information related to

such reburial, pursuant to the specific exemption set forth in California Government Code § 6254 (r).

TCR-3 Mark Cochrane of the Serrano Nation and Donna Yocum of the San Fernando Band shall be notified should any inadvertent discoveries be made during the undertaking to ensure that these tribes are also afforded an opportunity to provide input on the nature of the discovery.

Utilities and Service Systems

UTIL-1 The contract with construction contractors / vegetation removal professionals shall include the requirement that all materials that can feasibly be recycled shall be salvaged and recycled, including weeds and site vegetation that must be removed. The contractors / vegetation removal professionals shall submit a recycling plan to the MDLT and the District for review and approval prior to the start of construction activities to accomplish this objective.

Wildfire

WF-1 MDLT shall incorporate into the project design signage that indicates designated evacuation routes. Evacuation routes shall be confirmed with the San Bernardino County Fire Department.

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FIGURES

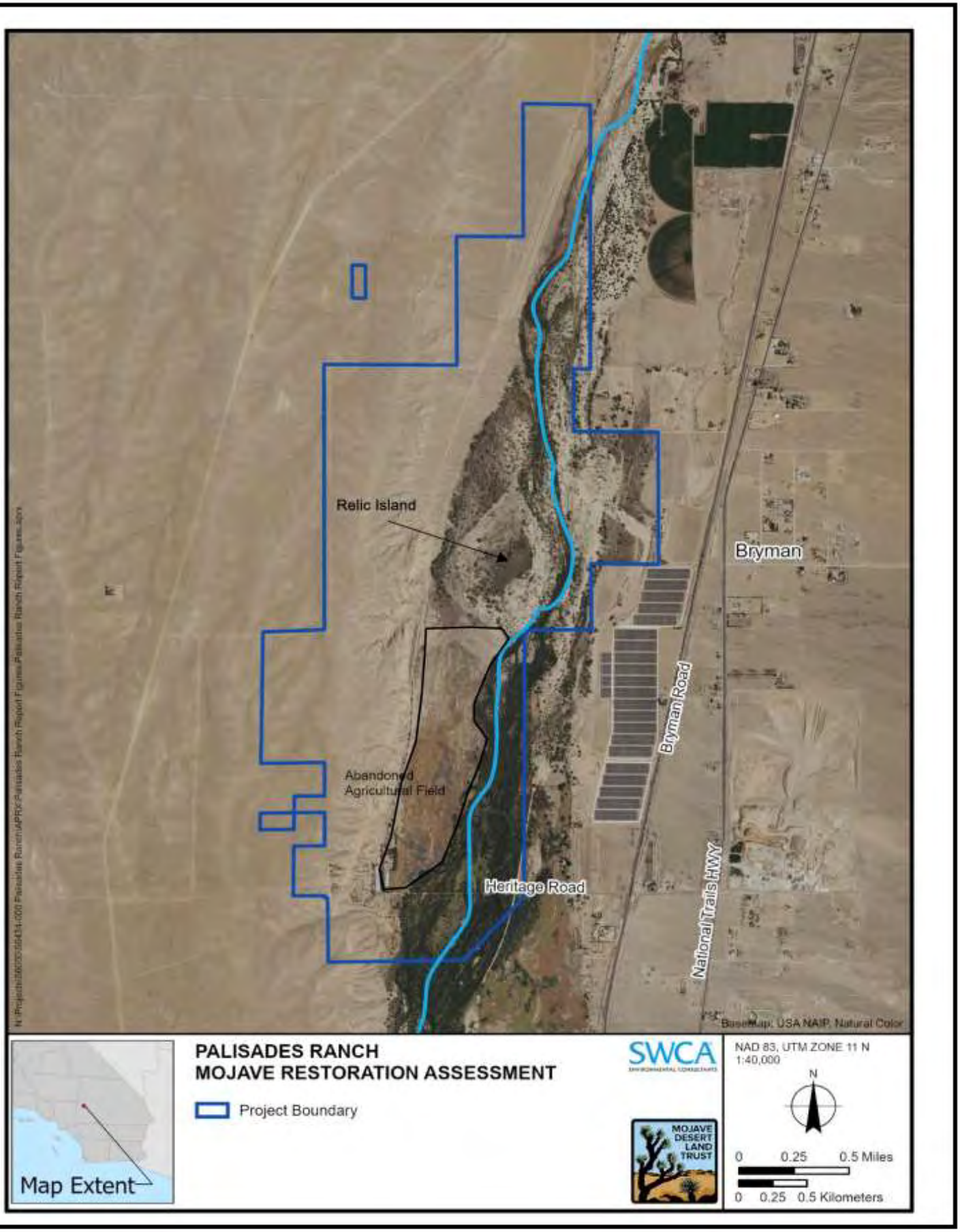


FIGURE 1

Tom Dodson & Associates
Environmental Consultants

General Site Location

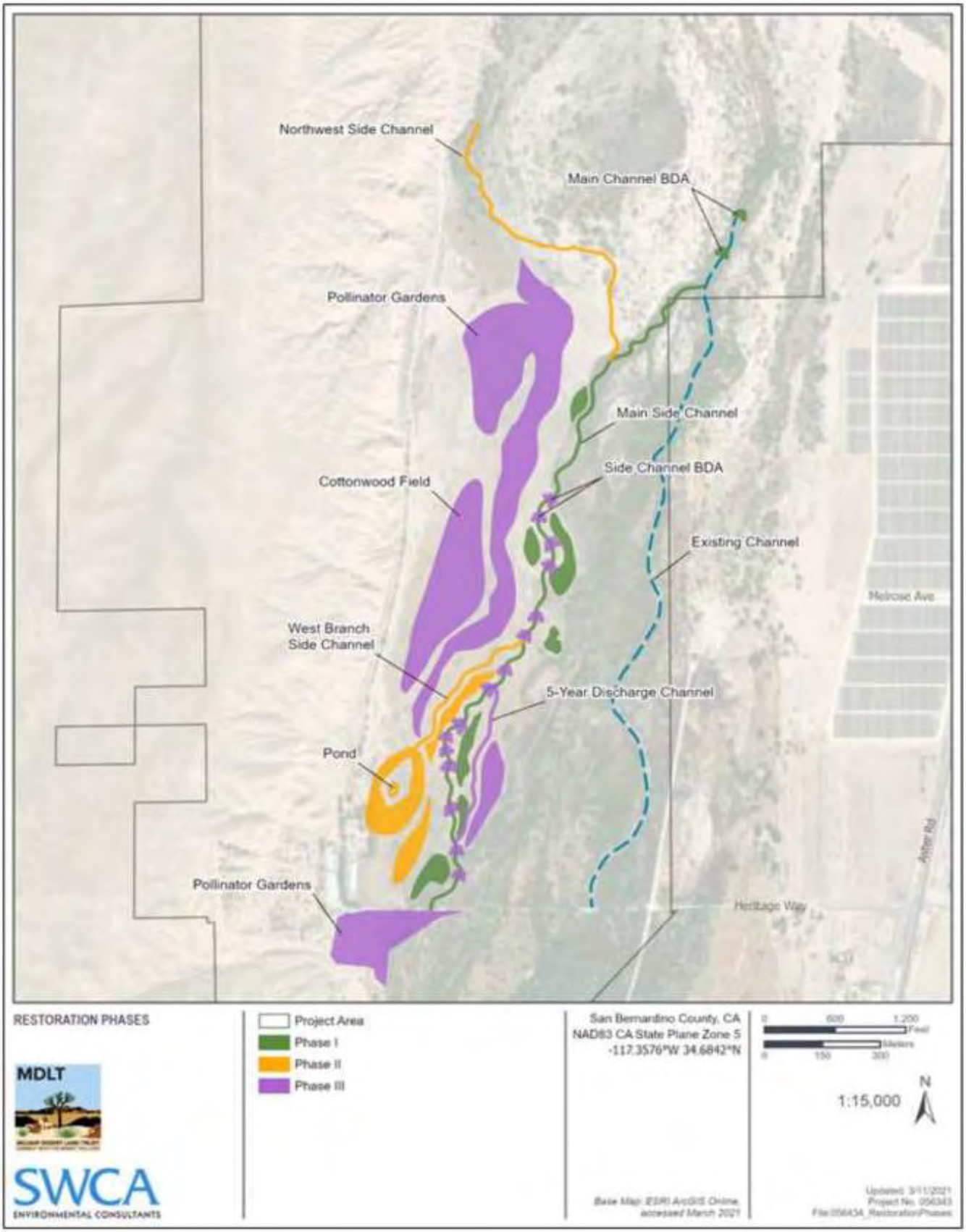


FIGURE 2

Tom Dodson & Associates
Environmental Consultants

Restoration Phases

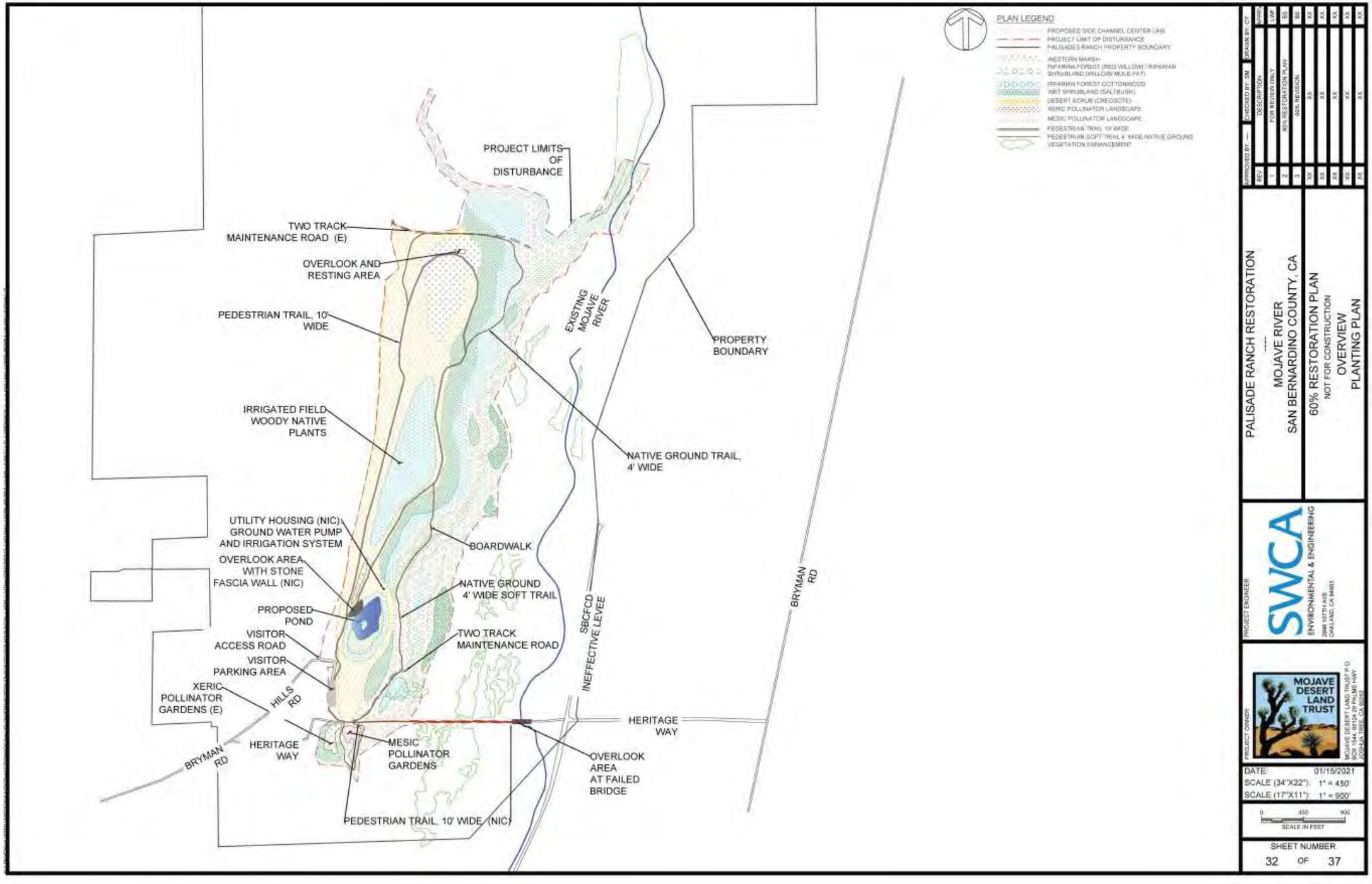
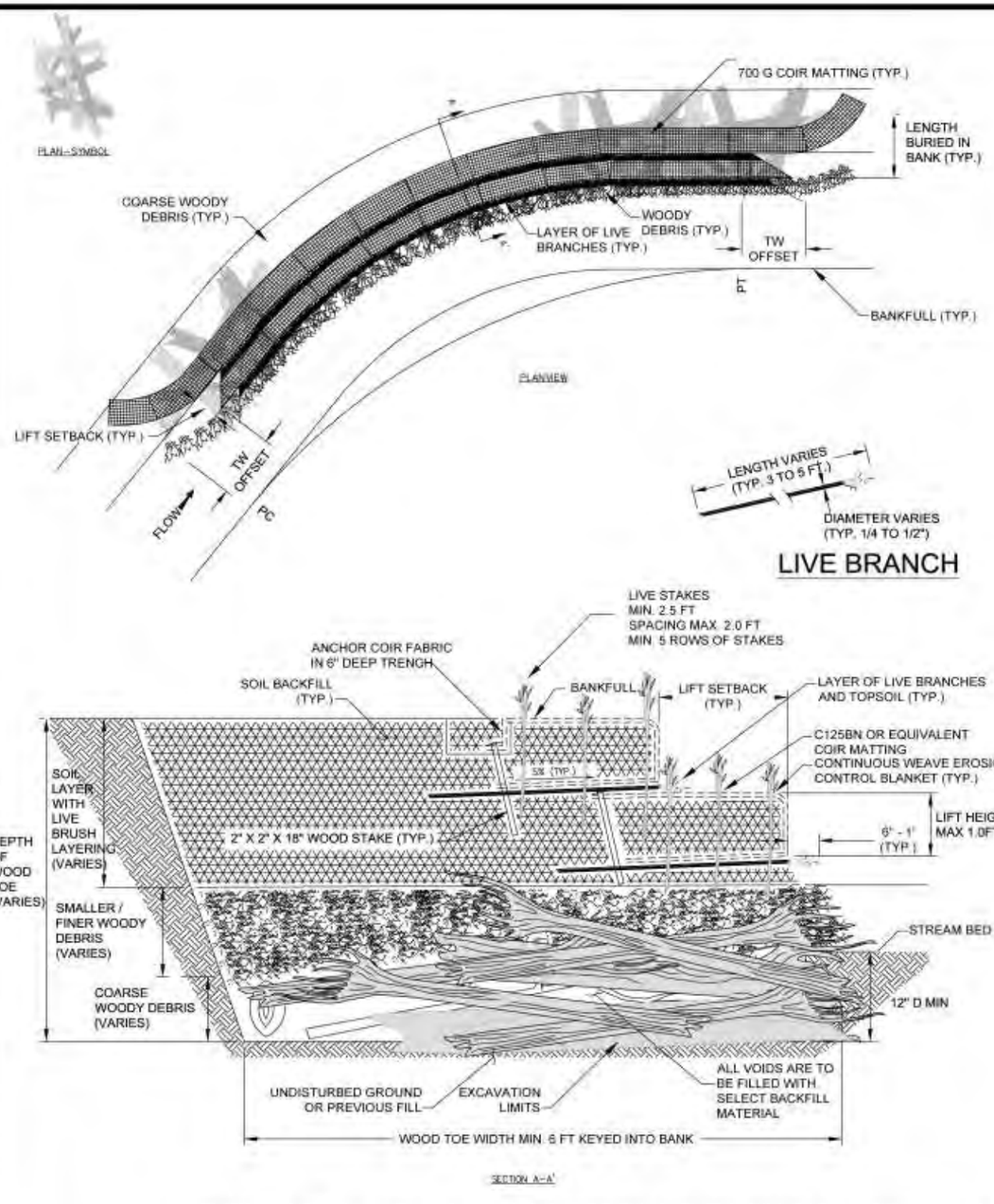


FIGURE 3

Tom Dodson & Associates
Environmental Consultants

Overview of Planting Plan



ZONE A TYPICAL DETAIL - LARGE WOOD AND BRUSH BANK PROTECTION

NOT TO SCALE

NOTES:

1. COARSE WOODY DEBRIS SHALL CONSIST OF LOGS, ROOTWADS, AND LARGE BRANCHES NOT SUITABLE FOR CONSTRUCTION OF LOG STRUCTURES. LOGS SHOULD BE A MIN. OF 10 FEET LONG AND A DIAMETER OF 6" INCHES AT THE BASE. ALL MATERIALS ARE TO BE APPROVED BY THE ENGINEER.
2. COARSE WOODY DEBRIS SHALL BE CONSTRUCTED WITH THE LARGEST MATERIAL PLACED FIRST. NO LOGS SHALL BE PLACED PARALLEL TO THE FLOW OF WATER, UNLESS DIRECTED BY THE ENGINEER. LOGS SHALL BE PLACED IN A CROSSING PATTERN OR WEAVE SUCH THAT EACH LOG IS ANCHORED BY ANOTHER LOG.
3. SMALL/FINE WOODY DEBRIS SHALL CONSIST OF MEDIUM TO SMALL LIMBS, BRANCHES, BUSHES, AND/OR LOGS. INVASIVE SPECIES SHALL NOT BE USED.
4. SMALL/FINE WOODY DEBRIS SHALL BE PLACED ABOVE THE COARSE WOODY DEBRIS WITH THE LARGEST MATERIAL BEING PLACED FIRST AND THE SMALLEST MATERIAL PLACED LAST.
5. ALL WOODY DEBRIS SHALL BE COMPACTED WITH THE EXCAVATOR BUCKET IN ORDER TO REDUCE THE PRESENCE OF VOIDS IN THE SMALL/FINE WOODY DEBRIS LAYER.
6. THE HORIZONTAL LOCATIONS OF ALL WOODY DEBRIS ARE LOCATED ON THE PLAN AND PROFILE SHEETS AND WILL BE PROVIDED TO THE CONTRACTOR. NO LOCATIONS OF WOODY DEBRIS SHALL VARY FROM THE PLAN LOCATIONS WITHOUT DIRECTION FROM THE ENGINEER.
7. GRAVEL LEVELING BASE SHALL BE INSTALLED ABOVE THE HIGHEST ELEVATION OF THE WOODY DEBRIS BEFORE THE SOIL LIFTS ARE INSTALLED.
8. THE SOIL BACKFILL USED FOR LIFTS AND TOPSOIL USED FOR LAYERING WITH THE LIVE BRANCHES SHALL BE FREE OF ANY LARGE ROOTS OR WOODY DEBRIS AND SHALL GENERALLY BE FREE FROM ANY GRAVEL OR COBBLE MATERIAL.
9. SOIL BACKFILL SHALL BE COMPACTED SUCH THAT FUTURE SETTLING WILL BE KEPT TO A MINIMUM, YET, NOT SUCH THAT THE UNDERLYING BRUSH IS DISPLACED OR DAMAGED.
10. THE TOP OF THE BACKFILL FOR THE FIRST LIFT SHALL BE SLOPED AT APPROXIMATELY 5% AWAY FROM THE STREAM.
11. PLACE A LAYER OF TOPSOIL AND LIVE BRANCHES ON TOP OF EACH SOIL LIFT SUCH THAT APPROXIMATELY 6 INCHES TO 1 FOOT OF EACH LIVE BRANCH WILL BE EXPOSED AND THE REMAINDER (2' TO 4') OF EACH LIVE BRANCH WILL BE COVERED BY THE NEXT SOIL LIFT.
12. LIVE BRANCHES SHALL BE OF THE SPECIES SPECIFIED FOR LIVE STAKES OR APPROVED BY THE ENGINEER AND SHALL EXCLUDE INVASIVE SPECIES.
13. PLACE A LAYER OF 6.5 FEET WIDE SC125BN EROSION CONTROL BLANKET, OR EQUIVALENT, ON TOP OF THE TOPSOIL AND LIVE BRANCHES SUCH THAT 2.5 FEET OF THE BLANKET WILL BE BURIED BELOW THE NEXT SOIL LIFT. ALLOW THE REMAINING 4.0 FEET OF BLANKET TO HANG OVER THE PRECEDING SOIL LIFT OR COIR FIBER LOGS.
14. SOIL CAN BE COMPACTED BY STACKING A PIECE OF 2 X 6 SAWN LUMBER EDGEWAYS UP TO THE LIFT HEIGHT SPECIFIED IN THE STRUCTURE TABLE AND SECURING WITH WOODEN STAKES TO PROVIDE A RIGID BACKSTOP FOR COMPACTING SOIL LIFT.
15. PLACE SOIL BACKFILL UP TO THE LIFT HEIGHT SPECIFIED OF NO GREATER THAN 1.0 FT BEING CAREFUL NOT TO PUSH/PULL OR TEAR THE FABRIC PREVIOUSLY PLACED.
16. THE TOP OF THE SOIL BACKFILL SHALL BE FLAT WITHIN THE LIFT SETBACK DISTANCE SPECIFIED IN THE STRUCTURE TABLE. BEYOND THE LIFT SETBACK DISTANCE, THE SOIL BACKFILL SHALL BE SLOPED AT AN APPROXIMATE 5% SLOPE AWAY FROM THE STREAM.
17. TOP DRESS THE SOIL LIFT WITH TOPSOIL FROM THE FACE OF THE SOIL LIFT BACK INTO THE FLOODPLAIN AT LEAST 4FT.
18. REMOVE THE SAWN LUMBER AND WOODEN STAKES FROM THE FACE OF THE SOIL LIFT AND WRAP THE FACE AND TOP OF THE SOIL LIFT USING THE WOVEN AND NON-WOVEN COIR MATTING HANGING OVER THE PREVIOUS LIFT/COIR FIBER LOGS.
19. THE EROSION CONTROL FABRIC SHALL BE PULLED AS TIGHT AS POSSIBLE WITHOUT TEARING OR EXCESSIVELY DISTORTING THE FABRIC.
20. SECURE THE EROSION CONTROL AND NON-WOVEN MATTING IN PLACE BY STAKING THE END OF THE EROSION CONTROL FABRIC WITH WOODEN STAKES ON 1.5-FOOT CENTERS.
21. BEGIN CONSTRUCTION OF THE NEXT SOIL LIFT BY REPEATING THE PREVIOUS NOTES STARTING WITH NOTE 11.
22. THE OVERALL SLOPE CREATED BY THE LIVE BRUSH LAYERING SHALL MATCH THE PROPOSED CROSS SECTION SHAPE FOR THE OUTER BANK OF THE TYPICAL POOL CROSS-SECTION FOR EACH REACH.
23. THE COIR BLANKETS AND GEOTEXTILE FABRIC USED FOR THE UPPER MOST SOIL LIFT WILL BE SECURED WITHIN A 6 INCH DEEP TRENCH AS SHOWN IN DETAIL.
24. THE SURFACE OF THIS STRUCTURE SHALL BE FINISHED TO A SMOOTH AND COMPACT SURFACE IN ACCORDANCE WITH THE LINES, GRADES, AND CROSS-SECTIONS OR ELEVATIONS SHOWN ON THE DRAWINGS. THE DEGREE OF FINISH FOR ELEVATIONS SHALL BE WITHIN +/-0.1 FT OF THE GRADES AND ELEVATIONS INDICATED OR APPROVED BY THE ENGINEER.
25. RE-DRESSING OF CHANNEL AND BANKFULL BENCH/FLOODPLAIN WILL LIKELY BE REQUIRED FOLLOWING INSTALLATION OF IN-STREAM STRUCTURES AND SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION.
26. THE LOWER BANK STABILIZATION IS CRITICAL TO THE DESIGN INTENT OF THIS PROJECT. VARIANCE FROM WOOD TOE BANK STABILIZATION WILL ONLY BE CONSIDERED IF THE WOOD IS NOT AVAILABLE ONSITE.

REV	DESCRIPTION	DRAWN BY: CV/SW
1	FOR REVIEW ONLY	LMF
2	95% RESTORATION PLANS	BS
3	60% REVISION	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX

APPROVED BY: —— CHECKED BY: SM

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION

DETAIL
WOOD TOE

PROJECT ENGINEER
SWCA ENVIRONMENTAL & ENGINEERING
1975 Dakoda Lane, Ste 220
Reno, NV 89502

PROJECT OWNER
MOJAVE DESERT LAND TRUST
Mojave Desert Land Trust P.O. Box 1544, 61124 29 Palms Hwy Yucca Valley, CA 92312

DATE: 01/15/2021

NTS

SHEET NUMBER
36 OF 37

FIGURE 4

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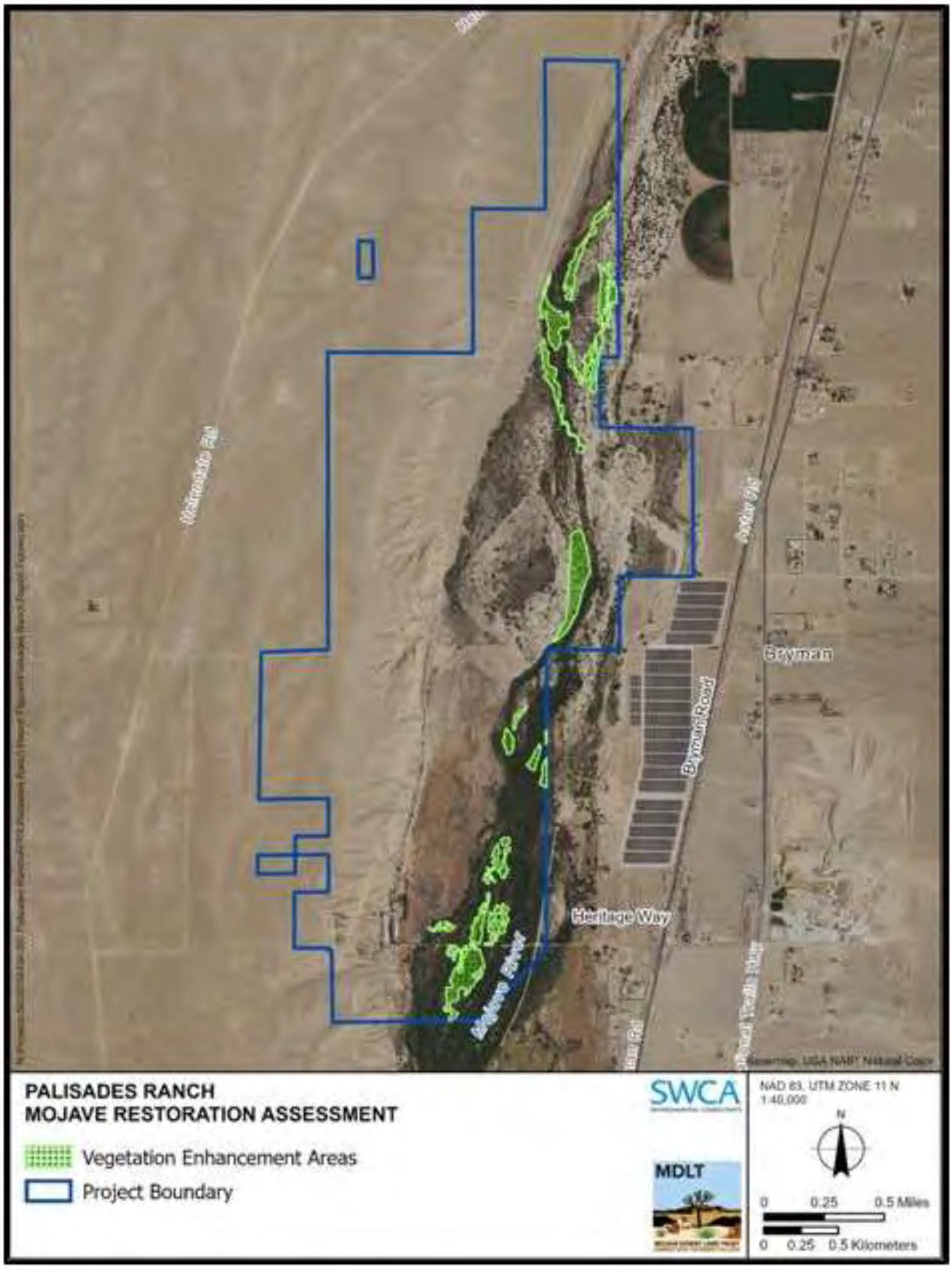
Detail Wood Toe



SOURCE:

FIGURE 5

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Vegetation Enhancement Areas

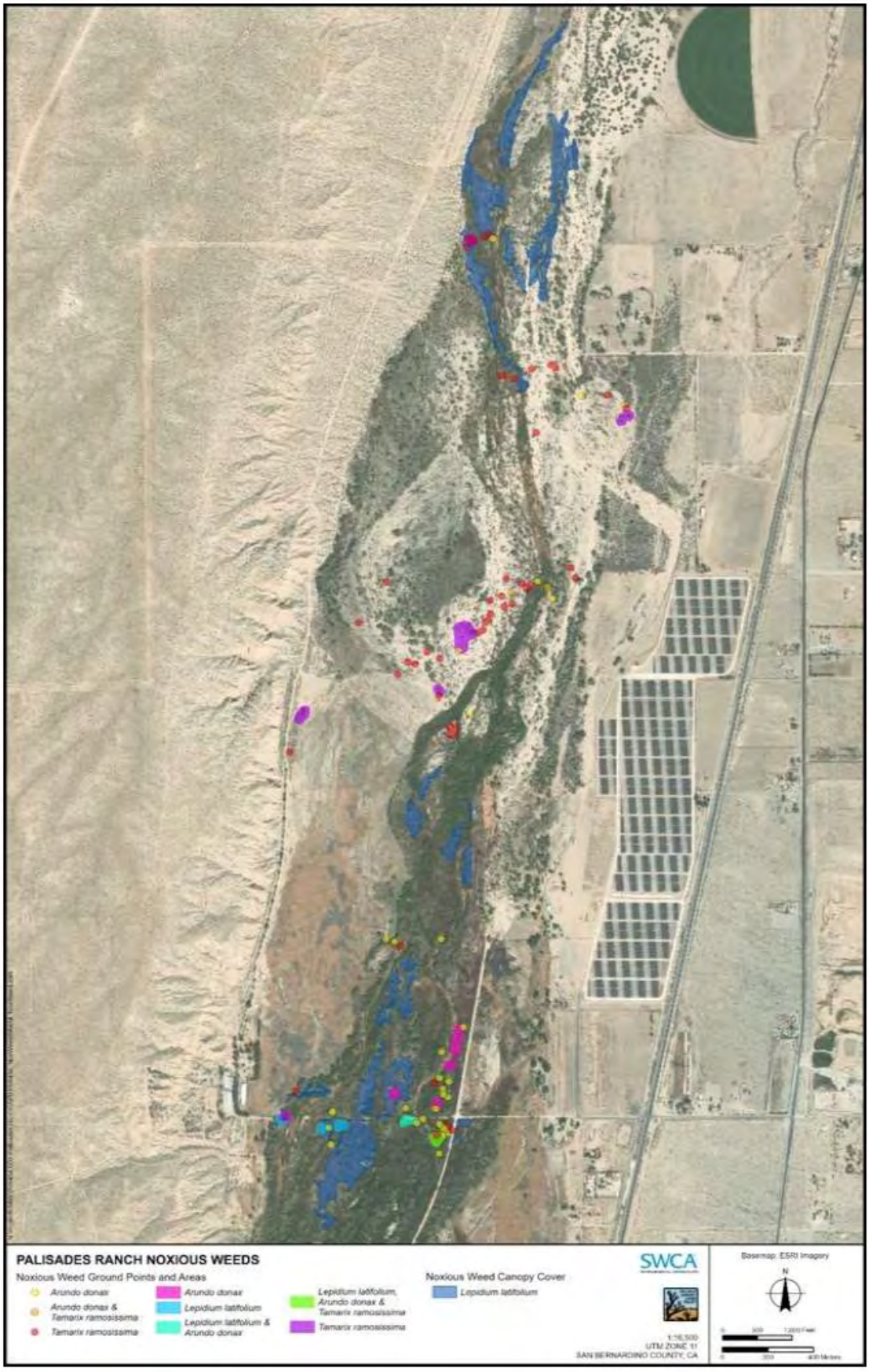

FIGURE 6

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Environmental Consultants

Noxious Weed Ground Points and Areas

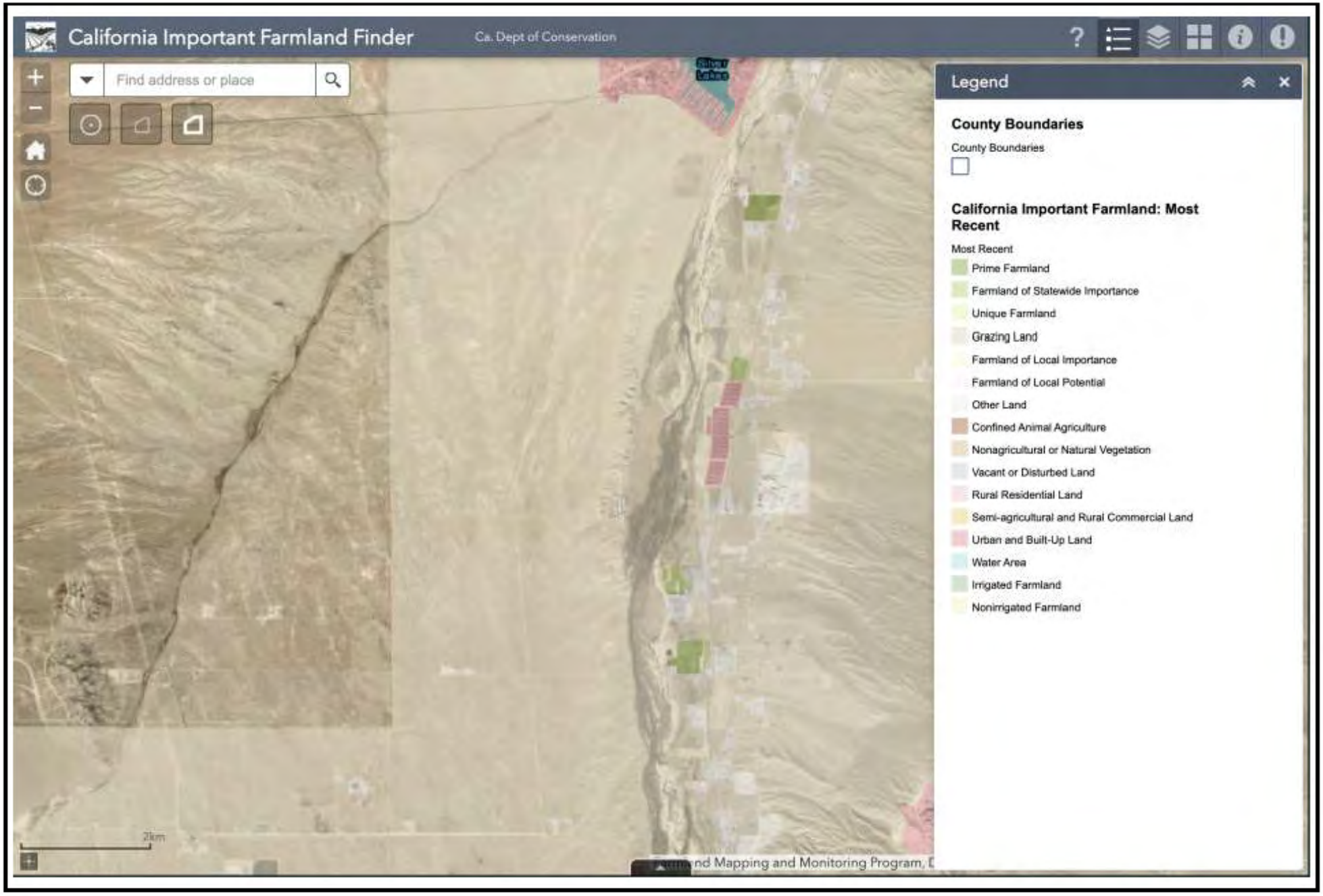

FIGURE II-1

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Environmental Consultants

Farmland Map

FIGURE IV-1

Tom Dodson & Associates
Environmental Consultants

Open, running water and streamside growth near north boundary

FIGURE IV-2

Tom Dodson & Associates
Environmental Consultants

One of the beaver ponds along Mojave River

FIGURE IV-3

Tom Dodson & Associates
Environmental Consultants

Mature sands of screw bean mesquite with understory of saltbush scrub

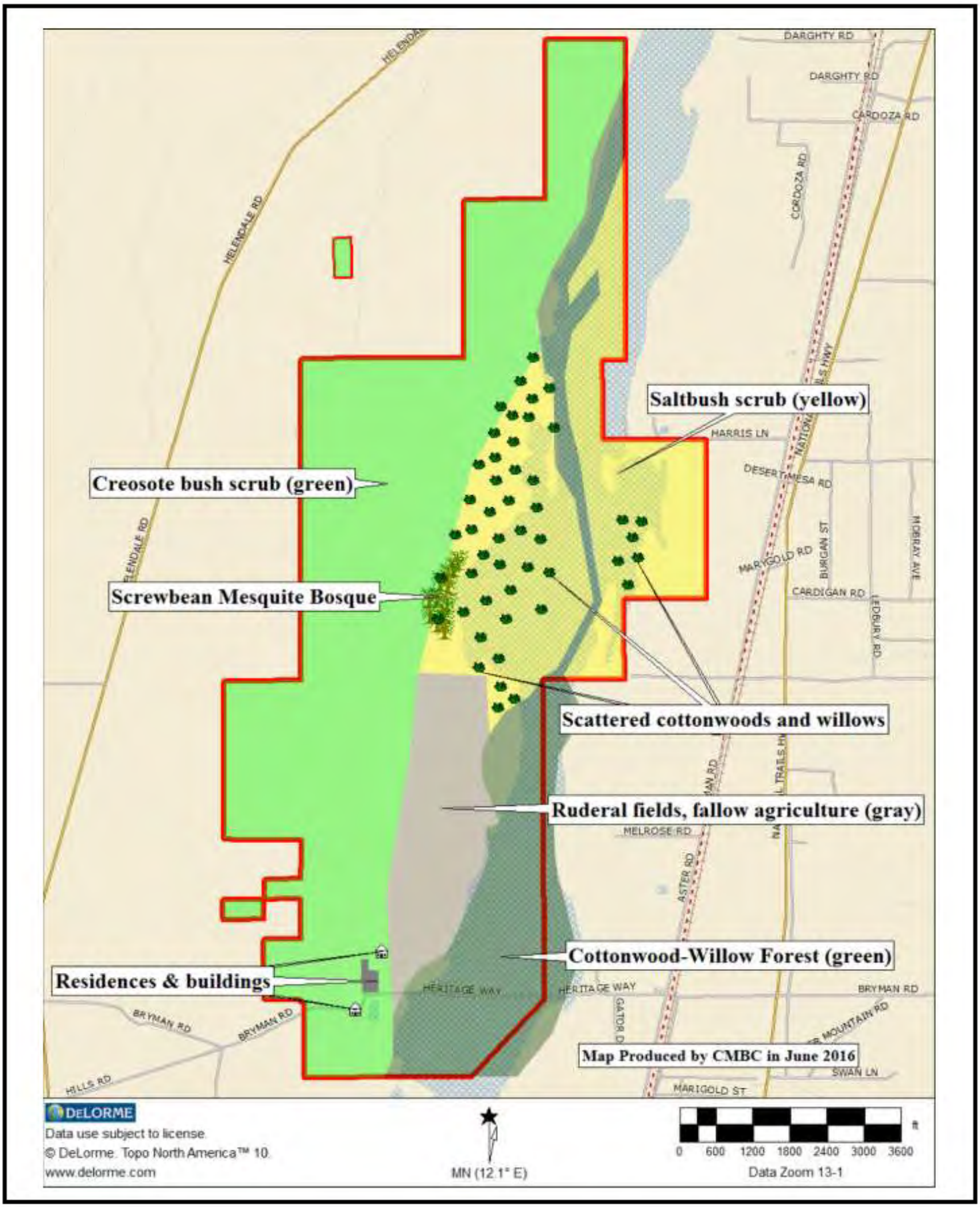

FIGURE IV-4

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Plant Communities Observed

FIGURE IV-5

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Environmental Consultants

Dense stands of Giant Reed on dry, fine sand near center of site

FIGURE IV-6

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Environmental Consultants

Salt Cedar near center of site

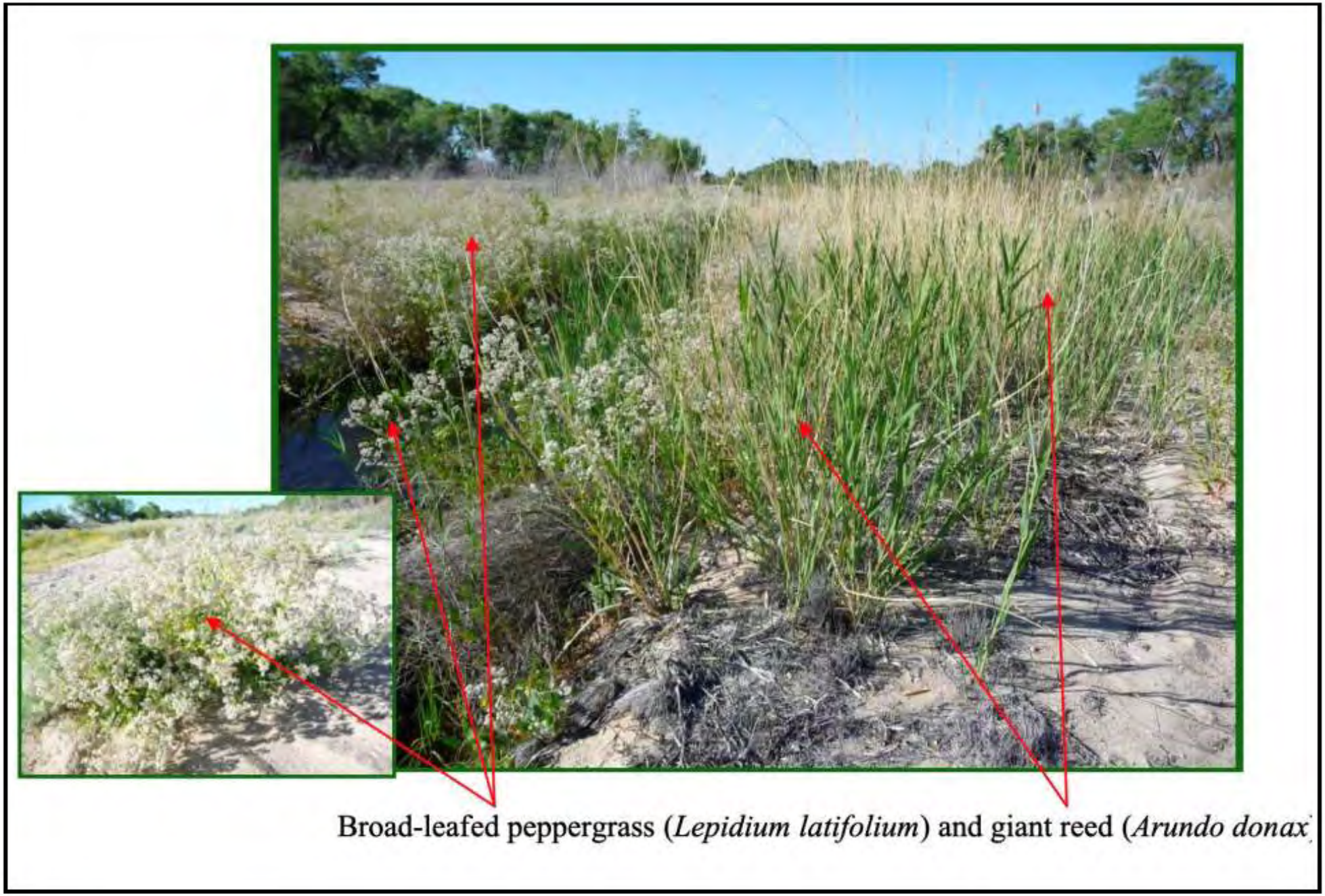

FIGURE IV-7

Tom Dodson & Associates
Environmental Consultants

Broad-leafed Peppergrass and Giant Reed

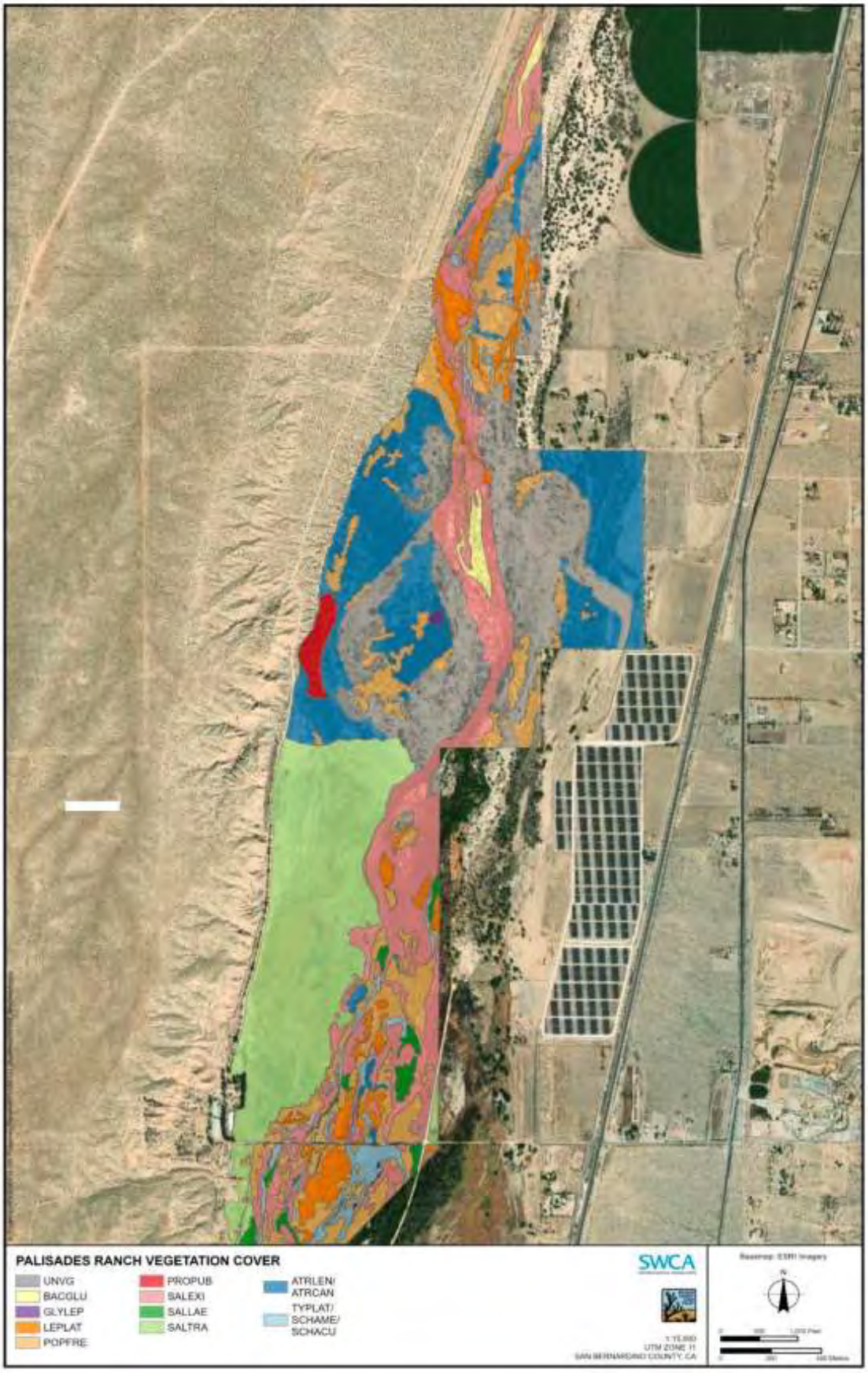

FIGURE IV-8

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Palisades Ranch Vegetation Cover

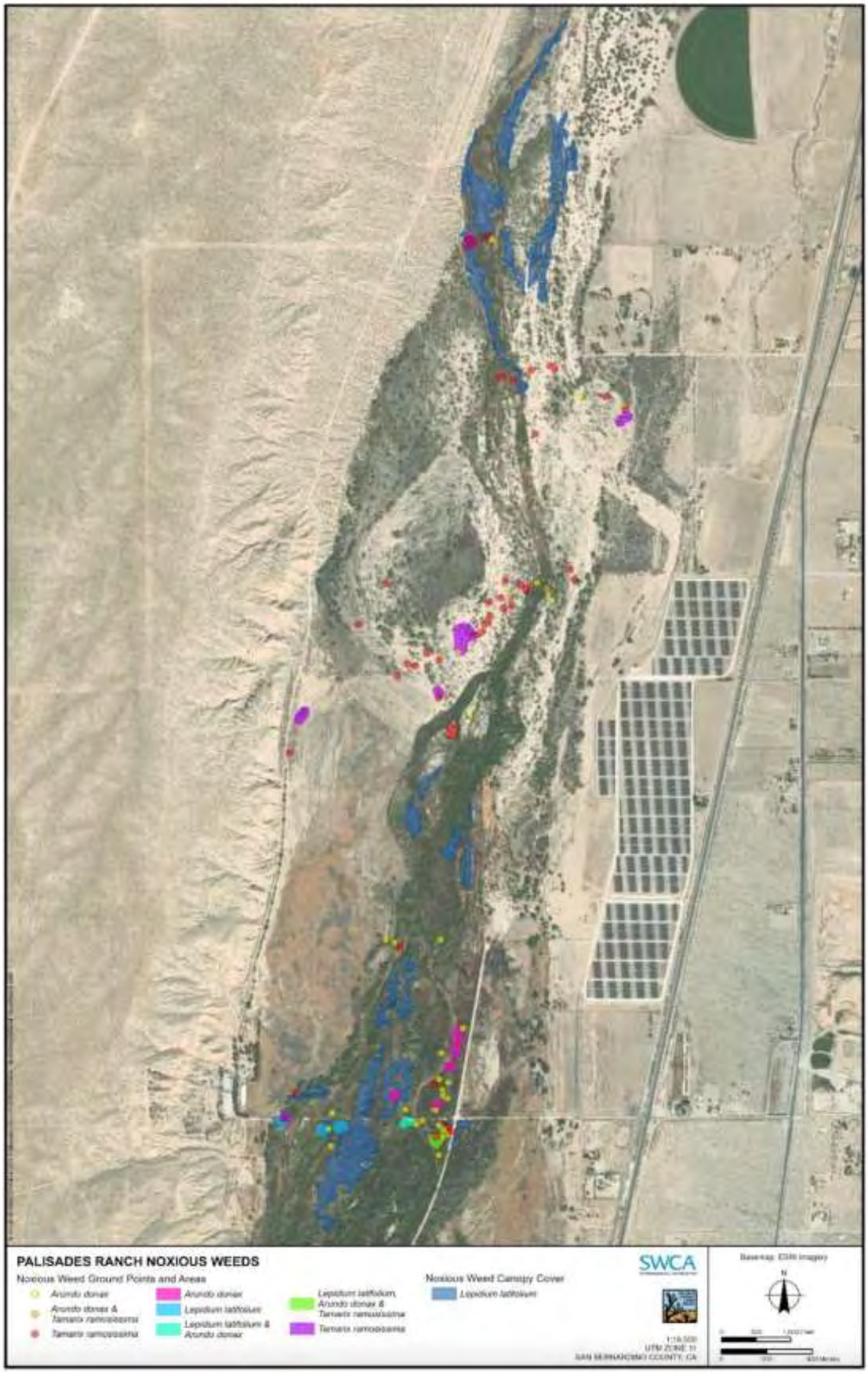

FIGURE IV-9

Tom Dodson & Associates
Environmental Consultants

Palisades Ranch Noxious Weeds

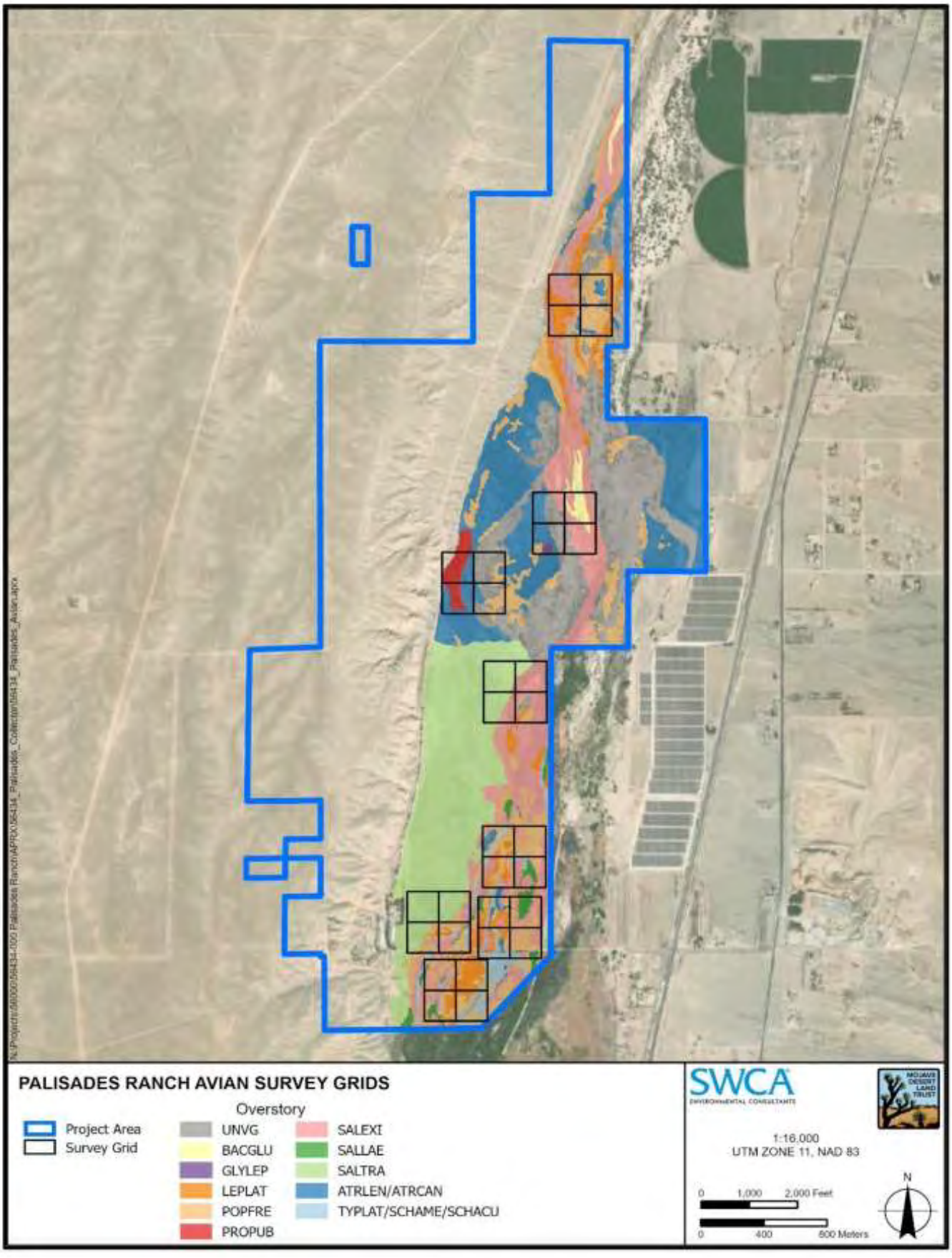

FIGURE IV-10

Tom Dodson & Associates
Environmental Consultants

Palisades Ranch Avian Survey Grids

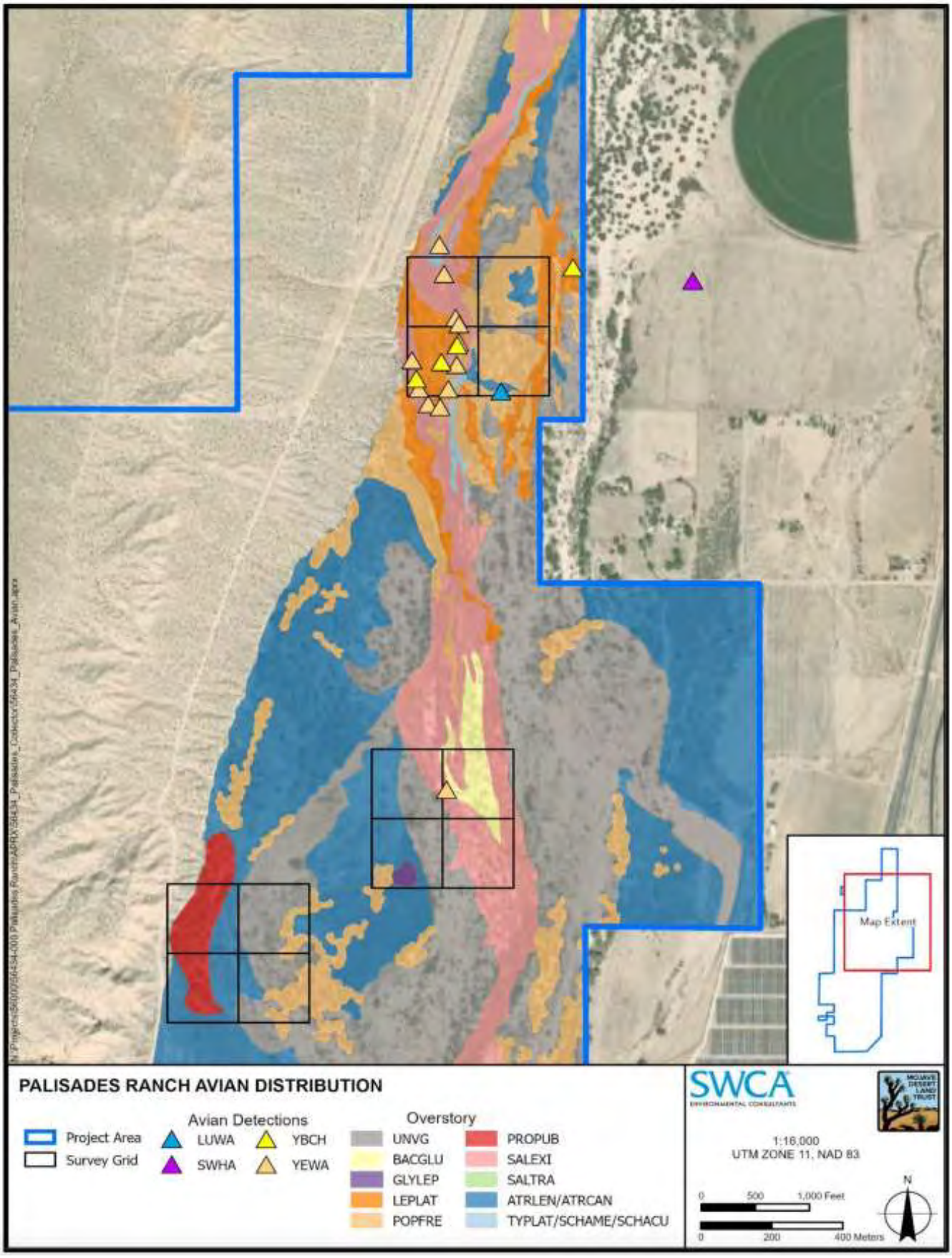

FIGURE IV-11

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Palisades Ranch Avian Distribution

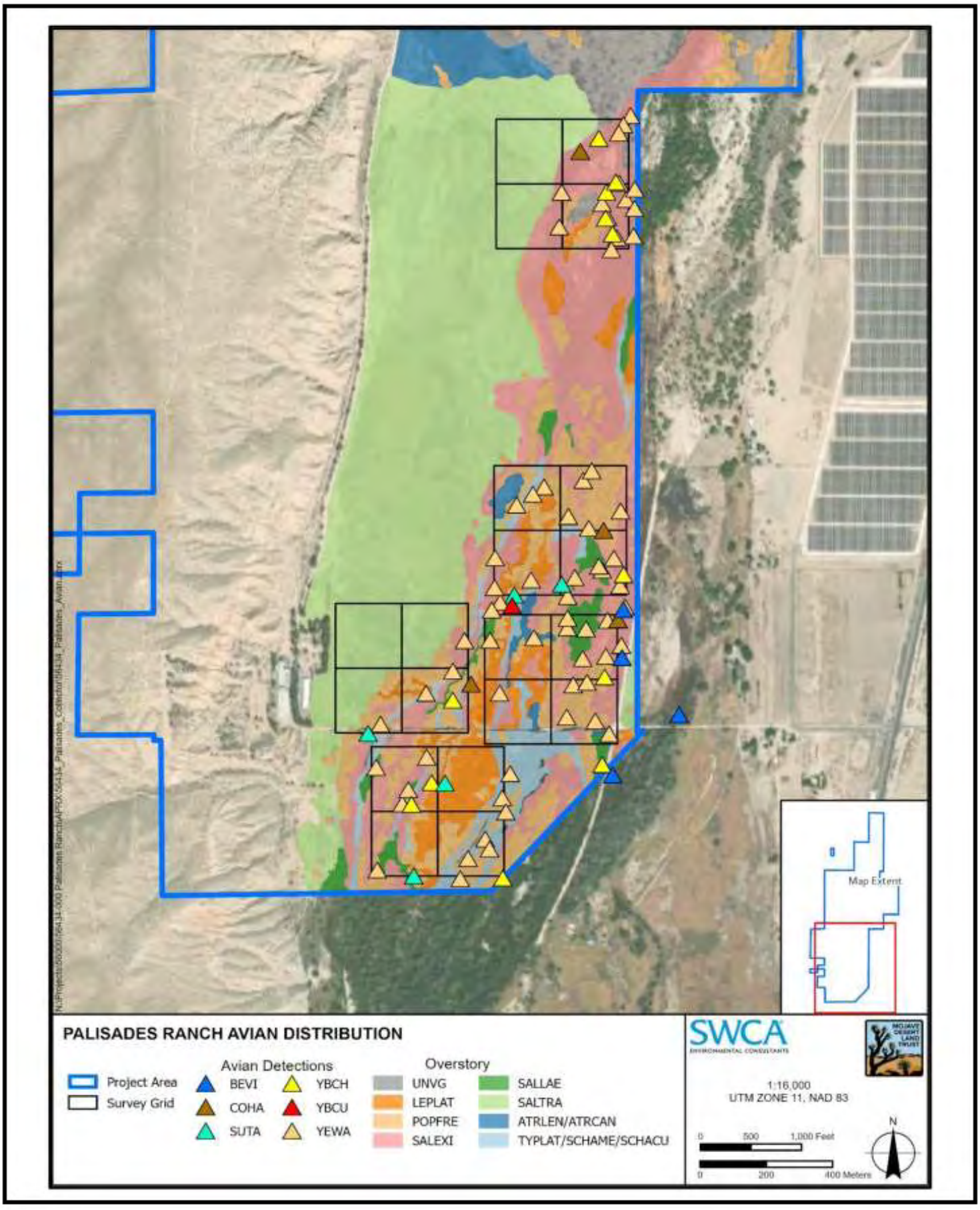

FIGURE IV-12

Tom Dodson & Associates
Environmental Consultants

Palisades Ranch Avian Distribution

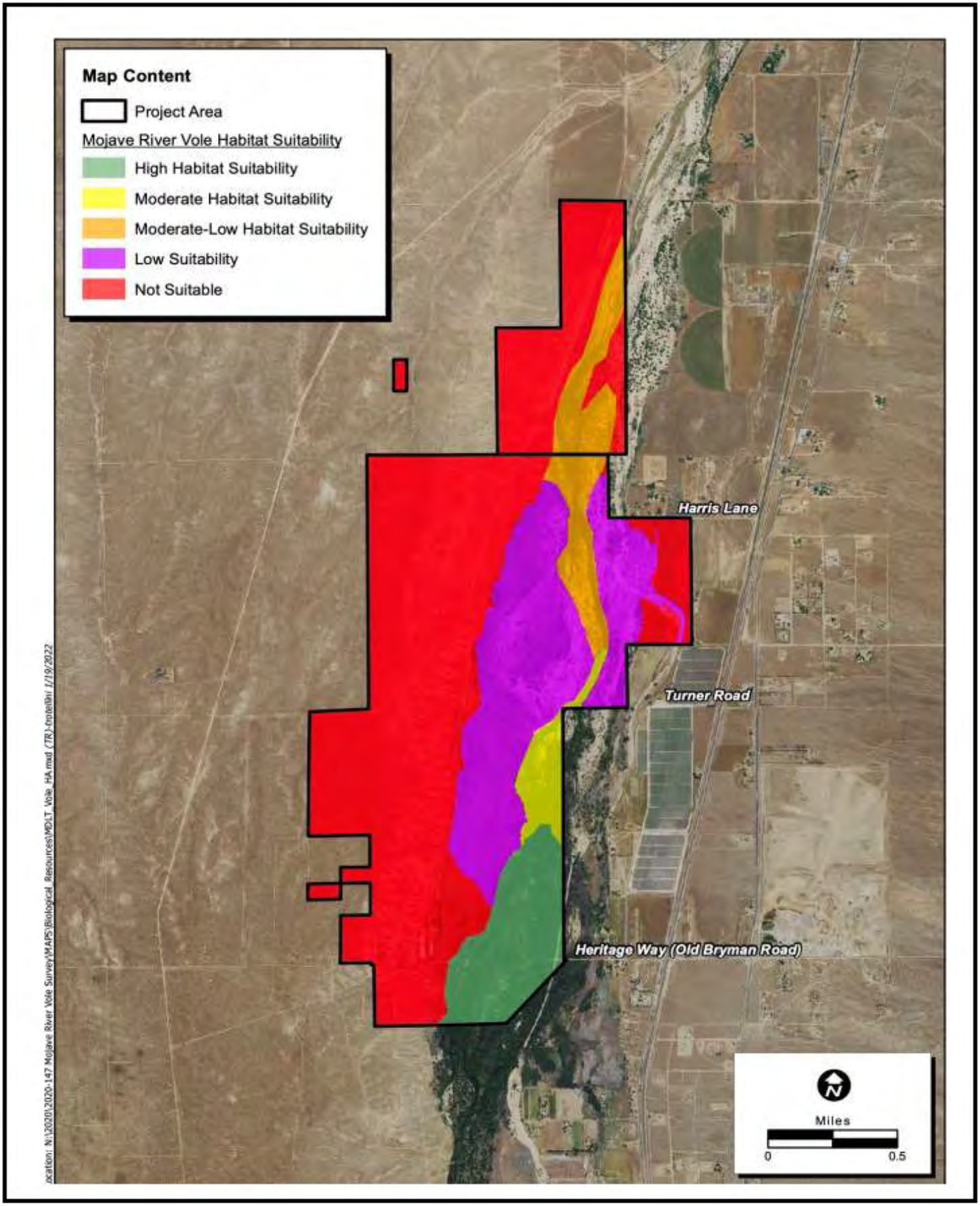

FIGURE IV-13

Tom Dodson & Associates
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Mojave River Vole Habitat Assessment

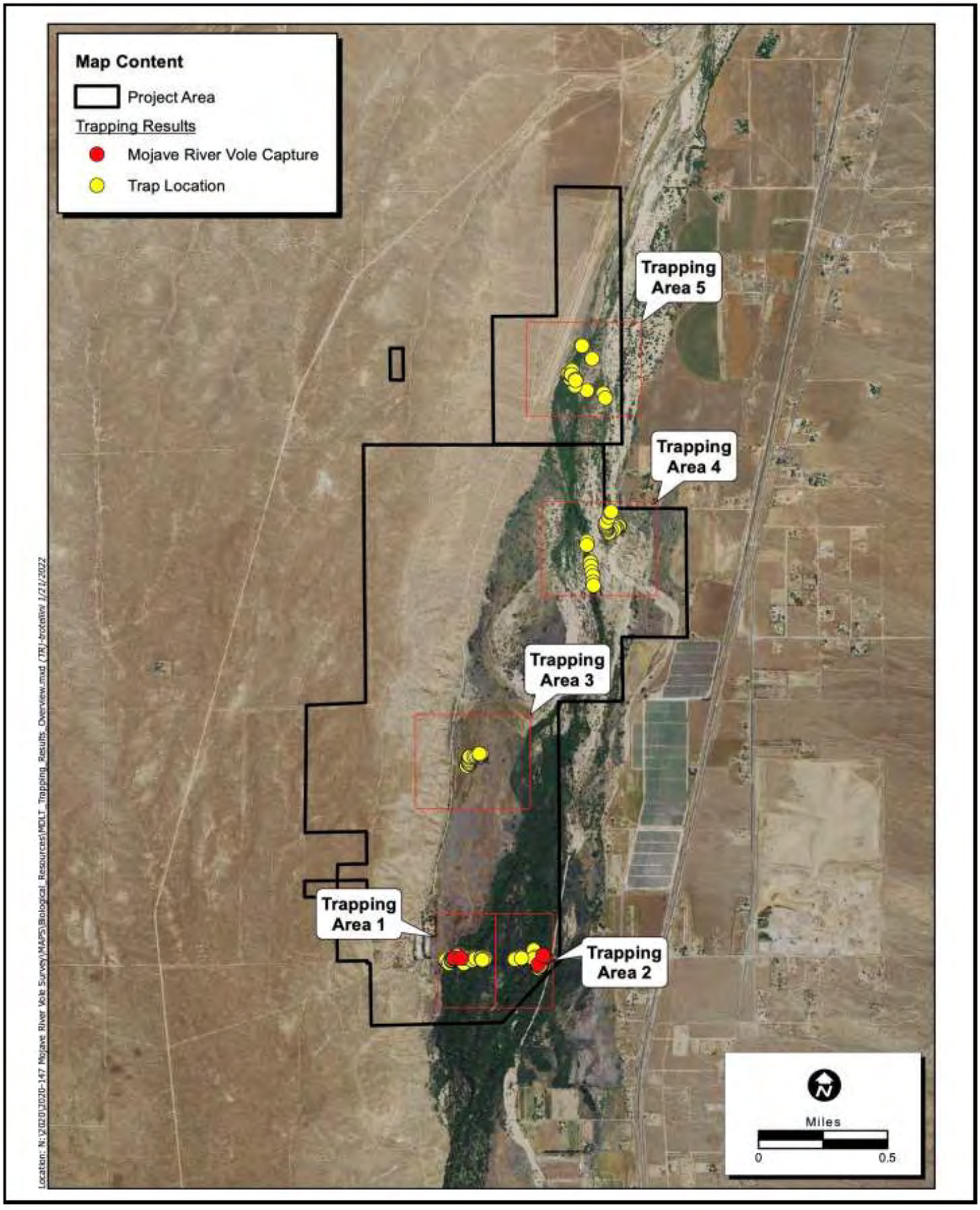

FIGURE IV-14

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Environmental Consultants

Trapping Results Overview

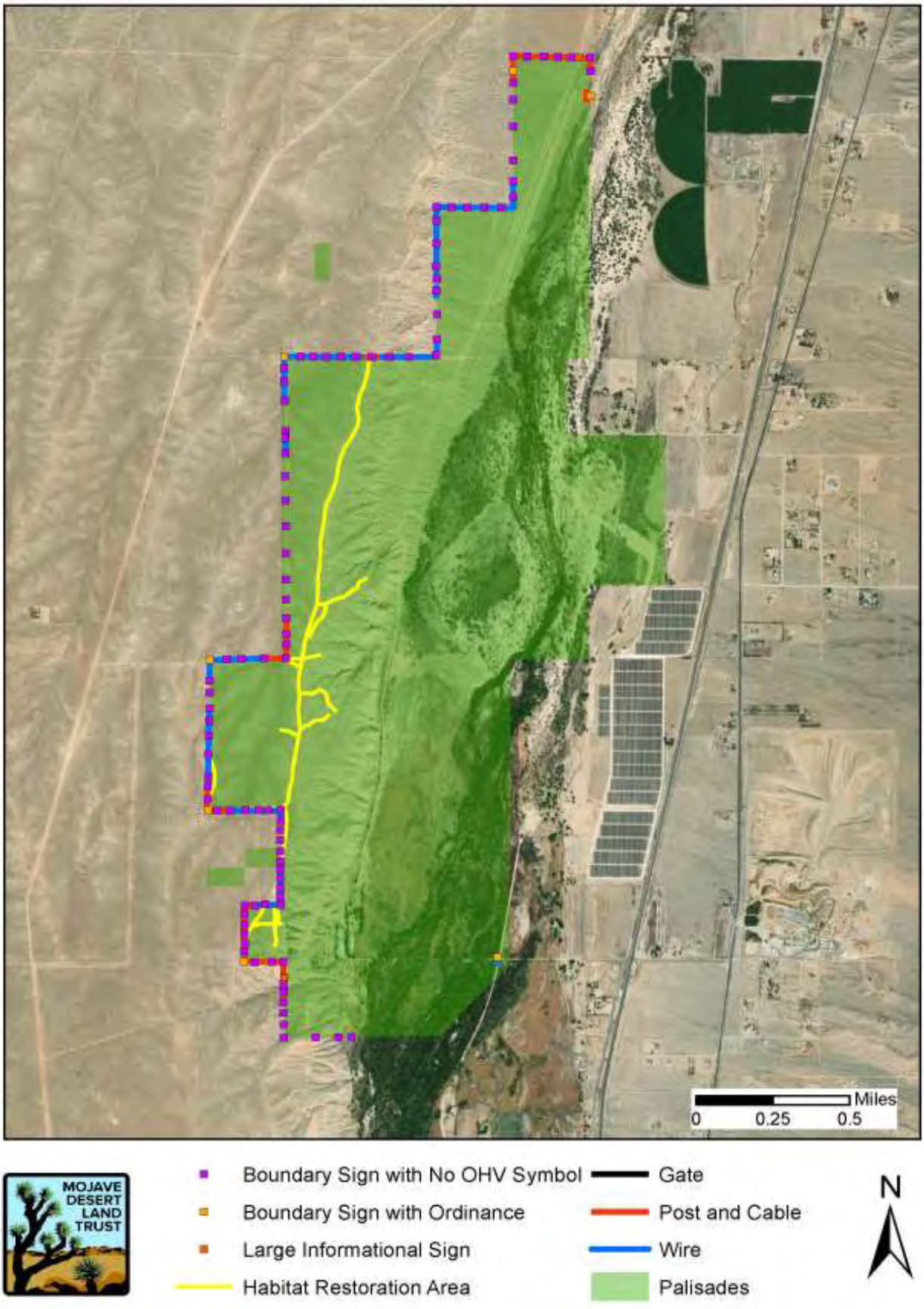

FIGURE IV-15

Tom Dodson & Associates
Environmental Consultants

Proposed Restoration of OHV Impacts at Palisades Ranch

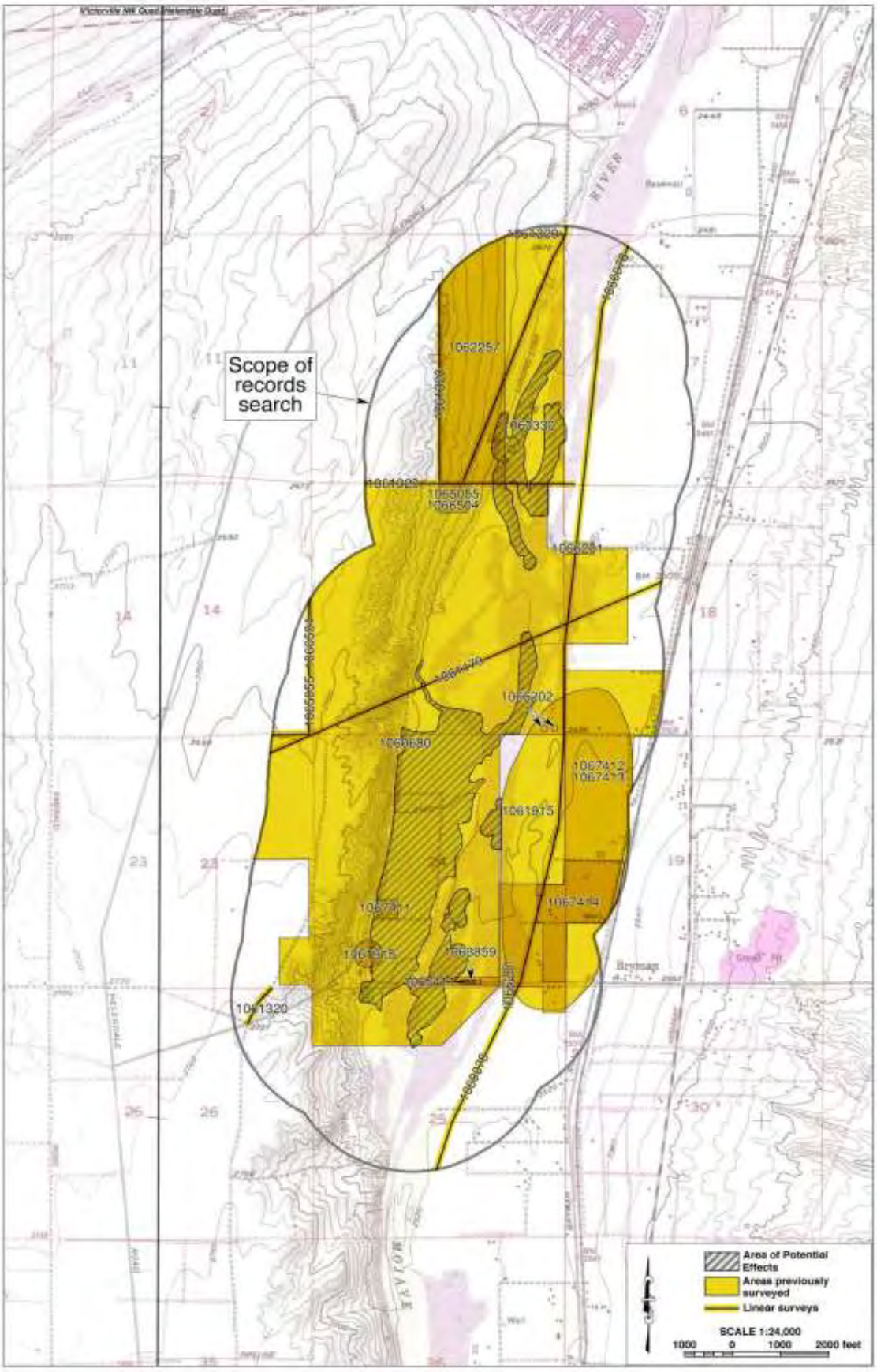

FIGURE V-1

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Area of Potential Effect

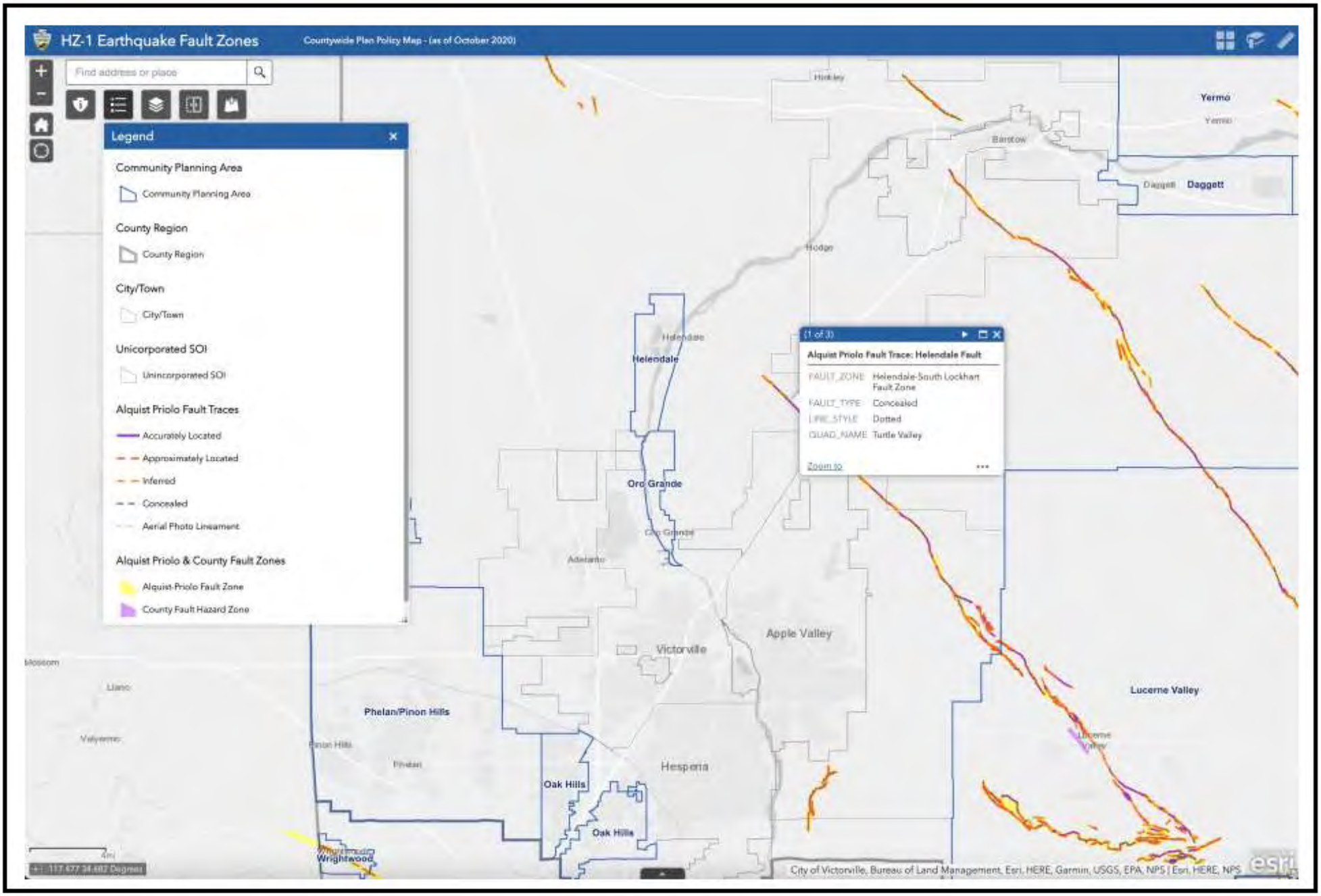

FIGURE VII-1

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Earthquake Fault Zones

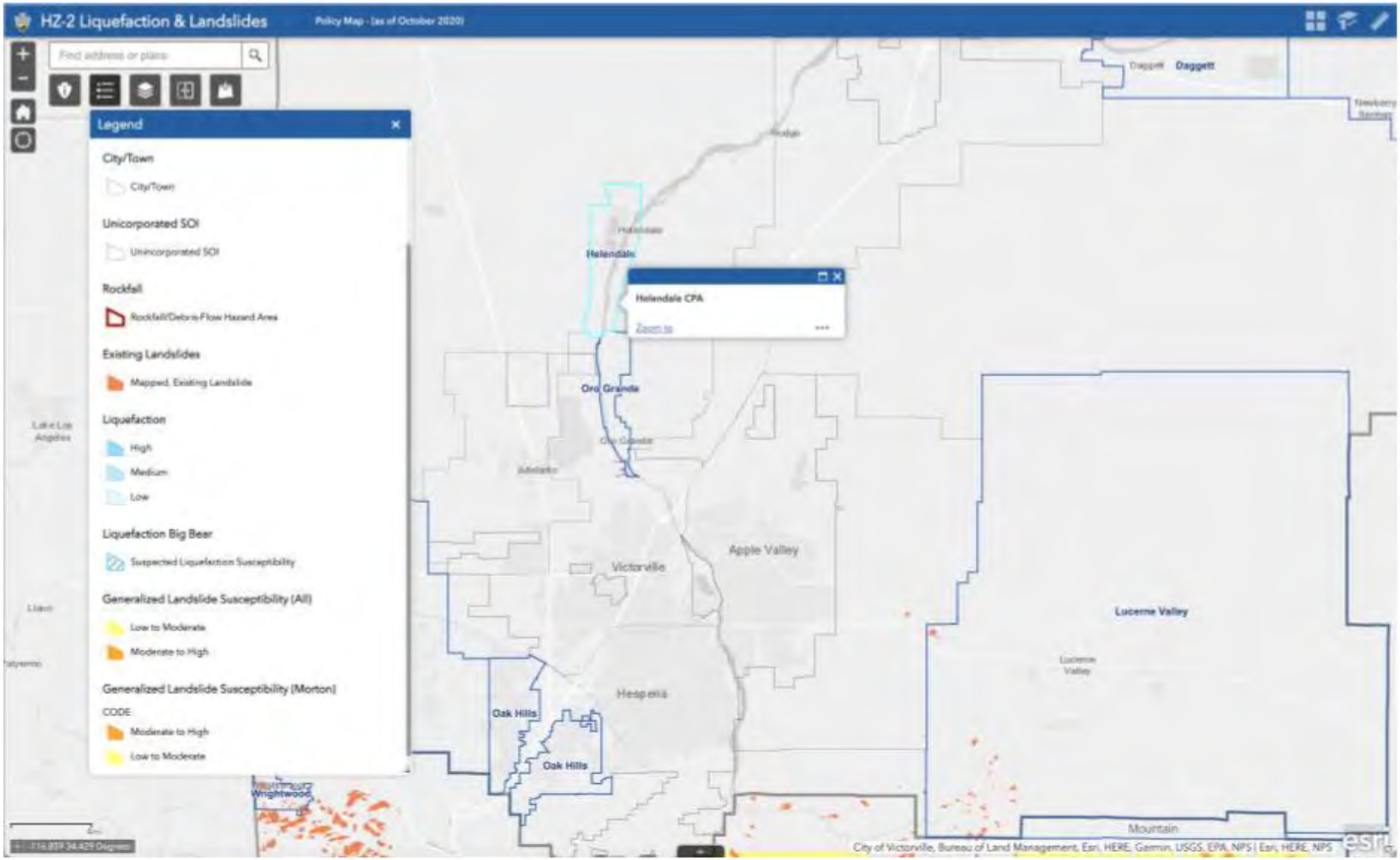

FIGURE VII-2

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Liquefaction & Landslides

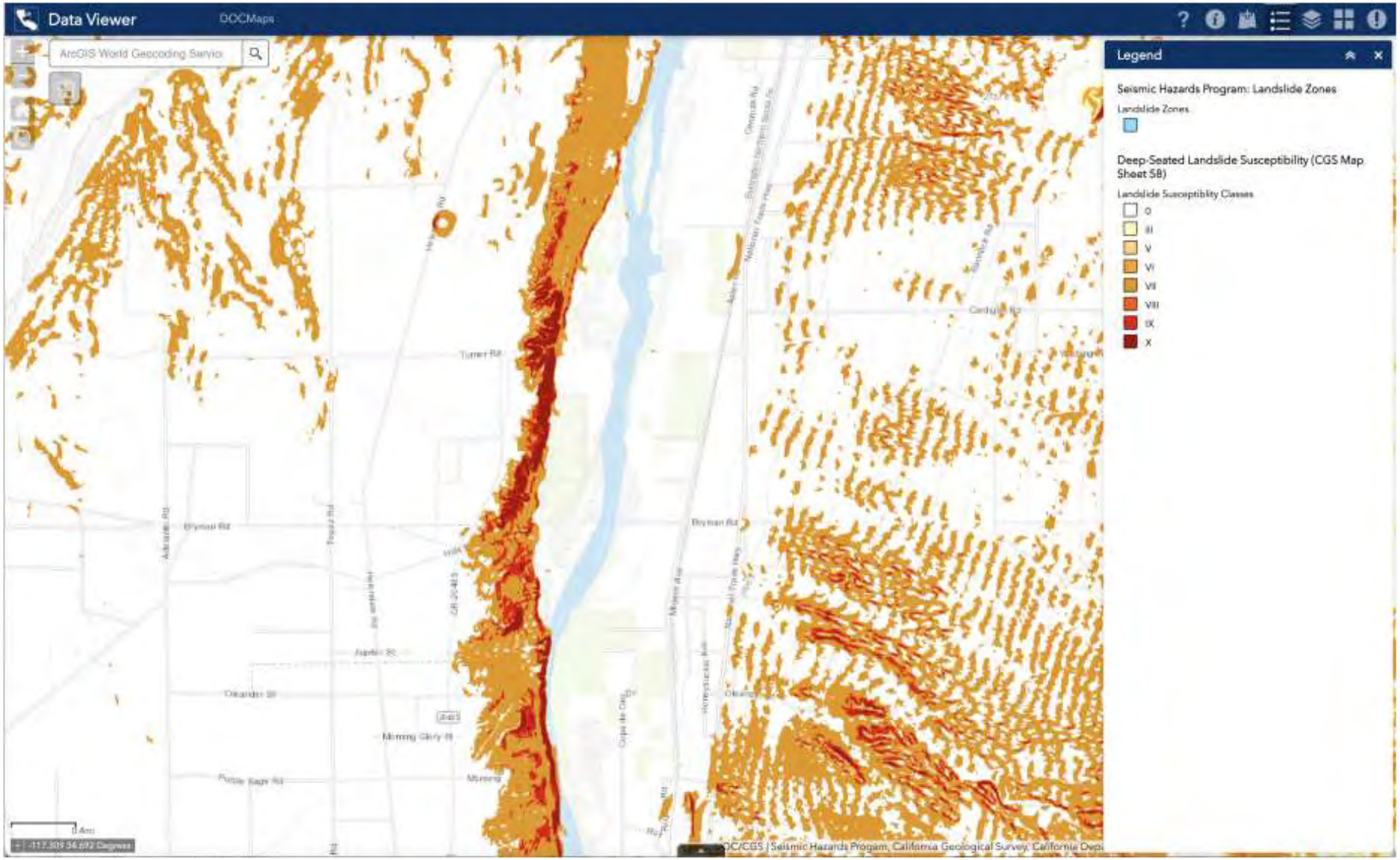

FIGURE VII-3

Tom Dodson & Associates
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Landslide Zones

Susceptibility to Deep-Seated Landslides in California

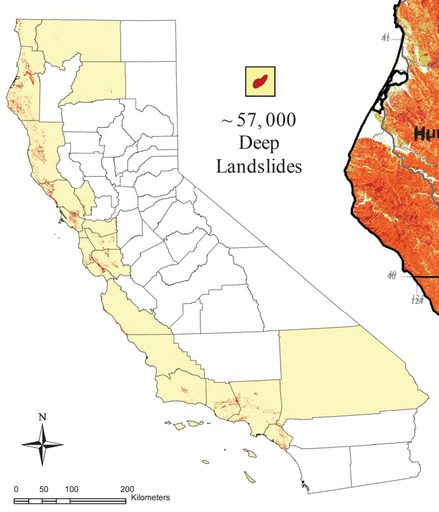
2011

C. J. Wills, F. G. Perez and C. I. Gutierrez

This map shows the relative likelihood of deep landsliding based on regional estimates of rock strength and steepness of slopes. On the most basic level, weak rocks and steep slopes are more likely to generate landslides. The map uses detailed information on the location of past landslides, the location and relative strength of rock units, and steepness of slope in a methodology developed by Wilson and Keefer (1985). The result shows the distribution of one very important component of landslide hazard. It is intended to provide infrastructure owners, emergency planners and the public with a general overview of where landslides are more likely. The map does not include information on landslide triggering events, such as rainstorms or earthquake shaking, nor does it address susceptibility to shallow landslides such as debris flows. This map is not appropriate for evaluation of landslide potential at any specific site.

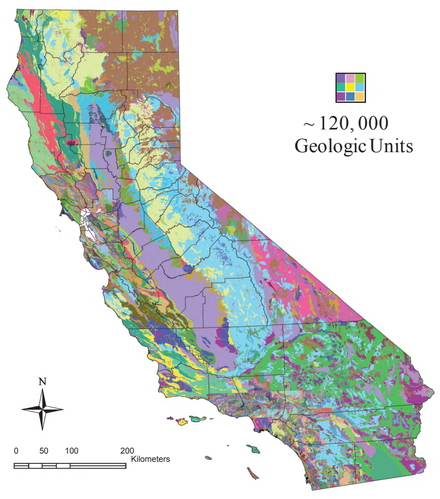
How this map was prepared

Landslide inventory: All previously mapped deep-seated landslides that are available in digital format are assigned the lowest value of rock strength. Note that digital landslide inventory maps are only available for specific counties, shown in yellow, and may cover only part of those counties.



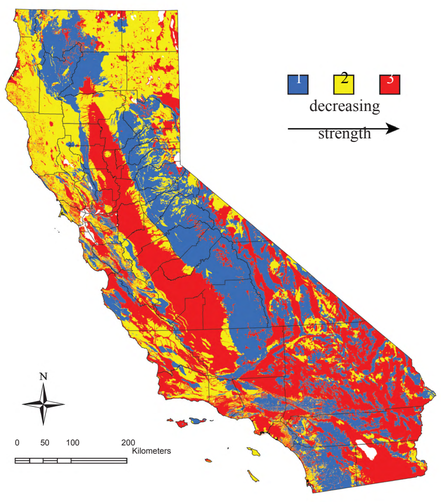
SOURCE: Digital maps compiled from USGS, and from CGS's Landslide Hazard Identification, Seismic Hazard Zoning and Forest and Watershed Geology Programs.

Geology: A general statewide geologic map is augmented with detailed geologic maps covering the most populous parts of the state to create a complete map. The physical properties of the geologic units were interpreted from the descriptions on the geologic maps to determine the rock strength units.

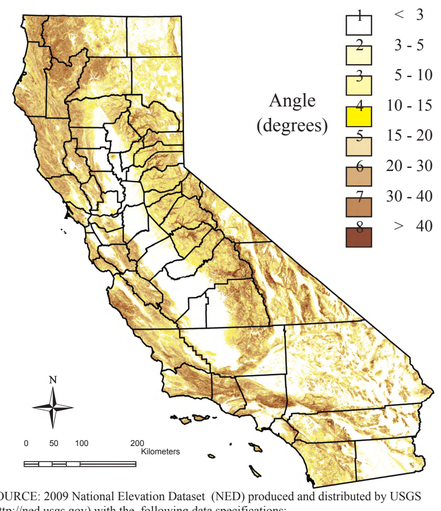


SOURCE: Digital geologic maps of various scales: 1:100,000 scale geologic maps of the Long Beach, Los Angeles, Oceanside, San Bernardino, San Diego, Santa Ana, and Santa Barbara 30 x 60 minute quadrangles; the regional simplified map of Wills and Clahan (2006); the 1:24,000 scale geologic maps of several 7.5 minute quadrangles; and the more detailed maps of Graymer (2008) of the San Francisco Bay area.

Rock strength: A relative rating of rock strength, a measure of resistance to landsliding, was developed from the geologic and landslide inventory maps. Each geologic unit was classified into one of three rock strength categories according to the methodology of Wieckzorek (1985). Crystalline rocks and well cemented sandstones are placed in the highest rock strength unit, weakly cemented sandstones in an intermediate unit, and shale, claystone, pre-existing landslides and unconsolidated surficial units in the weakest unit.

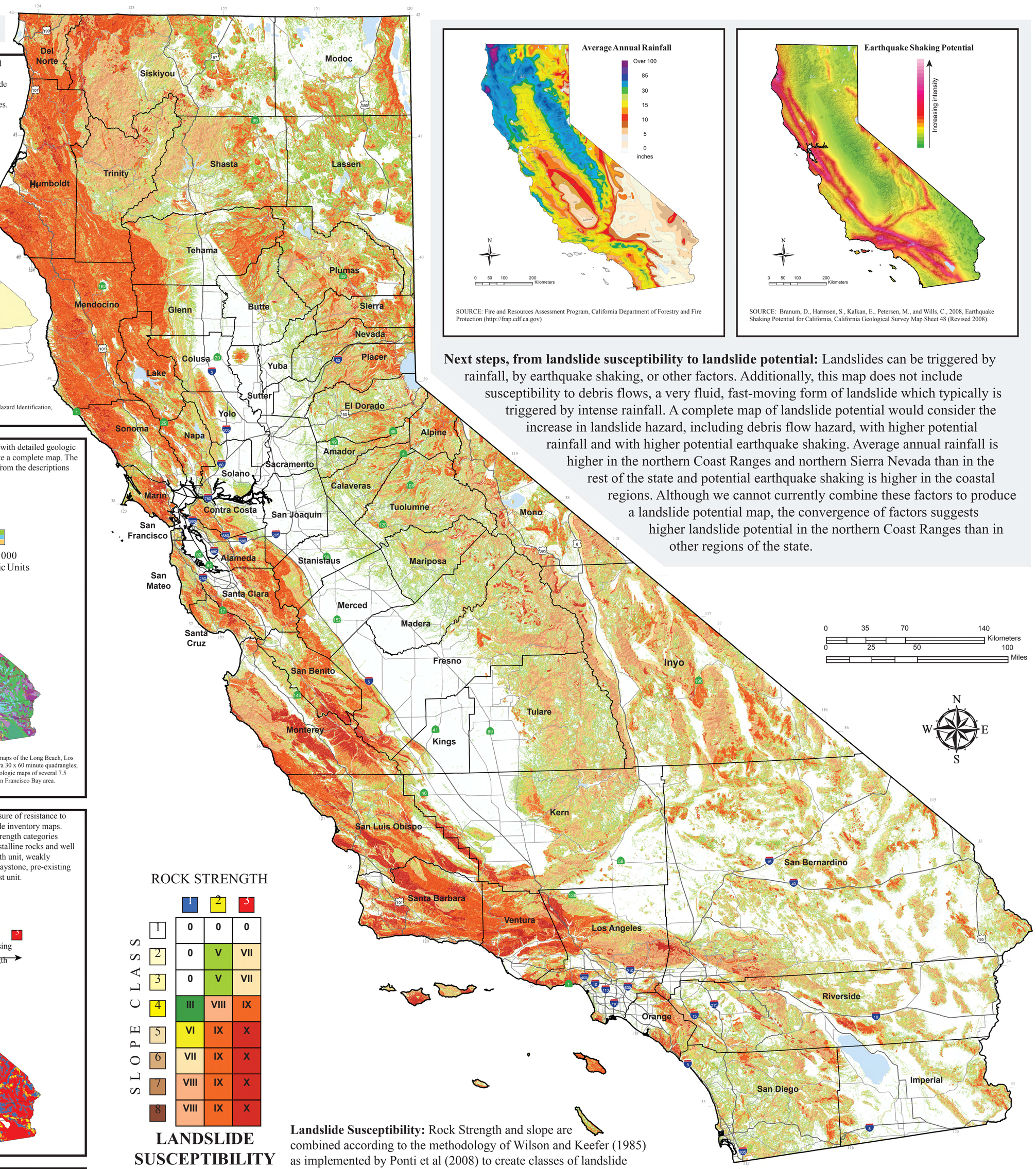


Slope: The slope gradient was computed from the 10-m grid of elevation values from the 2009 National Elevation Dataset (NED). Slope values were then grouped into eight slope classes ranging from nearly flat (less than three degrees) to very steep (greater than 40 degrees).



SOURCE: 2009 National Elevation Dataset (NED) produced and distributed by USGS (http://ned.usgs.gov) with the following data specifications:

Data Type:	Floating Point	Vertical units:	Meters
Projection:	Geographic	Spheroid:	GRS 1980
Datum:	NAD83	Tile size:	1 deg. by 1 deg.
Horizontal units:	Decimal Degree	Format:	ArcGRID and GRIDFLOAT



SOURCE: Fire and Resources Assessment Program, California Department of Forestry and Fire Protection (http://frap.cdf.ca.gov)

SOURCE: Branum, D., Harmsen, S., Kalkan, E., Petersen, M., and Wills, C., 2008, Earthquake Shaking Potential for California, California Geological Survey Map Sheet 48 (Revised 2008).

Next steps, from landslide susceptibility to landslide potential: Landslides can be triggered by rainfall, by earthquake shaking, or other factors. Additionally, this map does not include susceptibility to debris flows, a very fluid, fast-moving form of landslide which typically is triggered by intense rainfall. A complete map of landslide potential would consider the increase in landslide hazard, including debris flow hazard, with higher potential rainfall and with higher potential earthquake shaking. Average annual rainfall is higher in the northern Coast Ranges and northern Sierra Nevada than in the rest of the state and potential earthquake shaking is higher in the coastal regions. Although we cannot currently combine these factors to produce a landslide potential map, the convergence of factors suggests higher landslide potential in the northern Coast Ranges than in other regions of the state.

ROCK STRENGTH

SLOPE CLASS	1	2	3
1	0	0	0
2	0	V	VII
3	0	V	VII
4	III	VIII	IX
5	VI	IX	X
6	VII	IX	X
7	VIII	IX	X
8	VIII	IX	X

LANDSLIDE SUSCEPTIBILITY CLASSES

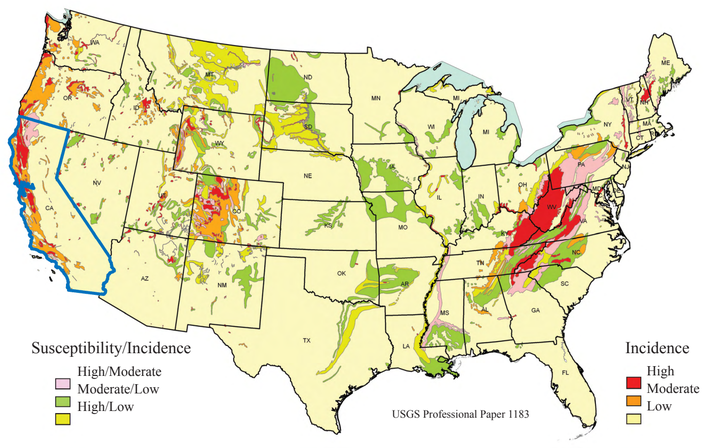
(0 III V VI VII VIII IX X)

increasing susceptibility

Landslide Susceptibility: Rock Strength and slope are combined according to the methodology of Wilson and Keefer (1985) as implemented by Ponti et al (2008) to create classes of landslide susceptibility. These classes express the generalization that on very low slopes, landslide susceptibility is low even in weak materials, and that landslide susceptibility increases with slope and in weaker rocks. Very high landslide susceptibility, classes VIII, IX, and X, includes very steep slopes in hard rocks and moderate to very steep slopes in weak rocks.

Landslide losses: California has a substantial share of the nation's landslide risk because of high population and concentration of infrastructure in areas with substantial landslide hazard. Landslides cause an estimated 25 to 50 deaths and over $2 billion damage per year in the United States (Spiker and Gori, 2003). This map of landslide susceptibility may be used to estimate where in California landslide losses are most likely to be concentrated.

Landslide Overview Map of the Conterminous United States



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Ponti, D.J., Tinsley, J.C. III, Treiman, J.A., and Seligson, H., 2008, Ground Deformation, section 3c *in* Jones, L. M., Bernknopf, R., Cox, D., Goltz, J., Hudnut, K., Mileti, D., Perry, S., Ponti, D., Porter, K., Reichle, M., Seligson, H., Shoaf, K., Treiman, J., and Wein, A., 2008, The ShakeOut Scenario: U.S. Geological Survey Open-File Report 2008-1150 and California Geological Survey Preliminary Report 25 http://pubs.usgs.gov/of/2008/1150/.

Spiker, E.C. and Gori, P., 2003, National landslide hazards mitigation strategy : a framework for loss reduction: U.S.Geological Survey Circular 1244, 56 p.

Wieckzorek, G.F., R.C. Wilson, R.C., and E.L. Harp, 1985. Map Showing Slope Instability during Earthquakes in San Mateo County, California. U.S. Geological Survey Miscellaneous Investigations Series Map I-1257-E.

Wilson, C. J., and Clahan, K.B., 2006, Developing a map of geologically defined site-conditions categories for California: Bulletin of the Seismological Society of America, V.96 p.1483-1501.

Wilson, R.C., and Keefer, D.K., 1985, Predicting areal limits of earthquake-induced landsliding, *in* J.I. Ziony, editor, Evaluating earthquake hazards in the Los Angeles region-an earth-science perspective: U.S. Geological Survey Professional Paper 1360, p. 317-345.

Acknowledgments: Special thanks to our colleagues at CGS: Dave Branum, Tim McCrink, Teri McGuire, Bob Moskovitz, Chuck Real, and Pete Roffers; and to Dino Bellugi of UC Berkeley and Dave Strong of USGS who processed and reprojected the original Geographic NED into UTM NED.

CALIFORNIA GEOLOGICAL SURVEY
www.conservation.ca.gov/cgs

USGS science for a changing world
www.usgs.gov

FIGURE VII-4

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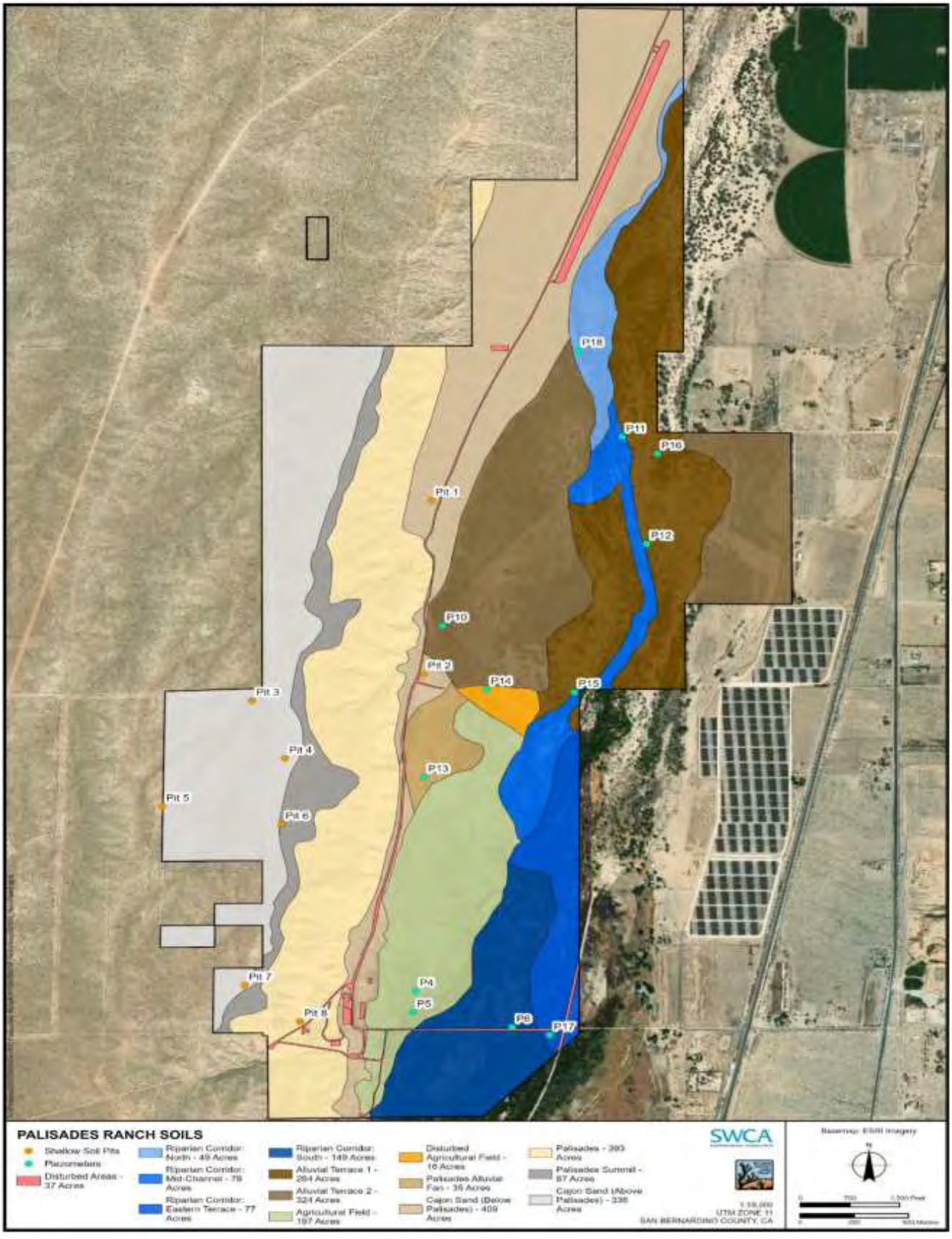

FIGURE VII-5

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Environmental Consultants

Palisades Ranch Soils

FIGURE IX-1

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Environmental Consultants

GeoTracker

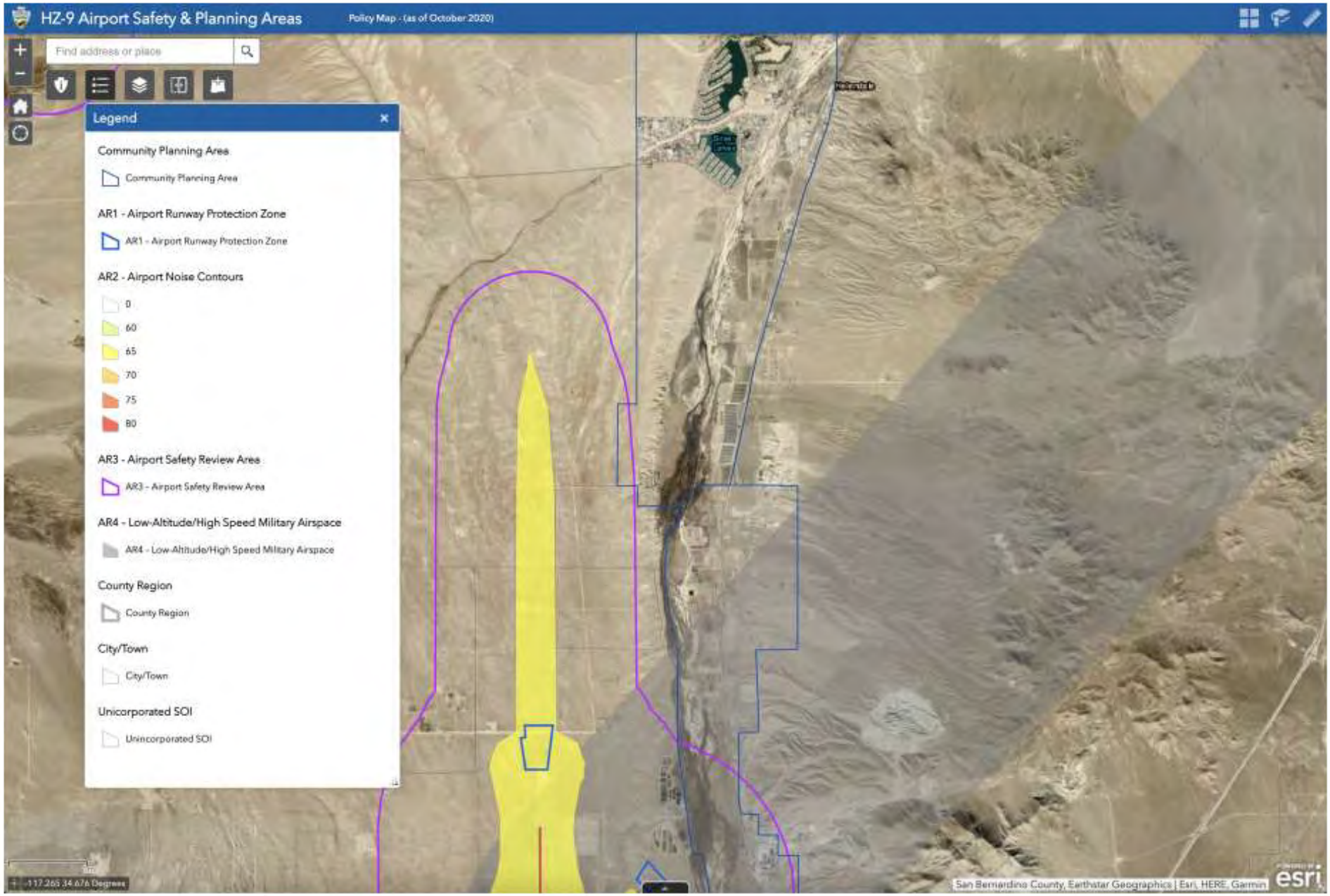

FIGURE IX-2

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Airport Safety & Planning Areas

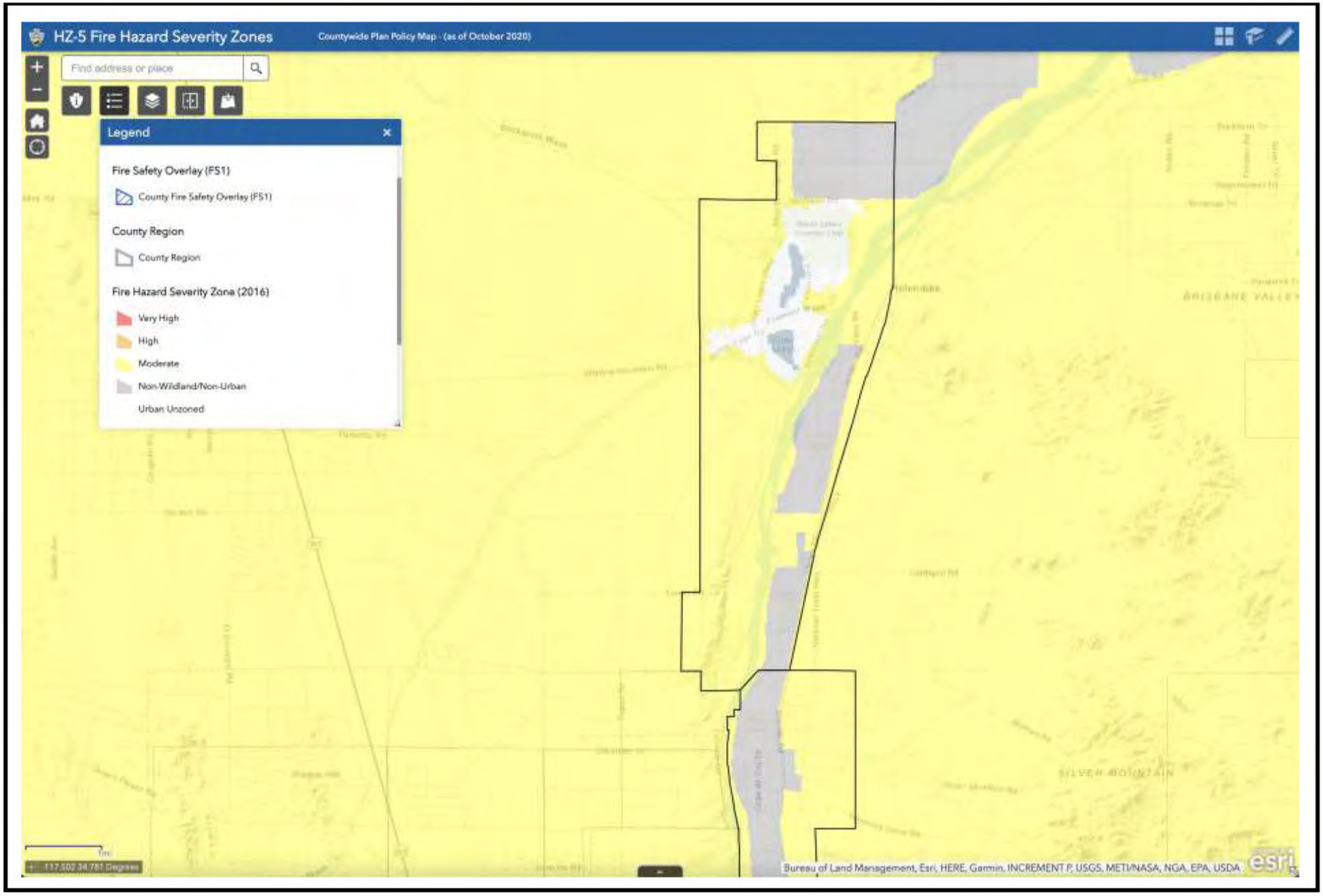

FIGURE IX-3

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Environmental Consultants

Fire Hazard Severity Zones

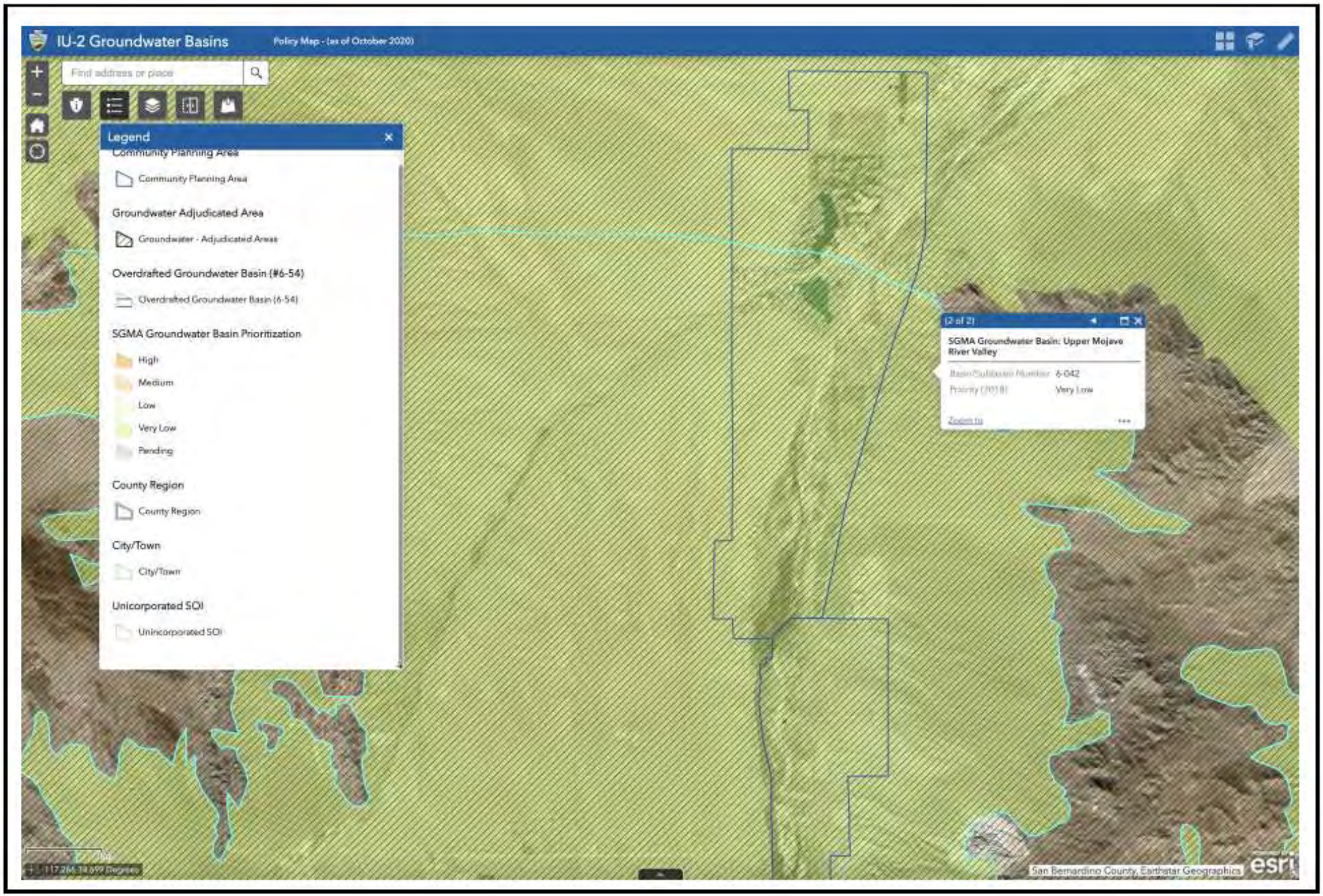

FIGURE X-1

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Groundwater Basins

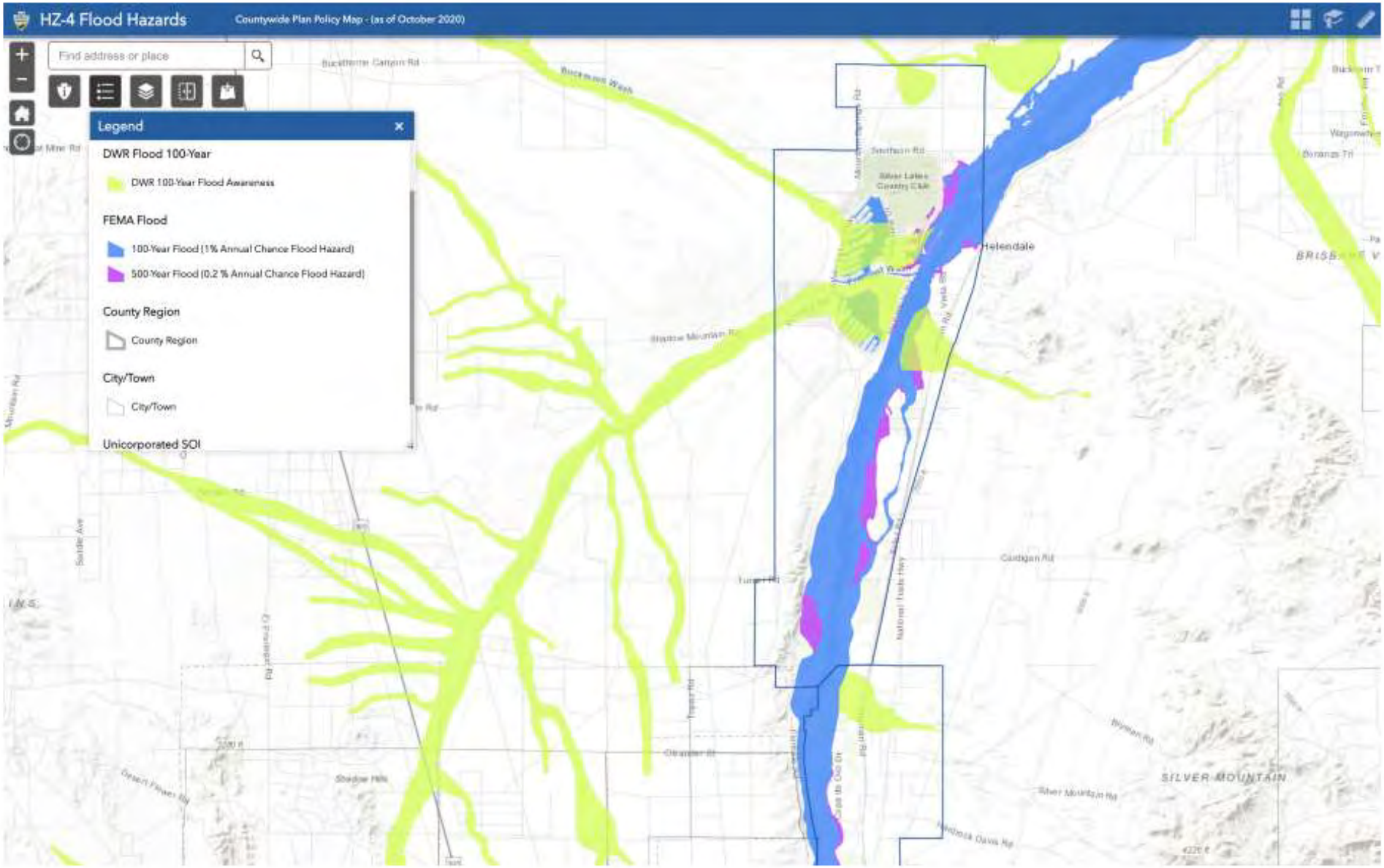

FIGURE X-2

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Flood Hazards

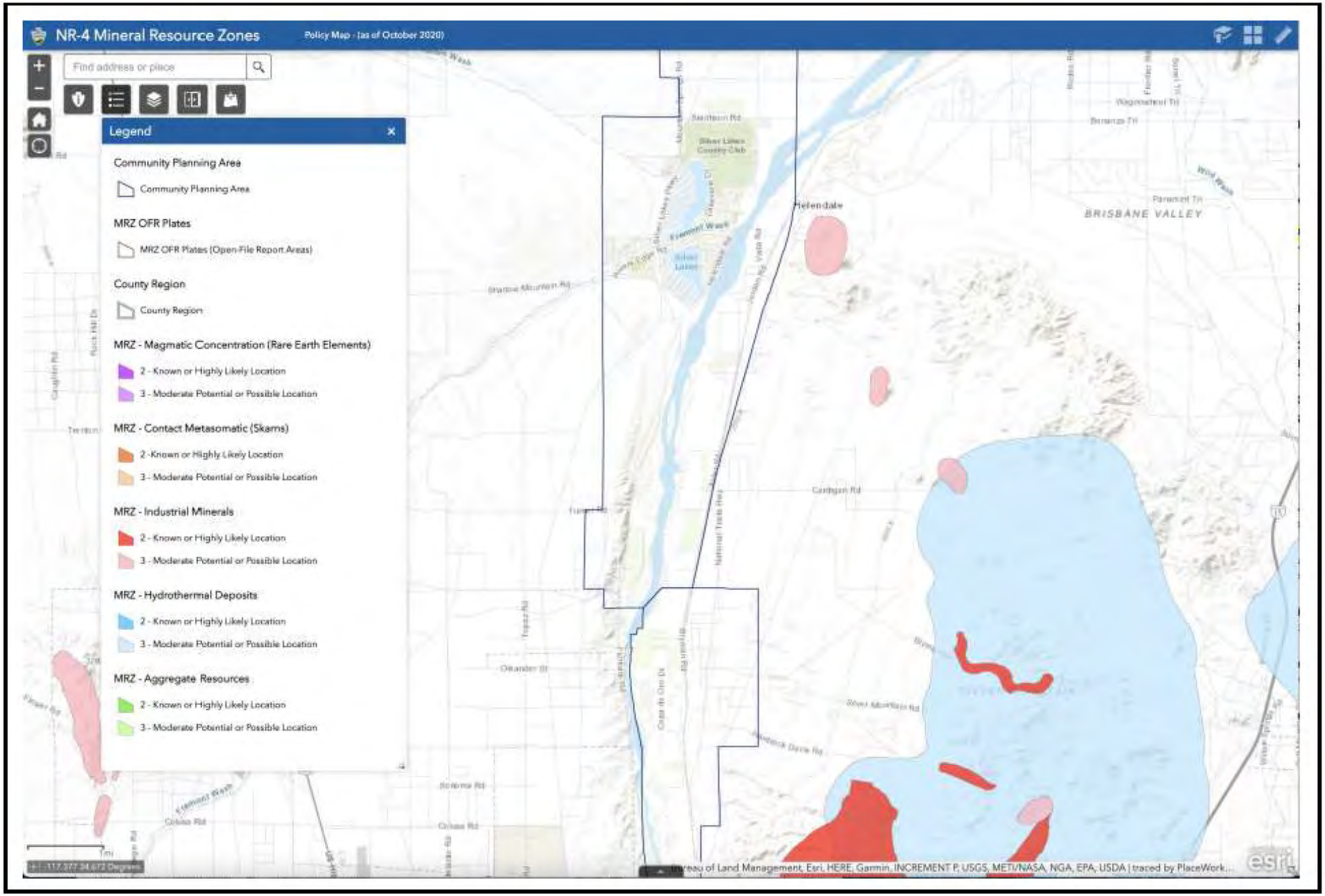

FIGURE XII-1

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Mineral Resource Area

FIGURE XVII-1

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Existing Transit Routes – Desert Region

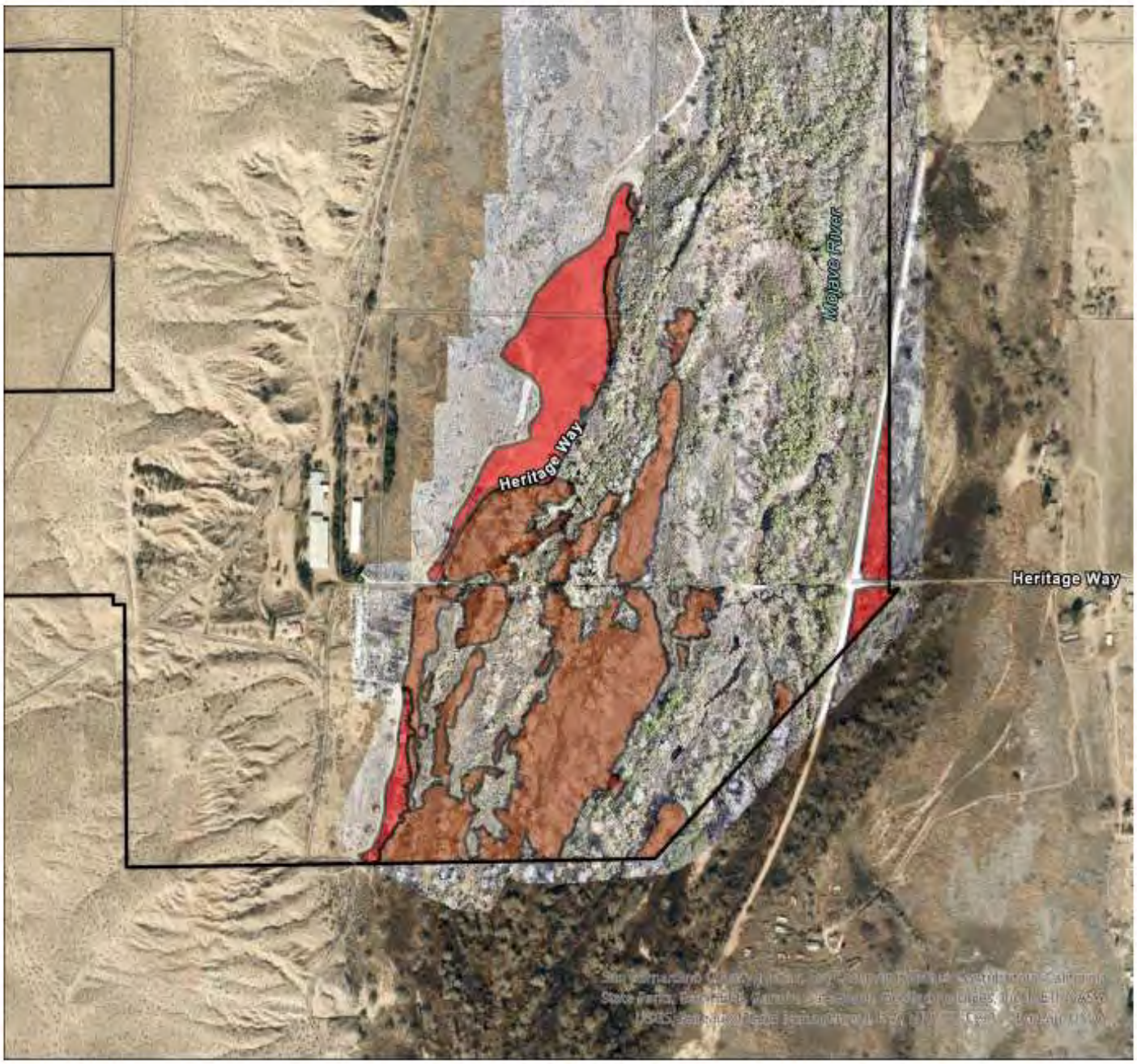

FIGURE XX-1

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Burned Area

FIGURE XX-2

Tom Dodson & Associates
Environmental Consultants

Full Property Scale Burn Area

APPENDIX 1

Final Palisades Ranch Conceptual Riparian Restoration Plan

MARCH 2021

PREPARED FOR

Mojave Desert Land Trust

PREPARED BY

SWCA Environmental Consultants

FINAL PALISADES RANCH CONCEPTUAL RIPARIAN RESTORATION PLAN

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SWCA Project No. 56434

March 2021

ABSTRACT

Mojave Desert Land Trust (MDLT) is planning conservation actions for Palisades Ranch, a 666-hectare (1,647-acre) area located along the Mojave River in San Bernardino County, California. MDLT obtained funding in 2018 and 2019 from the California Wildlife Conservation Board (WCB) to acquire the Property and develop a conceptual restoration plan for ecosystem restoration, with a focus on restoring habitat for special-status species. The overarching goal for conservation actions identified in this plan is to increase habitat for the following riparian and aquatic species: San Emigdio blue butterfly, Mohave tui chub, southwestern willow flycatcher, western yellow-billed cuckoo, and least Bell's vireo. Expanding riparian vegetation cover and extent will benefit habitat for these special status species.

In 2020, SWCA Environmental Consultants (SWCA) collected and interpreted ecological data related to the Mojave River and riparian zone soils, hydrology, groundwater levels, hydraulic condition, geomorphology, vegetation, history, and avian community to understand ecosystem processes and inform river channel and riparian restoration planning within Palisades Ranch. SWCA also compiled information about special status species birds, butterflies, mammals, reptiles, amphibians, and the Mohave tui chub to develop criteria for riparian enhancement and restoration to benefit special status species. The primary focus of these studies was to assist development of 60% designs to restore aquatic and riparian habitat within the 69-hectare (170-acre) abandoned agricultural field and the Mojave River channel adjacent to the agricultural field over a 77-hectare (190-acre) project area.

SWCA conducted a soil survey of Palisades Ranch to delineate and describe the soil map units and inform restoration planning. SWCA installed 11 groundwater wells throughout Palisades Ranch and initial readings indicate that groundwater nearer the active channel is shallower except in the northern half of the Property where a vertical groundwater gradient occurs near a relic island. SWCA analyzed the historic and current hydrology of the Mojave River and conducted hydraulic modeling to understand the relationship between flow characteristics, water surface elevations, erosion, and deposition throughout the project area. A series of historical aerial photographs from 1929 to present were analyzed with an emphasis on the Mojave River channel. Although the Mojave River channel appears to be a single-thread channel in the earliest photographs, the river was already altered by agricultural diversions. Construction of the Mojave Forks Dam and Silverwood Lake reservoir in 1971 reduced the magnitude of flood flows and contributed to vegetation encroachment and channel narrowing. Beaver activity is gradually changing the Mojave River at Palisades Ranch to be less of a single thread channel and become a multi-thread channel.

SWCA conducted fluvial geomorphic surveys with cross-sections using a survey-grade GPS to document existing channel form. The high riparian vegetation density and multitude of beaver dams made traversing the river channel challenging. On-the-ground elevations of the river channel and floodplain along these cross-sections were used to validate 1- and 2-dimensional hydraulic models. Federal Emergency Management Agency (FEMA) cross-sections were also modeled to assess potential changes in water elevations that could be caused by the proposed restoration project. Hydraulic models do not predict a rise in water surface elevation by the proposed project at any of the FEMA cross section locations.

SWCA mapped riparian vegetation and noxious weeds in January 2020 and used this information to propose areas for integrated weed management and to create a plant palette for riparian revegetation and enhancement. SWCA mapped 336 hectares (831 acres) of riparian vegetation of which 84 hectares (208 acres) was dominated by noxious weeds (perennial pepperweed and prickly Russian thistle). Big saltbush, red willow, and Fremont cottonwood were dominant in other areas. Tamarisk and giant reed occurred in isolated patches throughout Palisades Ranch.

Because riparian ecosystems are a major focus for restoration at Palisades Ranch, SWCA conducted rapid assessment, grid surveys for breeding birds in riparian habitats in April and July 2020. Eight special-status species were detected: least Bell's vireo, western yellow-billed cuckoo, Cooper's hawk, Lucy's warbler, summer tanager, Swainson's hawk, yellow warbler, and yellow-breasted chat. Southwestern willow flycatchers were not detected.

This information was synthesized to develop riparian enhancement and restoration alternatives with the greatest probability of increasing habitat for the focal species. SWCA evaluated six alternatives for restoration of the abandoned agricultural field and adjacent Mojave River channel and selected the highest ranked alternative to restore the floodplain channel and bench with a side channel, cottonwood field, and pond to increase riparian and aquatic habitats. SWCA developed design drawings for restoring the abandoned agricultural field that would result in approximately 30 hectares (75 acres) of riparian forest expansion. The 60% design includes proposed alignments for recreational trails and is provided as an appendix to this plan. SWCA recommends that the restoration area be the focus of public access for compatible recreation activities such as hiking, bird watching, wildlife viewing, and photography.

Other opportunities to enhance riparian habitat within Palisades Ranch were identified including areas prioritized for noxious weed management, riparian plantings, or pollinator gardens. Riparian enhancement and restoration projects were divided into phases and prioritized based on the order required for implementation. Estimated budgets are provided to support MDLT in regulatory and funding requirements. These planning designs and documents will support future restoration design, permitting, and implementation funding pursuits to preserve, enhance, and restore the diverse aquatic and riparian ecosystems of Palisades Ranch.

CONTENTS

Abstract i

1 Introduction 1
- 1.1 Purpose 1
- 1.2 Goals and Objectives 1

2 Physical Environment 3
- 2.1 Location of Palisades Ranch 3
- 2.2 Climate of Palisades Ranch 5
- 2.3 Geology of Palisades Ranch 5
- 2.4 Soils of Palisades Ranch 6
- 2.5 Hydrogeomorphology of Palisades Ranch 14

3 Biological Environment 35
- 3.1 Riparian Vegetation 35
- 3.2 Breeding Birds in Riparian Habitats 42
- 3.3 Butterflies 73
  - 3.3.1 Monarch 73
  - 3.3.2 San Emigdio blue butterfly 73
- 3.4 Mammals 73
  - 3.4.1 Mojave River Vole 73
  - 3.4.2 Bats 74
- 3.5 Aquatic Species 75
  - 3.5.1 Mohave Tui Chub 75
  - 3.5.2 Southwestern Pond Turtle 76
  - 3.5.3 Arroyo Toad 77
  - 3.5.4 California Red-legged Frog 77
  - 3.5.5 Beavers 78
- 3.6 Human History and Land Use 78

4 Conceptual Riparian Restoration Plan 81
- 4.1 Mojave River Restoration 81
  - 4.1.1 Design Objectives and Approach 81
  - 4.1.2 Project Considerations 84
  - 4.1.3 Evapotranspiration Estimates 86
  - 4.1.4 Proposed Design Features 87
  - 4.1.5 Revegetation and Plant Palette 89
- 4.2 Riparian Enhancement 93
  - 4.2.1 Integrated Weed Management Plan 95
- 4.3 Zones for Encouragement of Public Access 101
- 4.4 Project Phasing and Prioritization 102
- 4.5 Budget for Restoration Phases 103

Literature Cited 105

Appendices

Appendix A. Federal Emergency Management Agency Flood Hazard Information for Palisades Ranch
Appendix B. Hydrogeologic Map and Cross-Sections of Mojave River (Mojave Water Agency 2003)
Appendix C. Historical Aerial Photograph Sequence
Appendix D. Mojave River Restoration 60% Design Drawings
Appendix E. Cost Estimate for Mojave River Restoration Phases and Revegetation

Figures

Figure 1. Location of Palisades Ranch. 4
Figure 2. Soils map for Palisades Ranch. 9
Figure 3. Mojave River instantaneous peak flow (cfs). 16
Figure 4. Predicted hydraulic model versus observed water surface elevations in the Mojave River. 18
Figure 5. Plan view of FEMA cross section locations overlain on spatial distribution of flow velocity for 100-yr event (736 cms [26,000 cfs]) predicted by 2D HEC-RAS model, with flow vectors. 20
Figure 6. Cross-section of the terrain and predicted water surface elevations for a 100-year event at FIRM cross-section I. 21
Figure 7. Cross-section of the terrain and predicted water surface elevations for a 100-year event at FIRM cross-section J. 21
Figure 8. Cross-section of the terrain and predicted water surface elevations for a100-year event at FIRM cross-section K. 22
Figure 9. USGS groundwater wells and SWCA-installed piezometers within the Property. 24
Figure 10. Perched secondary channel in the floodplain. 26
Figure 11. Aerial photograph of the Property showing channel alignment at select years. 28
Figure 12. Main Mojave River channel from Heritage Road bridge. 30
Figure 13. Accumulated flood flow debris pile. 31
Figure 14. Palisades Ranch reconnaissance cross-section #1 located at River Station 8749. 32
Figure 15. Palisades Ranch reconnaissance survey cross-section #2 located at River Station 5184. 32
Figure 16. Palisades Ranch reconnaissance survey cross-section #3 located at River Station 1520. 33
Figure 17. Photograph looking upstream at the beaver dam and the confluence of the main channel and the high flow channel. 33
Figure 18. Palisades Ranch riparian vegetation map based on dominant overstory taxa. 38
Figure 19. Palisades Ranch riparian noxious weeds map. 39
Figure 20. Rapid assessment survey grids. 44
Figure 21. Special-status species detections at the Property, 2020 (map 1 of 2). 48
Figure 22. Special-status species detections at the Property, 2020 (map 2 of 2). 49
Figure 23. Least Bell's vireo distribution and habitat use. 50
Figure 24. Cooper's hawk distribution and habitat use (map 1 of 2). 54
Figure 25. Cooper's hawk distribution and habitat use (map 2 of 2). 55
Figure 26. Lucy's warbler distribution and habitat use. 56
Figure 27. Summer tanager distribution and habitat use. 58
Figure 28. Yellow warbler distribution and habitat use (map 1 of 5). 60
Figure 29. Yellow warbler distribution and habitat use (map 2 of 5). 61
Figure 30. Yellow warbler distribution and habitat use (map 3 of 5). 62

Figure 31. Yellow warbler distribution and habitat use (map 4 of 5). 63
Figure 32. Yellow warbler distribution and habitat use (map 5 of 5). 64
Figure 33. Yellow-breasted chat distribution and habitat use (map 1 of 5). 65
Figure 34. Yellow-breasted chat distribution and habitat use (map 2 of 5). 66
Figure 35. Yellow-breasted chat distribution and habitat use (map 3 of 5). 67
Figure 36. Yellow-breasted chat distribution and habitat use (map 4 of 5). 68
Figure 37. Yellow-breasted chat distribution and habitat use (map 5 of 5). 69
Figure 38. Existing and proposed conditions of the winter base flow inundation 86
Figure 39. Example of BDA (Wheaton et al. 2019). 88
Figure 40. Example of toe wood used in restoration. 89
Figure 41. Areas recommended for riparian enhancement. 94
Figure 42. Two types of perennial pepperweed stands occurring at Palisades Ranch, mixed and open. 98
Figure 43. Abandoned agricultural field dominated by prickly Russian thistle and fivehorn smotherweed. 99
Figure 44. Phases proposed for 60% Mojave River restoration plan. 104

Tables

Table 1. Wetlands Climate Data from the Victorville, California, Station 5
Table 2. Soil Map Unit Descriptions for Palisades Ranch 10
Table 3. Mojave River Daily Mean Flow at Palisades Ranch 15
Table 4. Flood Record Before and After Construction of Mojave Forks Dam 15
Table 5. Flood Studies Exceedance Interval and Flood Discharge Values 17
Table 6. Summary of Error Values from Model Low Flow Validation 18
Table 7. Water Surface Elevation Comparisons for Flood Insurance Rate Map Cross-Sections 18
Table 8. Historical Aerial Photograph Analysis Interpretation 29
Table 9. Vegetation Alliance Descriptions 40
Table 10. Observed Plant Species 41
Table 11. Avian Breeding Behaviors 45
Table 12. Survey Dates for Rapid Assessment Grid Surveys at the Property, 2020 45
Table 13. Species Documented during April and July 2020 Rapid Assessment Grid Surveys 47
Table 14. Special-status Bird Habitat Associations for Points of Highest Breeding Activity and Territories 72
Table 15. Difference in ET Rates Between Existing and Proposed Conditions of the Project Area 87
Table 16. Vegetation Types Specified for River Restoration and Vegetation Enhancement in the Project Area 89
Table 17. Plant Palette, Vegetation Type, Species Characteristics, and Proposed Method of Installation 91
Table 18. Invasive Plant Species Documented at Palisades Ranch and Ranked by Cal-IPC 95

1 INTRODUCTION

1.1 Purpose

Mojave Desert Land Trust (MDLT) is planning conservation actions for Palisades Ranch (the Property), a 666-hectare (1,647-acre) area located along the Mojave River in San Bernardino County, California (Figure 1). MDLT obtained funding in 2018 and 2019 from the California Wildlife Conservation Board (WCB) to acquire the Property and develop a conceptual restoration plan for ecosystem restoration, with a focus on restoring habitat for specific special-status species. Most of these special-status species rely on habitats supported by the Mojave River, which flows through the Property and creates a biodiversity hotspot within the Mojave Desert. In 2020, SWCA Environmental Consultants (SWCA) collected and interpreted ecological data related to the Mojave River and riparian zone history, hydrology, geomorphology, soils, vegetation, and birds to understand ecosystem processes and inform river channel and riparian restoration planning within Palisades Ranch. This conceptual riparian restoration plan summarizes data collected and analyzed by SWCA and presents prioritized restoration actions developed in collaboration with MDLT. SWCA also developed design drawings for restoring ecological integrity to the 69-hectare (170-acre) abandoned agricultural field that was previously riparian habitat (according to 1929 historical aerial photographs) over a 77-hectare (190-acre) project area. These planning documents will support future restoration design, permitting, and implementation funding pursuits to preserve, enhance, and restore the diverse aquatic and riparian ecosystems of Palisades Ranch.

1.2 Goals and Objectives

Conservation efforts for the Property, will be guided by the directives outlined in the 2018 WCB grant, which state that "…the [Palisades Ranch] Property shall be held, used, operated, managed and maintained only for the purposes of conserving a corridor of riparian habitat in the western Mojave Desert as well as adjacent upland desert plateau land and for the protection of the southwestern willow flycatcher, least Bell's vireo, Mojave tui chub, western yellow-billed cuckoo, desert tortoise, Mojave [sic] ground squirrel, burrowing owl, San Emigdio blue butterfly and to ensure the Property shall be held, used, operated, managed and maintained only for the purposes of wildlife habitat preservation, restoration and management, wildlife-oriented education and research, and for compatible public or private uses, all as may be consistent with wildlife habitat preservation and protection of sensitive biological resources…" (WCB 2019). Therefore, the conservation goals and objectives directing conceptual restoration planning and river restoration design are focused on maximizing benefit for multiple special-status species, which function as umbrella species. An umbrella species is defined as a "species whose conservation confers protection to a large number of naturally co-occurring species" (Roberg and Angelstam 2004). Multi-species umbrella approaches that include sensitive species that rely on resources at a range of spatial scales are valuable for conservation planning because these approaches are likely to capture habitat needs of the greatest number of co-occurring species.

The overarching goal for conservation actions identified in this plan, which was the original intent for the purchase of the Property and remains a top conservation priority is to increase habitat for the following riparian and aquatic species: San Emigdio blue butterfly (*Plebejus emigdionis*), Mohave tui chub (*Siphateles bicolor mohavensis*), southwestern willow flycatcher (*Empidonax traillii extimus*), western yellow-billed cuckoo (*Coccyzus americanus*), and least Bell's vireo (*Vireo bellii pusillus*). Dynamic river ecosystems create a shifting mosaic of hydrologically connected habitat patches that are distributed as a function of topographic diversity and spatio-temporal variation in river flow and sediment transport. This habitat complexity, in turn, typically supports high aquatic, riparian, and terrestrial species diversity within the floodplain. Maintaining or increasing aquatic and riparian species biodiversity in altered

ecosystems requires improving and/or creating habitat for these species, which can enhance and restore the ecological integrity of those ecosystems.

To achieve the conceptual riparian restoration plan's overarching goal, SWCA and MDLT developed several objectives and strategies to be addressed by this plan. These objectives and strategies were based on management goals proposed in the Palisades Ranch Management Plan, which was commissioned for Helendale Community Services District and Western Rivers Conservancy prior to acquisition of the Property by MDLT (California Department of Fish and Wildlife [CDFW] 2016). Goals and objectives related to aquatic and riparian habitat reference conditions, or historic conditions, are not realistic in this system due to reductions in Mojave River flood magnitudes caused by flood control infrastructure and diversions. Goals and objectives for this conceptual riparian restoration plan are instead focused on increasing ecological integrity, which is represented by the connectivity, diversity, and resiliency to disturbance (e.g., floods, drought, wildfire) of the river ecosystem. Where consistent with the conservation goals, actions that increase public awareness of the ecological value of Palisades Ranch and community engagement to further support MDLT's overarching organizational mission are mentioned in this plan; however, focused efforts for community engagement are being developed by MDLT staff concurrent with drafting of this plan. Objectives and strategies addressed by this plan include the following:

- Objective (O)1: Investigate occurrence, distribution, and habitat requirements of special-status aquatic and riparian species and designate umbrella species.
    - Strategy (S)1: Conduct breeding bird surveys in riparian zone of Mojave River.
    - S2: Research other special-status species and designate umbrella species that rely on a diversity of riparian and aquatic ecosystems at a range of spatial scales.
    - S3: Characterize habitat requirements and local, documented occurrences for umbrella species.
- O2: Identify areas and develop conceptual designs to preserve, enhance, and restore aquatic and riparian ecosystems and increase ecological integrity (connectivity, diversity, and resiliency) with a focus on umbrella species.
    - S4: Quantify extent of aquatic and riparian ecosystems.
    - S5: Assess ecological integrity of aquatic and riparian ecosystems.
    - S6: Develop conceptual designs to enhance and restore integrity of aquatic and riparian ecosystems with a focus on umbrella species.
    - S7: Develop 60% designs to restore aquatic and riparian habitat within the abandoned agricultural field and the Mojave River channel adjacent to the agricultural field and establish indicators of success.
- O3: Minimize occurrence and spread of noxious weeds on the Property to increase the integrity of vegetation communities.
    - S8: Prioritize noxious weed species for treatment or monitoring.
    - S9: Identify areas of existing noxious weed infestations.
    - S10: Coordinate with Mojave Water Agency and the Mojave Desert Resource Conservation District to identify the most effective methods for weed management and identify potential source populations within the jurisdiction of these agencies to help prevent spread and re-infestations.
- O4: Determine where human disturbance should be limited on the property to support ecosystem resilience.

- S11: Synthesize information on the distribution of existing special-status species occurrences and habitat and potential sensitivity to human disturbance.
- S12: Delineate areas that are currently incompatible with human disturbance or that will become more sensitive to human disturbance after habitat enhancement or restoration.

2 PHYSICAL ENVIRONMENT

2.1 Location of Palisades Ranch

Palisades Ranch is located in San Bernardino County, California, approximately 40 kilometers (km) (25 miles) southwest of Barstow, California. The Mojave River flows north through the Property along one of the rare aboveground reaches of this river which results in high biodiversity and unique plant communities (Figure 1). The project reach is within the Alto Transition Zone (TZ), where groundwater conditions support perennial surface flow. The drainage area of the Mojave River at the project site is 992 square km (383 square miles), with a base elevation of the stream at 760 meters (2,493 feet) (North American Vertical Datum [NAVD] 88). Palisades Ranch is 666-hectares (1,647-acres), with approximately 6 km (3.7 miles) of the Mojave River channel that flows through a broad floodplain.

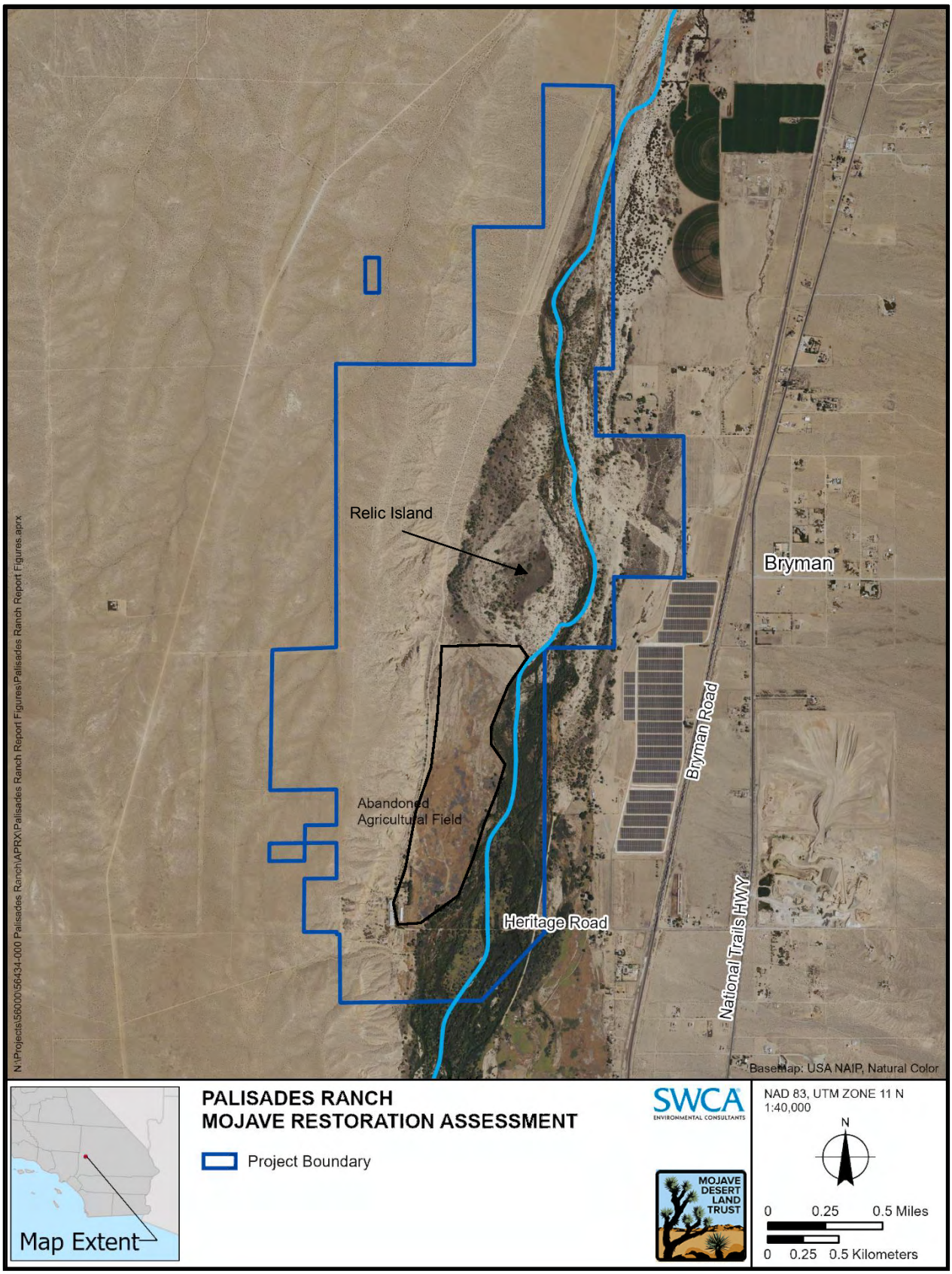

Figure 1. Location of Palisades Ranch.

2.2 Climate of Palisades Ranch

The climate of Palisades Ranch is typical for the Mojave Desert, with the majority of precipitation falling in the winter months (November–March), temperatures rarely below 0 degrees Celsius (°C) (32 degrees Fahrenheit [°F]), and maximum temperatures above 32°C (90°F) through most of the summer (June through September). The closest National Oceanic and Atmospheric Administration (NOAA) station to Palisades Ranch is the Victorville, California, station located approximately 16 km (10 miles) southeast of the Property. From 1940 through 2019, average annual total precipitation at this station was 1.2 centimeters (cm) (0.46 inch), with 0.3 cm (0.1 inch) of average annual snowfall (Table 1) (NOAA 2020). From June through September, average maximum temperatures were above 32°C (90°F), with less than 0.6 cm (0.25 inch) of average monthly precipitation. Average minimum temperatures were below freezing in January and December. In recent years, 2019 had higher than average monthly precipitation (1.7 cm [0.7 inch]), and 2011 through 2018 had lower than average precipitation (0.4 and 1.1 cm [0.15 and 0.42 inch], respectively).

Table 1. Wetlands Climate Data from the Victorville, California, Station

Month	Average Maximum Temperature (°F)	Average Minimum Temperature (°F)	Average Mean Temperature (°F)	Average Precipitation (in)	Average Snowfall (in)
January	58.9	30.3	44.6	0.94	0.9
February	62.3	33.5	47.9	1.02	0
March	67.1	37.2	52.1	0.77	0.1
April	74.1	42	58.1	0.34	0
May	82.1	48.3	65.2	0.12	0
June	91.7	55	73.3	0.04	0
July	98.2	61.5	79.9	0.15	0
August	97.2	60.7	79	0.19	0
September	91.3	54.7	73	0.23	0
October	80.1	45	62.5	0.32	0
November	67.4	35.4	51.4	0.49	0.2
December	59	30	44.5	0.87	0.1
Annual	-	-	-	-	-
Average	77.4	44.5	61	0.46	-
Total	-	-	-	5.49	1.4

Source: NOAA (2020)

Based on data collected from 1940 through 2019.

2.3 Geology of Palisades Ranch

The Property is within an alluvial plain bound to the west by older Pleistocene-age alluvial fan deposits that form a bluff that rises 61 meters (200 feet) above the floodplain. The older alluvium is composed of moderately consolidated deposits of interbedded gravel, sand, silt, and clay with cementation in the form of caliche (California Department of Water Resources [DWR] 1967). The Property is bound to the east by younger Holocene-age alluvial sand and gravel deposits, which are perched above the active channel. The older and younger alluvium are derived from the Mojave River draining ancient lakes. Today the Mojave River is an incised floodplain within these relic alluvial deposits. Evidence of naturally occurring asbestos

related to the Oro Grande Mining District upstream of Palisades Ranch suggests that soil analyses may be needed prior to earth disturbance activities.

2.4 Soils of Palisades Ranch

SWCA conducted a soil survey of the Property from January 14 through 17, 2020, to delineate and describe the soil map units to inform restoration planning. Soils data support a better understanding of existing vegetation distribution within the Property and can be applied in the river channel design (engineering) and revegetation planning.

2.4.1 *Methods*

U.S. Department of Agriculture (USDA) Soil Survey Geographic Database (SSURGO) data were examined via desktop analysis prior to field sampling to inform the field survey. Eight SSURGO soil series (map units) are delineated within the Property. A minimum of one soil survey location was identified from each map unit to confirm and characterize soil properties throughout the Property.

Senior soil ecologist Mandy Bengtson and ecologist Sarah Epstein surveyed soil pedons from 20 locations, including 12 hand-augured cores at piezometer locations and eight hand-excavated soil pits. Soil morphological characteristics at each pedon were described in accordance with the Natural Resources Conservation Service (NRCS) guidelines in the *Field Book for Describing and Sampling Soils* (Schoeneberger et al. 2012). Soil characteristics recorded included horizon designation and thickness, color, texture, percent rock fragments, roots, presence of pedogenic carbonates, soil cementation, visible salts, clay films, structure, and landform. Soil descriptions that matched SSURGO map units were named according to their existing USDA official soil series. Soils that did not correlate to a USDA official soil series description were named according to their geomorphic or geographic location and characteristics within Palisades Ranch to be meaningful and intuitive to MDLT managers.

Twelve augured soil cores were located within the riparian corridor and alluvial terraces and were characterized during piezometer installation. Soil cores were augured to the depth of the water table (100% soil saturation), and soils were described at 15-centimeter (6-inch) intervals. Eight hand-excavated soil pits were located near the palisades for several upland soil types. Soil profiles were described according to genetic horizon to a depth of approximately 0.6 meters (2 feet) or to a restrictive layer, whichever was shallower.

Post-processing desktop analyses synthesized soil morphological data, a digital terrain model (DTM), current and historical aerial imagery, and vegetation community data to delineate soil maps for the Property. All desktop analyses were completed with ESRI ArcMap 10.7.1.

2.4.2 *Results*

SWCA delineated 13 soil map units within the Property, composed of four soil map units within the Mojave River riparian corridor (floodplain) and nine soil map units upgradient from the riparian corridor (delineated within alluvial terraces, alluvial fan remnants, and badland landforms) (see Figure 2). Fifteen hectares (37 acres) of road, building, and yard footprints were delineated as “disturbed areas” within the soil map units. The 13 soil map units, including their dominant morphological characteristics and geomorphic setting, are presented in Table 2 and described below.

2.4.3 *Soil Map Units*

Riparian Corridor (143 hectares [353 acres]): The riparian corridor consists of an aboveground reach of the Mojave River within the Property. This area supports wetland vegetation communities such as cottonwood (*Populus* sp.), willow (*Salix* spp.), and salt grass (*Distichlis spicata*) on sand bars and broadleaf cattail (*Typha latifolia*) and bulrush (*Schoenoplectus* spp.) in channels. Perennial pepperweed (*Lepidium latifolium*), a noxious weed, is dispersed throughout the area. Beaver activity throughout the river has dammed and altered flows, affecting which areas of soil are inundated. Soils showed evidence of successional flood events and alluvial deposition of strata, each with distinct differences in soil color, texture, and coarse fragments. Soils throughout the riparian corridor are similar in character and are generally deep, sandy, and mostly non-effervescent. Due to its expanse, the riparian corridor was delineated into four separate map units, based on horizon characteristics and relative surface elevation. The four riparian corridor map units are described below.

- North (20 hectares [49 acres]): Soils are deep and characterized by sandy-textured soils overlying coarse sand. The water table at the time of survey was located at a depth of approximately 152 cm (60 inches) (at Piezometer 18).
- Mid-Channel (32 hectares [78 acres]): This section of the river was artificially deepened and the surrounding sand bars have coarse textures. Soils are deep and characterized by mixed coarse sand and sand. The water table at the time of survey was located at a depth of approximately 76 cm (30 inches) (at Piezometers 11 and 15).
- Eastern Terrace (31 hectares [77 acres]): This terrace was the highest elevation among the riparian corridor floodplain landforms. Soils are deep and characterized by sandy textures overlying organic-rich sandy loams. The water table at the time of survey was located at a depth of approximately 137 cm (54 inches) (at Piezometer 17).
- South (60 hectares [149 acres]): This area has the widest east-to-west expanse of river channels and wetland vegetation with strong beaver activity throughout. Soils are deep and characterized by sandy textures overlying coarse sand and sand. The water table at the time of survey was located at a depth of approximately 137 cm (54 inches) (at Piezometer 6).

Alluvial Terrace 1 (115 hectares [284 acres]): This landform is the most low-lying terrace above the riparian corridor, located along the east and west sides of the Mojave River. Soils (observed at Piezometers 12 and 16) are deep, loamy to sandy in texture, and mostly non-effervescent. Evidence of previous soil saturation along this terrace was observed, with oxidized soil matrices and root channels within the upper 30 cm (12 inches) of soil (at Piezometer 16). This map unit supports a cottonwood-willow–dominated vegetation community.

Alluvial Terrace 2 (131 hectares [324 acres]): This upland terrace is elevationally higher than the riparian corridor and Alluvial Terrace 1 and contains mixed vegetation communities that are dominated by mesquite (*Prosopis pubescens*) and/or saltbush (*Atriplex* spp.). The soils (observed at Piezometer 10) are slightly effervescent and have textures of sandy clay loam and loamy fine sands overlying fine sands.

Agricultural Field (80 hectares [197 acres]): The abandoned agricultural field is a remnant feature from previous ranching and agricultural activity at Palisades Ranch and is located on an old alluvial terrace. The soil and vegetation disturbance caused by agricultural operations allowed non-native, weedy species, such as prickly Russian thistle (*Salsola tragus*), to invade the area. Historical aerial imagery shows that this area was formerly a riparian corridor. Soils (observed at Piezometers 4 and 5) are deep, sandy, and largely non-effervescent, with loamy-textured soils overlying sand and coarse sand.

Disturbed Agricultural Field (6.5 hectares [16 acres]): This soil map unit occurs within a human-disturbed area along the same alluvial terrace as the agricultural field. Soils (at Piezometer 14) are deep, sandy-textured soils with slight effervescence. Excavation of the ground surface is visible from historic aerial imagery and likely caused invasion by a weedy vegetation community (e.g., prickly Russian thistle).

Palisades Alluvial Fan (14 hectares [35 acres]): This alluvial fan formed from surface runoff concentrated along the base of the palisades. Human disturbance within the abandoned agricultural field and in nearby areas is visible in historic aerial imagery. Soils (at Piezometer 13) are deep with loamy and sandy textures and are largely non-effervescent. A weedy vegetation community within the area is dominated by prickly Russian thistle.

Cajon Sand (Below Palisades) (166 hectares [409 acres]): This upland terrace is located along the base palisades, above the historic alluvial terraces and active riparian corridors. Soils (at Pits 1 and 2) are loamy sand to sand in texture, strongly effervescent, and support a creosote (*Larrea tridentata*) vegetation community.

Palisades (159 hectares [393 acres]): The map unit includes the badlands that form the face of the palisades. Gypsum salts were observed throughout the soil profile. Soils (Soil Pit 8) are characterized by sandy clay loam to sandy loam textures and are non-effervescent throughout. Soils have platy to subangular blocky structure and overlie a restrictive gypsum layer at approximately 79 cm (31 inches) in depth. Though largely unvegetated, the badlands have a creosote-dominated vegetation community. A rare plant, the Mojave fishhook cactus (*Sclerocactus polyancistrus*), grows on the face of the palisades.

Palisades Summit (35 hectares [87 acres]): This map unit is located along the shoulder of Palisades Summit. The strongly effervescent soils (at Soil Pit 6) contain carbonate concretions (approximately 1.3 cm [0.5 inches] in diameter) and smaller nodules of carbonates throughout the profile. Soils have an argillic horizon (as evidenced by clay films on soil peds) from 22.9 to 43 cm (9 to 17 inches) and a root-restrictive petrocalcic horizon at 43 cm (17 inches). This soil map unit supports a creosote-dominated vegetation community.

Cajon Sand (Above palisades) (136 hectares [336 acres]): This soil map unit is located elevationally above the Palisades Summit map unit and includes gently undulating alluvial landforms. Soil characteristics vary between alluvial fan remnants and lower-lying ephemeral drainages. The alluvial fan remnants (observed at Soil Pits 4, 5, and 7) are loamy- and sandy-textured soils, are strongly effervescent, and have subangular blocky structure. Soils formed within ephemeral drainages (observed at Soil Pit 3) are loamy and sandy in texture, are slightly effervescent, and have single-grained structure. This soil map unit supports a creosote-dominated vegetation community.

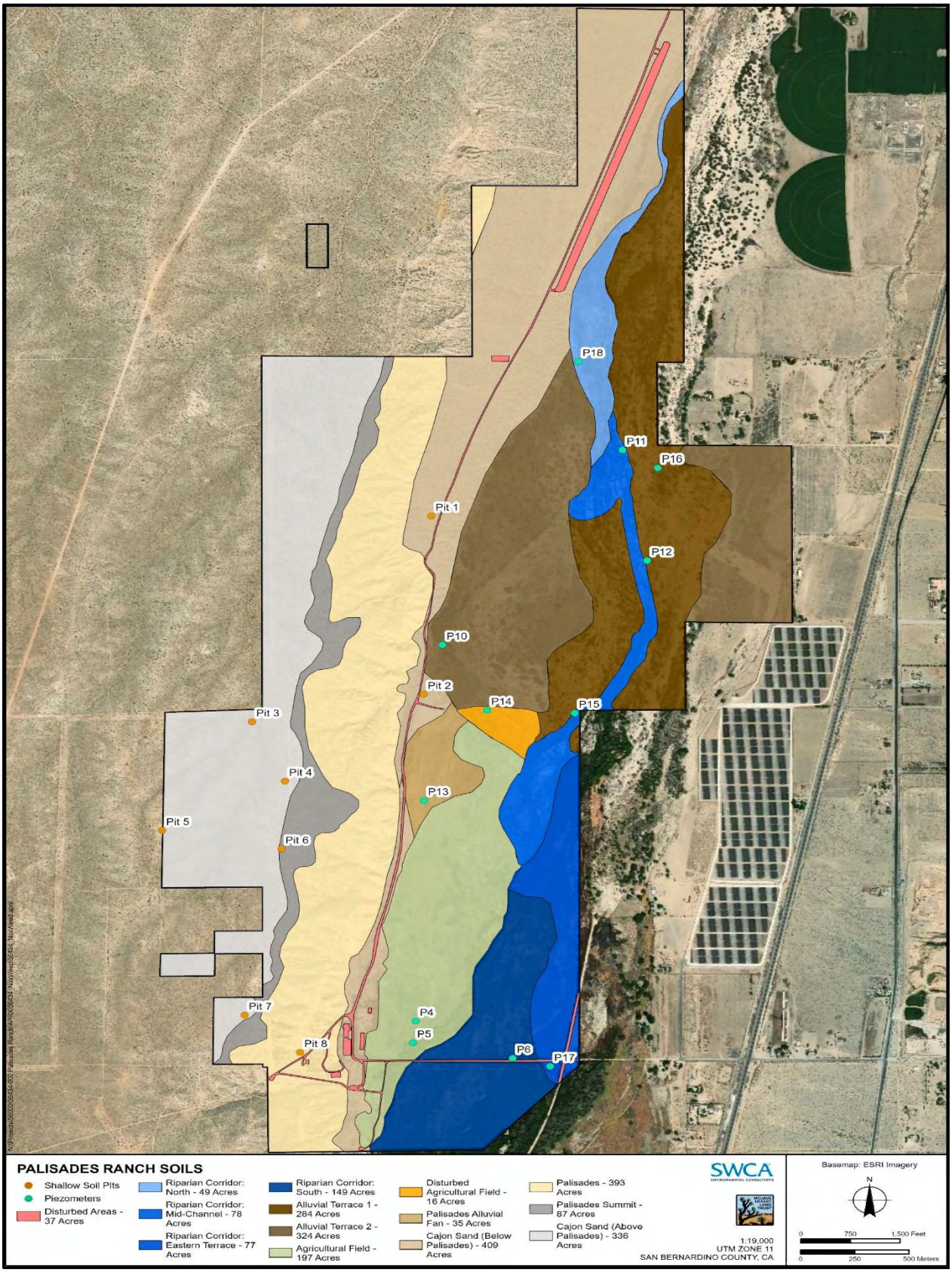

Figure 2. Soils map for Palisades Ranch.

Table 2. Soil Map Unit Descriptions for Palisades Ranch

Soil Map Unit	Landform	Parent Material	Observation Location(s) (Observation Type)*	Horizon	Depth (inches)	Texture	Moist Color (Mottle Color, if applicable)	Structure	% Coarse Fragments by Volume	Effervescence	Special Characteristics
Riparian Corridor: North	Floodplain	Alluvium Derived from Granite	Piezometer 18 (A)	A	0 – 6	Sand	10YR 4/2	None	0	Non-effervescent	None
				1C	6 – 30	Sand	10YR 6/3	None	0	Non-effervescent	None
				2C	30 – 60**	Coarse Sand	10YR 6/3 to 10YR 5/2	None	< 5	Non-effervescent	Cobbles between 36 and 42”
Riparian Corridor: Mid-Channel	Floodplain	Alluvium Derived from Granite	Piezometers 11 and 15 (A)	A/C	0 – 12	Coarse Sand	10YR 6/2 to 10YR 5/3	None	< 5	Non-effervescent	None
				1C	12 – 18	Coarse Sand	10YR 5/3	None	< 10	Non-effervescent	Cobbles present in horizon
				2C	18 – 30**	Sand to Coarse Sand	10YR 5/3 to 10YR 4/2	None	< 10	Non-effervescent	None
Riparian Corridor: Eastern Terrace	Floodplain	Alluvium derived from Granite	Piezometer 17 (A)	A/C	0 – 24	Sand	10YR 5/3	None	0	Non-effervescent	None
				1C	24 – 36	Sand	10YR 5/2	None	< 5	Non-effervescent	Soil is saturated
				2C	36 – 54**	Sandy Loam	2.5Y 3/1	None	< 5	Non-effervescent	Soil is mucky
Riparian Corridor: South	Floodplain	Alluvium Derived from Granite	Piezometer 6 (A)	A/C	0 – 24	Sand	7.5YR 5/2 to 7.5YR 4/4	None	0	Very slightly to non-effervescent	None
				1C	24 – 42	Coarse Sand	7.5YR 5/2 to 7.5YR 5/3	None	< 5	Non-effervescent	Cobbles present in horizon
				2C	42 – 54**	Sand	10YR 4/2	None	0	Non-effervescent	None
Alluvial Terrace 1	Alluvial Terrace	Alluvium Derived from Granite	Piezometers 12 and 16 (A)	A	0 – 6”	Loam to Sandy Loam	7.5YR 3/2 to 10YR 3/2	None	0	Non-effervescent	Oxidized matrix in loamy-textured soils
				1C	6 – 12	Sand	10YR 5/2 to 10YR 5/3	None	0	Very slightly to non-effervescent	Oxidation in root channels
				2C	12 – 66**	Sand to Coarse Sand	10YR 6/2 to 10YR 4/2	None	< 5	Non-effervescent	None
Alluvial Terrace 2	Alluvial Terrace		Piezometer 10 (A)	A	0 – 6	Sandy Clay Loam	7.5YR 4/2	None	0	Slightly effervescent	None

Soil Map Unit	Landform	Parent Material	Observation Location(s) (Observation Type)*	Horizon	Depth (inches)	Texture	Moist Color (Mottle Color, if applicable)	Structure	% Coarse Fragments by Volume	Effervescence	Special Characteristics
		Alluvium Derived from Granite		Bw	6 – 12	Loamy Fine Sand	7.5YR 5/3	None	0	Strongly effervescent	None
				C	12 – 24	Fine Sand	10YR 6/3 to 10YR 5/3	None	0	Slightly to very slightly effervescent	Water content in soil increasing
				2C	24 – 36	Sand	10YR 7/4 to 10YR 6/3	None	0	Slightly to non-effervescent	None
				3C	36 – 48**	Coarse Sand	7.5YR 5/3 to 10YR 5/3	None	< 5	Slightly to non-effervescent	None
Agricultural Field	Alluvial Terrace	Alluvium Derived from Granite	Piezometers 4 and 5 (A)	A	0 – 16	Sandy Loam to Loam	7.5YR 4/3 to 7.5YR 3/2 (5YR 4/6)	None	0	Slightly to non-effervescent	Oxidized root channels at 6 – 12”
				1C	16 – 42	Sand to Coarse Sand	7.5YR 5/2 to 10YR 4/3	None	< 5	Non-effervescent	None
				2C	42 – 54	Sand	10YR 5/4	None	0	Non-effervescent	None
				3C	54 – 60**	Coarse Sand	10YR 4/4	None	10	Non-effervescent	None
Disturbed Agricultural Field	Alluvial Terrace	Alluvium Derived from Granite	Piezometer 14 (A)	A	0 – 6	Sandy Loam	7.5YR 3/2	None	0	Non-effervescent	None
				A/C	6 – 12	Sand	7.5YR 4/2	None	0	Very slightly effervescent	None
				1C	12 – 24	Coarse Sand	7.5YR 5/2 to 7.5YR 4/2	None	0	Very slightly effervescent	None
				2C	24 – 48	Fine Sand to Sand	10YR 4/3 to 10YR 3/2	None	0	Slightly to non-effervescent	None
				3C	48 – 72**	Coarse Sand	10YR 6/4 to 10YR 5/4	None	< 5	Non-effervescent	None
Palisades Alluvial Fan	Alluvial Fan	Alluvium Derived from Granite	Piezometer 13 (A)	A	0 – 24	Loam	7.5YR 3/2 to 10YR 3/3	None	0	Slightly to non-effervescent	None
				Bw	24 – 48	Loamy Sand to Sandy Loam	10YR 3/3	None	0	Non-effervescent	None
				C	48 – 90	Sand to Coarse Sand	10YR 6/2 to 10YR 4/2	None	< 5	Non-effervescent	None
	Alluvial Fan Remnant		Pits 1, 2 (H)	A	0 – 1	Sandy Loam	10YR 4/3	None	< 10	Strongly effervescent	None

Soil Map Unit	Landform	Parent Material	Observation Location(s) (Observation Type)*	Horizon	Depth (inches)	Texture	Moist Color (Mottle Color, if applicable)	Structure	% Coarse Fragments by Volume	Effervescence	Special Characteristics
Cajon Sand (Below palisades)		Alluvium Derived from Granite		C1	1 – 21	Sand to Coarse Sand	10YR 5/4	None	< 10	Strong to violently effervescent	None
				C2	21 – 26	Sand	10YR 4/2	None	< 5	Strongly effervescent	None
Palisades	Badlands	Lacustrine Deposits	Pit 8 (H)	A	0 – 0.5	N/A	10YR 6/3	Platy	0	Slightly effervescent	Gypsum crust
				C1	0.5 – 8	Sandy Loam	7.5YR 4/6	Platy	0	Non-effervescent	Gypsum salts present
				C2	8 – 24	Sandy Loam	10YR 4/6	Subangular blocky	0	Non-effervescent	Gypsum salts present
				C3	24 – 31	Sandy Clay Loam	10YR 4/4	Subangular blocky	0	Non-effervescent	Gypsum salts present
				C4	> 31	N/A	N/A	N/A	N/A	N/A	Restrictive layer, possibly gypsum
Palisades Summit	Eroded Shoulder of Palisades	Alluvium Derived from Granite	Pit 6 (H)	A	0 – 3	Sandy Loam	10YR 4/4	Subangular blocky/Platy	0	Very slightly effervescent	Small nodules of CaCO3
				Bk	3 – 9	Loam	7.5YR 4/4	Subangular blocky	0	Violently effervescent	0.5” concretions of CaCO3
				Btk	9 – 17	Sandy Clay Loam	7.5YR 4/4	Subangular blocky	0	Violently effervescent	0.5” concretions of CaCO3. Argillic horizon; clay films present on peds.
				Bkkm	> 17	N/A	10YR 6/4	N/A	N/A	Violently effervescent	Restrictive layer; petrocalcic horizon
Cajon Sand (Above palisades)	Alluvial Fan Remnants	Alluvium Derived from Granite	Pits 4, 5, 7 (H)	A	0 – 4	Loam to Sand	7.5YR 5/4 to 10YR 4/4	Subangular blocky, platy, or none	< 5	Very slightly to violently effervescent	None
				C1	4 – 16	Loamy Sand to Sandy Loam	7.5YR 4/4 to 10YR 6/4	Subangular blocky	< 5	Strongly to violently effervescent	None
				C2	16 – 24	Loamy Coarse Sand to Sandy Loam	7.5YR 5/4 to 10YR 4/4	Subangular blocky or none	< 5	Very slightly to strongly effervescent	None
	Drainage		Pit 3 (H)	A	0 – 2	Loamy Sand	10YR 3/4	None	0	Very slightly effervescent	None

Soil Map Unit	Landform	Parent Material	Observation Location(s) (Observation Type)*	Horizon	Depth (inches)	Texture	Moist Color (Mottle Color, if applicable)	Structure	% Coarse Fragments by Volume	Effervescence	Special Characteristics
		Alluvium Derived from Granite		Bw	2 – 25	Sandy Loam	10YR 4/4	None	0	Very slightly effervescent	None

*Observation Type: augured soil core (A); hand-excavated soil pit (H)

**Shallowest observation of water table (saturated conditions)

2.5 Hydrogeomorphology of Palisades Ranch

2.5.1 *Mojave River Hydrology*

The Mojave River originates at the base of the rugged San Bernardino Mountains at the confluence of the West Fork of the Mojave River and Deep Creek. At the confluence of the West Fork and Deep Creek, the Mojave Forks Dam was constructed in 1971, impounding the Mojave River to form a 300,000-acre-foot capacity reservoir of water for the purposes of flood control and consumptive uses. The Mojave River Forks reservoir and Silverwood Lake reservoir, both completed in 1971, attenuate flood peaks, although they have no effect on annual runoff volume (Lines and Bilhorn 1996). Lake Arrowhead reservoir, built in 1922, provides only minimal flow regulation. Base flows on the Mojave River are maintained and augmented with recharge exchanges due to basin adjudication and water delivery requirements. Stream flow in the Mojave River from the Mojave Forks Dam to the Palisades Ranch site is a diminishing stream system. The decline in surface water flow along the length of the Mojave River is primarily caused by infiltration loss into the riverbed. The relationship between pulses of flood flows along the Mojave River has been characterized by smaller storms resulting in intermittent stream flow, whereas for very large events the momentum is conveyed and carries storm flow through the entire reach (United Research Services, Inc. 2003).

At Palisades Ranch the Mojave River is a perennial system, where base flow is supported by groundwater (described in Chapter 2.5.4) and the Victor Valley Wastewater Reclamation Authority discharge. Higher stream flows are intermittent and predominantly occur between December and March as a result of winter storms. These intermittent higher flows are primarily a result of higher-elevation rainfall that rapidly concentrates in the rocky and steep slopes and sheet flow rapidly concentrating in the valley at impervious development areas. The Mojave River has large fluctuations in flow, with base flow commonly less than 1.4 cubic meters per second (cms) (50 cubic feet per second [cfs]) and extreme pulses of short-duration peak flow events. Peak flow events are commonly less than 24 hours in duration; however, annual high-flow events commonly occur for several days.

The Victor Valley Wastewater Reclamation Authority (VVWRA) discharges a minimum daily flow of 24.7 acre-feet of water, at a rate of approximately 0.35 cms (12.4 cfs). Daily mean flows reported by the U.S. Geological Survey (USGS) for the period of record from 1970 to 2019, plus the minimum discharge from the VVWRA, were evaluated to determine mean daily flows at the project site. Daily mean flows are highest during the winter season from the middle of December to the middle of April. The average daily flow during the umbrella species nesting period (February to June) is 3.7 cms (130 cfs) (Table 3).

Prior to the construction of the Mojave Forks Dam in 1971, several large flood events pulsed through the reach with a maximum approximate discharge of 4,248 cms (150,000 cfs) in 1862 (Table 4). After construction of the Mojave Forks Dam, flood discharge along the Mojave River became regulated with a maximum discharge of 680 cms (24,000 cfs) in 1998. Flows are captured to replenish the reservoir, and the peak discharge along the river corridor is attenuated after passing through the dam (see Table 4).

The Mojave River flood flow events have significantly decreased in magnitude after construction of the Dam; however, flood flows spill over the dam at similar frequency (Figure 3). Flood flow events occur during all times of the year, from winter storm events to late summer thunderstorm-driven events.

Table 3. Mojave River Daily Mean Flow at Palisades Ranch

Day of month	Mean Daily Flow in Cubic Feet Per Second (cfs) Period of Record 10/01/1970 to 09/30/2019											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	47.5	55.5	317.5	128.5	64.5	32.5	21.7	19.4	20.3	23.5	28.5	33.5
2	41.5	51.5	423.5	120.5	56.5	32.5	21.6	19.2	20.1	23.5	28.5	33.5
3	41.5	63.5	291.5	111.5	51.5	32.5	21.3	19.5	20.2	23.5	28.5	33.5
4	48.5	48.5	321.5	95.5	49.5	32.5	21.2	19.4	21.5	23.5	28.5	34.5
5	43.5	60.5	281.5	134.5	48.5	33.5	21.1	19.4	21.1	23.5	28.5	33.5
6	41.5	63.5	238.5	127.5	48.5	32.5	20.9	26.5	20.6	23.5	28.5	44.5
7	56.5	70.5	196.5	112.5	53.5	32.5	20.7	20.7	20.5	23.5	28.5	41.5
8	137.5	298.5	169.5	103.5	51.5	32.5	20.6	19.5	20.3	24.5	28.5	36.5
9	348.5	204.5	148.5	93.5	49.5	31.5	20.6	19.5	20.5	24.5	28.5	34.5
10	284.5	302.5	136.5	85.5	49.5	31.5	20.5	19.6	24.5	24.5	30.5	34.5
11	363.5	139.5	165.5	79.5	50.5	31.5	21.4	19.2	21.5	24.5	30.5	34.5
12	231.5	134.5	211.5	96.5	50.5	31.5	20.7	19.3	21	24.5	30.5	35.5
13	140.5	159.5	182.5	89.5	59.5	26.5	20.7	19.4	20.9	24.5	30.5	35.5
14	171.5	261.5	136.5	85.5	58.5	24.5	20.1	19.6	20.8	24.5	31.5	35.5
15	122.5	290.5	128.5	92.5	57.5	24.5	20.1	19.7	20.8	25.5	30.5	36.5
16	132.5	342.5	130.5	100.5	47.5	24.5	20	19.6	20.8	25.5	31.5	36.5
17	215.5	263.5	124.5	85.5	45.5	24.5	19.7	20.4	20.9	25.5	31.5	37.5
18	217.5	281.5	130.5	77.5	42.5	23.5	19.4	20	21.1	26.5	31.5	37.5
19	91.5	480.5	119.5	77.5	40.5	23.5	19.3	19.8	21.2	27.5	31.5	38.5
20	80.5	508.5	121.5	73.5	39.5	23.5	19.6	19.8	21.4	41.5	31.5	56.5
21	83.5	294.5	140.5	80.5	39.5	22.5	19.5	19.8	21.2	35.5	32.5	281.5
22	83.5	301.5	139.5	76.5	38.5	22.5	19.5	19.9	21.3	28.5	32.5	324.5
23	87.5	224.5	150.5	76.5	38.5	22.5	19.3	19.8	21.3	27.5	31.5	190.5
24	77.5	325.5	149.5	71.5	38.5	22.5	20	20	21.5	26.5	31.5	122.5
25	69.5	149.5	140.5	63.5	37.5	23.5	18.9	19.9	21.4	26.5	32.5	94.5
26	78.5	138.5	147.5	54.5	36.5	23.5	18.9	19.9	21.8	26.5	32.5	108.5
27	83.5	148.5	142.5	55.5	35.5	22.5	19	20	21.8	31.5	32.5	61.5
28	111.5	179.5	164.5	52.5	35.5	22.3	19.2	20	21.8	30.5	32.5	52.5
29	178.5	71.5	128.5	55.5	35.5	21.9	19.5	20.1	21.9	27.5	33.5	76.5
30	92.5		130.5	72.5	34.5	21.9	19.2	20	22.4	27.5	35.5	69.5
31	62.5		165.5		32.5		19.6	21.7		27.5		49.5

Note: Flows less than 50 cfs are shown in red, flows between 50 cfs and 130 cfs are shown in yellow, and flows greater than 130 cfs are shown in green

Table 4. Flood Record Before and After Construction of Mojave Forks Dam

Greatest Flood of Record Before Construction of Dam	
Date	**Peak Discharge (cms / cfs)**
1/22/1862	~4,248 / 150,000
12/1867	~2,265 / 80,000
2/23/1891	~2,124 / 75,000
1/1/1910	~1,019 / 63,000

Greatest Flood of Record Before Construction of Dam	
3/2/1938	~1,999 / 70,600
Greatest Flood of Record After Construction of Dam (1971)	
Date	**Peak Discharge (cms / cfs)**
2/16/1980	425 / 15,000
2/8/1993	606 / 21,400
2/24/1998	680 / 24,000
1/11/2005	589 / 20,800
12/22/2010	510 / 18,000
2/14/2019	343 / 12,100

*Table adopted from Bureau of Reclamation (BOR) (2013) with more recent years' data from (USGS 10261500 Mojave River Lower Narrow Gage in Victorville, CA).

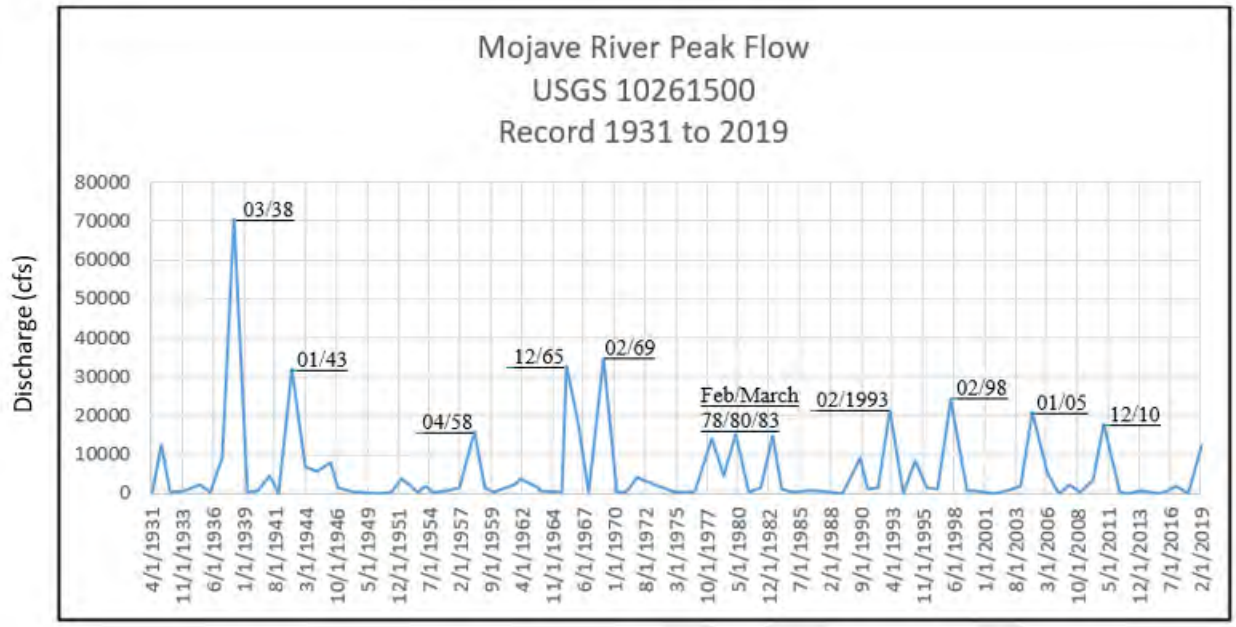

Figure 3. Mojave River instantaneous peak flow (cfs).

2.5.2 *Floodplain Management and Hydraulic Analysis*

San Bernardino County Flood Control District (SBCFCD) manages the floodway of the Mojave River at Palisades Ranch. The San Bernardino County Flood Control District was formed as a progressive measure as a direct aftermath of the disastrous March 1938 floods. The most injurious floods in terms of loss of life and financial loss were those of 1938 and 1969, due to extensive development within the Mojave River floodplain (Federal Emergency Management Agency [FEMA] 2016). Damages in 1938 exceeded $12,000,000 and several lives were lost. During the floods of January and February 1969, in which 13 people died, financial losses surpassed $55,000,000. These floods and the loss of life and property were the impetus of the Mojave Forks Dam flood control facility and the non-certified levee constructed at Palisades Ranch. The Mojave Forks Dam outlet structure has a maximum capacity of 708 cms (25,000 cfs). The non-certified levee runs along the east side of the floodplain at Heritage Road.

San Bernardino County participates in the National Flood Insurance Protection Program. The Palisades Ranch floodplain is delineated as zone AE, within the 100-year floodway, the area east of the non-certified levee is a special flood hazard area flooded by the 100-year flow, and the agricultural field is delineated as Zone X, shallow flooding of less than 1 foot during the 100-year event (Appendix A). Previous flood studies were reviewed to determine the 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year flood discharges. These studies report different discharge values because of discrepancies in the period of record (Table 5). The SBCFCD was contacted to request additional information and a copy of the regulatory flood model. However, the SBCFCD could not locate the regulatory model and acknowledged in response to the request that the area to be restored (project area) and non-certified levee are in an area where there is a need for a detailed flood study and evaluation (Drake 2020). SWCA's hydraulic modeling indicates that the upstream end of the levee, which is not tied into high ground, will be flanked by the Mojave River when flows exceed roughly 35.4 cms (1,250 cfs). Note that these results are preliminary and do not follow U.S. Army Corps of Engineers (USACE) methodology for levee certification.

Table 5. Flood Studies Exceedance Interval and Flood Discharge Values

Exceedance Interval (years)	USACE Discharge (cfs)	SBCFCD Discharge (cfs)	Flood Insurance Study Discharge (cfs)
2	1,400	11,270	—
5	9,000	15,767	—
10	15,000	19,808	8,000
25	18,000	24,165	—
50	21,000	27,335	20,000
100	26,000	30,900	26,000

Table adopted from BOR (2013) with FEMA values reported in the Flood Insurance Study for San Bernardino County and unincorporated areas (September 2, 2016).

The USACE Hydrologic Engineering Center's (HEC's) River Analysis System (HEC-RAS) Version 5.0.7 was used to model the existing and proposed (restored) hydraulic conditions at Palisades Ranch. A terrain model was developed utilizing the 2018 LiDAR (USGS point cloud San Bernardino County, CA), with additional detail added to the channel and floodplain from the SWCA geomorphic survey in January 2020. The vertical datum is in NAVD88 and the surface was processed by decimating the point cloud data to 25% density and using the landcover trim tools in Civil 3D ReCap software.

SWCA utilized the flood discharge values reported by FEMA in the most recent Flood Insurance Study (FIS; FEMA 2016) to evaluate flow and duplicate the 100-year flood model. The SWCA existing conditions hydraulic model of the site includes five flow profiles: the 2-year, 5-year, 10-year, 50-year, and 100-year recurrence interval flows. The 2-year recurrence interval evaluated in the project area hydraulic model was determined by SWCA from the period of record for 1971–2019 (USGS gage 10261500). The model was run with a steady-state analysis and an unsteady state analysis. The normal depth slope method was used as the downstream reach boundary condition. The downstream slope of 0.003 was used based on thalweg survey of the channel slope. The reach length evaluated is 3,200 meters (10,500 feet), from the upstream project area boundary to downstream of the relic island and channel and floodplain area proposed for restoration (Figure 5). The floodplain is well vegetated, and the Manning's "n" is set as 0.08, consistent with the FIS study.

The model was validated with measured water surface elevations taken during the January 2020 survey. The model was run for a 0.73 cms (25.8 cfs) flow using the 2018 LiDAR terrain surface. The difference between observed and predicted water surface elevations was calculated at 27 locations throughout the

project area. The model performed well, despite the lack of definition in the active channel and uncertainty due to dense canopy cover. Predicted values were plotted as a function of the observed values to look for trends in the error, and the error was tightly distributed around the 1:1 line (Figure 4). Average, maximum, minimum and root mean square error between the predicted and observed values is presented in Table 6.

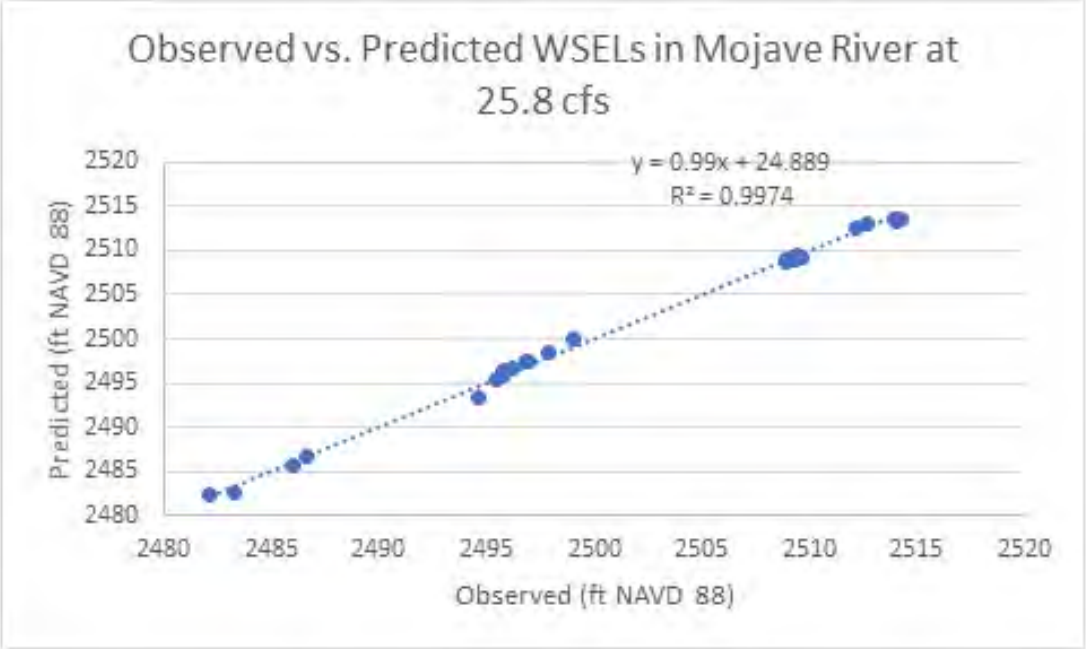

Figure 4. Predicted hydraulic model versus observed water surface elevations in the Mojave River.

Table 6. Summary of Error Values from Model Low Flow Validation

Error Type	Stage Difference (feet)
Average error	-0.02
Maximum error	0.86
Minimum error	-1.18
Root mean square error	0.52

Water surface elevations predicted by the 2D HEC-RAS model were compared to the values from the FEMA FIS at three locations in the study area: FEMA flood insurance rate map (FIRM) cross-sections I, J, and K (Figure 5). The existing and proposed conditions models predicted significantly higher water surface elevations than the FEMA FIS. No rise is predicted in water surface elevation by the proposed project at any of the FEMA cross section locations. Cross-section plots showing the vertically exaggerated terrain and predicted water surface elevations for a 100-year event (736 cms [26,000 cfs]) are presented in Figure 6 through Figure 8. The water surface elevations (WSEL's) are superelevated in the water surface sections view which is due to the model accounting for the momentum of the flow, which causes superelevation in bends. For consistency, WSEL's for Table 7 were sampled from the left edge of the water.

Table 7. Water Surface Elevation Comparisons for Flood Insurance Rate Map Cross-Sections

FIRM Cross-section	FEMA WSEL (feet)	Existing WSEL (feet)	Proposed WSEL (feet)
I	2,492.6	2,493.0	2,492.2

FIRM Cross-section	FEMA WSEL (feet)	Existing WSEL (feet)	Proposed WSEL (feet)
J	2,501.2	2,502.3	2,502.3
K	2,511.5	2,513.8	2,513.8

All elevations in North America Vertical Datum (NAVD) 88 vertical projection. FIRM = Flood Insurance Rate Map. WSEL = water surface elevation

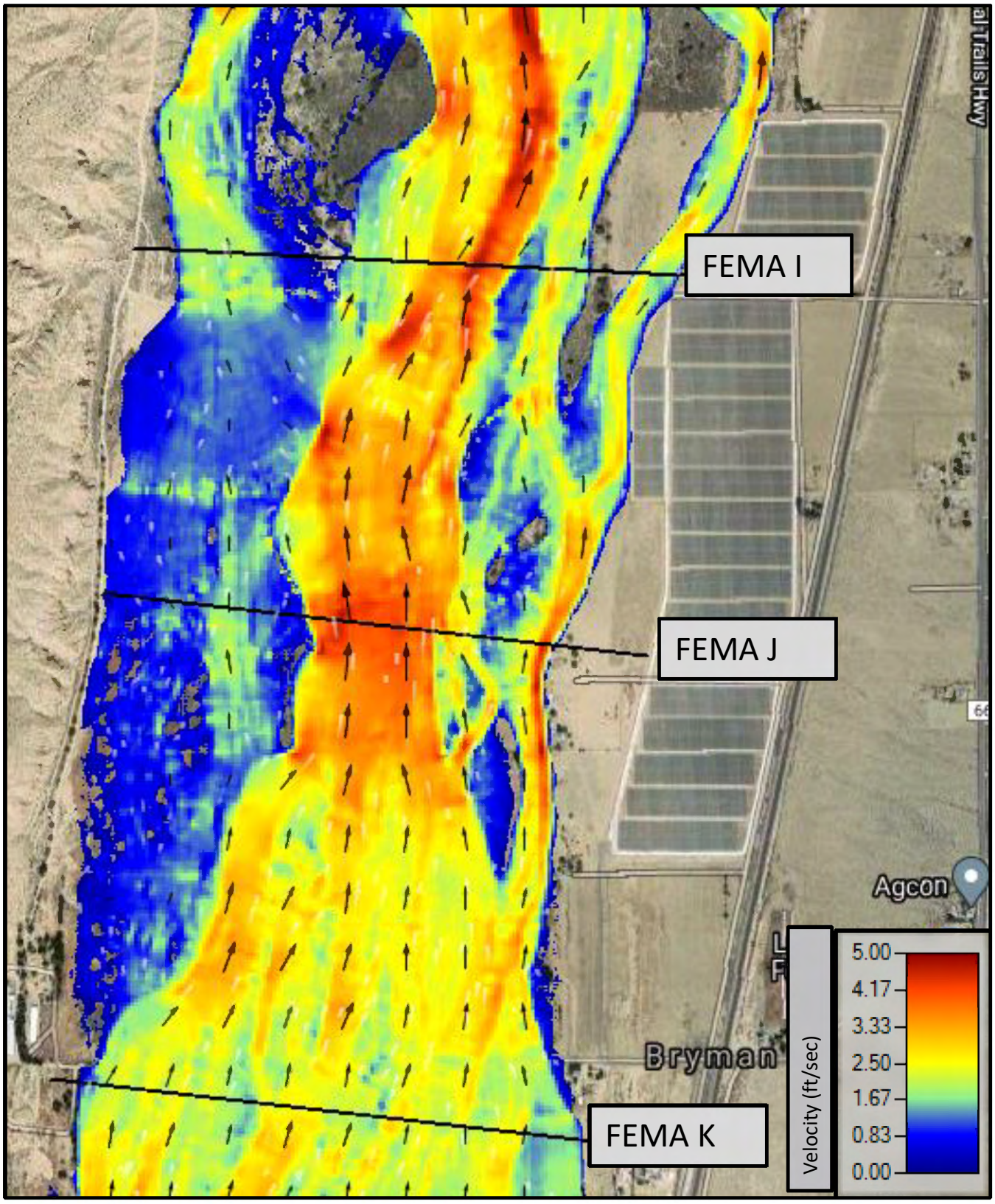

Figure 5. Plan view of FEMA cross section locations overlain on spatial distribution of flow velocity for 100-yr event (736 cms [26,000 cfs]) predicted by 2D HEC-RAS model, with flow vectors.

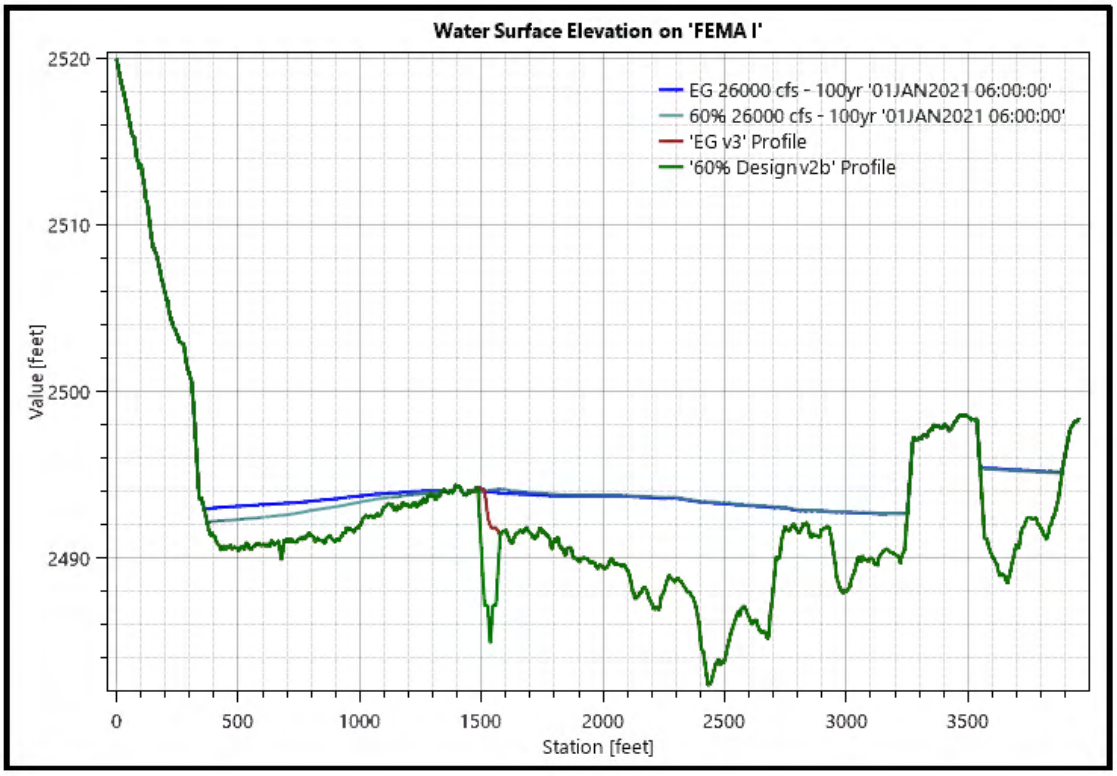

Figure 6. Cross-section of the terrain and predicted water surface elevations for a 100-year event (736 cms [26,000 cfs]) at FIRM cross-section I.

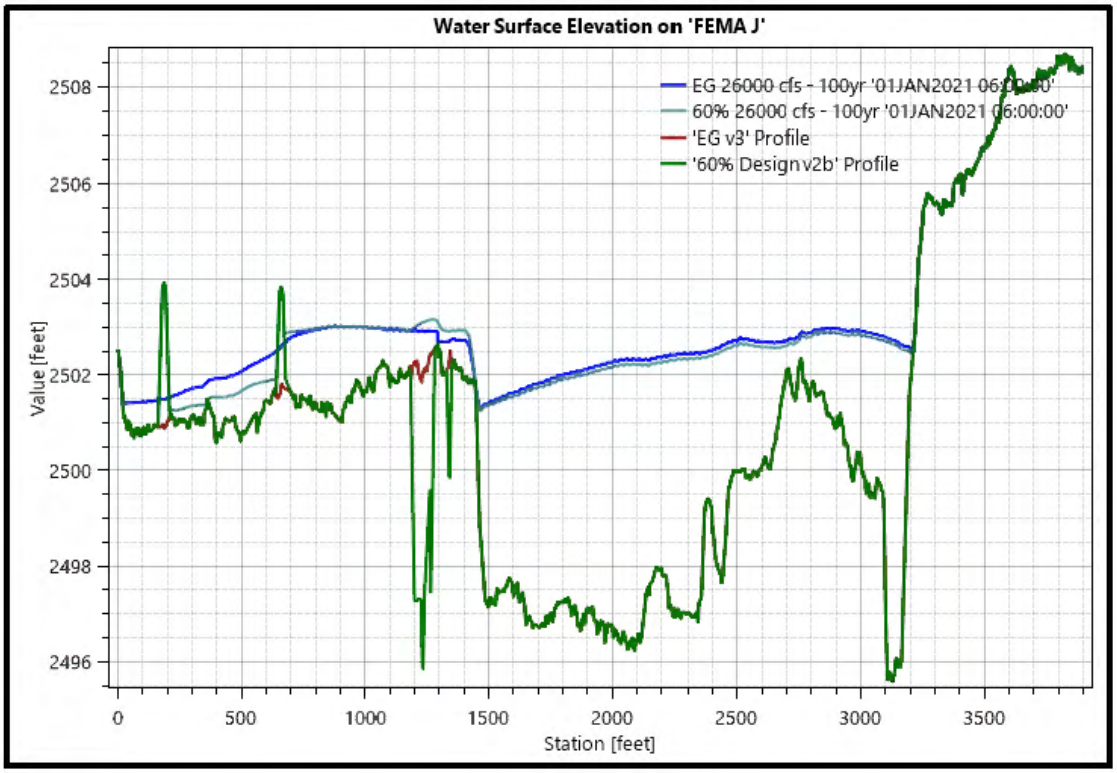

Figure 7. Cross-section of the terrain and predicted water surface elevations for a 100-year event (736 cms [26,000 cfs]) at FIRM cross-section J.

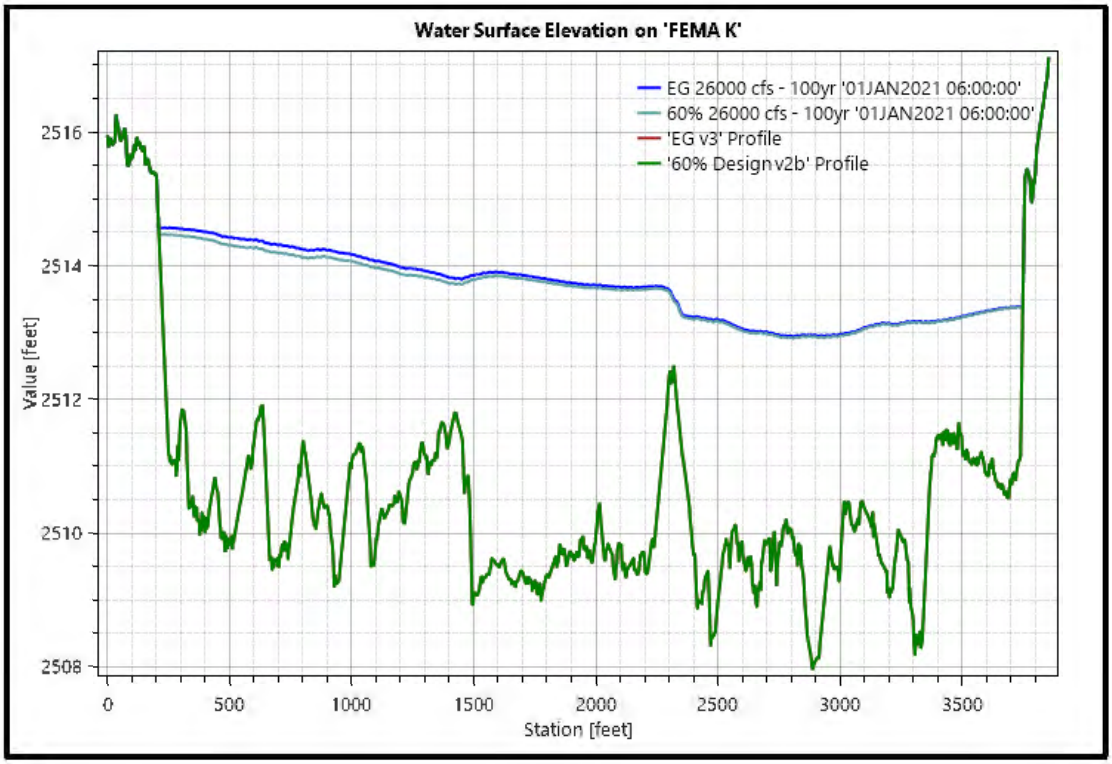

Figure 8. Cross-section of the terrain and predicted water surface elevations for a100-year event (736 cms [26,000 cfs]) at FIRM cross-section K.

2.5.3 *Groundwater Depths*

Four Floodplain aquifer groundwater monitoring wells are located on the Property. SWCA evaluated USGS well records for the period of record for 1996–2019. Approximate base groundwater elevation ranges from 762 meters (2,500 feet) (NAVD88) near Heritage Road at the upstream extent of the Property to 754 meters (2,475 feet) near the downstream end of the Property (USGS 2019). There is a 25-foot longitudinal difference in the average annual groundwater levels from the upstream extent to the downstream extent of the Property. Groundwater levels are typically highest during the spring months of March and April, with lower levels occurring in summer to late fall. Seasonal fluctuations of the groundwater level are about 1.5 meters (5 feet) near the upstream extents, and 3 meters (10 feet) at the downstream extents of the project area. The larger fluctuation at the downstream end of the project area is attributed to the vertical groundwater gradient in the Floodplain aquifer and recharge zone to the Regional aquifer.

SWCA installed 11 shallow piezometers to assist with a more detailed level assessment of the groundwater at the Property. The locations of the piezometers were selected to better understand the horizontal and longitudinal variations in groundwater levels in the Property. These piezometers will assist with understanding the localized influences from subsurface clay lenses and the active channel. These piezometers will also assist with calibrating the horizontal and longitudinal variation in groundwater levels across the floodplain, the seasonal fluctuations, and plant community distribution at the Project site. SWCA installed the piezometers in January 2020 and monitored them on March 14, 2020, after a 2-year (47.3 cms [1,670 cfs]) storm event that occurred on March 12, 2020 (Figure 9). In the future, MDLT or the Mojave Water Agency will monitor the groundwater levels in real time or quarterly and after storm events. During the time of installation, the depth to groundwater ranged from 68.5 to 210.8 cm (27 to 83 inches) below ground surface. On March 14, 2020, the depth to groundwater ranged from 24 to 169 cm (9.5 to 66.7 inches) below ground surface. As expected, the piezometers closer to the active channel had

shallower groundwater, and piezometers located farther from the channel in historic floodplain deposits had greater depths to the groundwater.

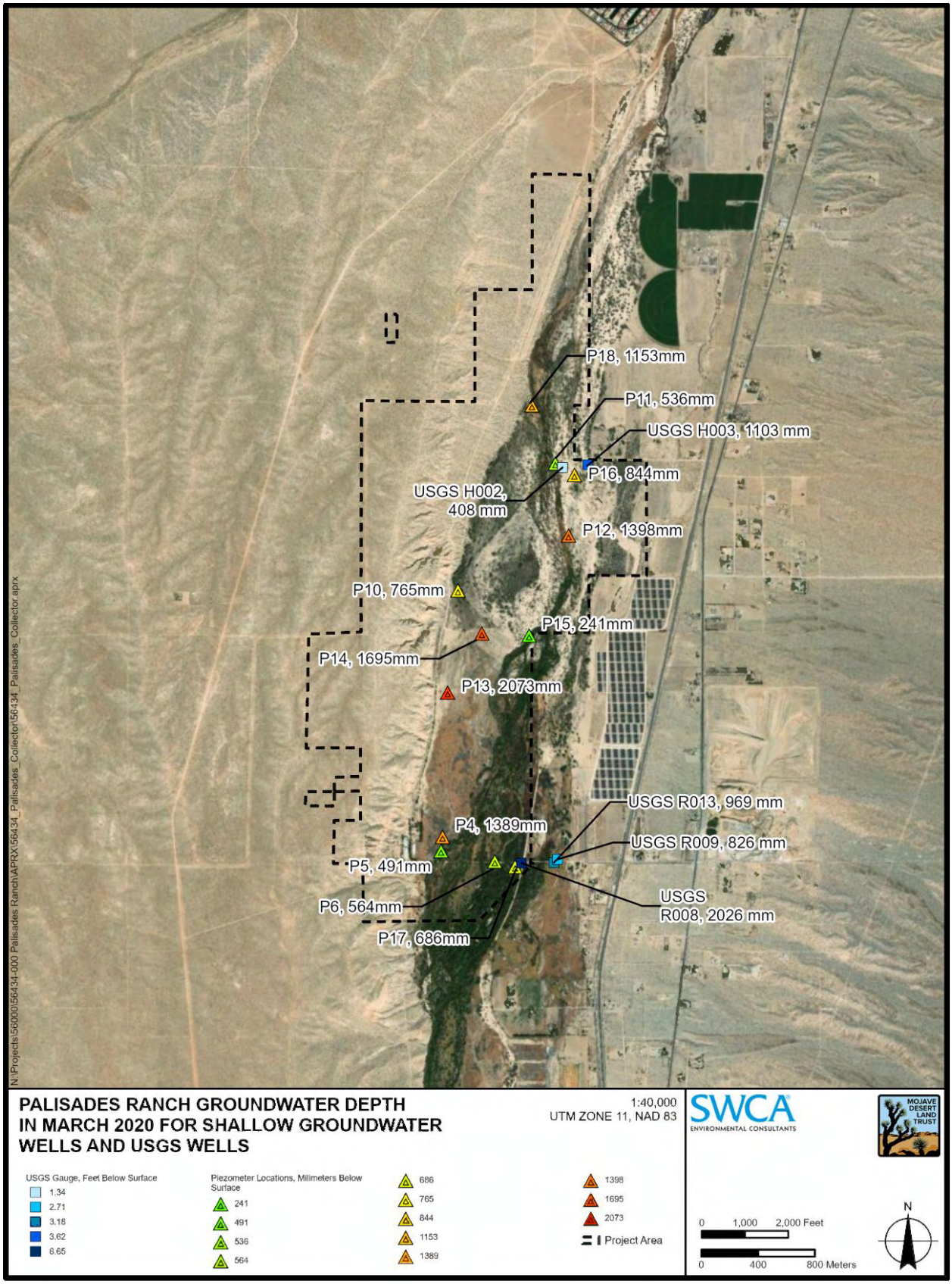

Figure 9. USGS groundwater wells and SWCA-installed piezometers within the Property.

2.5.4 *Hydrogeology*

The southern boundary of the Alto TZ begins at the Lower Narrows, where groundwater is forced to the surface as the Mojave River flows through a bedrock constriction. The northern limits of the TZ are controlled by the Helendale fault, where basement rock protrudes quartz monzonite at the downstream boundary of the TZ. The TZ consists of a deep Regional aquifer underlying a relatively shallow Floodplain aquifer. The Floodplain aquifer is composed of the older alluvial deposits located between the exposed bedrock outcrops. The Floodplain aquifer is approximately 21 meters (70 feet) thick at the Lower Narrows and 91 meters (300 feet) thick near Helendale (Appendix B). The floodplain aquifer at the Property is approximately 76 meters (250 feet) thick. The Floodplain aquifer is generally as wide as the Mojave River floodplain with aquitards that restrict flow within the Floodplain aquifer. These aquitards are subsurface clay lenses that force groundwater towards the surface supporting the denser riparian vegetation areas in the TZ. These clay lenses were likely finer materials deposited in backwater areas during Holocene-period flood events and are localized and discontinuous across the Floodplain aquifer.

The Regional aquifer generally provides groundwater to the Floodplain aquifer in the TZ. A constriction in the Regional Aquifer near the center of the TZ elevates water levels and recharges the Floodplain aquifer (United Research Services, Inc. 2003). Between the Mojave River Narrows and the Regional Aquifer constriction, there is generally an upward gradient of groundwater from the deep zone (Regional aquifer) to the shallow zone (Floodplain aquifer).

Upstream of the Helendale fault, the groundwater gradient reverses; there is a small vertical groundwater gradient from the Floodplain aquifer to the Regional aquifer indicating a potential recharge from the Floodplain aquifer to the Regional aquifer (United Research Services, Inc. 2003). Based on historical aerial imagery and interpretation of the active channel, it appears this zone of recharge from the Floodplain aquifer to the Regional aquifer occurs in Palisades Ranch. A relic island dissects the Mojave River Channel near this area of groundwater gradient change. Aerial imagery and groundwater wells data suggest this location is approximately where perennial surface flow in the Mojave River becomes intermittent and flows become subsurface.

2.5.5 *Fluvial Geomorphology*

The Mojave River at Palisades Ranch is a sand bed channel incised among older Holocene alluvial deposits. These older alluvial deposits make up the underlying Floodplain aquifer that supports perennial flow in the Property. The morphological character of the Mojave River is predominately a single thread sand bed channel with an irregular planform and low sinuosity, with some bifurcation of the active channel. During flood events the sand bed channel spreads flows across the floodplain and changes to a braided channel form with multiple flow paths across the floodplain. The natural sinuosity is low (measured as 1.1), and a radius of curvature of 366 meters (1,200 feet) is measured at relic land scars across the valley. These older land scars show a broad active sand bed channel that likely braided across the entire 1,067-meter (3,500-foot) wide historic valley floor. Over time agricultural developments reduced the floodplain width to approximately 610 meters (2,000 feet) wide riparian corridor at Palisades Ranch

Major morphological adjustments of the Mojave River are controlled by channel avulsion (i.e., channel abandonment and reformation) and changes associated with the flood flow sinuosity, and allocation of flow and bedload across the floodplain. Planform adjustments occur when the channel is no longer able to transport bedload within the active channel and it becomes easier to mobilize finer loose deposits and form other channels or maximize stream power by forming a cutoff to transport bedload. The flashy flood

flow hydrologic character of the Mojave River is prone to carry debris and commonly form debris jams which cause bifurcations, secondary channels, and natural channel adjustments across the floodplain. The ability of annual high flows to spread out across the floodplain is an important process to transport seeds to promote vegetation recruitment to colonize at deposits and along secondary channels.

2.5.6 *Historical Aerial Photograph Analyses*

Aerial imagery from 1929 to present was evaluated to observe morphological changes to the Mojave River floodplain at the Property (Appendix C). According to historical aerial photographs, the Mojave River at Palisades Ranch is a single thread channel with some bifurcation in the main channel. By 1929 the Mojave River watershed, floodplain, and channel had been modified by humans, and the single-thread channel could have been created by these early modifications. As Cluer and Thorne (2014) have hypothesized for alluvial river systems, the Mojave River could have been an extensive, multi-thread channel prior to human disturbance. Relic channel scars outside of the Property depict a broad alluvial system with multiple threads. During the January 2020 geomorphic survey, coarser deposits were noted in the elevated secondary channels, indicating that scour and transport of finer materials from high-flow events are still able to reach these secondary channels outside the riparian area (Figure 10).

Figure 10. Perched secondary channel in the floodplain.

Aerial images from 1929 to present were evaluated to understand the geomorphic stability of the reach (Table 8). Historical channel adjustments were predominantly controlled by agriculture development in the 1950s, narrowing the floodplain to maximize agricultural production. Other anthropogenic impacts were channelization of the main channel and the installation of a flood control levee in the 1970s. The Mojave Forks Dam and Silverwood Lake reservoir were constructed in 1971 (see Chapter 2.5.1), attenuating flood flows and reducing flood flow magnitude. After construction of the Mojave Forks Dam, the mainstream became less sinuous, and vegetation started encroaching the channel. The channel width narrowed from approximately 99 meters (325 feet) wide in 1929, to approximately 56 meters (185 feet)

in 1994, to approximately 14 meters (45 feet) in 2019. Anthropogenic impacts from reduced flows and channelization exacerbated channel incision and disconnected the baseflow channel from its historic floodplain. The predominant main channel has moved across the floodplain throughout time; however, the main channel is prone to flow along the east side of the floodplain at Heritage Road (Figure 11).

Aerial imagery is not available between the years of 1994 and 2005. The high flood event of 680 cms (24,000 cfs) (USGS 10261500) in 1998 likely caused channel adjustments. Between the years of 1994 and 2005, several secondary channels formed across the floodplain. Significant channel adjustments are observed after the high-flow event of 589 cms (20,800 cfs) in 2005. The 2005 flood event caused the Heritage Road bridge to fail and the Mojave River abandoned the 1970s channelized alignment. The 2005 flood flow caused the channel to reposition the thalweg against the east flank non-certified levee and self-restore some meander planform to its historic radius of curvature. The sinuosity of the 1971 alignment is approximately 1.0; after the 2005 flood event the sinuosity is approximately 1.1. The Mojave River is 213 meters (700 feet) longer than the 1970s channelized alignment in the Property due to increased sinuosity. Upstream of Palisades Ranch, the Mojave River is incised and runs along the west bluffs. The natural tendency of the channel at the upstream extents is to dissipate flood flow energy by sinuating the flood wave from the west side bluffs to the east side of the floodplain flowing against the toe of the ineffective levee. The scoured-out channel along the levee is now the baseflow channel and the thalweg runs along the levee at the upstream extents of the project area (see Figure 11).

Over the past several years, beavers have moved into the project area, influencing the geomorphology of the Mojave River and floodplain functions. Beaver activity is gradually changing the Mojave River at Palisades Ranch to be less of a single thread channel and become a multi-thread braided channel. Today, the baseflow channel appears to be near the 2005 alignment; however, there are more bifurcations in the main channel and active secondary channels. Beaver dams have created backwater areas, which are reducing the slope of the channel and actively perching the channel back up to its historic floodplain elevation. The Mojave River is no longer incised at Palisades Ranch and flows are spreading out across the 762-meter (2,500-foot)-wide floodplain more frequently. The secondary channels are inundated with greater frequency and supporting riparian regeneration. Beaver activity is restoring the valley floor by raising the groundwater conditions, activating the secondary channels with greater frequency, and benefiting floodplain habitats.

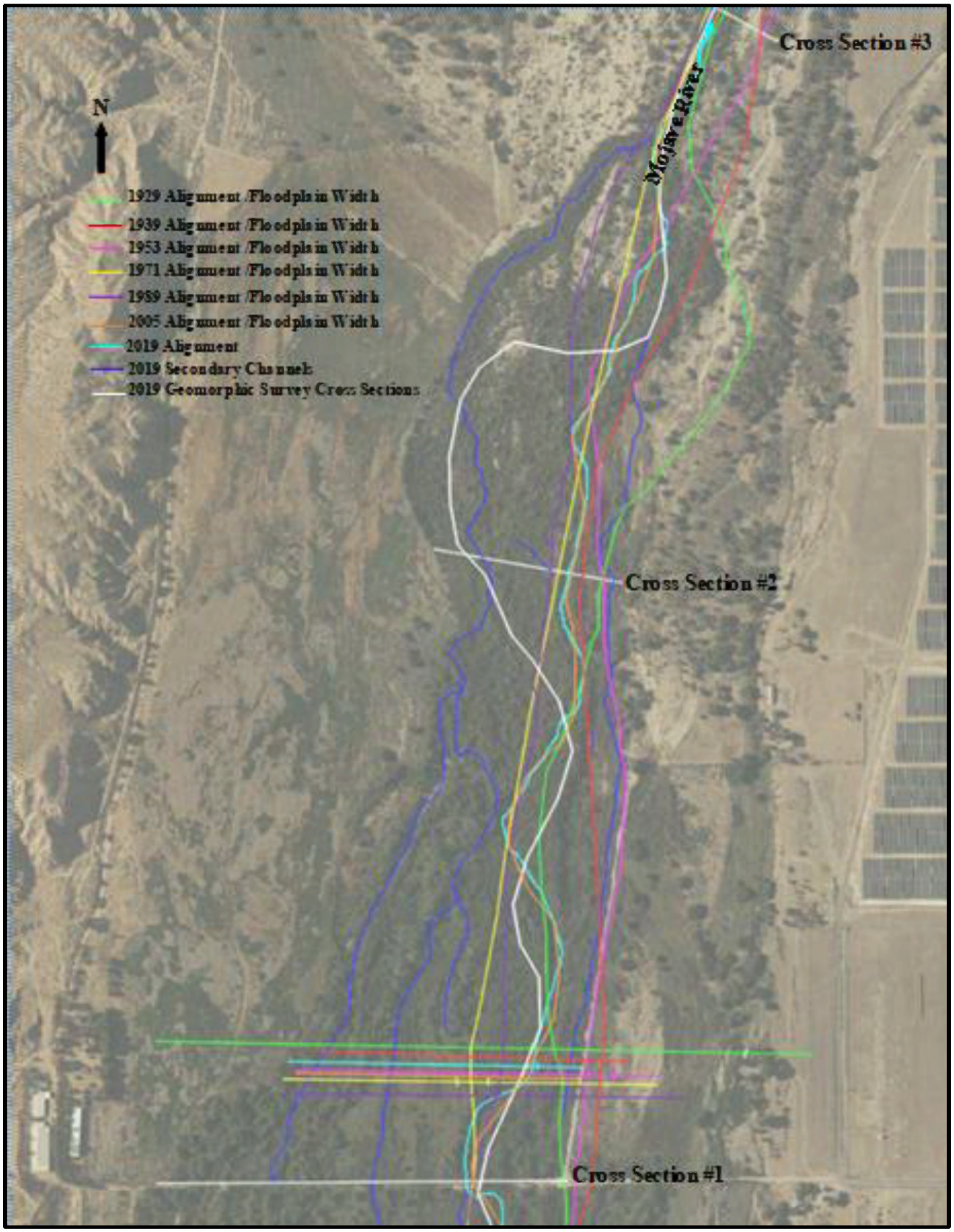

Figure 11. Aerial photograph of the Property showing channel alignment at select years.

Table 8. Historical Aerial Photograph Analysis Interpretation

Year	Floodplain Width (foot)	Channel Width (foot)	Description
1929	3,500	325	The Mojave River is a single thread channel with a broad floodplain that expands the alluvial valley floor. Upstream of the Property, channel alterations and channelization may have occurred. The channel is a single thread channel that flows along the east flank of the floodplain at Heritage Road. There are evident high flow paths and escarpments across the floodplain.
1939	1600	280	The Mojave River is a single thread channel flowing at the east edge of the floodplain against an agricultural field. The floodplain has been narrowed to 488 meters (1,600 feet) with agricultural developments on the east side of the floodplain, with a small field on the west side.
1952	1,800	280	The Mojave River is a single thread channel with less sinuosity and slight shifting to the east side of the floodplain. The agricultural field has completely developed the west side of the floodplain. Agriculture development has expanded both the west and east sides of the floodplain and valley floor.
1972	1,800	250	Aerial imagery of 1972 shows a single thread channel with the alignment continuing to shift towards the east side of the floodplain at Heritage Road crossing. In 1969 a side channel appears to have been dredged to route flow left of a high point bar and realign the main channel to the location of the future bridge crossing at Heritage Road. In 1971 the entire reach at Palisade Ranch was channelized and straightened.
1978			Between the years of 1971 and 1978, a flood control levee was constructed by SBCFCD along the east side of the floodplain. The levee is about 549 meters (1,800 feet) upstream and 610 meters (2,000 feet) downstream of Heritage Road. The Mojave River remains a single-thread channel in the dredged, channelized alignment with evident overbanking flows on the east of the high point bar. The point bar is becoming more vegetated and forming an island between the dredged main channel and forming a high flow channel along the flood control levee at east side of the floodplain.
1989		214	A bridge is constructed at Heritage Road crossing. The Mojave River remains within the 1971 dredged alignment with evident scour and high flow pathways along the flood control berm.
1994		185	The Mojave River remains within the 1971 dredged alignment. The channel has narrowed, and mature vegetation is becoming more established on point bars.
2005		85	In 2005 the high-flow event of 578 cms (20,400 cfs) caused the Mojave River to abandon the 1971 channelized alignment and reposition the thalweg to run along the flood control levee at the east flank of the floodplain. The thalweg scoured the left of the bridge abutment causing failure of the crossing. The channel planform adjusted to a more historical alignment restoring some meander bends to a 365 radius of curvature to a more meandering planform. The mainstem of the Mojave River avulsed to the high flow channel along the flood control berm. The left bank of the bridge was washed out.
2006		85	The Mojave River flows remains in the 2005 avulsed alignment along the flood control berm. Vegetation continues to encroach the low flow channel. Wetlands and ponds are formed in hydrologically connected segments of the 1971 channelized alignment. The Heritage Road bridge crossing is repaired.
2013		50	The Mojave River is significantly encroached by vegetation and multiple wetlands and ponds are forming in scoured pockets across the floodplain. The Heritage Road bridge is dilapidated and abandoned.
2018		45	The Mojave River base flow channel appears to be near the 2005 alignment; however, secondary channels are more active. There are multiple high flow channels and a network of smaller flow paths across the floodplain. Vegetation encroachment makes it difficult to determine the base flow channel alignment. Small perennial ponds are located in the 1971 dredged channel, and in the older secondary channel scoured flow paths. The channel is completely encroached by cattails and debris jams making it difficult to determine the single thread flow path in some areas.

Note: Channel width measured 183 meters (600 feet) downstream of Heritage Road crossing. See Appendix C for 1929, 1939, 1952, 1972, 1983, and 2018 photographs.

2.5.7 *Geomorphic Survey*

In January 2020, SWCA conducted a reconnaissance geomorphic survey of the Property reach using a survey-grade global positioning system (GPS). Cross-section and longitudinal surveys were limited due to tree canopy height, thick cattail growth in the main channel, deep water conditions, and limited time for field efforts (Figure 12). The floodplain was difficult to traverse due to thick riparian vegetation and debris. The longitudinal profile of the channel and exact position of the thalweg was difficult to determine due to beaver dams, thick vegetated channel, and shifting channels between sandbars. Accumulated flood flow debris strung around mature vegetation was measured 1.2 to 1.5 meters (4 to 5 feet) above the thalweg in several locations (Figure 13). Accumulated debris exacerbated plugging of the main channel and shifting the flow paths of the sand bed channel. Beaver dams created overwide channel sections and deep pools that were too deep to traverse by foot and too thick with cattail growth for bathymetric survey.

Beavers have been opportunistic by building dams strategically placed between elevated sand deposits, plugging the perched secondary channels with wood to create wet meadows to farm willows on sand bars. Several beaver dams were surveyed during the reconnaissance geomorphic field investigations. The average vertical drop height of surveyed beaver dams is 0.5 meters (1.5 feet), and lengths ranged from 7.6 to 47.2 meters (25 to 155 feet). The channel pool depths behind beaver dams were beyond our survey capabilities without a boat. The Mojave River flow was approximately 0.7 cms (25.6 cfs) at the time of survey. The Mojave River Lower Narrows gage station in Victorville (USGS 10261500) measured 0.4 cms (13.3 cfs) on January 14 and 15, 2020, and the Victorville Valley Wastewater Reclamation authority (VVWRA) discharged approximately 0.4 cms (12.4 cfs) minimum flow. Beaver activity elevated the water surface conditions, and the floodplain was saturated with several active flow paths during the time of survey. The entire floodplain was saturated with water measured at the surface from the west side of the floodplain at the toe of the agricultural field, to the east side of the floodplain at the toe of the non-certified levee.

Figure 12. Main Mojave River channel from Heritage Road bridge.

Figure 13. Accumulated flood flow debris pile.

Three cross-sections were traversed across the floodplain during the reconnaissance geomorphic survey. The 2018 LiDAR data (USGS LiDAR San Bernardino County, CA) was augmented with geomorphic survey data to develop representative cross-sections across the floodplain. Cross-section #1 is located at the Heritage Road crossing (Figure 14). Beavers have built a dam immediately upstream of the bridge, with a dam height of 764.6 meters (2,508.5 feet), and a 2-meter (6.5-foot)-deep pool in the 1971 channel alignment. The channel shifts from the east side of the floodplain and flows through the concrete bridge abutments with some flow on the east side of the abutment. Cross-section #1 depicts the multiple flow paths across the floodplain and the elevated water surface conditions due to the multiple beaver dams between sand bars. At cross-section #1 beaver dams were surveyed immediately upstream of the bridge crossing and the east side of the bridge, at station 500, and at station 1200.

Cross-section #2 is located near the middle of the agricultural field (Figure 15). Like cross-section #1, beavers had built dams across the 1971 dredged channel near station 700 creating a deep pool behind the beaver dam. Car bodies with a debris jam were surveyed near the toe at the east side of the floodplain.

Cross-section #3 is located where the Mojave River conforms back to a single thread channel (Figure 16). Cross-section #3 is approximately 2.1 km (1.3 miles) downstream of the Heritage road bridge crossing. Beavers had built a dam across the incised channel immediately upstream of cross-section #3. Cross-section #3 is partially incised due to the 1971 channelization and is entrenched for this type of system with an entrenchment ratio (ER) of 2. The upstream segments are not entrenched reflecting the healthy response to beaver activity. The beaver dams have put flows back up on the floodplain by damming the incised channel segments, reducing the slope and energy grade at high flows, creating backwater conditions, and promoting vegetation growth and roughness across the floodplain. Aggradation of fine sediments behind beaver dams was not evident during the time of survey. The sand bed channel did not have riffle or dune features, but rather was mostly vegetated with limited segments of a clean uniform sand bottom channel (Figure 17). The approximate reach slope is 0.003 ft/ft.

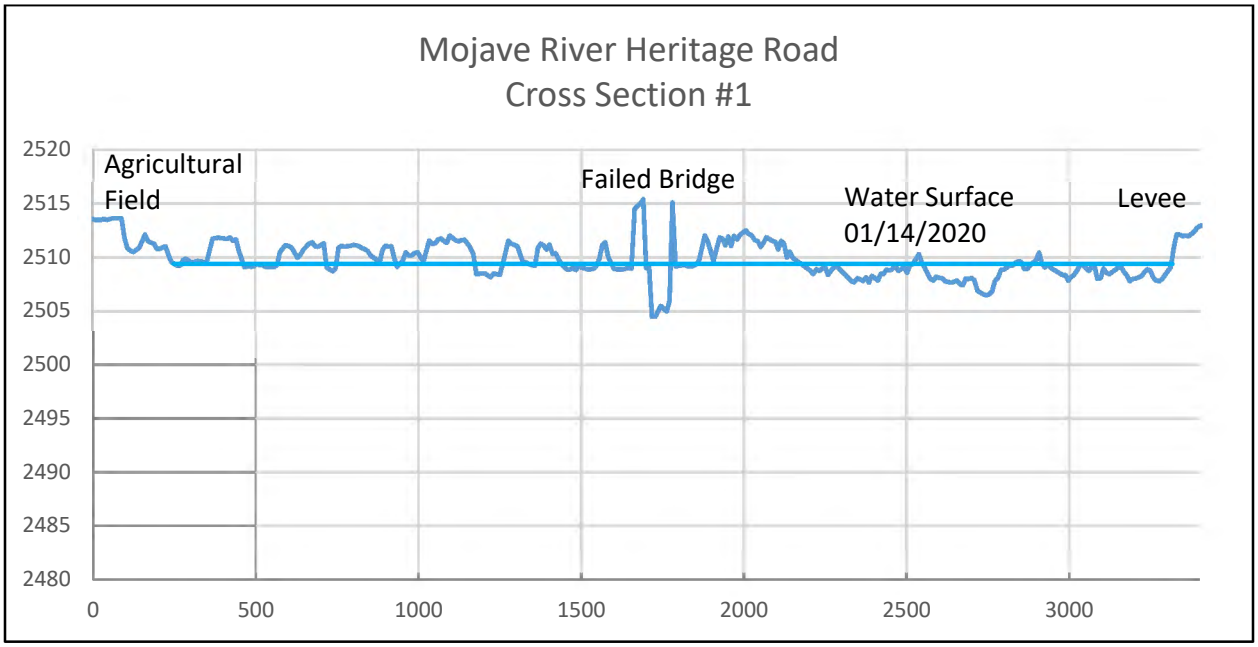

Figure 14. Palisades Ranch reconnaissance cross-section #1 located at River Station 8749 (see Figure 5).

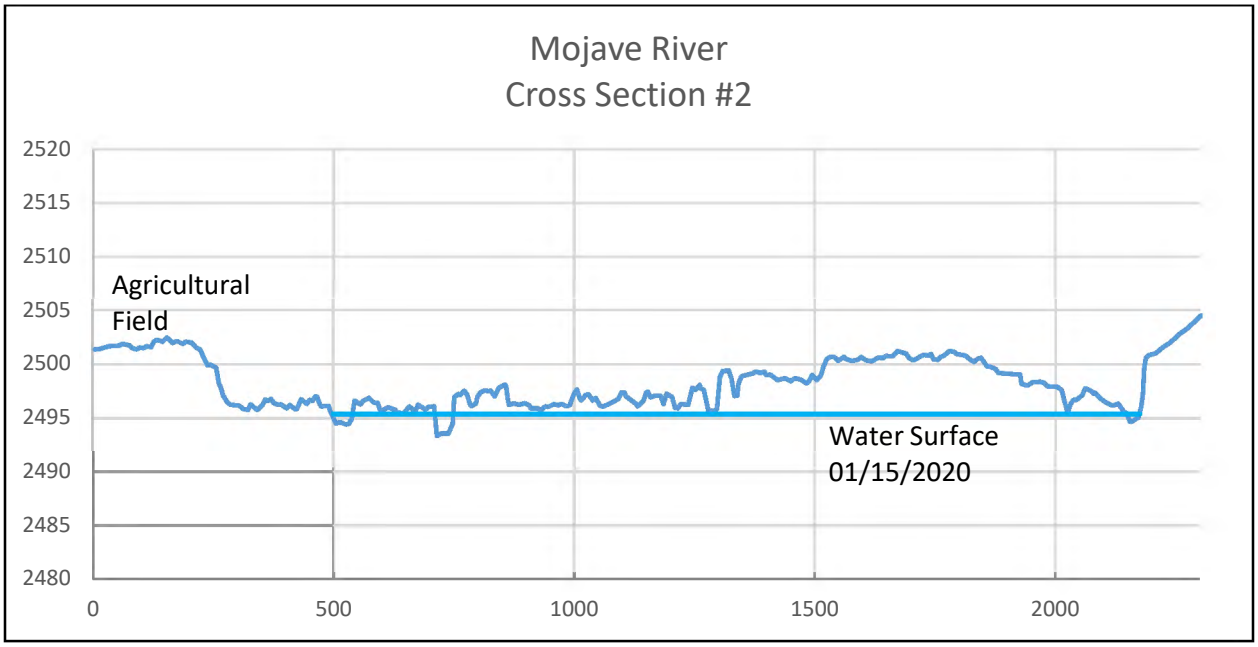

Figure 15. Palisades Ranch reconnaissance survey cross-section #2 located at River Station 5184 (see Figure 5).

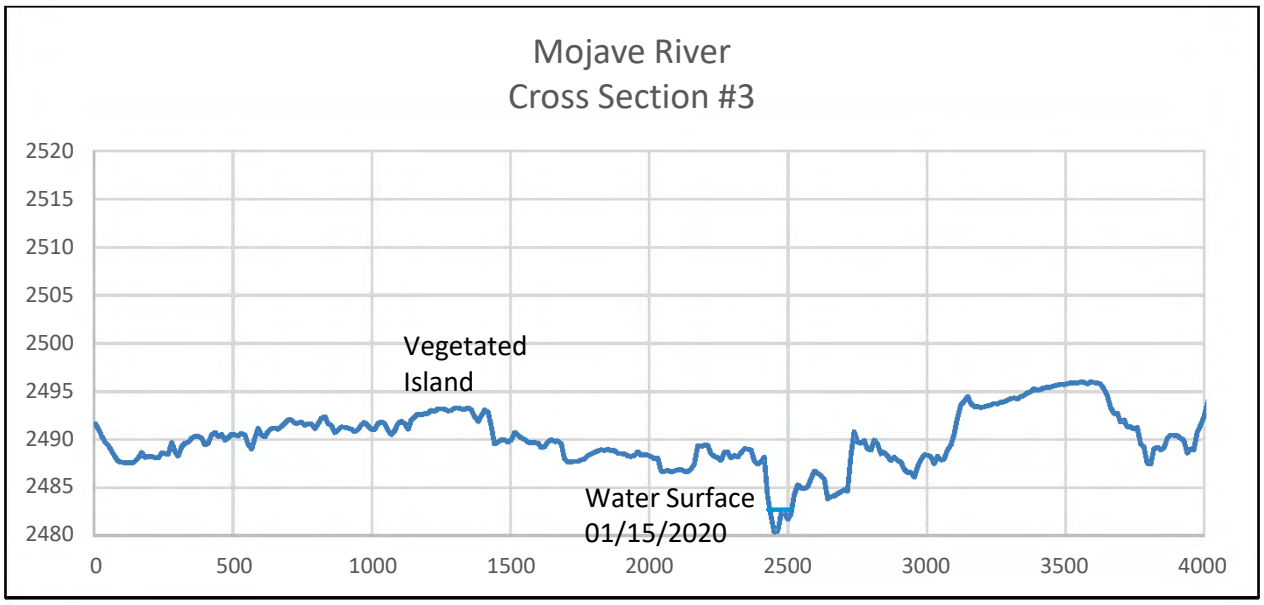

Figure 16. Palisades Ranch reconnaissance survey cross-section #3 located at River Station 1520 (see Figure 5).

Figure 17. Photograph looking upstream at the beaver dam and the confluence of the main channel (right) and the high flow channel (left).

2.5.7.1 ROLE OF DISTURBANCE

Fluvial geomorphic processes that are driven by flood disturbance create the template for aquatic and riparian biodiversity which, in turn, alters the response of fluvial landforms to future flood disturbance. For example, flood deposition of a sandbar creates bare sediment where early successional plants (e.g., willows, cottonwoods) can establish. If these plants persist for 15 years or more without a flood scouring the sandbar, future floods will be ineffective at removing vegetation, which could cause channel incision. River regulation in the form of dams, diversions, and inter-basin water transfers alter disturbance regimes (flood frequency, magnitude, timing, and duration) and change the distribution and abundance of fluvial landforms and riparian plants and animals. Floods in the Mojave River at the Property diminished significantly after construction of the Mojave Forks Dam which has allowed riparian vegetation to expand as depicted by historical aerial imagery (see Chapter 2.5.6). Future floods capable of scour and erosion will therefore need to be of higher magnitude to uproot riparian plants, and long-term persistence of early successional riparian plants requires forces of erosion or deposition to maintain ecosystem integrity. Other types of disturbance may play this role in the future along regulated rivers such as the Mojave River.

River regulation increases fire frequency and intensity in riparian ecosystem due to increased fuel loads. Currently, wildfires along the Mojave River are not common. According to LANDFIRE (2016) data there is no documentation of wildfire within the boundaries of the Property from 1999–2016. In 2011, disturbance in northern abandoned agricultural field classified as “unknown” by LANDFIRE but appears to be a burn based on satellite imagery and evidence of burn during field surveys in 2020. Most wildfires in the upper Mojave River Basin occur in the San Bernardino Mountains, although in 2002 a 32-acre wildfire burned the Mojave River floodplain near Helendale and Silver Lakes (California Department of Forestry and Fire Protection 2020). However, the Mojave Desert Resource Conservation District noted increasing concern about the probability of wildfires, particularly in reference to abandoned agricultural fields along the Mojave River dominated by prickly Russian thistle. Controlled burns should be considered for enhancement of the riparian zone, especially if future floods are not large or frequent enough to create erosional or depositional surfaces.

The historic, dominant land use of the upper Mojave River Basin has been agriculture and ranching. The first ranchers grazed sheep, and farmers cultivated the fertile floodplain bottom lands with alfalfa and other crops. The desire to prevent floods from washing away fields led to floodplain management actions in 1969 (river channelization), 1971 (dam construction and major channelization of Mojave River in the Property), and in the mid-1970s (construction of flood control maintenance berm on east side of the floodplain). In 2010 a 170-acre agricultural field on the west side of the Palisades Ranch floodplain was abandoned. Other landowners within the upper Mojave River Basin are selling water rights and abandoning agriculture. The restoration of these fields will be required to minimize invasive plant monocultures that may also threaten the Mojave River.

This expansion of riparian vegetation at the Property, especially willows and cottonwoods, has allowed colonization by beavers and construction of beaver ponds, creating a positive feedback whereby riparian vegetation expands further as water spreads out along the floodplain. Beaver dams have shaped the upstream stretch of the Mojave River through the Property, first allowing channel avulsion and more recently creating a multi-thread channel (refer to Chapter 2.5.5) and have alleviated some of the negative effects of channelization. Beavers are discussed more in Chapter 3.5.5.

3 BIOLOGICAL ENVIRONMENT

The diverse nature of the aquatic and riparian ecosystems associated with the Mojave River at Palisades Ranch suggest that the ecological integrity of this area is high, especially in the south half of the Property. SWCA documented diverse plant and bird communities within Palisades Ranch; examined the distributions, conservation status, and habitat requirements of other special-status taxa dependent on riparian or aquatic ecosystem occurring or thought to occur within the Property; and designated umbrella species for the purposes of enhancement and restoration design.

3.1 Riparian Vegetation

SWCA conducted riparian vegetation mapping in January 2020 to support restoration planning efforts and further our understanding of the ecology of riparian plant species in this area. We also mapped noxious weeds for this purpose and to support future weed management actions. We will use these data for revegetation planning to predict what species will be most suitable to plant following river restoration implementation.

3.1.1 *Methods*

3.1.1.1 PATCH-LEVEL VEGETATION MAPPING

Botanist Ian McCowen and ecologist Sarah Epstein completed pedestrian surveys for the patch-level vegetation mapping on January 18–23, 2020. Seven transects were mapped using Collector for ArcGIS by ESRI on a Samsung Galaxy Tab Active2 coupled with a Geode GPS receiver. Transects were located within the riparian zone and oriented west to east, intersecting the Mojave River. Transects were selected based on the visual heterogeneity of the riparian zone as observed through spatial imagery and spaced approximately 550 meters (1,800 feet) apart.

While conducting the pedestrian surveys, biologists used spatial imagery to delineate visually distinct vegetation patches with a minimum mapping unit of 10 by 10 meters (33 by 33 feet) and identified all major plant species within. Once identified, a canopy cover class from 1–6 (1 = 0%–5%, 2 = 6%–25%, 3 = 26%–50%, 4 = 51%–75%, 5 = 76%–95%, and 6 = 96%–100%) was estimated for each species. Each vegetation patch was photo-documented using a Nikon Coolpix W300 GPS enabled digital camera. The biologists walked together along the same transect and observed either north or south to avoid overlap. Each vegetation patch was mapped to the greatest visual extent possible and varied depending on vegetation density and species richness.

The mapped polygons were used as training data to digitize the Palisades Ranch riparian area vegetation based on the dominant overstory taxa. The following vegetation classes were defined and digitized across the riparian zone of Palisades Ranch: 1) big saltbush / fourwing saltbush (*Atriplex lentiformis* / *Atriplex canescens*), 2) mulefat (*Baccharis glutinosa*) (now *Baccharis salicifolia*), 3) American licorice (*Glycyrrhiza lepidota*), 4) perennial pepperweed (*Lepidium latifolium*), 5) Fremont cottonwood (*Populus fremontii*), 6) screwbean mesquite (*Prosopis pubescens*), 7) narrow-leaf willow (*Salix exigua*), 8) red willow (*Salix laevigata*), 9) prickly Russian thistle (*Salsola tragus*), and 10) broadleaf cattail / chairmaker's bulrush / hardstem bulrush (*Typha latifolia* / *Schoenoplectus americanus* / *Schoenoplectus acutus*) (Table 9). ESRI World Imagery, a normalized difference vegetation index derived from NAIP imagery, U.S. Fish and Wildlife Service National Wetlands Inventory maps, and high-resolution drone imagery provided by the Center for Transformative Environmental Monitoring were all used to digitize and classify polygons.

3.1.1.2 NOXIOUS WEEDS AND SPECIAL-STATUS PLANTS

Noxious weeds were mapped concurrently with patch-level vegetation mapping. Infestations that had 10 individuals or more were mapped with a polygon feature, while infestations with nine or less were mapped with a point feature. Due to the density and distribution of perennial pepperweed (*Lepidium latifolium*) within the riparian area, mapping of this species was completed using spatial and aerial imagery.

Special-status plants were not mapped, as most special-status plant species that occur within Palisades Ranch are located outside of the riparian area. Furthermore, surveys were conducted in winter outside of the phenological optimum of most special-status plants. A plant survey was conducted in May 2020 by the California Botanical Garden (formerly Rancho Santa Ana Botanical Garden) to identify special status plant species on the Property. A final survey is proposed for Spring 2021, and a final report summarizing results of the surveys will be prepared in April 2021.

3.1.2 *Results*

3.1.2.1 PATCH-LEVEL VEGETATION MAPPING

Within the riparian corridor, 336 hectares (831 acres) were mapped with 10 dominant taxa classes and one unvegetated class (Figure 18, Table 9). Out of the 10 dominant taxa classes, seven are represented within vegetation alliances as described by the International Vegetation Classification system developed by NatureServe (2020). The remaining three are unique or invasive taxa not typically represented within North American vegetation alliances. The unvegetated class has sparse vegetation without a dominant species and is typically found on large sandbars within the Property. The vegetation map depicts bands of establishment oriented along the Mojave River that indicate successive years of establishment along past and present river channel alignments. Species codes, vegetation alliance, and total area are provided in Table 9. A list of identified plants is provided in Table 10.

3.1.2.2 NOXIOUS WEEDS AND SPECIAL-STATUS PLANTS

Prickly Russian thistle (*Salsola tragus*) is the most abundant noxious weed present within the Property and dominates 66 hectares (164 acres), primarily within the abandoned agriculture field (Figure 18). Perennial pepperweed (*Lepidium latifolium*) dominates 17.8 hectares (44 acres) and also occurs in many mixed stands throughout the Property (Figure 19). Perennial pepperweed varies in density throughout the Palisades Ranch riparian corridor and is more common in sites with saturated soils and partial shade. Other noxious weed species observed include giant reed (*Arundo donax*) and tamarisk (*Tamarix ramosissima*). Thirty-six points and 10 polygons were mapped that contained giant reed. Giant reed infestations were more localized to areas with higher soil saturation, and commonly found near an active channel. Fifty-six points and 8 polygons were mapped that contained tamarisk. While tamarisk occur near active channels, most plants were identified along sandbars. It is important to note that only noxious weeds that were observed on foot were mapped. This was due to high vegetation density, challenges with deep water, and large project footprint. As such, additional locations of the observed noxious weeds may be present within the Property.

Preliminary results of the May 2020 plant survey performed by the California Botanical Garden identified Mojave Desert fishhook cactus (*Sclerocactus polyancistrus*; California Rare Plant Rank 4.2) on the Property. A single individual was identified during the survey in upland desert scrub dominated by creosote bush (*Larrea tridentata*) and burrobush (*Ambrosia dumosa*), west of the riparian restoration project area. Though outside the project area, this project would benefit Mojave Desert fishhook cactus by reducing potential threats to its habitat; namely by managing invasive species within the riparian corridor

and restoring the agricultural field to riparian habitat. No special status plant species were identified within the riparian restoration project area.

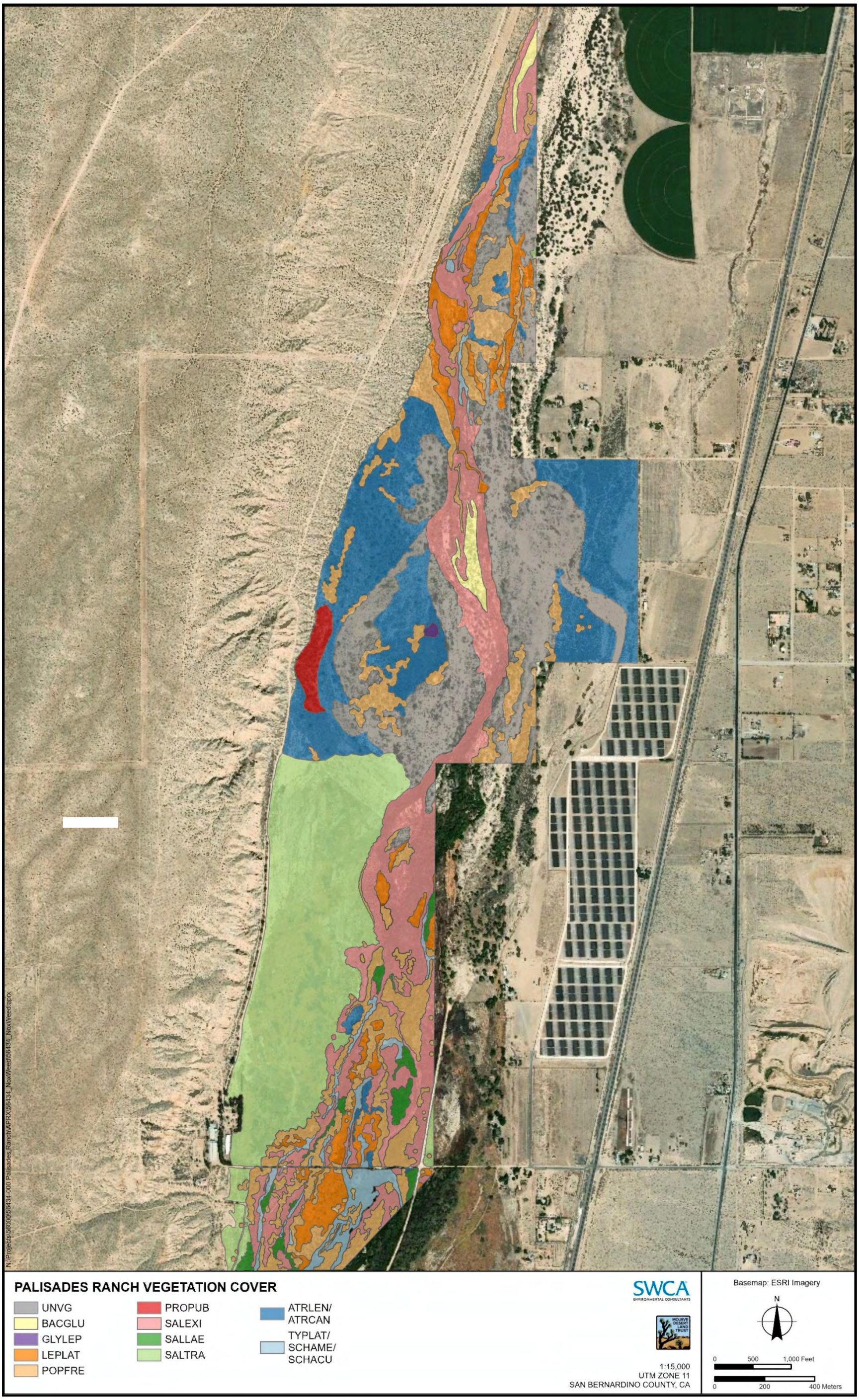

Figure 18. Palisades Ranch riparian vegetation map based on dominant overstory taxa.

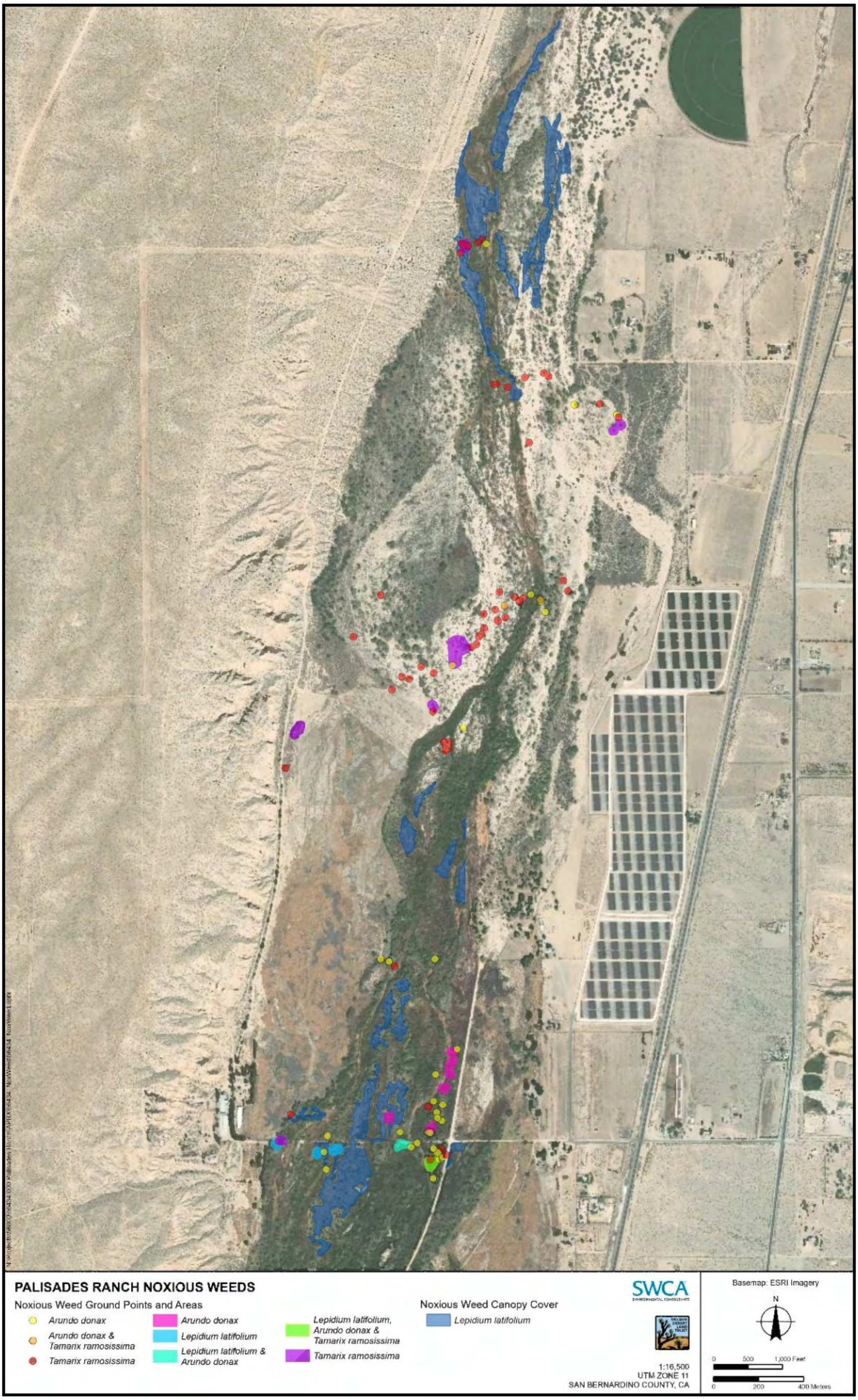

Figure 19. Palisades Ranch riparian noxious weeds map.

Table 9. Vegetation Alliance Descriptions

Species Code	Total Area (hectares/ acres)	Vegetation Alliance	Alliance Description
ATRLEN / ATRCAN	61/150	*Atriplex lentiformis* (big saltbush) Wet Shrubland Alliance	The dominant or codominant shrub is *Atriplex lentiformis* in association with *Artemisia californica, Atriplex canescens, Baccharis pilularis, Baccharis salicifolia, Encelia californica, Bassia americana, Malosma laurina, Myoporum laetum, Pluchea sericea, Prosopis glandulosa, Rhus integrifolia, Suaeda taxifolia*, and *Tamarix* spp.
BACGLU	3.2/8	*Baccharis salicifolia* (mule-fat) Wet Shrubland Alliance	This alliance includes riparian shrublands dominated by *Baccharis salicifolia* (formerly *Baccharis glutinosa*). *Salix gooddingii* may be an emergent tree at low cover in some stands. Other associated species can include shrubs such as *Artemisia californica, Baccharis emoryi, Baccharis neglecta, Baccharis pilularis, Malosma laurina, Nicotiana glauca, Pluchea sericea, Prosopis glandulosa var. glandulosa, Rubus* spp., *Salix exigua, Salix lasiolepis*, and *Sambucus nigra ssp. canadensis*.
GLYLEP	0.4/1	N/A	The dominant species is *Glycyrrhiza lepidota.* While no community/alliance exists for this species, it is inset within the *Atriplex lentiformis* Wet Shrubland Alliance.
LEPLAT	17.8/44	N/A	The dominant species is *Lepidium latifolium.* While no community/alliance exists for this species, it is a major dominant weedy species within the Property.
POPFRE	48/119	*Populus fremontii* (Fremont cottonwood) Great Basin Riparian Forest Alliance	This alliance contains riparian woodlands dominated by *Populus fremontii*. Individuals of *Populus fremontii* are scattered or occur in groves and may reach 30 meters in height and 2 meters in diameter. Other species that may occur in the canopy/subcanopy include *Baccharis salicifolia, Celtis laevigata var. reticulata, Fraxinus berlandieriana, Fraxinus velutina, Juglans microcarpa, Populus deltoides ssp. wislizeni, Prosopis glandulosa, Prosopis pubescens, Prosopis velutina, Salix amygdaloides, Salix exigua, Salix gooddingii*, and *Salix lasiolepis*.
PROPUB	3.2/8		
SALEXI	57.5/142	*Salix gooddingii – S. laevigata* (Goodding's willow – red willow) Riparian Forest Alliance	This alliance consists of riparian woodlands and forests dominated by *Salix gooddingii* and/or *Salix laevigata*, either as single-species stands or as mixed stands. Stands may or may not include *Populus fremontii*, and if they do, it is a minor component relative to dominant overstory canopy species. Shrubs may include *Salix exigua*, *Baccharis emoryi, Baccharis salicifolia, Cornus sericea,* and *Rhus trilobata.*
SALLAE	4/10		
SALTRA	66/164	N/A	The dominant species is *Salsola tragus*. While no community/alliance exists for this species, it is a major dominant weedy species within the Property.
TYPLAT / SCHACU / SCHAME	8.5/21	*Typha domingensis – T. latifolia – Phragmites australis* ssp. *americanus* (southern cattail – broadleaf cattail – common reed) Western Marsh Alliance	This alliance contains stands dominated by native species *Typha angustifolia, Typha domingensis*, and/or *Phragmites australis ssp. americanus* either alone as monotypic stands or in combination with other tall emergent freshwater marsh species. Associated species vary widely; they include many sedges such as *Carex aquatilis, Carex pellita, Carex rostrata*, bulrushes such as *Schoenoplectus acutus, Schoenoplectus americanus*, and *Schoenoplectus heterochaetus*, and broad-leaved herbs such as *Asclepias incarnata, Impatiens capensis, Sagittaria latifolia, Scutellaria lateriflora, Sparganium eurycarpum*, and *Verbena hastata*.
UNVG	66/164	N/A	Sparse vegetation without a dominant species. Typically found within large sandbars within the Property.
Total	336/831	--	--

Source: NatureServe (2020)

Table 10. Observed Plant Species

Species Binomial	Common Name	Status
Achnatherum hymenoides	Indian ricegrass	native
Ambrosia acanthicarpa	Annual bur-sage	native
Ambrosia psilostachya	Western ragweed	native
Ambrosia sp.	Ambrosia species	N/A
Amsinckia tessellata	Fiddleneck	native
Anemopsis californica	Yerba mansa	native
Artemisia sp.	Sagebrush species	native
Arundo donax	Giant reed	non-native*
Aster spp.	Asteraceous species	N/A
Atriplex canescens	Fourwing saltbush	native
Atriplex covillei	Coville's orach	native
Atriplex lentiformis	Big saltbush	native
Atriplex polycarpa	Allscale	native
Atriplex spinifera	Spiny saltbush	native
Baccharis emoryi	Emory baccharis	native
Baccharis salicifolia	Mulefat	native
Bassia hyssopifolia	Fivehorn smotherweed	non-native
Bromus tectorum	Cheat grass	non-native
Carex spp.	Carex species	N/A
Chenopodium sp.	Chenopodium species	N/A
Chrysothamnus nauseosus	Rubber rabbitbrush	native
Cirsium sp.	Thistle species	N/A
Cynodon dactylon	Bermudagrass	non-native
Descurainia pinnata	Tansy	non-native
Descurainia sophia	Flixweed	non-native
Distichlis spicata	Inland saltgrass	native
Eleocharis spp.	Spikerush species	N/A
Elymus triticoides	Beardless wildrye	native
Ephedra nevadensis	Nevada joint-fir	native
Eriogonum pusillum	Buckwheat	native
Eriogonum sp.	Buckwheat species	N/A
Eriodictyon trichocalyx	Hairy yerba santa	native
Glycyrrhiza lepidota	American licorice	native
Juncus spp.	Juncus species	N/A
Lactuca serriola	Wild lettuce	non-native
Lepidium latifolium	Perennial pepperweed	non-native*
Melilotus albus	White sweetclover	non-native
Mentzelia albicaulis	Little blazing star	native
Phragmites australis	Common reed	non-native
Plantago major	Broadleaf plantain	non-native
Polypogon monspeliensis	Rabbitsfoot grass	non-native
Populus fremontii	Fremont's cottonwood	native
Prosopis pubescens	Screwbean mesquite	native
Salix exigua	Narrow-leaf willow	native

Species Binomial	Common Name	Status
Salix laevigata	Red willow	native
Salix lasiolepis	Arroyo willow	native
Salsola tragus	Prickly Russian thistle	non-native*
Schoenoplectus acutus	Hardstem bulrush	native
Schoenoplectus americanus	Chairmaker's bulrush	native
Schismus barbatus	Mediterranean grass	non-native
Tamarix ramosissima	Tamarisk	non-native*
Typha latifolia	Broadleaf cattail	native
Urtica holosericea	Stinging nettle	native
Xanthium strumarium	Cocklebur	native

* Indicates noxious weed listed by the California Department of Food and Agriculture (2020)

3.2 Breeding Birds in Riparian Habitats

SWCA conducted breeding bird surveys in April and July 2020 to support restoration planning efforts and further our understanding of avian distribution and ecology in riparian habitats at the Property. We will discuss avian distribution data as it pertains to vegetation classes or alliances to determine what vegetation types will provide the most benefit to sensitive avifauna following river restoration implementation.

3.2.1 *Survey Methods*

The Draft Land Management Plan for Palisades Ranch (CDFW 2016) notes seven special-status bird species observed on the Property in May 2016, and several other special-status birds known to occur in the general area. Most of these species are strictly associated with riparian habitat. Because management goals for the Property aim to preserve and restore ecological integrity, and to preserve native plant and wildlife communities, particularly in riparian areas, a major focus will be to promote habitat conservation for riparian bird species, the majority of which have suffered regional population declines.

Because riparian ecosystems are a major focus for restoration at the Property, SWCA proposed completion of rapid assessment, grid surveys for breeding birds in riparian habitats. The survey protocol was designed to generally follow the Sonoran Desert Breeding Bird Survey Field Manual for Rapid Surveys (Corman et al. 2012). The goal of these surveys was to first determine what species are currently using the Property and where they are located (see Chapter 1.2). This information was then used to inform management decisions and restoration recommendations on the Property, some which have been incorporated into this document.

To complete the rapid assessment grid surveys, SWCA established 32 grids, each 200 square meters (0.05 acres), in the riparian zone concentrated on the southern half of the Property (Figure 20). Grids were grouped into 8 400-meter square (0.1-acre) plots, each plot consisting of 4 grids. An avian ecologist completed one 4-grid plot per morning, for a total of 8 field days per survey visit. Two survey visits were completed at each plot during the breeding bird season (mid-April–mid-August) to map bird species and record notes on breeding activity, if observed. The avian ecologists conducted surveys during peak bird activity, generally between 30 minutes before sunrise and 11:00 a.m.

At the beginning and end of each rapid assessment grid survey, the avian ecologists recorded general information about the survey, such as plot name, surveyor name, start and stop time, and weather conditions. Surveys were not conducted when wind speeds exceeded 20 km per hour (12 miles per

hour) or during periods of heavy or sustained precipitation. Once a rapid assessment grid survey had commenced, the avian ecologist walked the survey plot and recorded the location(s) for each species within the plot, concentrating on recording special-status species and making a point to walk within 50 meters (164 feet) of every part of the survey plot. For each bird or pair detected, the avian ecologists recorded a point for the initial detection location and updated that point location as higher level breeding behaviors (Table 11) were recorded. Thereby, breeding was confirmed for some species at the Property, while only lower level breeding behaviors (i.e., Pair, Male, Female, Unknown Sex) were recorded for those species that were either migrating through the Property or only using it for foraging activities. Additionally, for special-status species, the avian ecologists recorded multiple locations of an individual or pair to establish approximate territory boundaries.

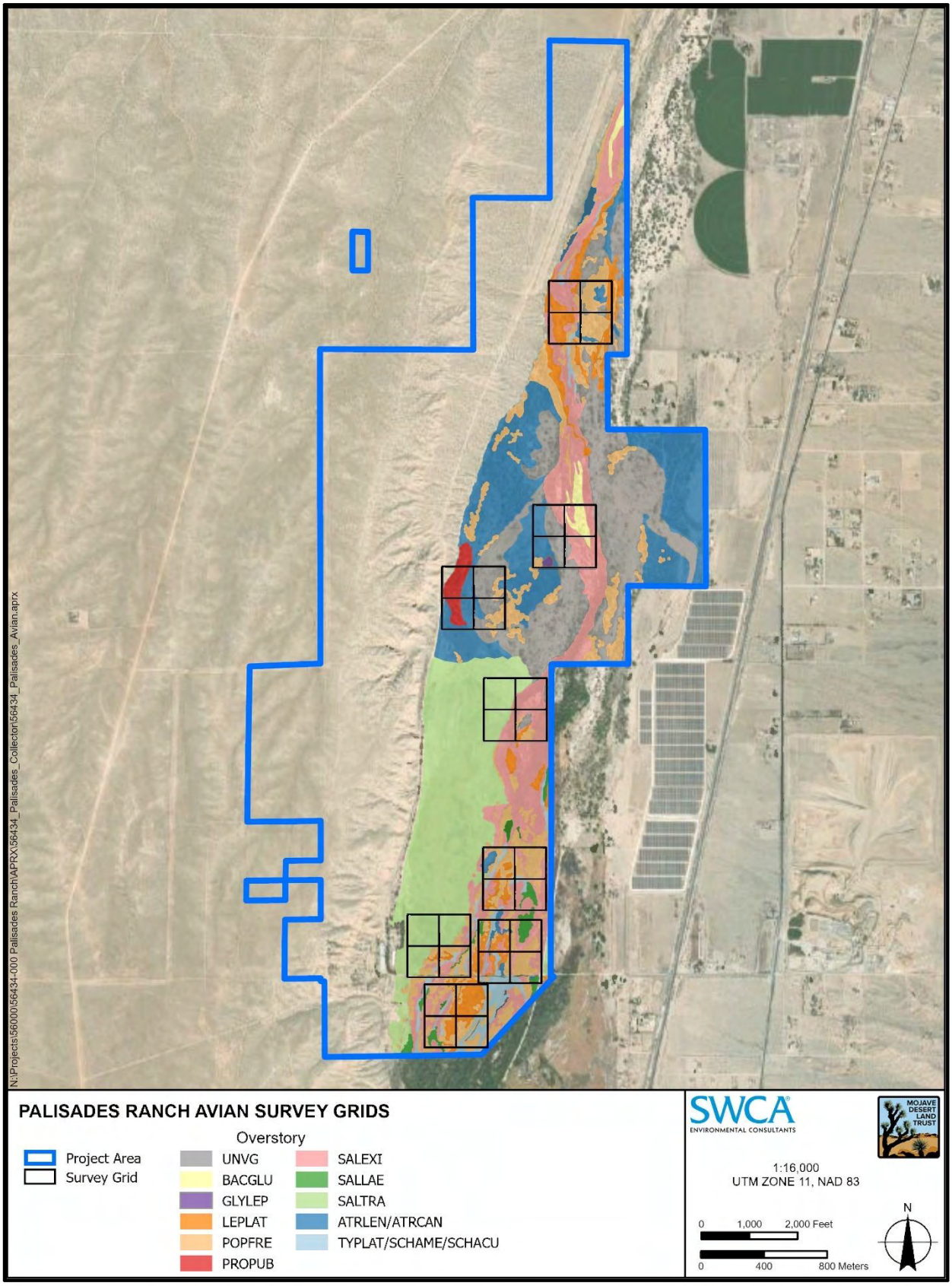

Figure 20. Rapid assessment survey grids.

Table 11. Avian Breeding Behaviors

Breeding Code	Breeding Behavior Observed
NY	Nest with Young
NE	Nest with Eggs
FY	Feeding Dependent Young
ON	Occupied Nest
DD	Distraction Display
NB	Nest Building
PN	Probable Nest
P	Pair
M	Male
F	Female
U	Unknown Sex

Data were collected using a Samsung Galaxy Tab Active2 tablet equipped with Collector for ArcGIS by ESRI and paired with an external Geode GPS receiver. These units displayed georeferenced aerial imagery along with each survey grid. Use of the Collector application ensured consistency and completeness of data, because certain fields were required to be filled out and could not be left blank. From this effort, SWCA developed species-specific distribution maps for the seven special-status species described in the Draft Land Management Plan (CDFW 2016) that could be compared with mapped vegetation patches, described in Chapter 3.1. These data identify species nesting in the area as well as migratory or vagrant species. These spatial data provide land managers with valuable information on bird distributions and habitat associations on the Property, which will inform habitat management and restoration efforts.

3.2.2 *Survey Results*

The two rapid assessment grid survey visits were completed by SWCA avian ecologists Justin Streit and Austin Xu between April 22 and July 17, 2020 (Table 12). Each survey visit required 8 person-mornings to cover all 8 rapid assessment survey plots. Weather conditions were favorable during the 2 survey visits, with no precipitation and wind speeds ranging from 0–8 km (0–5 miles) per hour. The avian ecologists recorded 92 species of birds at the Property in April and July, of which 8 are considered special-status species in California (Table 13). Some of these species were detected in April but not July and were, therefore, likely only migrating through the Property (e.g., Cassin's vireo [*Vireo cassinii*], hermit thrush [*Catharus guttatus*], Swainson's hawk [*Buteo swainsoni*], yellow-rumped warbler [*Setophaga coronate*], etc.). However, the majority of species identified in Table 13 could breed or were documented breeding at the Property.

Table 12. Survey Dates for Rapid Assessment Grid Surveys at the Property, 2020

Survey Visit	Survey Dates
First	April 22–29
Second	July 14–17

3.2.2.1 SPECIAL-STATUS SPECIES

In total, 8 special-status species were recorded at the Property in 2020: least Bell's vireo, western yellow-billed cuckoo, Cooper's hawk (*Accipiter cooperi*), Lucy's warbler (*Oreothlypis luciae*), summer tanager

(*Piranga rubra*), Swainson's hawk, yellow warbler (*Setophaga petechia*), and yellow-breasted chat (*Icteria virens*). Special-status species were recorded at 7 of the 8 survey plots (Figure 21 and Figure 22).

3.2.2.1.1 Least Bell's Vireo

Least Bell's vireo is one of 4 recognized subspecies of Bell's vireo (*Vireo bellii*) that breeds from California to northwest Baja California. It was listed as an Endangered species under the ESA on May 2, 1986 (USFWS 1986) and is also listed as Endangered under the California Endangered Species Act (CESA) (CDFW 2019). Factors contributing to the decline of least Bell's vireo include modification and destruction of riparian habitat and nest parasitism by brown-headed cowbirds (*Molothrus ater*) (Olsen and Gray 1989).

Brown-headed cowbirds are widespread across the riparian areas of the Property and were recorded at seven of the eight survey plots in 2020. While brown-headed cowbird control programs have been implemented as a means to increase population numbers of host species (and specifically Bell's vireos), Smith (1999) only recommends this action when parasitism rates of a threatened or endangered host species are documented in excess of 50–60%. Therefore, brown-headed cowbird treatment is not recommended unless significant parasitism rates are documented via extensive, species-specific nest monitoring.

Bell's vireos usually start breeding in April and can continue through July, and pairs can attempt up to 7 nests in a season (Kus et al. 2010). Bell's vireos nest in a variety of habitats, but least Bell's vireos generally nest in willow-dominated habitats. In one study of nest site selection along the San Ynez River, least Bell's vireos generally nested in riparian habitat, but were also recorded on terraces above the floodplain and up to 200 meters (656 feet) from the edge of the river channel (Olsen and Gray 1989). Nests are typically within 1 meter (3 feet) of the ground, and a variety of species can be used for nest substrate (Olsen and Gray 1989). Territory size of Bell's vireos range from 0.1 to 1.7 hectares (0.2 to 4.2 acres) (Kus et al. 2010). Least Bell's vireos are largely monogamous (Kus et al. 2010), but multiple sexual strategies, including polyandry and polygamy, have been recorded (Greaves 1987). Critical habitat for least Bell's vireo has been designated, but none occurs at the Property.

During the 2016 avian surveys, biologists recorded what was believed to be 1 individual in 2 different locations at the extreme southeastern portion of the Property (CDFW 2016). In 2020, 2 different pairs of least Bell's vireos were observed in this same general area at the southeastern corner of the Property (Figure 23). The southernmost of these 2 pairs was observed at a nest, thereby confirming breeding at the Property in 2020. Two additional locations for least Bell's vireo were recorded just outside of the Property (see Figure 22). An avian ecologist mapped estimated territory boundaries for each of the 2 pairs of least Bell's vireos within the Property boundary; these territories were located within the *P. fremontii*- and *S. exigua*-dominated vegetation classes (see Figure 23). The southern pair's nest was in a clump of mule-fat, though the overstory appeared to be dominated by coyote willow and tamarisk.

Table 13. Species Documented during April and July 2020 Rapid Assessment Grid Surveys

American Coot	Downy Woodpecker	Red Crossbill
American Crow	Dusky Flycatcher	Red-breasted Nuthatch
American Kestrel	Eurasian Collared-Dove	Red-shouldered Hawk
Anna's Hummingbird	European Starling	Red-tailed Hawk
Ash-throated Flycatcher	Gray Flycatcher	Red-winged Blackbird
Barn Owl	Great Blue Heron	Rock Wren
Bell's Vireo (BEVI)	Great Egret*	Ruby-crowned Kinglet
Belted Kingfisher	Great Horned Owl	Say's Phoebe*
Bewick's Wren	Great-tailed Grackle	Song Sparrow
Black Phoebe	Green Heron	Sora
Black-chinned Hummingbird	Hermit Thrush	Spotted Sandpiper
Black-crowned Night Heron	House Finch	Spotted Towhee
Black-headed Grosbeak	House Wren	Summer Tanager (SUTA)
Black-throated Gray Warbler*	Killdeer	Swainson's Hawk (SWHA)
Black-throated Sparrow*	Lawrence's Goldfinch	Townsend's Warbler
Blue Grosbeak	Lazuli Bunting	Turkey Vulture
Blue-gray Gnatcatcher	Lesser Goldfinch	Verdin
Brewer's Sparrow*	Lesser Nighthawk	Virginia Rail
Brown-headed Cowbird	Lincoln's Sparrow	Warbling Vireo
Bullock's Oriole	Lucy's Warbler (LUWA)	Western Bluebird
Bushtit	MacGillivray's Warbler	Western Kingbird
California Quail	Mallard	Western Tanager
California Thrasher	Marsh Wren	Wilson's Snipe
Canada Goose	Mourning Dove	Wilson's Warbler
Cassin's Vireo	Northern Flicker	White-breasted Nuthatch
Cinnamon Teal	Northern Rough-winged Swallow	White-throated Swift
Common Raven	Nuttall's Woodpecker	Yellow Warbler (YEWA)
Common Yellowthroat	Olive-sided Flycatcher	Yellow-billed Cuckoo (YBCU)
Cooper's Hawk (COHA)	Orange-crowned Warbler	Yellow-breasted Chat (YBCH)
Costa's Hummingbird*	Pacific-slope Flycatcher	Yellow-rumped Warbler
Double-crested Cormorant*	Pied-billed Grebe*	

* Indicates species recorded incidentally while on Property, but not recorded during surveys

Note: Red font indicates special-status species.

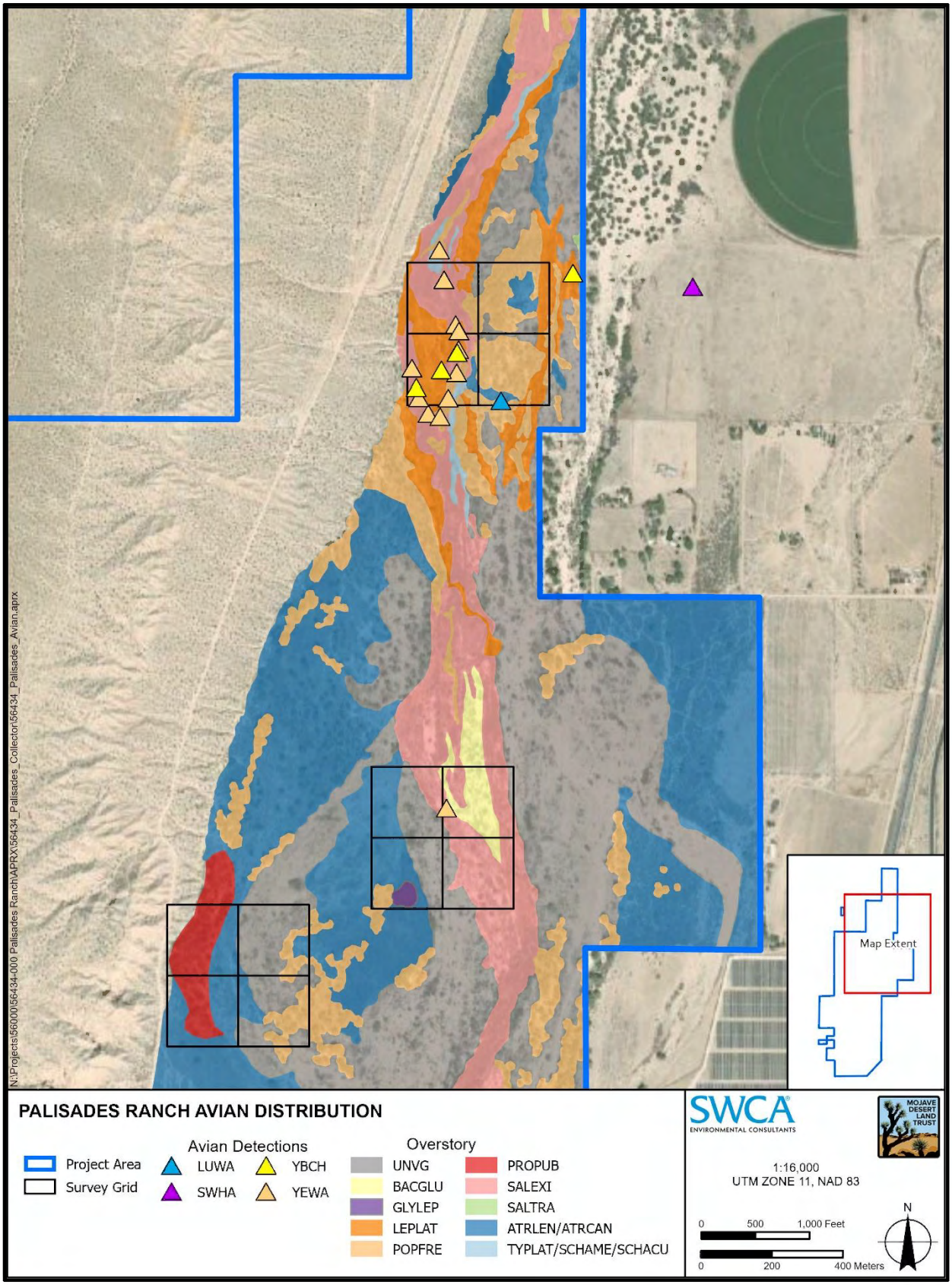

Figure 21. Special-status species detections at the Property, 2020 (map 1 of 2).

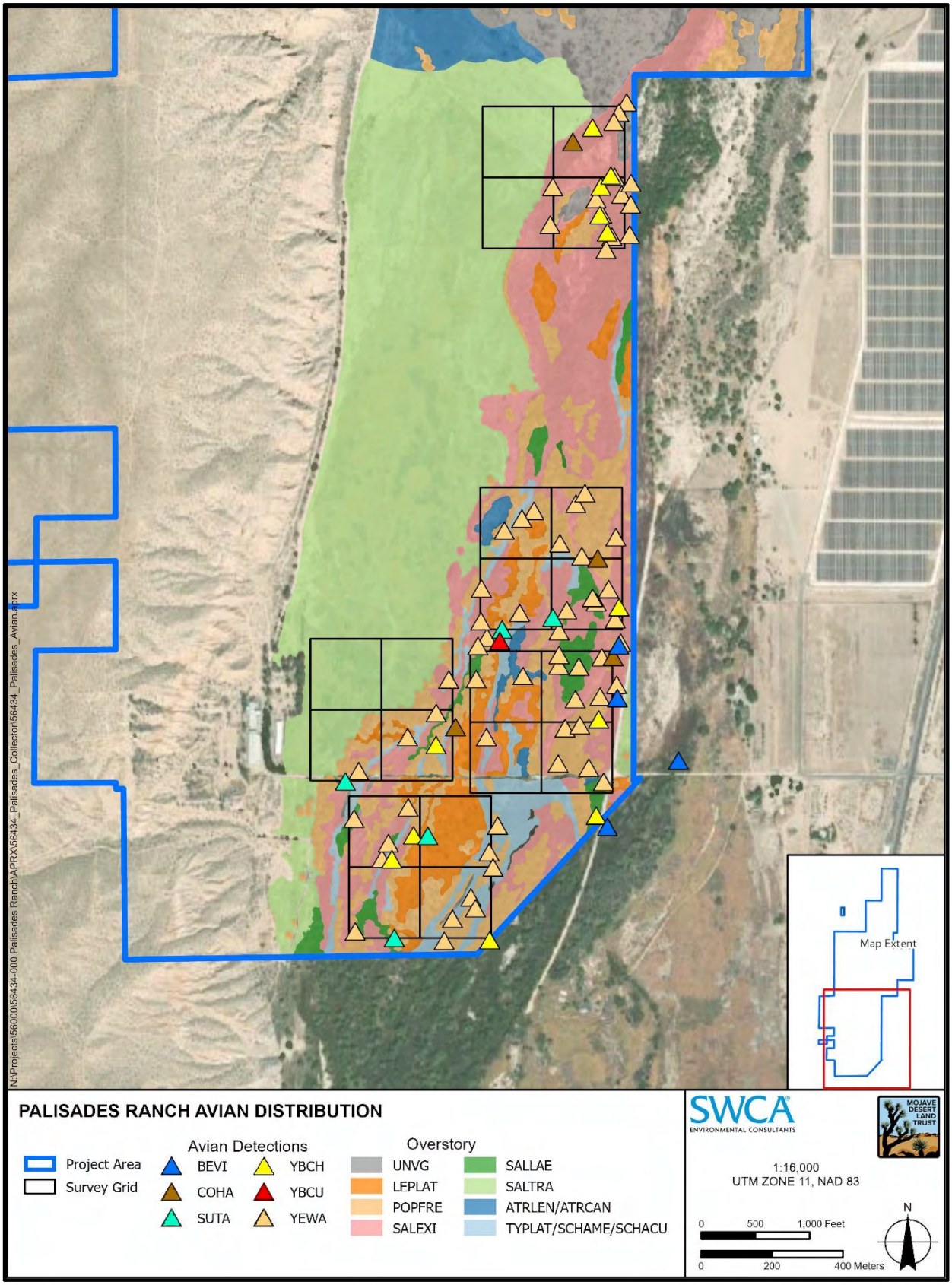

Figure 22. Special-status species detections at the Property, 2020 (map 2 of 2).

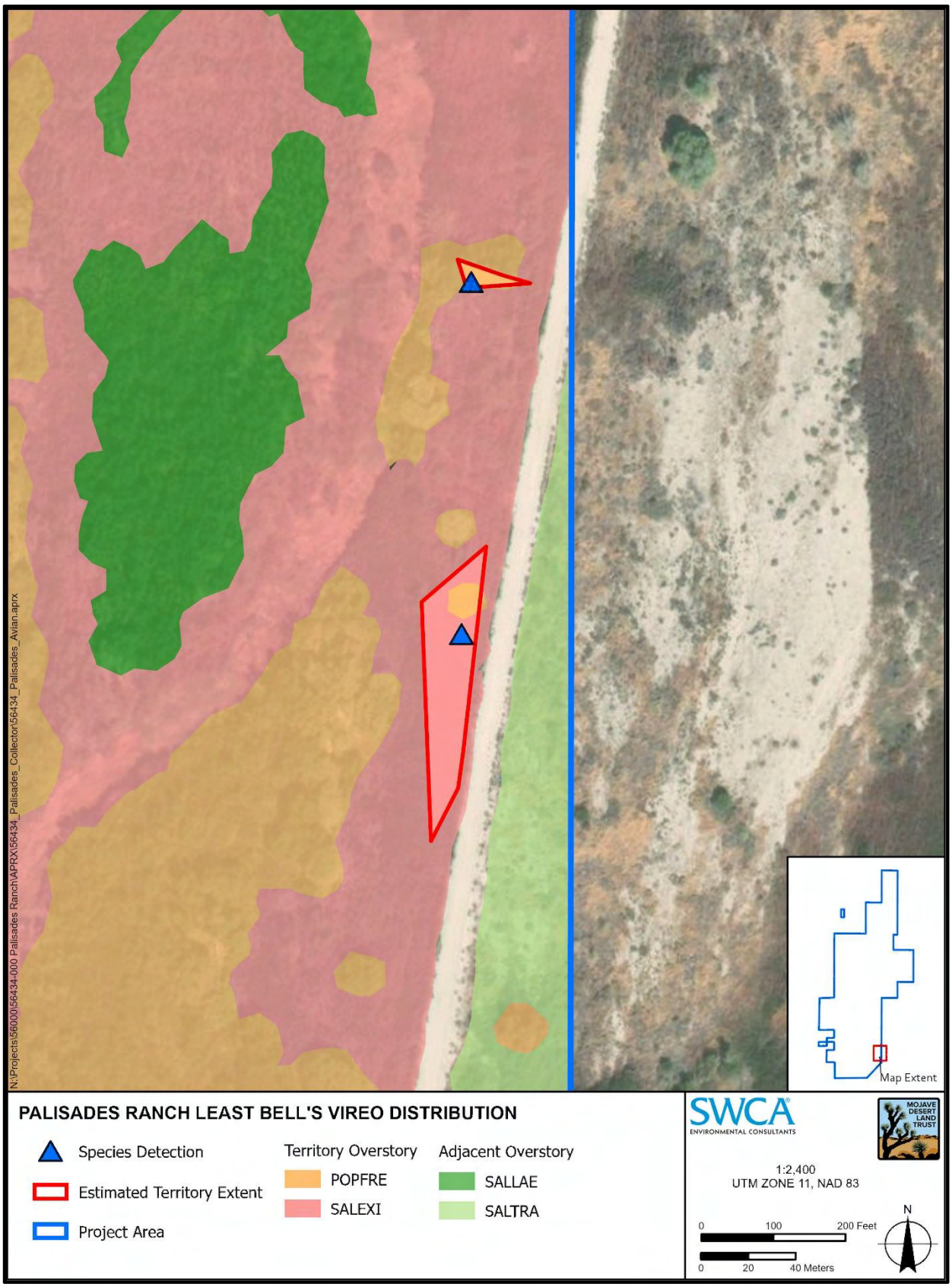

Figure 23. Least Bell's vireo distribution and habitat use.

3.2.2.1.2 Western Yellow-billed Cuckoo

The yellow-billed cuckoo was historically widespread and locally common along rivers throughout the western United States (U.S. Fish and Wildlife Service [USFWS] 2013b). However, populations have declined across the west in recent years, largely as a result of loss, degradation, and fragmentation of riparian habitat. Consequently, the western distinct population segment was listed as Threatened under the ESA in October 2014 (USFWS 2014a). The yellow-billed cuckoo is also listed as Endangered under the CESA (CDFW 2019). Proposed critical habitat for the western yellow-billed cuckoo was revised in 2020, but the Property was not included in any proposed critical habitat unit (USFWS 2020).

Yellow-billed cuckoo home ranges are generally at least 40 hectares (100 acres) in size and often exceed 80 hectare (200 acres), though home ranges as small as 1 hectare (2.5 acres) have been documented (USFWS 2020). These patches are typically at least 100 meters (328 feet) wide (USFWS 2020). Yellow-billed cuckoos have not been found nesting in isolated patches less than 1 hectare (2.5 acres) in size or in linear habitats less than 10–20 meters (33–66 feet) wide, but they may use these habitats during migration and early in the breeding season (Halterman et al. 2015). Breeding habitat typically includes multi-storied riparian woodlands dominated by willow or cottonwood (USFWS 2020). Breeding habitat is typically adjacent to watercourses with less than 3 percent slopes. Yellow-billed cuckoos are known to nest in dense early to mid-successional riparian habitats (USFWS 2014b). A study of nest placement in Arizona and California found that nests were placed between 1 and 22 meters (0.3 to 72 feet) above ground, with an average height of 7 meters (23 feet) (Hughes 2015). Yellow-billed cuckoos tend to be serially monogamous, but serial polyandry has been regularly documented in western populations.

Natural or altered fluvial geomorphic processes are an essential component for sustaining and regenerating the riparian woodlands required by western yellow-billed cuckoos (USFWS 2020). Seed germination of cottonwoods and willows is dependent on sediment movement and deposition, typically associated with flooding or other dynamic high-flow events. These processes can also lead to uneven or mixed aged forest patches within a larger habitat unit. Dynamic fluvial geomorphic processes can be achieved through natural flooding or through scheduled irrigation events (USFWS 2020). McNeil et al. (2013) found that nest site selection along the Lower Colorado River was not dependent on distance to water or soil saturation. If this is true across the species' range, then it could be inferred that while the presence of water itself may not be important to cuckoos, the habitat produced by the water is important, as it allows for seed germination and can produce the cooler, more humid habitats that this species prefers.

The yellow-billed cuckoo was not recorded during the 2016 avian surveys at the Property (CDFW 2016); however, this species does not typically arrive at its western breeding grounds until June, so it is unlikely that surveys conducted in May would have detected this species. One yellow-billed cuckoo was detected at the Property in July 2020, when a lone bird gave two long series of "coo" notes. While the exact location of this aurally detected bird could not be determined, the avian ecologist was able to estimate the location of the calling bird by recording its bearing from 2 different locations, which was within a band of Fremont cottonwood at the southern end of the Property (see Figure 22). The riparian zone is approximately 600 meters (1,970 feet) wide at this location, and the band of Fremont cottonwood is bordered by coyote willow and *Typha domingensis – T. latifolia – Phragmites australis* ssp. *americanus* Western Marsh Alliance, on its western and eastern flanks, respectively. Vegetation composition in this area is diverse and the canopy structure is complex and varied, all of which is ideal for yellow-billed cuckoo.

3.2.2.1.3 Cooper's Hawk

The Cooper's hawk nests in fairly large trees, which tend to be relatively abundant in riparian habitats. This species breeds across North America, and this relatively common bird has been exhibiting an increasing population across California over the last 50 years (Rosenfield et al. 2019). This species is considered a CDFW Watch List species (CDFW 2019). Cooper's Hawks breed from late March through early July.

Cooper's hawks prefer large trees for nesting (21 to 52 cm [8 to 20 inches] diameter at breast height) and place their nests between 8 and 15 meters (26 and 49 feet) above ground height (Rosenfield et al. 2019). Neighboring pairs of Cooper's hawks can be as close as 160 meters (525 feet) but are generally spaced 700–1,000 meters (765–1,093 yards) apart. Cooper's hawks are almost always monogamous.

A single Cooper's hawk was recorded at the southern end of the Property during the 2016 avian surveys (CDFW 2016). In 2020, this species was undetected in April but was detected at four different locations during the July surveys (Figure 24 and Figure 25), including at least two recently fledged birds observed flying within a relatively tight area around their presumed nest. These four detections comprised two distinct territories delineated at the Property, one lying completely within a *S. exigua*-dominated woodland and one lying almost completely within a *P. fremontii*-dominated woodland (see Figure 24 and Figure 25).

3.2.2.1.4 Lucy's Warbler

Lucy's warbler breeds throughout most of the southwestern United States and frequently nests in close association with mesquite trees, though it may use other habitats such as *P. fremontii* woodland. This species is in decline throughout much of its breeding range due to riparian habitat loss and mortality and/or removal of mesquite trees (Johnson et al. 2020). Lucy's warbler is designated as a Species of Special Concern by the CDFW and a USFWS Bird of Conservation Concern (CDFW 2019). This species breeds from mid-March to mid-July, and generally has 2 or more broods per season.

Lucy's warbler breeds primarily in dense lowland riparian mesquite woodland (which is considered optimal breeding habitat for this species) but will also frequently nest in tamarisk. This species will also breed in xeroriparian vegetation along dry desert washes, and within arrowweed (*Pluchea sericea*) and willow along desert riparian areas. Lucy's warblers generally build nests between 0.6 and 6 meters (2 to 20 feet) off the ground, and they establish territories that range from 30 meters (98 feet) apart in mesquite bosque to 200 meters (656 feet) apart in desert washes (Johnson et al. 2020).

Lucy's warblers were not recorded within the Property during avian surveys in 2016, though CDFW (2016) identified that "habitats at Palisades Ranch are ideally suitable for this species." During the April 2020 survey, a lone male Lucy's warbler was observed singing from a defined territory dominated largely by *P. fremontii* woodland at the northern end of the Property (Figure 26); this bird was not detected during the second breeding bird survey in July 2020. This bird's territory was at least 75 meters (246 feet) away from the main channel and could be described as relatively dry and composed partially of *Atriplex*-dominated shrubland (see Figure 26).

3.2.2.1.5 Summer Tanager

The summer tanager occurs across the southern United States from California to Florida. While the species is thought to be stable across much of its range, destruction of riparian woodlands appeared to cause population declines in the desert southwest; however, at least some of those populations have rebounded (Robinson 2012). Summer tanagers are considered a Species of Special Concern by CDFW (2019). Nesting activities typically occur from May through July (Robinson 2012).

In the southwestern United States, summer tanagers prefer broad swaths of riparian forest dominated by large cottonwood and willow, particularly those exhibiting "plantation" qualities where the canopy is neither too open nor too closed (Robinson 2012). Summer tanagers of the desert southwest nest in horizontal branches of large trees, typically close to or over dry or perennial creeks. One study of southern California summer tanagers reported an average nest height of 11.3 meters (37 feet) (Robinson 2012). Territories in southern California are said to range from 9 to 11 hectares (22 to 27 acres) (Robinson 2012). Summer tanagers appear to be serially monogamous.

This species was recorded from 1 or 2 locations in the extreme southeastern portion of the Property during the 2016 avian surveys (CDFW 2016). In 2020, summer tanagers were recorded at 5 different locations (and incidentally observed in several more) in the southeastern portion of the Property, composing at least 2 different territories (Figure 27). Because summer tanagers can maintain relatively large territories and can move great distances within those territories, tracking individual birds can be extremely difficult. Therefore, it is unclear if the larger, more northern of the 2 summer tanager territories (see Figure 27) constitutes 1 large territory or multiple smaller territories. Though habitat use data was not recorded in the field, biologists noted that these birds were always or almost exclusively observed within large cottonwood trees. So while the territories for this species are large and encompass 8 different vegetation classes, it appears that the cottonwood-dominated vegetation class is the most important class for this species; though the inclusion of many habitat classes may indicate the importance of mixed riparian forests with multiple canopy layers.

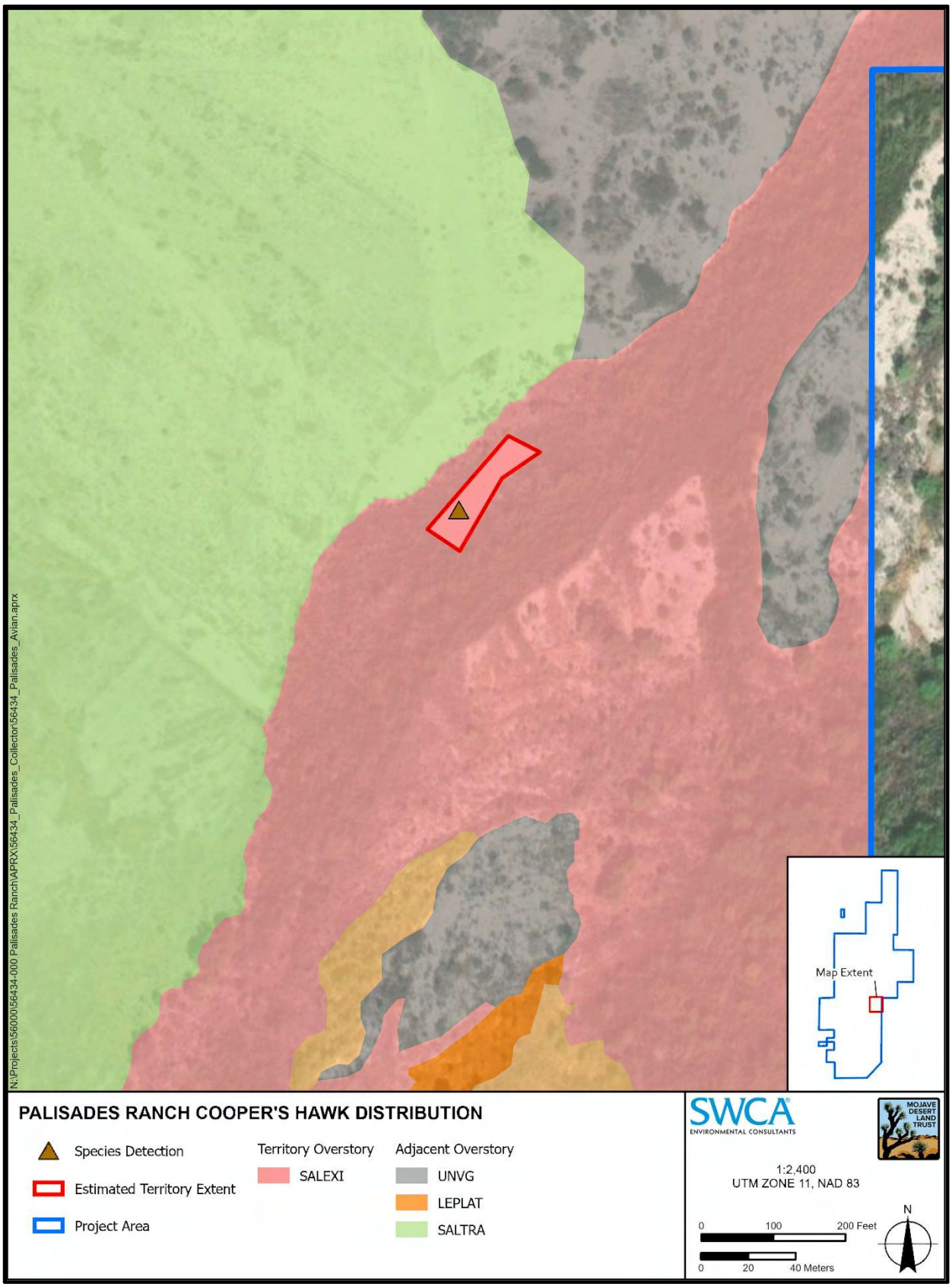

Figure 24. Cooper's hawk distribution and habitat use (map 1 of 2).

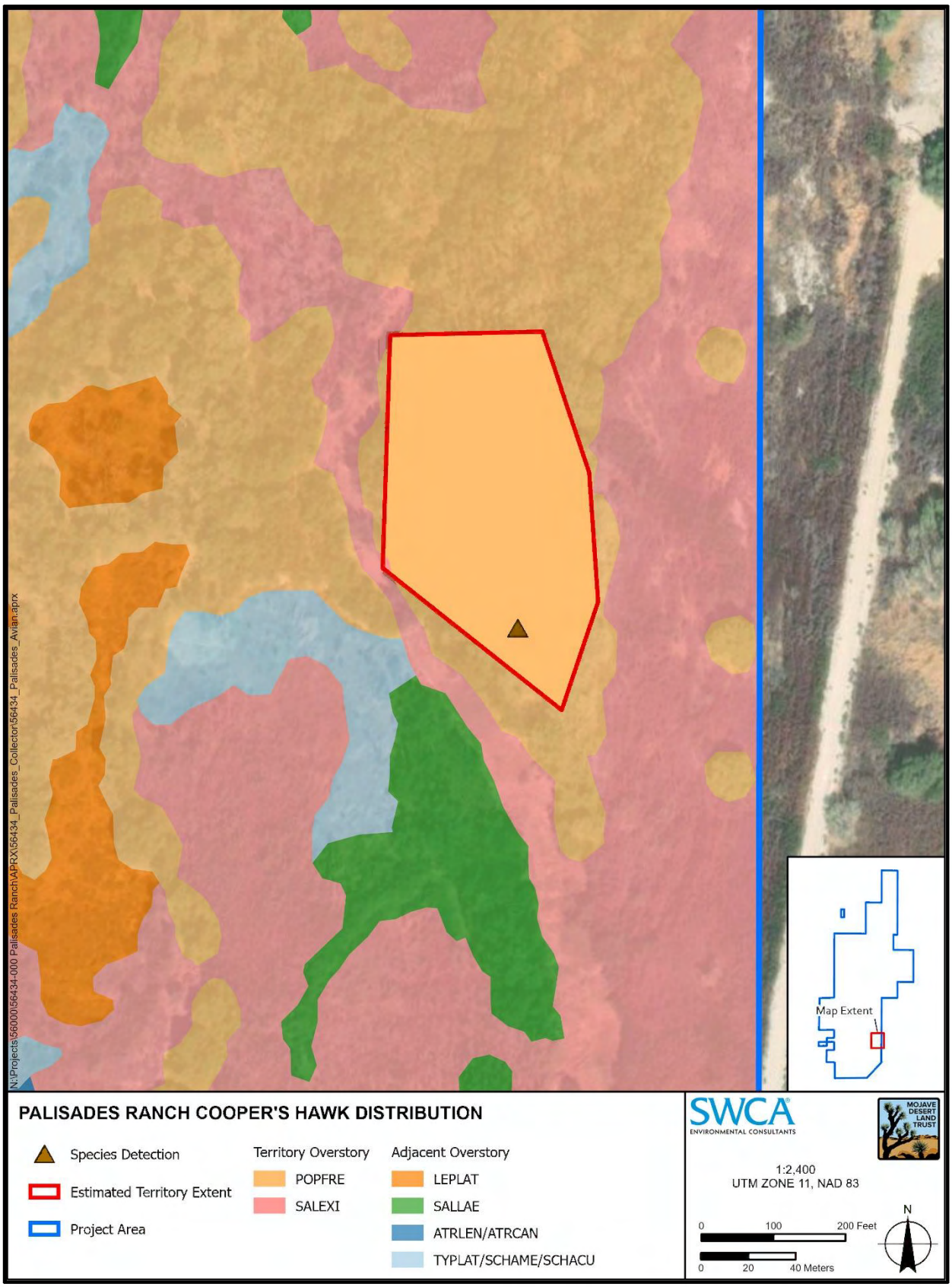

Figure 25. Cooper's hawk distribution and habitat use (map 2 of 2).

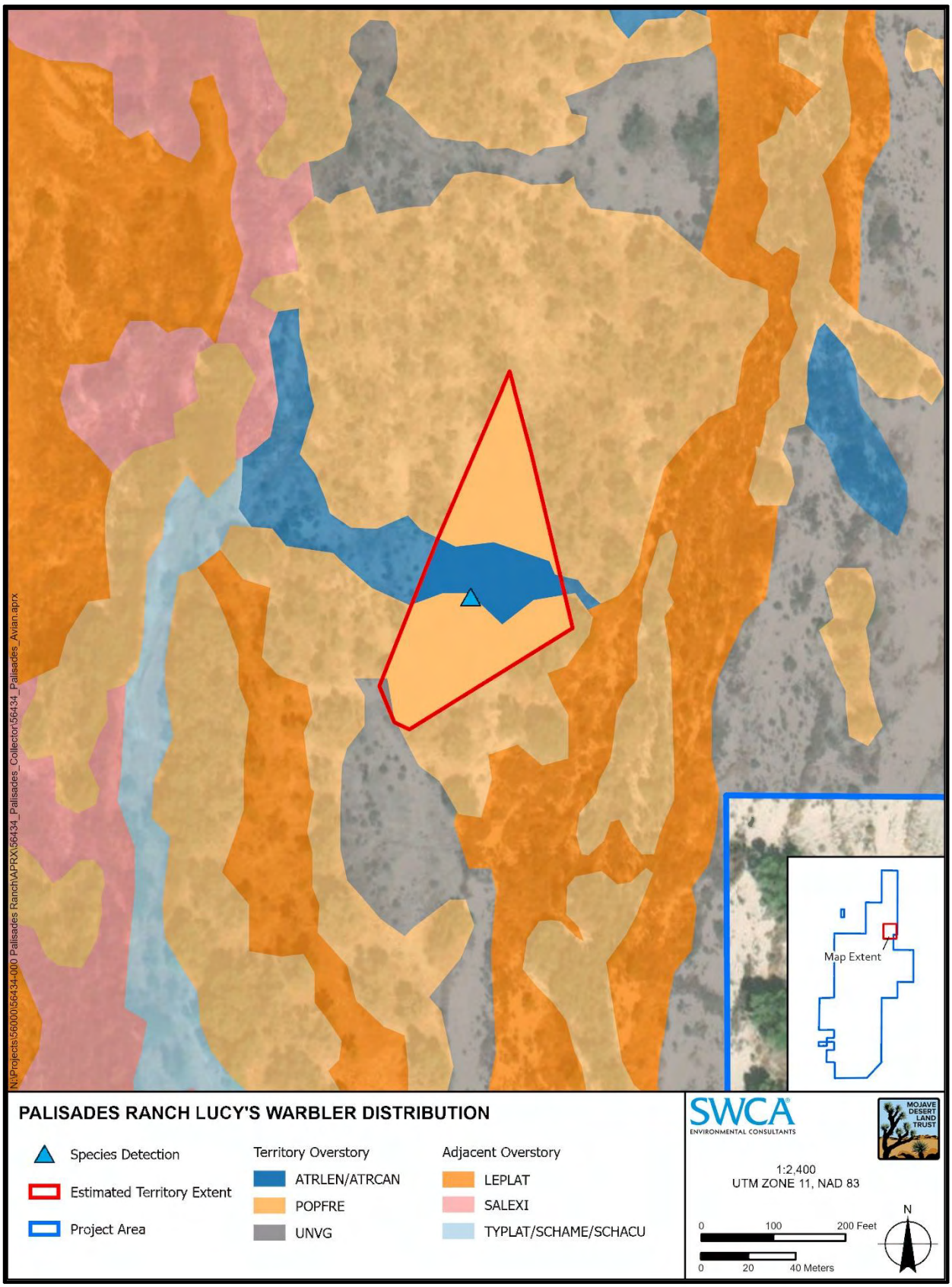

Figure 26. Lucy's warbler distribution and habitat use.

3.2.2.1.6 Swainson's Hawk

The Swainson's hawk nests in scattered trees within grassland, shrubland, or agricultural areas. This species breeds across western and central North America, although breeding populations have been extirpated from the coastal areas and Mojave Desert in Southern California, with habitat loss and degradation cited as the primary factors in its absence from these areas. This species is listed as Threatened under the CESA and is considered a USFWS Bird of Conservation Concern (CDFW 2019). In central California, Swainson's Hawks begin breeding as early as mid-March through July (Bechard et al. 2020).

Swainson's hawks typically nest in isolated trees or groves along a stream course and within a variety of tree species, including riparian species such as willows and cottonwoods. Their nests are placed at varying heights aboveground but are generally located near the top within the tree crown. Neighboring pairs of Swainson's hawks can be as close as 60 meters (197 feet) but are generally spaced 1.5–2.5 km (1,640–2,734 yards) apart (Bechard et al. 2020). Swainson's hawks are usually monogamous.

Swainson's hawk were not recorded at the Property during the 2016 avian surveys, and CDFW (2016) stated that this species likely migrates through the area, only stopping to forage and roost on the Property. In 2020, a single Swainson's hawk was observed soaring over the desert northeast of the Property (see Figure 21). Because this species was recorded outside of the Property boundary, inferences on habitat use cannot be made, though it is expected that this species could use much of the riparian corridor at the Property during migration.

3.2.2.1.7 Yellow Warbler

The yellow warbler breeds across most of North America and is associated with wet, willow-dominated habitats. It appears to be generally stable across all of its range (Lowther et al. 1999) but has been designated as a Species of Special Concern by CDFW and a Bird of Conservation Concern by USFWS (CDFW 2019). Yellow warblers generally breed from late May–July, and they normally only rear 1 brood per breeding season (Lowther et al. 1999).

Most nests are built in willows or other shrubs between 1 and 3 meters (3 to 10 feet) above ground but can be built as high as 15 meters (49 feet) (Lowther et al. 1999). This species seems to be regularly associated with young or early successional riparian vegetation. Compared to other species, territories of yellow warblers are relatively small, ranging from less than 0.1 to 1.0 hectares (0.3 to 2.5 acres). Pairs are primarily monogamous, but polygyny does occur somewhat regularly.

The yellow warbler was the most common special-status species recorded during the 2016 avian surveys at the Property; yellow warblers were recorded from at least 12 locations in the southeastern portion of the Property, though biologists identified that "they are likely even more common than the detections would suggest" (CDFW 2016). In 2020, this species was easily the most detected special-status species at the Property. More than 60 individual yellow warbler territories were mapped across 6 of the 8 plots surveyed at the Property (Figure 28 through Figure 32), with many additional territorial males detected outside of survey plots. While native riparian woodlands, particularly those with dense willow, are important to yellow warblers, this species appears to be abundant anywhere at the Property where water is present throughout the breeding season. Yellow warbler territories were most abundant in areas dominated by *S. exigua*, followed by *P. fremontii*- and *S. laevigata*-dominated forests.

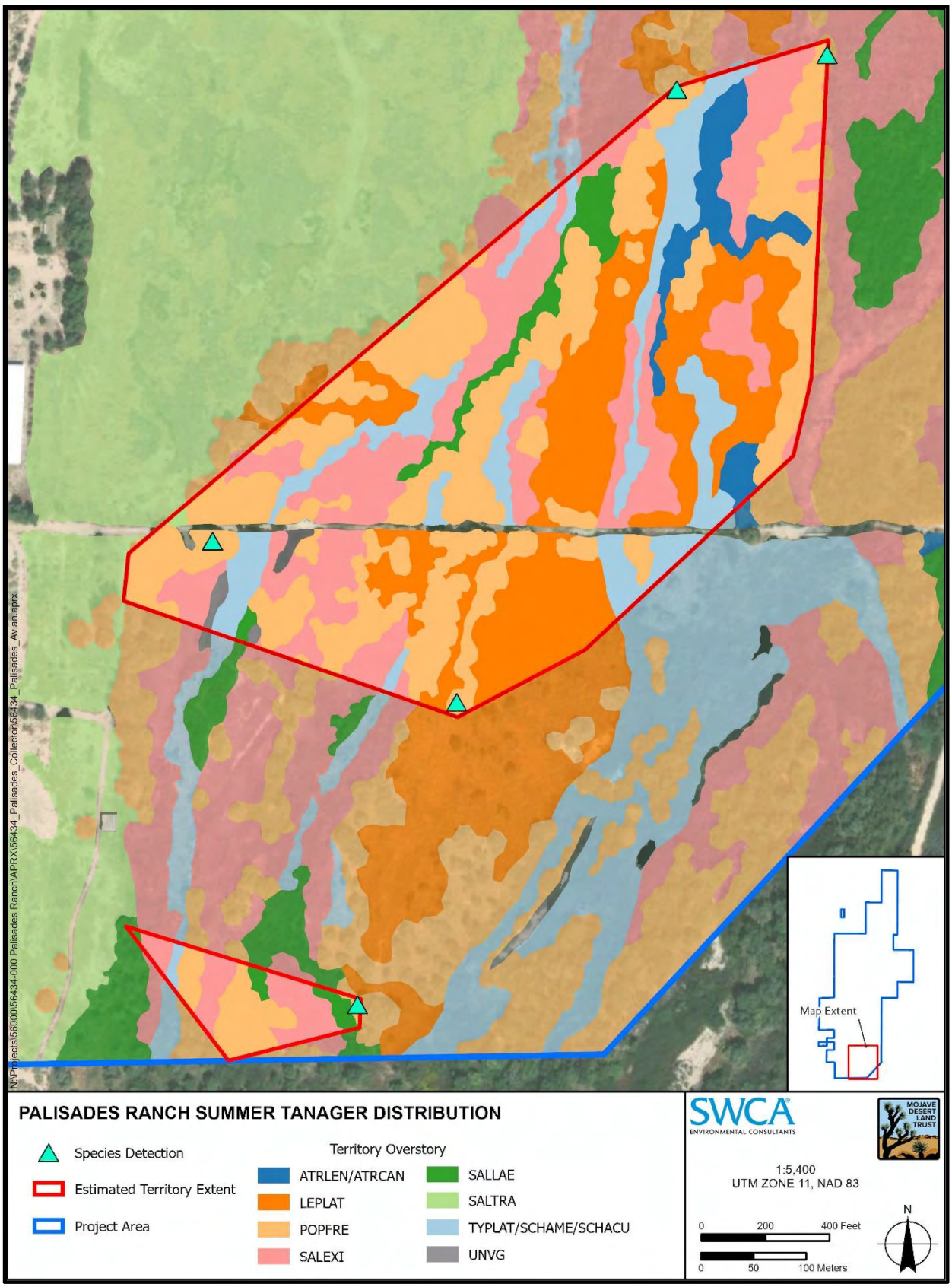

Figure 27. Summer tanager distribution and habitat use.

3.2.2.1.8 Yellow-breasted Chat

The yellow-breasted chat breeds across the contiguous United States, preferring dense shrubby habitat, often near water. Though this species is relatively abundant in appropriate habitat and the population has not shown significant changes across its range, the yellow-breasted chat has decreased in numbers in the desert southwest due to loss of habitat (Eckerle and Thompson 2001). It is designated as a Species of Special Concern by CDFW (2019). Nesting activities generally occur from mid-May through July.

Yellow-breasted chats prefer a variety of dense shrubby habitats. In Arizona, they have been said to be associated with mesquite and willow in riparian habitats (Eckerle and Thompson 2001). Nests are placed low in dense vegetation, often close to the ground. Territory sizes range from 0.4 to 2.4 hectares (1 to 5.9 acres). Yellow-breasted chats appear to be predominantly socially monogamous, but some birds can be polygynous.

This species was recorded from at least 8 locations in the southeastern portion of the Property during the 2016 avian surveys (CDFW 2016). In 2020, this species was the second most abundant special-status species recorded with 14 unique territories identified across 6 of the 8 plots surveyed (Figure 33 through Figure 37). Yellow-breasted chats were most abundant in coyote willow-dominated forests, but they were detected within many different vegetation classes included areas dominated by *P. fremontii* and *L. latifolium*.

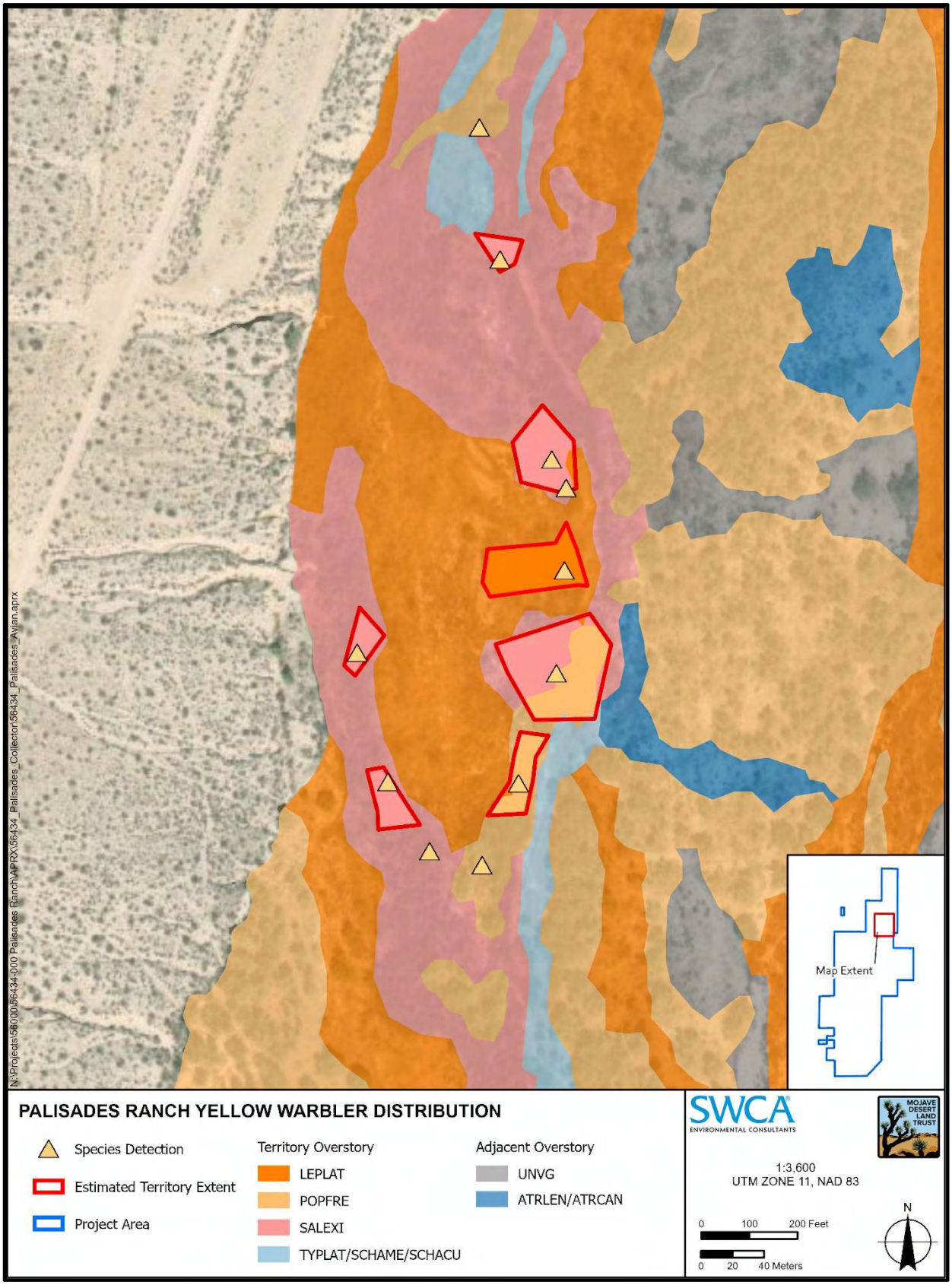

Figure 28. Yellow warbler distribution and habitat use (map 1 of 5).

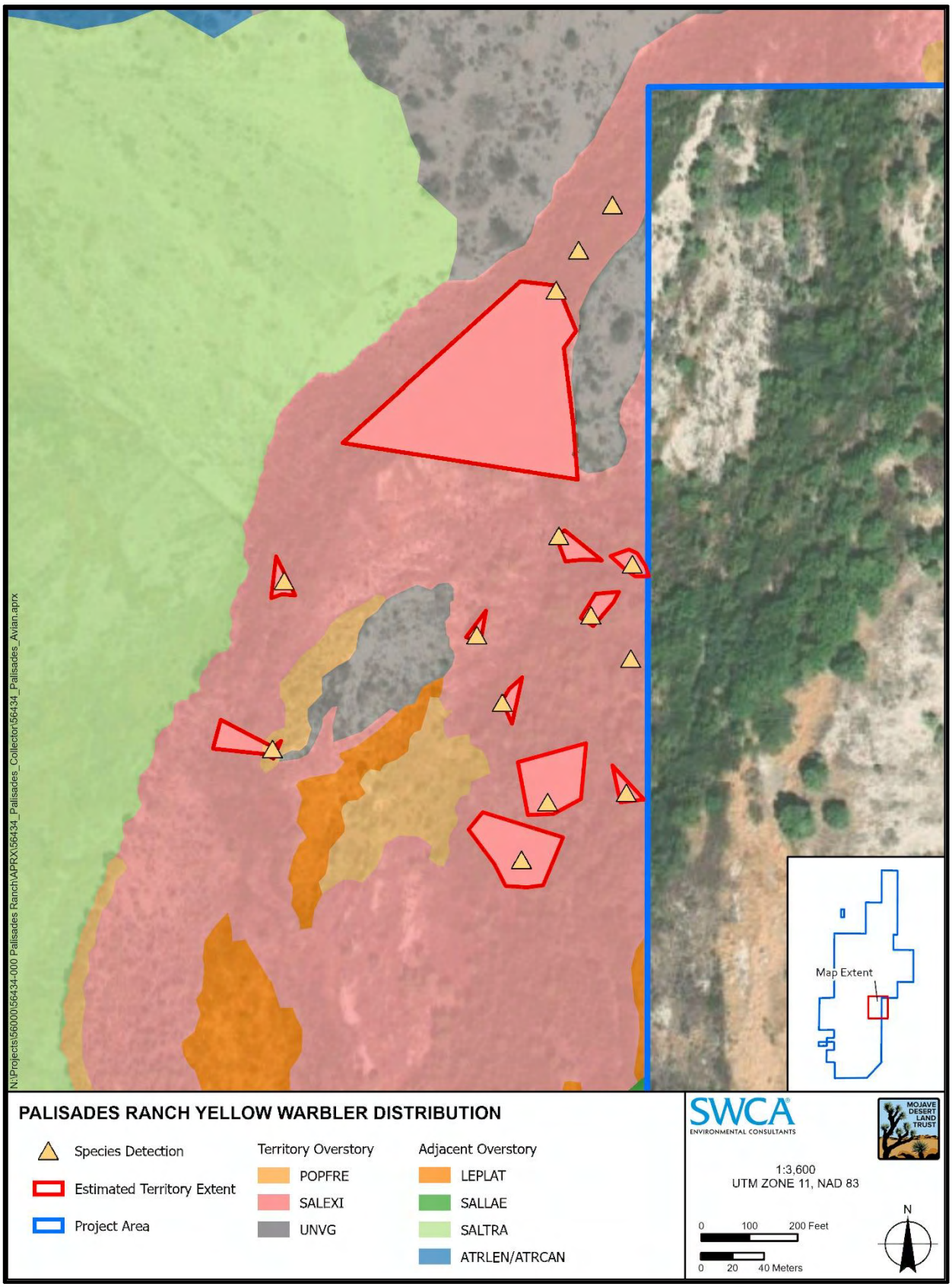

Figure 29. Yellow warbler distribution and habitat use (map 2 of 5).

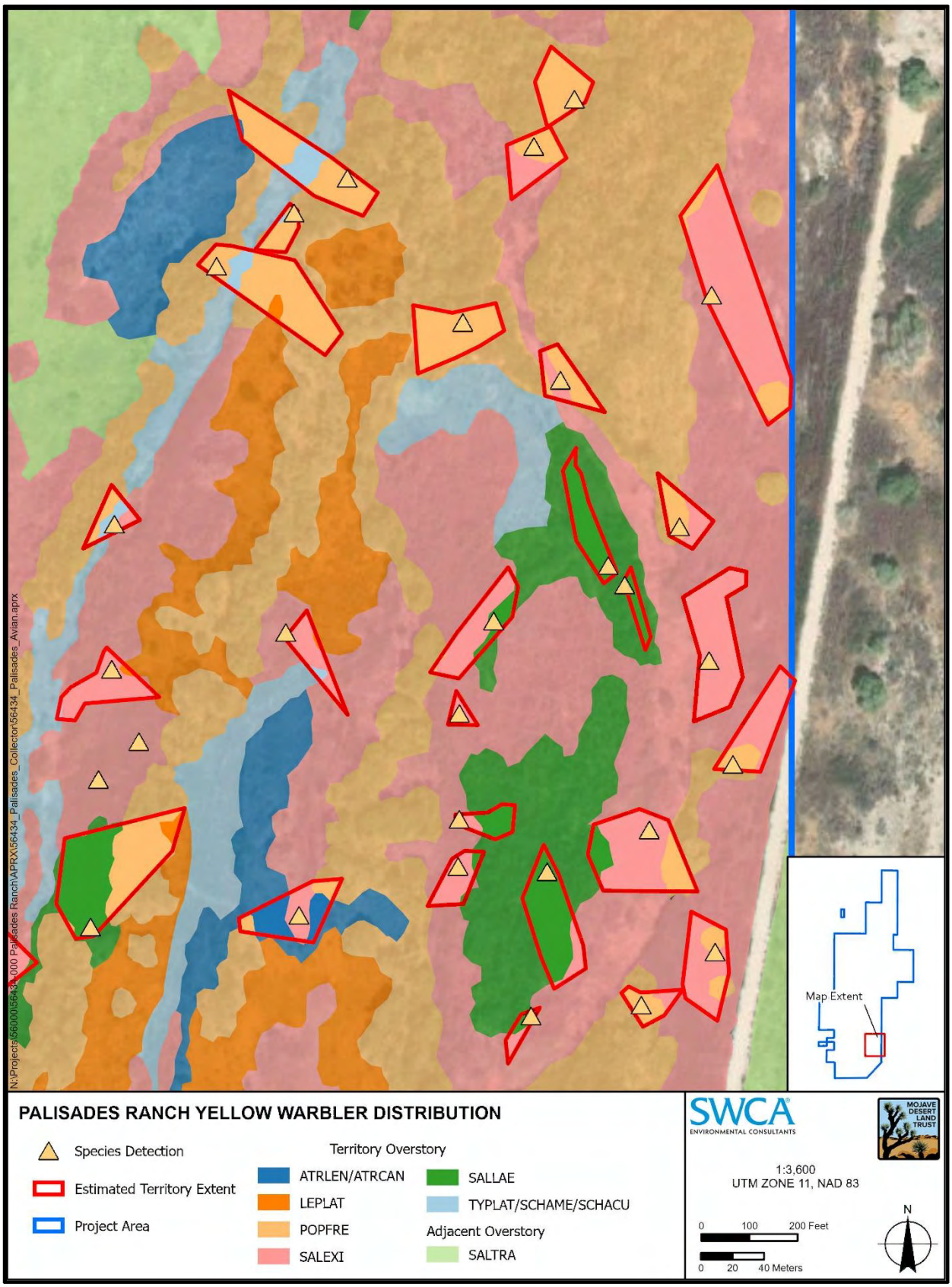

Figure 30. Yellow warbler distribution and habitat use (map 3 of 5).

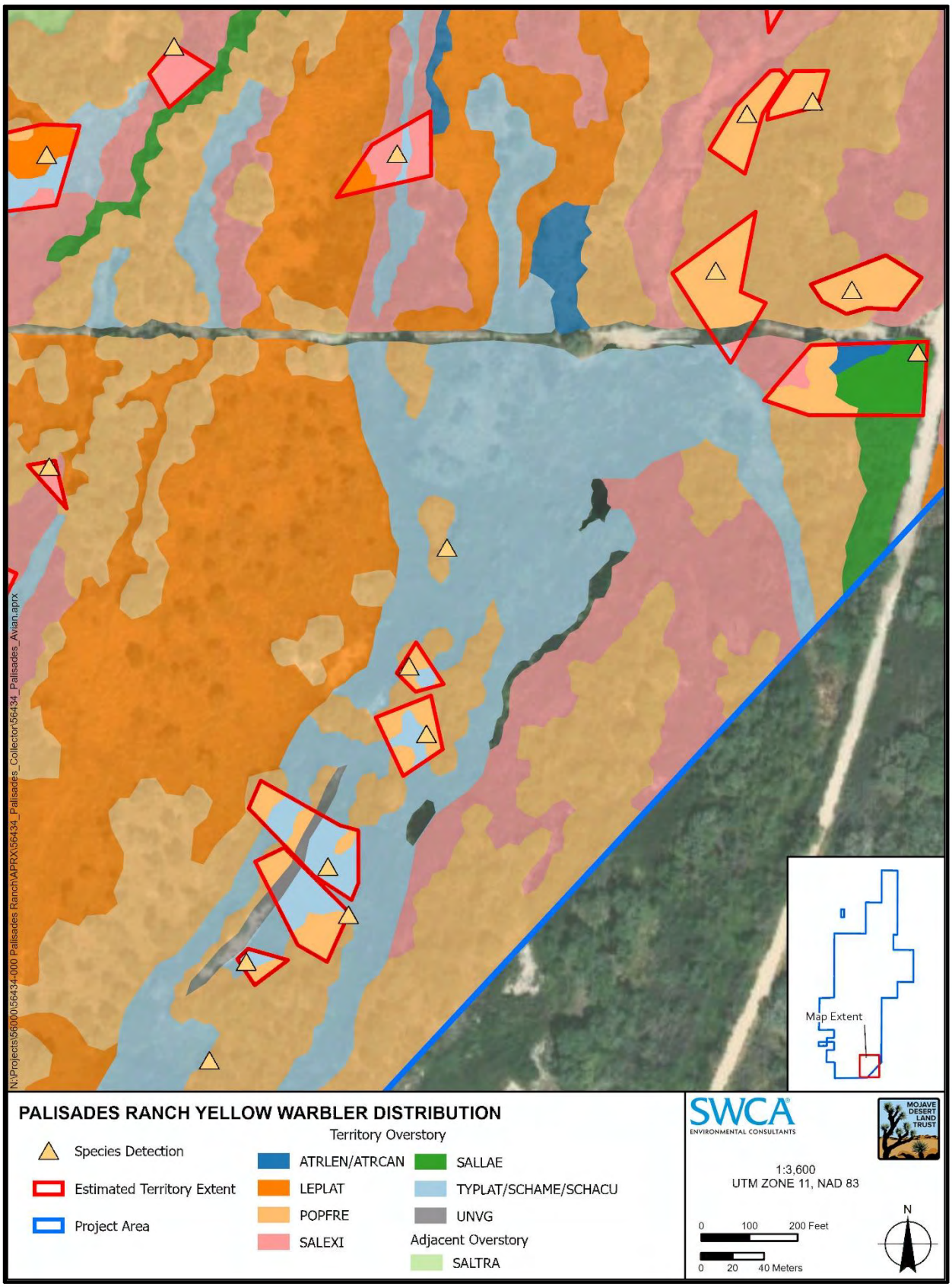

Figure 31. Yellow warbler distribution and habitat use (map 4 of 5).

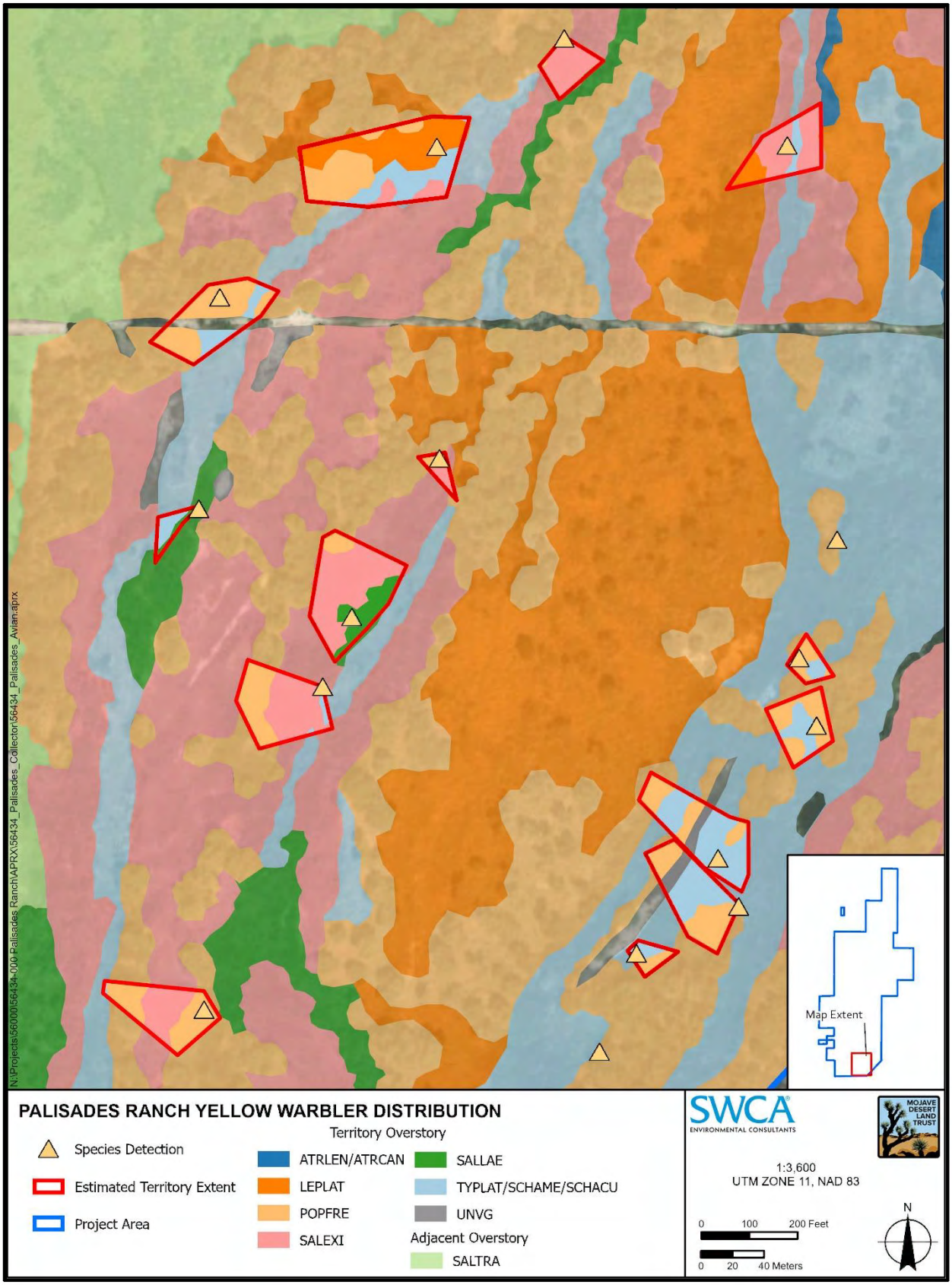

Figure 32. Yellow warbler distribution and habitat use (map 5 of 5).

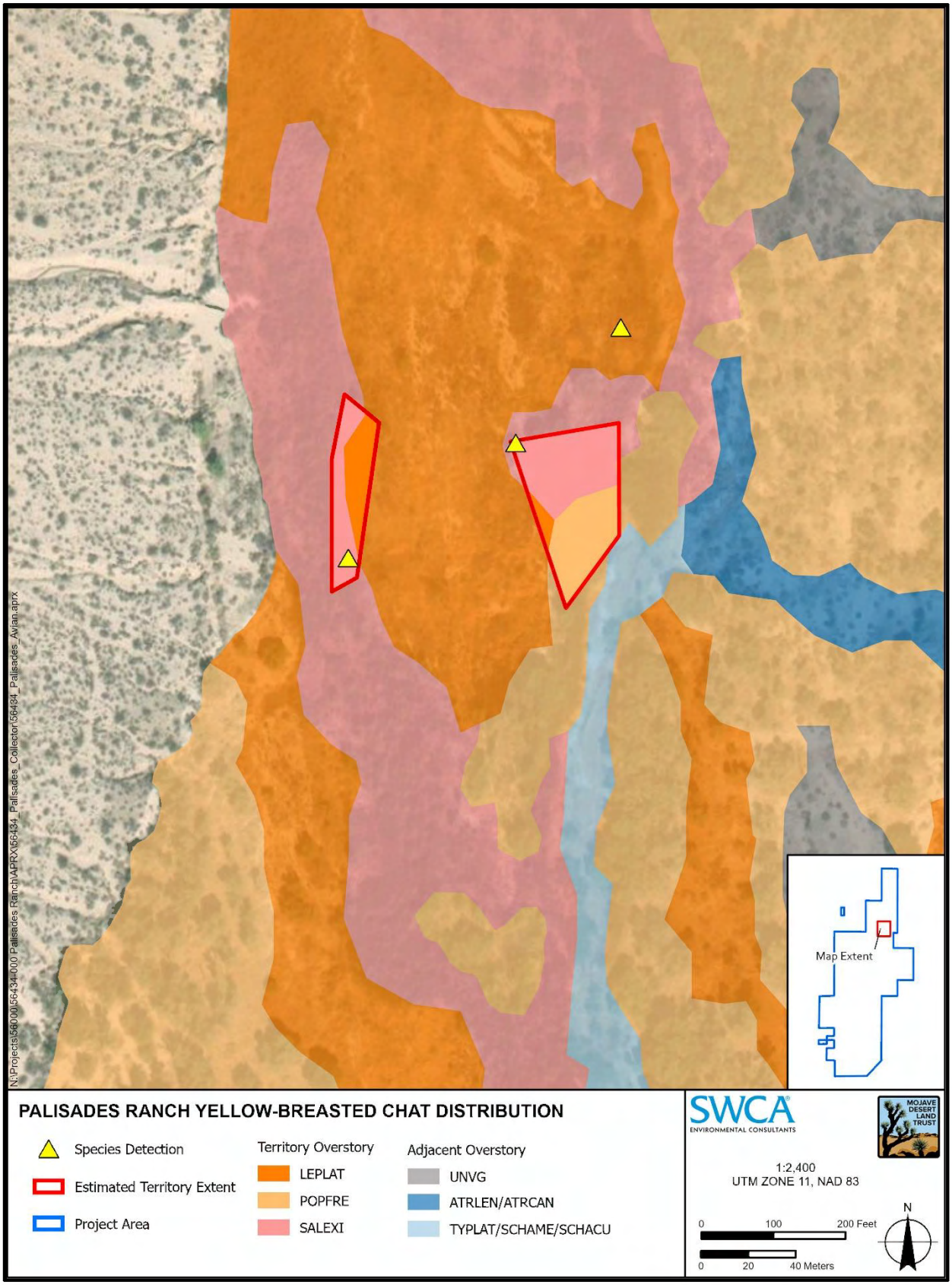

Figure 33. Yellow-breasted chat distribution and habitat use (map 1 of 5).

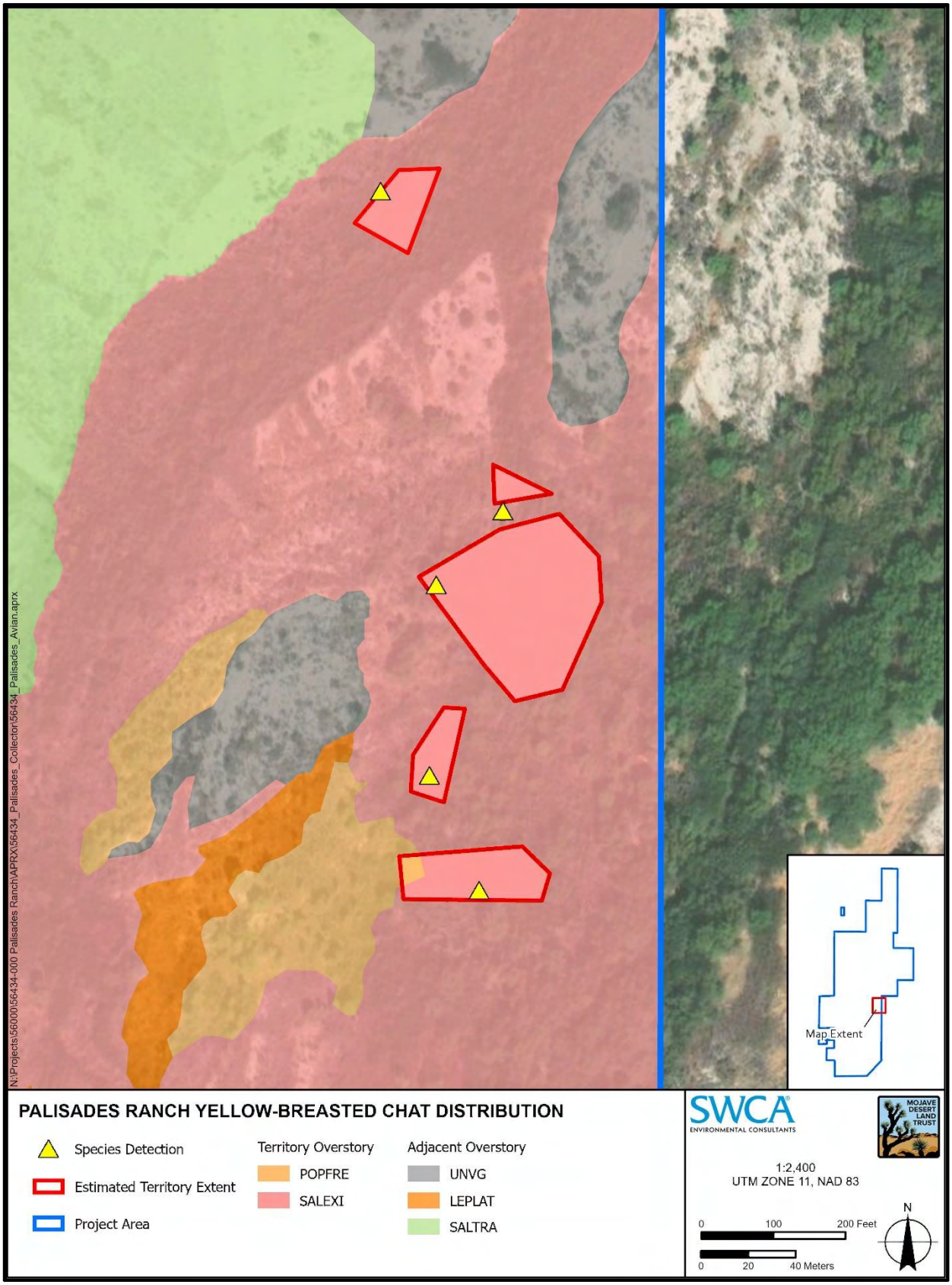

Figure 34. Yellow-breasted chat distribution and habitat use (map 2 of 5).

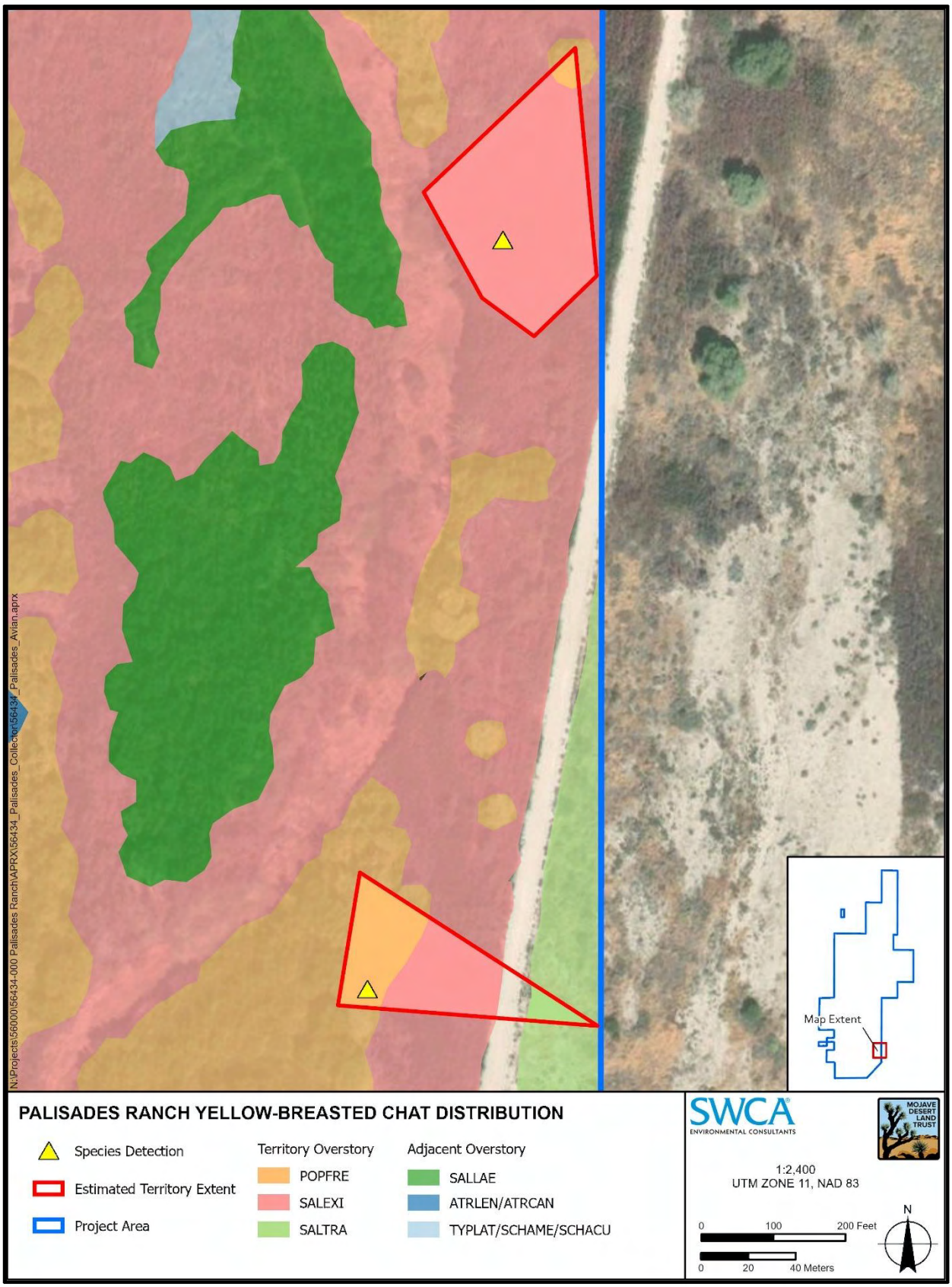

Figure 35. Yellow-breasted chat distribution and habitat use (map 3 of 5).

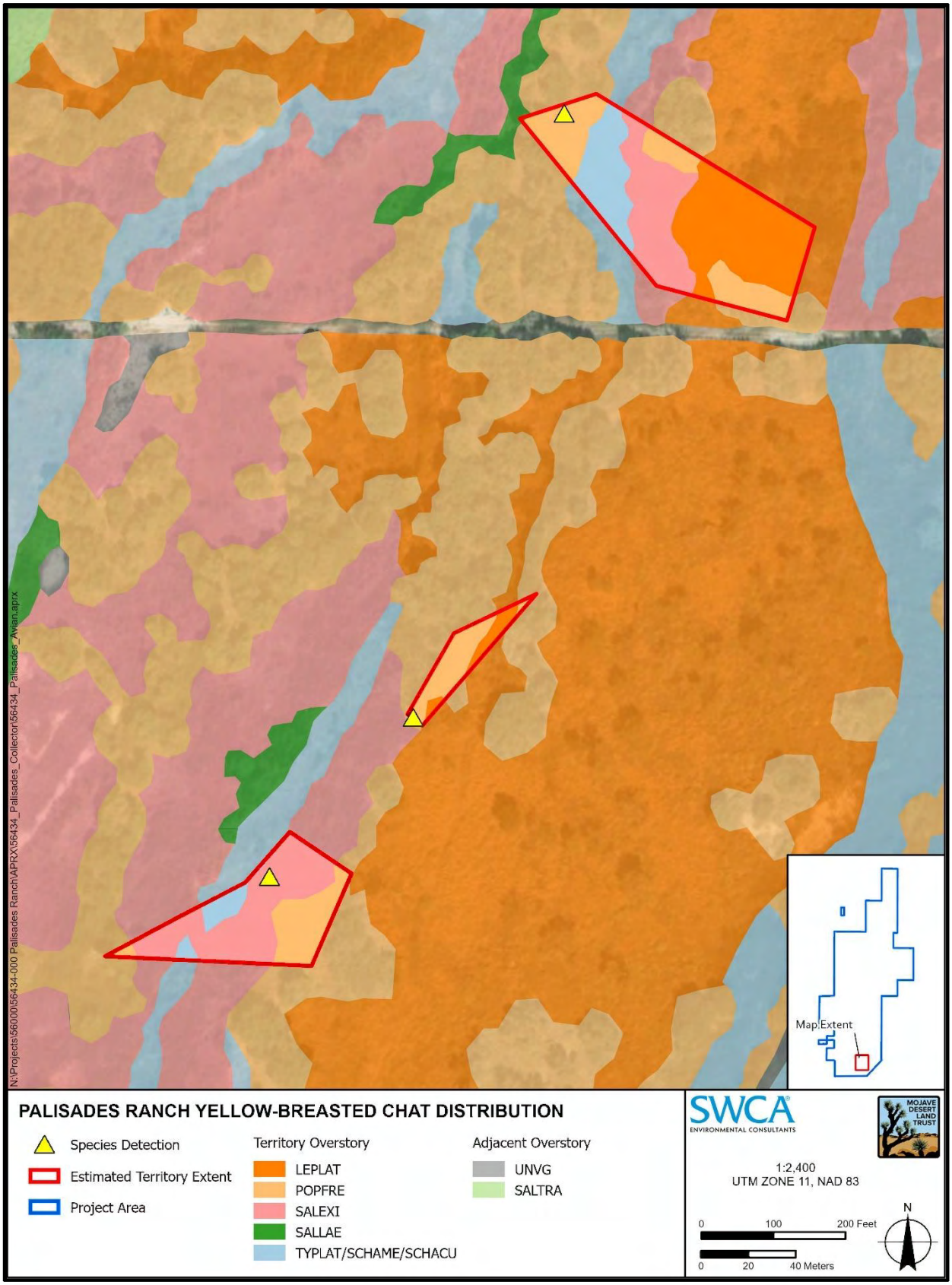

Figure 36. Yellow-breasted chat distribution and habitat use (map 4 of 5).

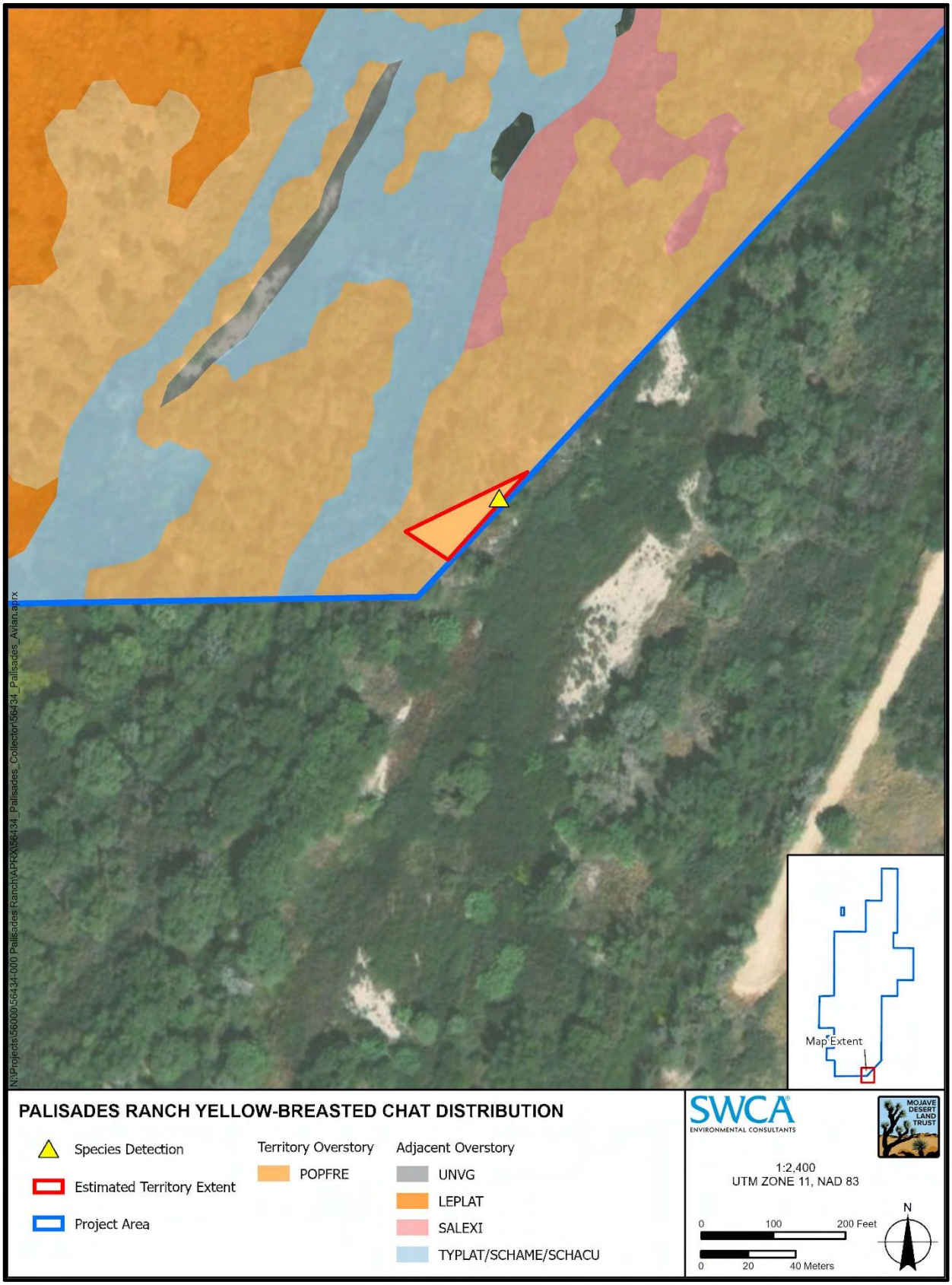

Figure 37. Yellow-breasted chat distribution and habitat use (map 5 of 5).

3.2.2.2 SPECIAL-STATUS SPECIES HABITAT USE

Special-status birds were much less likely to be detected in the 3 survey grids in the northern half of the Property and the grids that overlapped the abandoned agricultural field. To assess potential affinities of special-status species for specific habitats, vegetation class composition within the point of highest breeding behavior and estimated territory extents for each special-status species were calculated (Table 14). Special-status species' territories were composed mostly of *P. fremontii*- and *S. exigua*-dominated vegetation classes (67% between the 2 classes), and these were also the most common vegetation classes surveyed within the grids. Three vegetation classes were not used at all by special-status species (*B. salicifolia* shrubland, *G. lepidota,* and *P. pubescens* riparian forest). Chi-squared analyses did not reveal a significant difference in the territorial use of vegetation classes compared with the proportion of vegetation classes surveyed, but more than 40% of surveyed *L. latifolium, P. fremontii, S. exigua, S. laevigata,* and *T. latifolium*-dominated vegetation classes contained special-status birds. *Populus fremontii* riparian forest is the most commonly used vegetation class for Lucy's warbler, Cooper's hawk, and summer tanager, while *S. exigua* is the most commonly used vegetation class for least Bell's vireo, yellow warbler, and yellow-breasted chat (see Table 14). These habitat associations are expected for these species.

3.2.2.3 SPECIAL-STATUS SPECIES NOT RECORDED

Several species that were either recorded at the Property in the past or were thought to have the potential to occur at the Property were not recorded during the 2020 avian surveys. These include brown-crested flycatcher (*Myiarchus tyrannulus*) and burrowing owl (*Athene cunicularia*), which were recorded at the Property during the 2016 avian surveys (CDFW 2016); Vermilion flycatcher (*Pyrocephalus obscurus*), which had been detected on the Property in 2000; and LeConte's thrasher (*Toxostoma lecontei*), loggerhead shrike (*Lanius ludovicianus*), and several species of special-status raptors, including northern harrier (*Circus hunsonius*), sharp-shinned hawk (*Accipiter striatus*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), prairie falcon (*Falco mexicanus*), long-eared owl (*Asio otus*), and osprey (*Pandion haliaetus*), which had never been recorded at the Property but were thought to have potential for occurrence. In addition, southwestern willow flycatcher were not detected at the Property in 2020, but due to its conservation status, more discussion is provided for this species.

3.2.2.3.1 Southwestern Willow Flycatcher

The southwestern willow flycatcher is one of 4 subspecies of willow flycatcher (Unitt 1987), and this subspecies was listed as an Endangered species under the ESA on February 27, 1995 (USFWS 1995). It is also listed as Endangered under the CESA (CDFW 2019). Factors contributing to the decline of southwestern willow flycatchers on their breeding grounds include loss, degradation, and/or fragmentation of riparian habitat; invasion of riparian habitat by non-native plants; and brood parasitism by brown-headed cowbirds. Southwestern willow flycatchers breed in dense, mesic riparian habitats at scattered, isolated sites in New Mexico, Arizona, southern California, southern Nevada, southern Utah, southwestern Colorado, and, at least historically, extreme northwestern Mexico and western Texas. One of the last long-distance neotropical migrants to arrive in North America in spring, southwestern willow flycatchers typically arrive in May or June and depart in August (Sogge et al. 2010).

They nest in a variety of habitats, but common characteristics of southwestern willow flycatcher breeding habitat include tree or shrub cover greater than or equal to 3 meters (9.8 feet) in height, vegetation with dense twig structure and high canopy closure, relatively high levels of green foliage, and close proximity to surface water or saturated soil (McLeod and Pellegrini 2013; Sogge et al. 2010). This habitat is often not uniformly dense and may be interspersed with small openings and patches of open water. Water conditions are also not uniform among occupied breeding sites, with water present only through early

June at some breeding sites. Southwestern willow flycatchers nest in habitat patches ranging in size from 0.8 hectares (2.0 acres) to several hundred hectares but are rarely detected in narrow strips of habitat less than 10 meters (32.8 feet) wide. During the nesting season, southwestern willow flycatchers occupy home ranges averaging less than 0.5 hectares (1.2 acres) in size (Cardinal 2005). Willow flycatchers are generally monogamous, but cases of polygyny have been documented (Ehrlich et al. 1988). Migrant willow flycatchers are found in spring and fall in a variety of habitats that are not suitable for breeding. These migration stopover habitats, even though not used for breeding, are likely important for reproduction and survival.

At least 2 individual willow flycatchers were recorded from 4 locations in the extreme southeastern portion of the Property in 2016, but the subspecies of these individuals could not reliably be determined, as surveys were conducted in May and 2 northern subspecies of willow flycatcher migrate through southern California in the late spring annually (CDFW 2016). It remains unclear whether the individuals detected in May 2016 were the more northern subspecies or if southwestern willow flycatchers occupy the Property in some years or for a portion of the breeding season.

Designated critical habitat for the southwestern willow flycatcher includes riparian habitats along the Mojave River within the Mojave Management Unit, including the entire stretch of the Mojave River within the Property (USFWS 2013a). And it appears that all of the habitat characteristics required by southwestern willow flycatchers are abundantly available at the Property, including: 1) dense riparian vegetation within 3 to 4 meters (10 to 13 feet) of the ground composed of species such as willows, baccharis (*Baccharis* spp.), nettle (*Urtica* spp.), and cottonwood and interspersed with less dense openings throughout and 2) areas of saturated soils or inundation by slow-moving or stagnant surface water (USWFS 2002) Despite the pervasiveness of these habitat requisites at the Property, willow flycatchers were not detected at the Property in 2020. By definition, the USFWS (2002) would describe this reach of the Mojave River as “unoccupied suitable habitat,” since the habitat characteristics are present, but the site remains unoccupied. It appears that southwestern willow flycatchers have not yet colonized this stretch of the Mojave River because the population is small and fragmented or there is some missing habitat characteristic that has not yet been identified. Since the rapid assessment grid surveys conducted in 2020 were not comprehensive in temporal or spatial distribution, focused species-specific surveys for southwestern willow flycatcher could potentially determine the use of the Property as a migratory stopover or a small, yet undetected breeding population.

Table 14. Special-status Bird Habitat Associations for Points of Highest Breeding Activity and Territories

Dominant Overstory Taxa	Area Surveyed (Acres)	Western Yellow-billed Cuckoo		Least Bell's Vireo		Cooper's Hawk		Lucy's Warbler		Summer Tanager		Yellow Warbler		Yellow-breasted Chat		Occupied Habitat Totals (Acres)*
		Points	Territory Acres	Points	Territory Acres	Points	Territory Acres	Points	Territory Acres	Points	Territory Acres	Points	Territory Acres	Points	Territory Acres	
ATRLEN / ATRCAN	17.54 (8%)	-	-	-	-	-	-	-	0.22 (23%)	-	1.59 (4%)	-	0.20 (1%)	-	-	2.01 (11%)
BACGLU	3.25 (2%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0 (0%)
GLYLEP	0.65 (<1%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0 (0%)
LEPLAT	23.24 (11%)	-	-	-	-	-	-	-	-	-	8.85 (23%)	2 (3%)	0.76 (5%)	2 (13%)	0.49 (11%)	10.10 (43%)
POPFRE	47.64 (23%)	1 (100%)	-	1 (50%)	0.05 (16%)	1 (25%)	1.79 (94%)	1 (100%)	0.74 (77%)	5 (100%)	13.05 (34%)	25 (32%)	5.13 (31%)	4 (25%)	0.93 (20%)	21.69 (45%)
PROPUB	5.88 (3%)	-	-	-	-	-	-	-		-	-	-	-	-	-	0 (0%)
SALEXI	50.00 (24%)	-	-	1 (50%)	0.29 (84%)	2 (50%)	0.12 (6%)	-		-	8.89 (23%)	36 (47%)	7.70 (47%)	9 (56%)	2.92 (64%)	19.92 (40%)
SALLAE	5.11 (2%)	-	-	-	-	-	-	-		-	1.23 (3%)	9 (12%)	1.51 (9%)	1 (6%)	<0.00 (<1%)	2.74 (54%)
SALTRA	27.23 (13%)	-	-	-	-	-	-	-		-	0.07 (<1%)	-	-	-	0.04 (1%)	0.11 (<1%)
TYPLAT / SCHACU / SCHAME	10.41 (5%)	-	-	-	-	1 (25%)	-	-		-	4.59 (12%)	5 (6%)	1.13 (7%)	-	0.19 (4%)	5.91 (57%)
UNVG	19.62 (9%)	-	-	-	-	-	-	-	0.01 (1%)	-	0.22 (1%)	-	0.07 (<1%)	-	-	0.30 (1%)
Total	210.56	1	-	2	0.34	4	1.91	1	0.97	5	38.49	77	16.50	16	4.57	62.78

* Red text indicates occupied habitat that represents a percent composition lower than available habitat surveyed (i.e., this habitat was avoided); blue text indicates occupied habitat that represents a greater percent composition than available habitat surveyed (i.e., this habitat was preferred).

3.3 Butterflies

3.3.1 *Monarch*

The Monarch butterfly (*Danaus plexippus plexippus*) is a North American multigenerational migratory butterfly. This species is currently being assessed by the USFWS for listing under the ESA (USFWS 2014c). While it is not currently listed as endangered, a decision on whether to list this species is expected to be issued in December 2020 (Center for Biological Diversity 2019). Factors contributing to their decline include habitat loss, climate change, and adverse effects from pesticide use (Pelton et al. 2019). Their range spans from central Mexico and reaches into the southern tips of the Canadian provinces. Most of the western population overwinters in the coastal woodlands of California and breeds across the western states, beginning in late winter and early spring (Borders and Lee-Mäder 2014).

Monarch butterflies rely heavily on the presence of milkweed (*Asclepias* spp.) on which they lay their eggs. While adult butterflies use a variety of food sources in the form of nectar, caterpillars eat the leaves of milkweed almost exclusively. Palisades Ranch support several nectar species important for adult Monarchs such as baccharis (*Baccharis* spp.), rabbitbrush (*Chrysothamnus* spp.), and a diverse list of sunflower species (Asteraceae). While milkweed has not been documented within Palisades Ranch, two species, narrow leaf milkweed (*Asclepias fascicularis*) and desert milkweed (*Asclepias erosa*), have been observed near Victorville and Barstow, California, respectively (CalFlora 2020; CDFW 2016).

3.3.2 *San Emigdio blue butterfly*

The San Emigdio blue butterfly is a southern California endemic butterfly. While this species is not listed under the ESA or CESA, it is listed as a sensitive species by the U.S. Forest Service. It is an extremely rare species that has been recommended for the endangered species list several times, yet the USFWS has concluded each time that not enough is known to make a determination. According to lepidopterist Gordon Pratt, the original range has been reduced to less than 20% of its former extent and will likely suffer further due to climate change (CDFW 2016). The historic range of the San Emigdio blue butterfly covered a large portion of southern California, from southern Joaquin Valley and Mojave Desert south to Victorville, although recent observations are limited to areas around Isabella Lake in Kern County, with one observation within Palisades Ranch (CDFW 2016; NatureServe 2020).

Factors contributing to the species' decline include cattle ranching, climate change, and limited obligate species overlap (CDFW 2016). San Emigdio blue butterflies rely on the presence of fourwing saltbush (*Atriplex canescens*) as a food source for their caterpillars. They also rely on protection from the field ant (*Formica francoeuri*) from parasitoids and predators (CDFW 2016). The overlap of these two obligate species is uncommon as saltbush is a desert shrub and the field ant is uncommon in the desert. Mr. Pratt concludes this may be the reason the butterfly is so rare and noted once the ant disappears from the site, the butterfly disappears soon after (CDFW 2016). At Palisades Ranch, fourwing saltbush often occurs in mixed patches with quailbush (*Atriplex lentiformis*), a facultative wetland plant, which may indicate higher likelihood of obligate species overlap for the San Emigdio blue butterfly.

3.4 Mammals

3.4.1 *Mojave River Vole*

The Mojave River vole (*Microtus californicus mohavensis*), a subspecies of the California vole (*M. californicus*), is endemic to the Mojave River corridor and has been documented near Victorville and Oro Grande, California. In 2019, Lovich (2020) observed a dead Mojave River vole near the bridge in the

southern portion of Palisades Ranch. The Mojave River vole is a Species of Special Concern in the state of California. Their populations are restricted and disjointed throughout their limited habitat. Threats to their populations include loss of riparian habitat along the Mojave River to agriculture and urban development, channelization of the river to control flooding, and competition with the non-native house mouse (*Mus musculus*) (Brylski 1998).

The Mojave River vole is largely unstudied, so its life history is interpreted from research on the California vole and other subspecies (e.g., the Amargosa vole [*M. c. scirpensis*]). The Mojave River vole occurs in grassy or riparian habitats along the Mojave River where it forages on grasses, forbs, and marsh vegetation. The *Typha domingensis – T. latifolia – Phragmites australis ssp. americanus* Western Marsh Alliance described in Chapter 3.1 could provide habitat for the Mojave River vole. Burrows are placed in non-flooded areas of their habitat and the voles will create runways around their burrows through vegetation. They find cover from predators in their burrows, and in downed wood and brush piles. Habitat use at varying elevations occurs, as documented in the Amargosa vole seeking shelter at higher elevations than the lowest riparian corridor during flood events. Breeding may occur year-round but is most prevalent in February and March, the wet season in the Mojave Desert. The vole's gestation period is 21 days, which produces an average of four offspring per litter. The voles may breed in their first year of life and have up to five litters of offspring annually (Brylski 1998).

In 2020, ECORP Consulting, Inc. conducted pre-survey studies using aerial imagery and a preliminary habitat assessment to identify potential Mojave River vole habitat. Trapping studies informed by the habitat assessment will be conducted in Spring or early Summer 2021 in areas where potential Mojave River vole habitat and/or presence was detected. Results of the studies will be presented in a Biological Technical Report expected to be completed in 2021. The riparian restoration described in this plan would benefit the Mojave River vole by improving existing habitat and creating new habitat at Palisades Ranch.

3.4.2 *Bats*

Desert riparian habitat typically supports high relative bat species diversity and activity levels (Drost and Hart 2008; Williams et al. 2006). Palisades Ranch, in particular, contains a variety of landforms, water features, and vegetation types that likely provide suitable roosting and foraging habitat for several bat species. The Draft Land Management Plan for Palisades Ranch (CDFW 2016) identifies four special-status bat species that have been documented within the vicinity of the Property: pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*), spotted bat (*Euderma maculatum*), and silver-haired bat (*Lasionycteris noctivagans*). In addition, western mastiff bat (*Eumops perotis*) may also occur within the Property (Gogul-Prokurat 2017a). All of these bat species are threatened by a multitude of factors, including white-nosed syndrome (caused by *Pseudogymnoascus destructans*), habitat alteration and loss, drought, fire, and climate change (CDFW 2014, 2015).

3.4.2.1 PALLID BAT

Pallid bat is listed as a Species of Special Concern by the CDFW (2019). Unlike most of the bats in the order Chiroptera, pallid bats are not specialized aerial insectivores. Instead, they glean their prey from vegetation or the ground (Wilson and Ruff 1999). Their varied diet consists mainly of terrestrial invertebrates such as scorpions or centipedes, although larger prey, such as lizards, may also be taken. Pallid bats generally roost in crevices, although they have also been documented roosting in buildings and in trees. Pallid bats are generally detected in upland desert habitat, although they will also utilize riparian forest areas (CDFW 2014; Reid 2006). Suitable habitat for this species may be present on the Property (Gogul-Prokurat 2017b).

3.4.2.2 TOWNSEND'S BIG-EARED BAT

Townsend's big-eared bat is listed as a Species of Special Concern by the CDFW (2019). This bat is generally found roosting in abandoned mines, caves, and buildings. Townsend's big-eared bats are found in a variety of habitats, from upland desert scrub to coniferous forest, and are most commonly encountered within mesic habitat, where they prey on moths and other flying insect species (CDFW 2014). Townsend's big-eared bat is often referred to as a "quiet bat," as it will often produce low-amplitude vocalizations and can also hunt by sight alone; as a result, it is rarely detected acoustically and may be underrepresented in acoustic studies. Suitable habitat for Townsend's big-eared bat may be present on the Property (Gogul-Prokurat 2017c).

3.4.2.3 SPOTTED BAT

Spotted bat is listed as a Species of Special Concern by the CDFW (2019). In the Western US, this species is found in arid areas and also occurs in coniferous forests. They are frequently detected near rocky outcrops, which they are known to utilize for day roosting habitat; spotted bats will also roost in caves (Wilson and Ruff 1999). This species is also known to forage within riparian marsh habitat (Williams et al. 2006). Spotted bats feed on several species of moths and other flying insects. The Property contains 8.5 hectares (21 acres) of riparian marsh habitat (see Chapter 3.1) and may provide foraging habitat for this species (Gogul-Prokurat 2017d).

3.4.2.4 WESTERN MASTIFF BAT

Western mastiff bat, also known as greater bonneted bat, is listed as a Species of Special Concern by the CDFW (2019). Western mastiff bat habitat may be present within the Property (Gogul-Prokurat 2017a). These are fast, high-flying bat species that are known to roost in elevated features with high exposure, such as rock crevices, buildings, and hollow trees. Western mastiff bats are known to fly up to 25 km (15 miles) nightly to foraging areas, where they feed on large insects such as moths, crickets, grasshoppers, cicadas, beetles, and bees (Reid 2006, Wilson and Ruff 1999).

3.4.2.5 SILVER-HAIRED BAT

Silver-haired bat is considered a special-status species by the CDFW (2019) and may occur anywhere in California below 2,743 meters (9,000 feet) during migration. This bat is a tree specialist; they will utilize hollow trees, bark, and woodpecker holes as maternity and day/night roost sites. The *Populus fremontii* Great Basin Riparian Forest Alliance covers 48 hectares (119 acres) of the Property and may provide roosting habitat for this species (Gogul-Prokurat 2017e). Silver-haired bats forage less than six meters (20 feet) above wooded areas and water features for a variety of small flying insects, such as moths, beetles, flies, and ants (CDFW 2014, Wilson and Ruff 1999).

3.5 Aquatic Species

3.5.1 *Mohave Tui Chub*

The Mohave tui chub is the singular native fish endemic to the Mojave River basin in California's San Bernardino and Kern Counties. Mohave tui chub are adapted to the slow moving, lacustrine-like hydrology of the Mojave River as it occurred before human-made alterations (USFWS 2009). The fish are minnow-like, range between 10–23 cm (4–9 inches) in length, and feed on plankton, insect larvae, and detritus. Their lifespan is around two years and spawning activity occurs from March to April, and occasionally October, when water temperatures reach 18°C (NatureServe 2020; USFWS 2009).

In the 1930s, the Arroyo chub (*Gila orcutti*) was introduced into the Mojave River, and by the 1970s, the genetically pure Mohave tui chubs were extirpated from the river due to competition and hybridization (USFWS 1984, 2009). The USFWS listed the Mohave tui chub as endangered under the ESA in 1970. The last population of genetically pure Mohave tui chub inhabited Soda Springs, a series of ponds near the terminus of the river, which were then used to establish new populations in refugia habitats (USFWS 1984).

From 1939 to 2011, translocation of the Mohave tui chub has been attempted at 17 seeps, springs, and ponds in southern California and Nevada, but most populations did not establish (USFWS 2009). Flooding, poor water quality, insufficient water quantity, and disease have been attributed to the extirpation of translocated populations (NatureServe 2020). As of 2007, the Mohave tui chub inhabit three refuge locations: Lake Tuendae and MC Spring at Soda Springs, Lark Seep at China Lake Naval Air Weapons Station, and at Camp Cady Wildlife Area along the Mojave River; all of which are human-made or human-maintained habitats (USFWS 2009). The Lark Seep population, established in 1972, contains the largest and most genetically diverse population of the fish (United States Navy 2015); however, naval station personnel are interested in translocating the population off-site due to pond maintenance concerns (Lovich 2020).

USFWS (2009) recommends translocating populations of around 500 fish into refuge locations within the Mohave tui chub's historical range along the Mojave River. Refuge habitats should occur as ponds or pools at least 1.2 meters (4 feet) deep and have an inflow of fresh water to maintain water quality. Water quality should range in temperature from 3–36°C, dissolved oxygen greater than 2 parts per million, salinity between 40 and 323 millimols per liter, and pH less than 10. Aquatic vegetation should occur in the habitats to support aquatic invertebrates and provide spawning substrate (USFWS 2009). Typical aquatic vegetation in Mohave tui chub habitat includes southern cattail (*Typha domingensis*), chairmaker's bulrush, aquatic ditchgrass (*Ruppia maritima*), and algae (USFWS 1984). Excessive cattail cover should be removed to regulate dissolved oxygen and maintain open water. Riparian vegetation should exist around the waterbodies to provide shade and cool water temperatures.
To ensure establishment, the refuge habitat should be free of competing and predatory aquatic species (USFWS 2009). A translocated population of Mohave tui chub to Palisades Ranch would support the USFWS' goal of downlisting the species from endangered to threatened if 6 translocated populations can thrive for 5 consecutive years in habitats along the Mojave River (USFWS 2009).

3.5.2 *Southwestern Pond Turtle*

The southwestern pond turtle (*Actinemys pallida*), formerly known as the Western pond turtle (*A.* [*Clemmys*] *marmorata*), occurs from the central coast range south of the San Francisco Bay area to the species' southern range boundary in Baja California. This species occurs from around sea level to 2,041 meters (6,696 feet) in elevation. The southwestern pond turtle is listed as a Species of Special Concern by the CDFW (2019). Illegal collection, non-native turtle and frog species, and habitat loss are the primary threats to this species. Southwestern pond turtles have been observed along the Mojave River near Victorville, Hesperia, and along the Mojave Narrows (Bureau of Land Management 2005; Lovich 2020; Nafis 2020).

Habitat for the southwestern pond turtle is varied, and consists of ponds, lakes, rivers, streams, creeks, marshes, and irrigation ditches with abundant riparian and aquatic vegetation in woodland, forest, and grassland habitat. This species utilizes deeper areas, such as pools, in streams, rivers, or creeks. Southwestern pond turtles require basking sites to watch for predators, and will use various substrates such as logs, rocks, cattail mats, and exposed banks (Nafis 2020). This species nests in sandy banks near slow-moving streams but will also move considerable distances (up to 100 meters [330 feet]) from water into upland areas to lay their eggs (CDFW 2014; Storer 1930). A study of western pond turtles in Oregon

reported nest sites were located in areas with sparse ground cover, low vegetation (less than 45 cm [1.5 feet]), southern to southeastern aspects, gentle slopes (less than 40 degrees), and in close proximity (less than 200 meters [656 feet]) to aquatic habitat (Rosenberg et al. 2009).

Trapping surveys for this species were conducted in 2020 by USGS, Southwest Biological Science Center (Lovich et al. 2020). Surveys were conducted using 2.5-foot diameter hoop traps and performed in ponded areas created by beaver dams within the riparian corridor of the Property. No southwestern pond turtles were captured or observed during approximately 117 trap hours.

3.5.3 *Arroyo Toad*

The arroyo toad (*Anaxyrus californicus*) occurs in low gradient, medium-to-large streams and rivers with intermittent and perennial flow in coastal and desert drainages in central and southern California, and Baja California, Mexico (CDFW 2019; Nafis 2020). Arroyo toad was listed as federally endangered in 1994 (59 FR 64859) (USFWS 1994). This species is currently believed to be extirpated from the Mojave River (USFWS 2014d); however, potential arroyo toad habitat is present within the Property. The USGS, Southwest Biological Science Center conducted presence-absence surveys for this species on the Property in March 2020 and deployed a Wildlife Acoustics Song Meter in June and July 2020 to detect arroyo toad calls (Lovich et al. 2020). No arroyo toads in any life stage were observed during the surveys nor were any detected from recordings made on the song meter.

Arroyo toads are found in aquatic, riparian, and upland habitats, and require slow-moving streams with sandy soils and streamside terraces (Sweet 1992). This species requires very shallow, still, or low-flow pools for breeding, egg-laying, and tadpole development. Periodic flooding and scouring of channels is a critical element in the creation and maintenance of arroyo toad habitat (Madden-Smith et al. 2005). Due to its specific ecological requirements, the arroyo toad is particularly vulnerable to habitat destruction and alteration. Additional threats to this species include non-native predators such as American bullfrogs (*Lithobates catesbeianus*) and fish, drought, fire, and climate change (Campbell et al. 1996; Jennings and Hayes 1994; Sweet 1992).

3.5.4 *California Red-legged Frog*

The California red-legged frog (*Rana draytonii*) is federally listed as threatened according to the ESA (USFWS 1996). It is the largest native frog in the western United States and can reach up to 12.7 cm (5 inches) in length. The Property may provide habitat for this species, although it is likely extirpated from the Mojave River. The USGS, Southwest Biological Science Center conducted presence-absence surveys for this species on the Property in March 2020 and deployed a Wildlife Acoustics Song Meter in June and July 2020 to detect anuran calls (Lovich et al. 2020). No California red-legged frogs in any life stage were observed during the surveys, nor were any detected from recordings made on the song meter.

This species can be found within 1.6–3.2 km (1 to 2 miles) of suitable breeding sites, which are characterized by deep, still or slow-moving water deeper than 0.8 meters (2.5 feet), with varying amounts of edge and emergent plant cover (although sites with dense riparian and aquatic vegetation are preferred) (USFWS 2017). California red-legged frogs breed primarily in ponds (including stock ponds), but will also use streams, marshes, and lagoons (Elliott et al. 2009; USFWS 2017). Suitable breeding sites remain moist and cool through the summer. In the summer or during periods of drought, this species often aestivates in upland terrestrial habitat, and will use rocks, leaf litter, buildings, or small mammal burrows. Bullfrogs and predatory fish are considered primary threats to this species, which can feed on tadpole, metamorph, and juvenile age classes. Ephemeral water features that become dry for part of the year are favorable breeding sites for the California red-legged frog, as they will not support the life cycles of predators, such as bullfrogs and predatory fish, that feed on them (USFWS 2017).

3.5.5 *Beavers*

Although beavers (*Castor canadensis*) are not special-status species, their beneficial activities, particularly dam building, in the Mojave River have many conservation implications. Extensive fur trapping in the 1800s and near extirpation of beavers led to the misconception that beavers and their habitat were absent on southern California rivers (Lanman et al. 2013). The unpredictable nature of flow regimes in dryland rivers with periodic droughts and flash floods limits riparian vegetation and beaver habitat extent, but dam and reservoir construction have increased riparian vegetation and likely increased beaver abundance (Gibson and Olden 2014). Beaver dams are abundant in the upstream half of the Property, and this area also has high biodiversity.

Beavers prefer riparian trees (red willow, Goodding's willow, and Fremont cottonwood) for dam building. Foraging has been demonstrated to increase red willow growth rate but can be detrimental to cottonwoods, especially where cottonwoods are already limited by flow regulation (Gibson and Olden 2014). Fencing of young cottonwoods may be necessary along beaver-occupied rivers or streams where cottonwoods are less common. Non-native plants such as perennial pepperweed may also benefit from the increased stability provided by beaver dams. Beaver dam breaching and re-building creates disturbance that riparian shrubs and trees such as willows and cottonwoods are adapted to; however, this disturbance could also benefit tamarisk, especially if it occurs during summer when willows and cottonwoods are no longer releasing seeds.

Beaver dams increase fluvial geomorphic diversity (i.e., increase type and abundance of landforms) and surface water extent. Beaver ponds are associated with a higher diversity of riparian birds and small mammals (Gibson and Olden 2014), including some non-native, invasive species such as bullfrogs and crayfish that are predators and competitors of special-status species such as the arroyo toad. Beaver dams can reduce channel incision if dams persist long enough for sediment to accumulate, and beaver introductions and beaver dam analogs (BDAs) are commonly used in stream and river restoration (Pollock et al. 2015).

3.6 Human History and Land Use

The Palisades Ranch Property is within the traditional landscape of the Mohave peoples, who included the Serrano and Vanyume. The Mohave peoples lived in village-hamlets (Bean and Smith 1978). They could be categorized as gatherers who occasionally hunted. They utilized upland resources such as pinyon pines as well as lowland resources like cactus and other various roots, tubers, and seeds (Bean and Smith 1978). Typically hunted resources were rabbits, deer, and birds such as quail.

Post-contact history for the state of California is generally divided into three periods: the Spanish period (1769–1822), Mexican period (1822–1848), and American period (1848–present). In these three periods indigenous groups across California experienced different types of colonialism in different ways. The Spanish mission and presidio occupation imposed Christianity on indigenous peoples of the area beginning in 1769. Coastal missions were most instrumental in imposing new belief systems and new, stringent, discipline imposed by Spanish occupation of the coastal areas and beyond forced a shift in social sensibilities among indigenous people (Jackson and Castillo 1995). During the Spanish period, non-mission indigenous people were permitted to move around freely and own property, typically if they were not idle in occupation. Despite some of these liberties, Spanish colonial rule heavily imposed its institution on indigenous groups.

The Mexican period began in 1822, following Mexican independence from Spain, and the following decade included an ultimately successful effort by the new government to secularize the missions. Those indigenous people disenfranchised and captive in the mission systems were transferred to a new system

of debt peonage (Hurtando 1988; Rawls 1984). Previously captive indigenous people were permitted to live in villages on lands granted to Hispanics and were effectively indentured to provide labor to the landowners. Non-captive indigenous people were permitted to continue to occupy their villages and hunt or collect their traditional foods in their traditional places, even if those places were incorporated within Mexican or Spanish land grants. At this time, indigenous groups in the area began integrating into Euro-American culture, often leaving traditional lifeways behind for occupations within Euro-American or Spanish-Mexican agricultural systems by becoming ranch hands (*vaqueros*) and farm laborers. Extending to 1848, the Mexican period includes the events when Euro-American occupation of California increased after the Mexican-American War (1846–1848). Though the previous decades had been difficult for indigenous groups, the postwar period was especially devastating.

Beginning in 1848, indigenous peoples experienced not just a change in colonial rule, but also an influx of nonnative people due to the discovery of gold at Coloma. The Mexican-American War's end resulted in swift land grabs, additional cultural disruptions, and decimation of indigenous populations (Hurtando 1988; Rawls 1984). It is estimated that that 20% of the indigenous population of California died between 1848 and 1852, falling from an estimated 71,050 to 60,450 individuals (Cook 1976). Three decades later, the indigenous population is estimated at only 12,500 individuals, less than 20% of its size prior to the California Gold Rush (Cook 1976). Population health degradation was most severe during this period when California was a territory of the United States, but natural resource degradation and restriction had just begun.

Early land use of the Mojave River area by non-indigenous peoples between 1769–1870 was livestock ranging prior to the establishment of trails systems. Spain's desire to link large commercial colonies throughout present-day New Mexico and southern California without having to negotiate the Grand Canyon resulted in the famous expedition of Francisco Dominguez and Father Silvestre Velez de Escalante in 1776. The Spanish friars and eight companions left New Mexico in search of a more northerly overland route between Santa Fe and Monterey, California (Swanson 1995), but were ultimately impeded by bad weather. Although the explorers failed to achieve their primary objective, their field notes provide some of the first historic-period accounts of the Native inhabitants and regional landscape. This route, combined with the trails explored by Father Francisco Garcés in 1776 and Jedediah Smith in 1826, was later incorporated into the Old Spanish Trail which passes south east of the Palisades Ranch project vicinity.

Two years after Smith's expedition, the Mexican trader Antonio Armijo completed the route between New Mexico and the California coast initiated by Dominguez and Escalante, finishing in Los Angeles rather than Monterey. The trail exited southern Utah and crossed through northwestern Arizona before entering Nevada near Bunkerville. From here, the route curved to the southwest, passing through the future site of Las Vegas before entering Alta, California (Elliott 1987; Hulse 1990). When the party reached the Mojave River, they followed it to Los Angeles (Paher 1971).

The inauguration of the Spanish Trail was a watershed event. The route immediately became a major component of the trade network between the West Coast and the interior country. Development of the trail as a major trade route was spurred by the livestock industry, particularly the legal (and illegal) commerce of horses and mules purchased in California and transported east to Santa Fe. The Old Spanish Trail became the main mode of long-distance transportation for the American Southwest during the 1830s and 1840s, connecting Santa Fe to Los Angeles and completing a highway that ran from Independence, Missouri, to Los Angeles, California.

A group of Mormon volunteers, dubbed the Mormon Battalion, who were enlisted for the Mexican–American War traveled the Spanish Trail after their discharge from service in 1848 (Swanson 1995). Most members of the battalion traveled to northern Utah along a section of the Old Spanish Trail from

Los Angeles through the Las Vegas Valley (Smart 1994). Thereafter, this corridor, including a portion of the Old Spanish Trail, was commonly referred to as the Mormon Road. Traffic on the eastern leg of the Old Spanish Trail diminished by the end of the Mexican War in 1848, and the Mormon Trail rose to prominence as the primary commercial route connecting Salt Lake City and southern California via Las Vegas (McCracken 1992). The Mormon Trail was increasingly used after the discovery of gold in California and the accelerating interest in mining exploration in Death Valley. Over time, miners established boom camps, which provided a market for ranching operations (McCracken 1992).

An overland mail route came through the Palisades Ranch project vicinity in the 1850s. A strategic way to improve mail service by subverting poor weather, in 1854 a four-year contract took mail from Salt Lake City through the area to San Diego (U.S. Postal Service 2010). Utilizing pack mules, horseback saddle bags, and wagons, mail was carried to California residents vial portions of the Mormon Trail until 1858 (U.S. Postal Service 2010).

As automobiles began to change American life, wagon roads and overland mail routes began to giving way to auto trails for commerce, travel, and tourism. The National Old Trails Road was near the Palisades Ranch vicinity and was established in 1912. Later in 1926 a series of auto trails across America, including trials in the Palisades Ranch vicinity, were aggregated into the nationwide network of numbered highways. The National Old Trails Road (also known as the National Trails Highway) in the Palisades area was designated part of the famous Route 66 along with other auto trail segments. Auto travel mostly transported people and facilitated commerce through the Palisades Ranch area until the mid to late twentieth century when a transition in landscape use occurred.

In the late nineteenth century, the Palisades Ranch vicinity may have first been homesteaded by Aaron Lane. He ranched livestock and alfalfa in the area (Thompson and Thompson 1995). The Palisades Ranch may have developed from the economic momentum of commercial traffic along the Mohave Road and nearby station named for Aaron, as Lane's Crossing. Local knowledge indicates that later, in the 1930s the Palisades Ranch was a family farm property, where they continued to plant alfalfa as well as fruit trees beginning the 1930s (Hill Family 1993). In 1937 a large flood washed out the alfalfa field and transported some of the farm equipment down river.

A transition from pastoral land use to more urban and industrial land use in the Mojave River area of San Bernardino County was underway by the 1970s. Urban and city-dwelling denizens from California's inland empire and surrounding areas moved east to the desert for a variety of reasons. The newly founded community of Helendale (established in approximately 1970) was the biggest draw. While specific socio-cultural drivers may have catalyzed urbanization of the Mojave River area during the late historic and modern times, the theme of leaving the family ranch in the past in favor of housing tracts was most impactful to the Palisades Ranch property. This theme was common to the late nineteenth century development of the broader Southern California area too (Wade et al. 2009).

In the late twentieth century, the Palisades Ranch property was owned by Bob Older and his wife Betsy. The Palisades Ranch property totaled 890 hectares (2,200 acres) in 1980 and 1981 (*Los Angeles Times* 1980*; San Bernardino County Sun* 1981). As early as 1980, Mr. Older sought to sell more than 75% of his land, roughly 688 hectares (1,700 acres) (*Los Angeles Times* 1980; *San Bernardino County Sun* 1981). The property for sale was detailed as "the northern ¾ acres" which featured 7.2 km (4.5 miles) of Mojave River frontage, a private airport, and dwellings on "the central 500 acres" (*San Bernardino County Sun* 1981).

The Olders aggregated their 890-hectare (2,200-acre) ranch landholding from the Silver Ranch, Triangle Ranch, and Hill Ranch, which when combined, were renamed to the Palisades Ranch (*San Bernardino County Sun* 1970). The Silver Ranch was also known as the Silver River Ranch that was previously

owned by the Delfino Brothers. In 1990, the Palisades Ranch produced alfalfa on 81 hectares (200 acres) near the river (Nordyke 1990). Bob Older died at the Palisades ranch property on Ranch Oct 13, 1995 at the age of 74 (San Bernardino County Sun 1995). Mr. Older was survived by his wife sons Steve and Bob. Five years prior to Mr. Older's death, a time capsule was buried at the ranch, with the intent to be opened in 2090 (Nordyke 1990).

Neighboring the Olders' Palisades Ranch in the late twentieth century were several other agricultural enterprises. The cattle and alfalfa producing Helendale Ranch, the Hayes pullet Ranch, the Manuel Cortes Ranch-Cordoza Dairy Ranch, and the 5-M Ranch which produced Charolais cattle, all near the Palisades Ranch (*San Bernardino County Sun* 1970).

4 CONCEPTUAL RIPARIAN RESTORATION PLAN

Throughout this chapter, actions categorized as riparian or river enhancement and restoration are prescribed. Riparian enhancement actions include planting, soil amendments, irrigation, weed treatments, and placement of small woody debris. Riparian restoration actions include river channel alignment, terrace cutting, grading, installation of in-channel structures, and other construction actions that require heavy equipment. Best management practices (BMPs) during construction and long-term management of the property will be described in the 30% Conceptual Restoration Plan for Palisades Ranch and in the Overview of Long-term Management of the Property. Those documents will address ongoing monitoring and maintenance of the restored habitats described in this Conceptual Riparian Restoration Plan to address threats (e.g., off-highway vehicle [OHV] trespass, exotic plant species, pathogens, soil contaminants) to the restored habitats and associated special status species. Additionally, long-term management will include supplementary measures as needed for promoting healthy riparian habitat, such as supplemental plantings, controlled flooding to assist vegetation establishment, and erosion control, and include metrics for determining restoration success.

4.1 Mojave River Restoration

4.1.1 *Design Objectives and Approach*

As stated earlier, the overarching goal for conservation actions identified in this plan is to increase habitat for the San Emigdio blue butterfly, Mohave tui chub, southwestern willow flycatcher, western yellow-billed cuckoo, and least Bell's vireo. The 60% river restoration design includes restoration of wet shrubland dominated by saltbush that will provide potential habitat for the San Emigdio blue butterfly. Other pollinators will also benefit from the mesic and xeric pollinator gardens specified and described in Chapter 4.1.5. A population of the Mohave tui chub could be translocated to the 2-acre pond to be fed by groundwater or well water. This pond is disconnected from the Mojave River, which would prevent introduction of the non-native arroyo chub.

The *Southwestern Willow Flycatcher Recovery Plan* (USFWS 2002) identifies that restoration of habitat for the southwestern willow flycatcher would also benefit many other riparian species and that any habitat restoration approach specific to that species should not only consider entire plant and animal communities but also the physical elements and processes that sustain those communities; this necessitates the full restoration of a natural flow regime. As recommended by the USFWS (2002), this design would reconnect the channel with the entire floodplain, which would allow for natural flooding and dynamic flows across the Property and for beavers to expand their distribution at the Property, perpetuating a complex and heterogenous floodplain.

To expedite establishment and sustainability of new riparian forest, this design would also include plantings of cottonwood and willow forest and shrubland, also recommended by the USFWS (2002) for restoration of southwestern willow flycatcher habitat. The design would also increase the area of available habitat for several state of California special-status birds known to occur at the Property, including least Bell's vireo, western yellow-billed cuckoo, Cooper's hawk, Lucy's warbler, summer tanager, yellow warbler, and yellow-breasted chat. Additionally, plantings of mesquite would enhance habitat complexity and provide potential foraging and/or nesting habitat for least Bell's vireo, western yellow-billed cuckoo, and Lucy's warbler.

SWCA used a multi-criteria decision analysis tool to evaluate alternatives for restoration of the abandoned agricultural field and adjacent Mojave River channel. Six alternatives were considered that were scored based on their ability to meet objectives categorized by improved riparian habitat (canopy height diversity, increased perennial flow area, riparian area, increased emergent marsh habitat, reduced invasive plants); improved aquatic habitats (perennial deep pools, ephemeral deep pools, off-channel perennial pools, in-channel habitat diversity); water quality benefits (reduced hydromodifications, hyporheic exchange/nutrient cycling, temperature reduction); regulatory floodplain (requiring a FEMA letter of map revision [LOMR], hydraulic benefits, improved conveyance of flood waters); water allocation (groundwater/aquifer recharge, water conservation); and maintenance required (channel stability, minimized fire risk, reduced flood velocities, reduced riparian invasive plant infestations). The alternatives considered consisted of 0) no action; 1) create a backwater channel; 2) create a side channel; 3) restore the floodplain channel with the floodplain bench, and restore the historic, intermediate channels; 4) raise the floodplain of the main Mojave River channel by filling the incised channel and cutting a new channel; and 5) disconnect the backwater channel/oxbow. Alternative 3 was ranked the highest by the SWCA design team. The Alternative 3 design was modified to include a backwater channel and pond to increase riparian and aquatic habitats.

The recommended approach for aquatic habitat restoration at Palisades Ranch involves reconnecting the abandoned agricultural field to the Mojave River by reestablishing a nested floodplain that resembles historic floodplain conditions. Reconnecting the abandoned agricultural field to mimic historic floodplain conditions entails excavating bifurcated channels and a nested floodplain that would be connected to the current lower valley floor active floodplain. Restoration of the agricultural field is anticipated to restore the historic floodplain and braided channel form during annual high flows, promote natural recruitment of vegetation and beaver colonization, and boost groundwater storage of the floodplain aquifer. The design approach will not be hard engineering, but rather a system that will allow for natural processes to take place to have the greatest ecological uplift possible.

The 60% design drawings depict the general restoration site plan, proposed side channel alignments, and proposed channel dimensions (Appendix D). The design proposes to construct a main side channel, a west branch side channel, and two higher elevation 5-year return interval (RI) channels within the proposed nested floodplain in the abandoned agricultural field. The 60% design drawings show a general grading plan for the larger trapezoidal side channels and excavated floodplain. The final design is anticipated to include a finer-scale grading plan that would include topographic variations along the margins to promote habitat variety and add interest to the landscape.

The main side channel is approximately 2,012 meters (6,600 feet) in length and would support perennial wetland habitats in the excavated channel and along the margins. The main side channel is designed to be connected to the Mojave River floodplain at the old Heritage Road crossing, enhancing an existing bifurcated channel in the floodplain at that location. The main side channel would route Mojave River overbank flows through the agricultural field excavated floodplain and connect to other proposed bifurcated channels. The main side channel is designed to have 0.5-foot-deep water at the 3.7 cms (130 cfs) average flow that occurs during the target nesting period (February–April). The main side channel

and excavated floodplain would be fully activated during the 1.5-year RI Mojave River flows of 12.7 cms (450 cfs). The main side channel ties into the Mojave River at the downstream extents where the Mojave River conforms to a quasi-single thread channel. The main side channel would be inundated from Mojave River backwater conditions during base flows for approximately 549 meters (1,800 feet).

BDAs are planned to serve as temporary grade control structures in the main channel of the Mojave River to raise the head of the river and promote backwater conditions in the main side channel. The proposed BDA structures are not sustainable and are anticipated to partially fail during large flood events and, therefore, would not impact the BFEs. The proposed design approach is to temporarily stabilize the side channels and floodplain for the first few years after construction to initiate the restoration process, and thereafter, the design is anticipated to result in natural channel adjustments. Some localized erosion and deposition are anticipated around BDAs which does not pose a risk to infrastructure. Additional BDAs are planned to be installed after the initial process of establishing a pilot channel; these structures would assist with fully restoring the floodplain by spreading flows across the excavated floodplain, inundating a greater area to support riparian habitats, and promoting flow in the other secondary channels. Temporary channel and bank stabilization structures are proposed to be installed to promote the process-based restoration approach. These treatments are organized according to the flood recurrence interval zone for budget purposes; however, exact placement is to be determined during the final design phase.

The west branch side channel is 434 meters (1,425 feet) long and would function as a backwater channel during flows greater than the 2-year RI, as well as an outlet channel for pond maintenance or provide irrigation water to the restored riparian areas. The west branch side channel is tied into the proposed pond. A radial head gate with a screen is proposed to release pond water down the west branch side channel to augment flows in the side channel and excavated floodplain areas as needed to support establishment of plantings.

The design proposes to construct a 0.8-hectare (2-acre) irrigation water pond that could host Mohave tui chub. The proposed pond would include an island to provide potential nesting, rearing, and basking sites for southwestern pond turtles. The pond would have a continuous 100-year RI flood elevation berm around the area to prevent capture during flood event flows. An ethylene propylene diene monomer (EPDM) liner is proposed to hold water and reduce seepage. EPDM is safe for fish, would not be penetrated by plant roots, and typically has a 20- to 30-year design life. A stone wall is proposed on the west side of the pond to support deep water and shade and provide an opportunity for an overlook area for recreation and education. The pond is designed with a maximum depth of 2.15 meters (7 feet) and an average side slopes of 3:1, which is within the range of slopes where Pilliod et al. (2013) documented overwintering pond turtles in California utilizing shelter sites. A minimum water depth of 1.2 meters (4 feet) is recommended to reduce cattail invasion and stabilize dissolved oxygen and temperature fluctuations (USFS 2011). A 2-foot-deep terrace is planned around the south and west perimeter of the pond. Water levels of the pond would fluctuate and inundate this terrace to support additional shallow water habitats. The side slopes and the upper-level terrace will be planted with bulrush to compete with cattails.

The design anticipates some disturbance to the Mojave River and riparian area (Appendix D). The design plans to remove select trees and large branches in order to clear access for construction activities and install proposed restoration structures (e.g., toe wood bank stabilization, BDAs, wood enhancements). The disturbance areas are shown on the 60% plans (Appendix D). Harvested trees, large limbs, and brush are needed to construct proposed restoration structures. A field biologist will mark all trees for removal and trimming prior to construction. All limbing of branches greater than 10 cm (4 inches) in diameter are proposed to be conducted by a California certified arborist. Willow transplants and on-site cutting of willow stakes and cottonwood poles will also be directed by the field biologist. Areas disturbed for restoration implementation will be restored or enhanced.

The design approach aims to restore the historic floodplain footprint and maximize ecological uplift using process-based principles. Excavation of the abandoned agricultural field to lower the grades to the 2-year and 5-year RI flood terraces with side channels that function as Mojave River high-flow channels will restore natural processes. The installation of wood structures and other natural materials will promote short-term recovery and provide the needed stability until vegetation establishes. The restoration approach will not include many engineered structures to retain the channel but will encourage natural adjustments and beaver activity.

The recommended approach for construction phasing is to excavate the nested floodplain and leave a coffer dam in place for 2 growing seasons to isolate the freshly excavated areas from the Mojave River and allow for woody riparian vegetation (i.e., willows and cottonwoods) to establish. Once robust root mass and riparian vegetation has established across the excavated floodplain, the coffer dam will be removed to allow Mojave River flows to connect to the restored channel. Once Mojave River flows are connected to the excavated floodplain, natural processes will take place to form a main side channel within the corridor. The restoration approach assumes the side channel would form within the excavated 2-year floodplain terrace and would meander and migrate across the excavated corridor. BDAs would be placed to enhance the process of restoring hydraulic conditions and promote additional beaver activity in the restored area.

The design aims to restore natural processes and provide the following benefits:

- Restore historic floodplain with the construction of a 2-year RI nested floodplain terrace and 5-year RI terraces.
- Restore historic secondary channels in the floodplain by constructing side channels through the abandoned agricultural field that are connected during Mojave River annual high-flow events. A total of 2.4 kilometers (1.5 miles) of annual flow side channel aquatic habitat is proposed, and 1,067 meters (3,500 feet) of channels are proposed to be activated at the 5-year RI flow.
- Restore backwater conditions to promote wetland habitats in the floodplain.
- Promote groundwater recharge of the floodplain aquifer.
- Promote natural recruitment of riparian vegetation.
- Restore native plant diversity to 170 acres of the abandoned agricultural field and enhance an additional 20 acres within the project area. Mesic pollinator gardens and xeric pollinator gardens are planned to enhance habitats and landscape aesthetics.
- Enhance aquatic habitats with the construction of wood structures and bank structures.
- Provide opportunities for natural area recreation and educational stewardship program hosting.
- Construct a 2-acre pond to be used as irrigation water and potential to support Mohave tui chub conservation.

4.1.2 *Project Considerations*

- Construction phasing is recommended to isolate the freshly excavated floodplain corridor in the agricultural field from Mojave River flows until vegetation has established. A coffer dam is recommended to be maintained for 2 growing seasons until the floodplain corridor establishes vegetation cover.
- Restoration of the floodplain will require a FEMA LOMR. Although preliminary investigation indicates that the proposed design will not raise BFEs, the delineated 100-year boundary will

be adjusted. A boundary change requires significantly less effort than raising a BFE and could be accomplished in a shorter time frame, thereby reducing hydraulic modeling and reporting efforts.

- BDA structures in the Mojave River will promote beaver activity to build upon these structures; however these structures are not stable and would fail given a large event. Hydraulic modeling results show that the design does not impact the BFEs and the adjacent San Bernardino Flood Control District non-certified levee. The design proposes to excavate 120,000 cubic yards of material out of the floodplain thereby creating a wider floodplain and enhancing flood flow capacity of the Mojave River in the project area. A permanent two-track maintenance access road is planned within the constructed riparian and wetland areas so that areas can be periodically maintained. The initial Nationwide 27 permit should include these areas so that future work could occur by obtaining a Nationwide 3 permit for channel maintenance.

- The San Bernardino Flood Control District has expressed interest in partnering this project. They would like to evaluate potential improvements to the non-certified levee and are actively seeking opportunities for mitigation (Drake 2020).

- A temporary irrigation system should be operated for 1 to 3 growing seasons until vegetation is established. A permanent irrigation system is planned to be installed to support the cottonwood field in the upland area. The elevation of the irrigated field is designed so that the pond water irrigation can be gravity fed to the field.

- Water rights and potential project constraints need to be better understood prior to designing a temporary irrigation system for upland planting and to provide water to the proposed pond. A groundwater pump is planned to provide water to the pond. The volume of the pond is 2,588 cubic meters (3,386 cubic yards), and refill twice per year is planned in order to use the pond water for irrigation purposes and to reduce pond salinity and temperature to maintain habitat conditions for Mohave tui chub (see Chapter 3.5.1).

- Riparian enhancement through planting is encouraged. The 60% design proposes to construct a floodplain corridor with terraces to promote the restoration process; however, the overarching goal is for the restoration area in the agricultural field to be self-sustaining. Once the channel processes are restored to activate multi-thread channels and encourage beavers to populate the area, additional recruitment of vegetation and widening of the floodplain will take place. Plantings in the 2-year and 5-year RI flood terraces could be focused at side channel bends and clustered in the open spaces to achieve stability in the short term. In the long term, natural recruitment of vegetation would occur to fill these areas and establish robust cover. Weed control treatments are anticipated to continually be required. The 60% design proposes to excavate a 5-year flood terrace near Mojave River Station 6,500 to restore flow to the screwbean mesquite (*Prosopis pubescens*) patch on the west side of the relic island. Figure 38 shows existing and proposed conditions of the 2- year and 5-year RI flows in the floodplain.

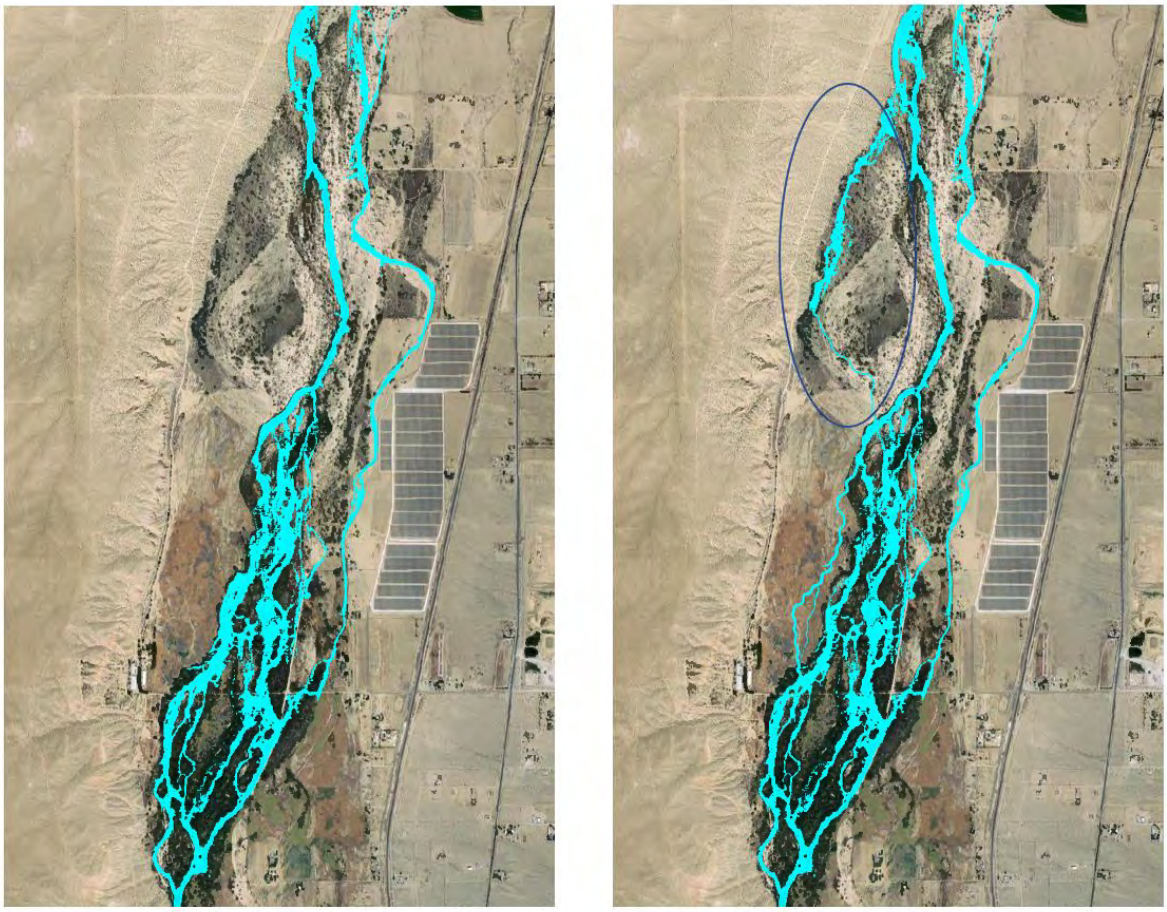

Figure 38. Existing and proposed conditions of the winter base flow inundation in the left and right panes, respectively. Additional wetted area created by the new channel is circled in the proposed-conditions view.

4.1.3 *Evapotranspiration Estimates*

Evapotranspiration (ET) rates were estimated using a study of riparian vegetation along the Mojave River (Neale et al. 2011) and a study conducted along the Rio Grande River in New Mexico (Brower 2018) because the Neale et al. (2011) analysis did not include all of the vegetation types associated with this project. ET rates reported for these climatically similar locations are comparable for all vegetation categories and are supported by the Mojave River riparian water use consumptive report. ET rates assume reduction rates published in the USGS investigation (Lines and Bilhorn 1995).

Initial estimates indicate that ET rates would increase for the proposed conditions when compared with existing use as an agricultural field used for alfalfa production (Table 15). The higher ET rates of the planned willow riparian forest and riparian shrubland specified for planting in the nested floodplain corridor show the greatest environmental consumptive uses. However, whether ET rates for new riparian vegetation resulting from this project will be considered consumptive uses needs to be confirmed by the Watermaster for the Mojave Water Agency. Available consumptive uses for the project are estimated to be 74 acre-feet. If the existing water rights are considered a transfer of use, there may be consumptive use adjustments for aquaculture (surface water times 2 meters [7 feet]). This adjustment may not apply

because species listed in the Biological Resource Mitigation Plan will benefit (see the 1996 Mojave Basin Area Adjudication).

Table 15. Difference in ET Rates Between Existing and Proposed Conditions of the Project Area

Vegetation Type	Area (acres)	ET Rate (acre-feet/year)	Cover (%)	Reduction in ET Rate (% of cover)	Estimated ET Rate (acre-feet/year)
Existing Conditions					
Alfalfa Production	170	2.4	85	90	408
Proposed Conditions					
Riparian Forest*	52.2	4.1	75	10	214
Riparian Forest – Irrigated Field*	12.9	2.8	85	1	36
Western Marsh**	12.5	5.6	50-70	46	70
Wet Shrubland**	28.8	2.4	30-50	46	69
Desert scrub*	48.5	1.1	30-50	46	53
Pollinator Gardens	13	1.8	85	46	23
Open Water (Pond)**	2.0	5.7	100	0	11
Open Water (Channels)**	0.8	5.7	100	0	5
Total Potential Environmental Consumptive Uses					482
Potential Difference in Consumptive Uses (Existing to Proposed Condition)					74

* Riparian forest and desert scrub ET rates derived from Neale et al. (2011). Whether ET rates of new riparian vegetation are considered consumptive uses will be determined by the Watermaster at the Mojave Water Agency.

** Western marsh, wet shrubland, and open water ET rates derived from Brower (2018).

4.1.4 *Proposed Design Features*

Aquatic habitat enhancement structures are planned for the restoration and recovery of the channel and floodplain (Appendix D).

4.1.4.1.1 Channel Wood Structures and Beaver Dam Analog Structures

The 60% design proposes to use large wood harvested on-site to add variability in the side channels, provide cover and organic matter, promote local scour, and enhance aquatic habitats. Wood structures are planned at specific locations to help define channels, promote the establishment of a pool with overhanging cover, and provide temporary bank stability. Wood structures mimic tree roots and deadfall that would naturally occur along the stream banks and channel, aiding in soil stabilization. Over time, the woody material degrades but after vegetation has established, which will provide permanent stabilization. In addition, wood structures provide aquatic cover, provide channel bed diversity, promote stability of islands and micro-topographic features, and provide habitat for aquatic macroinvertebrates that are food sources for aquatic species.

BDA structures are planned for the mainstem of the Mojave River and the main side channel. These structures are not designed to be stable at the 100-year flood flow event and will promote the hydraulic function of the main side channel by enhancing backwater conditions during Mojave River baseflows. These structures often encourage more beaver activity. Construction of BDAs in the side channels after the initial establishment of the pilot channel and vegetation establishment of the excavated floodplain are proposed. These structures will utilize brush material harvested on-site. These structures promote debris

and wood accumulation and encourage beaver activity. These structures are low-cost options for restoration treatments to add structure to the proposed side channel (Figure 39).

Figure 39. Example of BDA (Wheaton et al. 2019).

4.1.4.1.2 Bank Structures

Bank structures are planned to provide short-term protection and promote long-term stability. Bank structures will be constructed of large toe wood, brush layering, and biodegradable materials.

Toe wood structures are proposed for lateral stability and to enhance pool habitat in the Mojave River and side channels (Appendix D). In the Mojave River, these structures would be constructed of large wood with diameters of at least 15 centimeters (6 inches) and minimum 1.8-meter-diameter (3-foot-diameter) root balls. Toe wood structures in the side channels would be constructed of smaller branch material of at least 15 centimeters (6 inches) in diameter transplanted with intact roots placed on top of the buried logs. These structures provide lateral bank roughness and act as stable undercut bank cover for aquatic habitat. Toe wood is installed in the bank from the bottom of the pool to above the bankfull water level and covered with live brush layering. Live brush layering is composed of live cuttings that take root at the toe and eventually replace the deadwood toe protection with woody growth (Figure 41).

Wood habitat clusters are proposed to be placed throughout the 2-year RI and 5-year RI flood terrace. These structures are buried brush material; typically, plantings are incorporated into the cluster to promote hiding spaces and upland cover for terrestrial species. These structures are typically placed at the upstream side of topographic features (islands); and across the floodplain to add roughness to the freshly excavated corridor.

Weed-free non-rice straw should be worked in to the soil to provide organic material, water-holding capacity, and resistance from wind erosion.

Figure 40. Example of toe wood used in restoration.

4.1.5 *Revegetation and Plant Palette*

Revegetation of the river restoration project area will involve establishing 8 vegetation types that are specified in the 60% restoration design plans: western marsh, willow riparian forest and riparian shrubland, cottonwood riparian forest, wet shrubland (saltbush), desert scrub, irrigated cottonwood field, mesic pollinator garden, and xeric pollinator garden throughout 77 hectares (190 acres) (Table 16). The locations for these vegetation types were determined by cross-referencing the riparian vegetation map (see Figure 18) with the flood return interval predicted by the hydraulic model and estimated groundwater depths for the proposed, restored condition.

Implementation of the river restoration project will create a new surface on which to establish native plants and exclude noxious weeds, especially perennial pepperweed, tamarisk, and giant reed (see Chapter 4.2.1). A combination of weed-free non-rice straw and established woody riparian vegetation will provide temporary stabilization of the channels and minimize noxious weed establishment. For surfaces that are disturbed but will be disturbed again during a subsequent phase of restoration, a sterile cover crop with wildlife value is recommended for temporary weed control.

Table 16. Vegetation Types Specified for River Restoration and Vegetation Enhancement in the Project Area

Vegetation Type	Flood Return Interval (years)	Area (hectares/acres)
Western marsh	≤2	5.2/12.9
Willow riparian forest and riparian shrubland	>2 and ≤9	18.5/45.8
Cottonwood riparian forest	>5 and ≤49	11.8/29.1
Wet shrubland (saltbush)	≥50 and <100	11.6/28.7
Desert scrub	≥100	19.5/48.1
Irrigated field	≥100	5.3/12.9

Vegetation Type	Flood Return Interval (years)	Area (hectares/acres)
Mesic pollinator garden	>5 and ≤49	0.4/1.0
Xeric pollinator garden	≥50 and <100	4.7/11.5
Total		76.9 / 190.1

The recommended plant palette with plants appropriate for the Property is provided in Table 17. These species provide a mixture of growth forms to create a multi-story canopy and habitat for umbrella species (e.g., southwestern willow flycatcher) and pollinators. The use of local plants, if possible, is recommended because transplanting species from different regions can cause maladaptation. These issues can be more pronounced in some species than others. For example, fourwing saltbush has several levels of polyploidy depending upon the region from which this plant originates. Depending on the different levels of polyploidy, plant recruitment could be reduced. If screwbean mesquite is used for revegetation, investigations into the current condition of existing trees and potential die-off and factors contributing to regional die-off should be conducted (see Madera 2016).

Detailed methods for site preparation, soils treatments, planting, herbivory protection, supplemental water, monitoring, and maintenance are not included in this plan but should be prepared along with the final (100%) restoration design. Site preparation will involve clearing, weed control, and plant salvage. Soils treatment may include final grading, crimping, mulch (straw) application, and mycorrhizal inoculation. Mycorrhizal inoculation considering potential species-specific mutualisms, especially in relation to Fremont cottonwood, should be used to benefit climate change resilience and overall health of native plants in relation to potential noxious weeds (Hultine et al. 2020). Translocation of soils from existing cottonwood stands that have not been invaded by tamarisk may also provide mycorrhizae. Planting methods will be specific to each vegetation type. Herbivory protection with a focus on beaver exclusion is specified for riparian forest and shrubland woody plants, including those in the mesic pollinator garden, and these methods were incorporated in the cost estimate (Appendix E). Supplemental water techniques will be identified during the next phase of design with more information pertaining to water rights.

Table 17. Plant Palette, Vegetation Type, Species Characteristics, and Proposed Method of Installation

Species Name	Common Name	Vegetation Type	Growth Form	Wetland Indicator Status	Inundation Tolerance	Drought Tolerance	Commercial Availability	Proposed Method of Installation	Spacing (feet on center)
Achnatherum hymenoides	Indian ricegrass	desert scrub	bunch grass	UPL	none	high	routinely available	seeding	—
Achnatherum speciosum (Stipa speciosium)	desert needlegrass	desert scrub	bunch grass	UPL	none	high	limited availability	seeding if available	—
Anemopsis californica	yerba mansa	western marsh	perennial forb	OBL	high	none	routinely available	cuttings/container	6
Artemisia douglasiana	Douglas' sagewort	riparian shrubland and woodland	perennial forb	FAC	low	medium	routinely available	seeding	—
Asclepias californica	California milkweed	xeric pollinator garden	perennial forb	UPL	low	medium	limited availability	seeding	—
Asclepias erosa	desert milkweed	xeric pollinator garden	perennial forb	UPL	low	medium	limited availability	seeding	—
Asclepias fascicularis	Mexican whorled milkweed	mesic pollinator garden	perennial forb	FAC	none	medium	routinely available	seeding	—
*Atriplex canescens**	fourwing saltbush	wet shrubland	shrub	UPL	none	high	routinely available	seeding	—
*Atriplex lentiformis**	quailbush	wet shrubland	shrub	FAC	high	high	routinely available	seeding	—
Baccharis emoryi (B. salicina)	Emory's baccharis	riparian shrubland	shrub	FACW	medium	low	limited availability	container	10
Baccharis salicifolia	mulefat	riparian shrubland	shrub	FAC	low	low	routinely available	container	10
Bidens laevis	smooth beggartick	western marsh	perennial forb	OBL	medium	low	routinely available	seeding	—
Carex barbarae	Santa Barbara sedge	western marsh	graminoid	FAC	high	low	routinely available	container/plugs	6
Carex praegracilis	clustered field sedge	western marsh	graminoid	FACW	high	low	routinely available	container/plugs	6
Chilopsis linearis	desert willow	wet shrubland; mesic pollinator garden	tree	FAC	low	high	routinely available	container	18
Cleome isomeris	bladderpod	desert scrub	shrub	UPL	none	high	routinely available	seeding	—
Dichelostemma capitatum	bluedicks	wet shrubland	perennial forb	FACU	low	medium	routinely available	container	10
Distichlis spicata	inland saltgrass	riparian shrubland and woodland; wet shrubland	rhizomatous grass	FAC	high	medium	routinely available	plugs (seeding not recommended)	10
Elymus trachycaulus	slender wheatgrass	wet shrubland	rhizomatous grass	FACU	low	high	routinely available	seeding	—
Elymus triticoides	wildrye	wet shrubland	rhizomatous grass	UPL	high	high	routinely available	seeding	—
Encelia farinosa	brittlebush	wet shrubland	shrub	UPL	none	high	routinely available	container	16
Ephedra nevadensis	Nevada jointfir	desert scrub	shrub	UPL	none	none	limited availability	container	10
Epilobium canum	hummingbird trumpet	xeric pollinator garden	perennial forb	UPL	none	high	routinely available	container	10
Eriogonum umbellatum	sulphur-flower buckwheat	xeric pollinator garden	shrub	UPL	none	high	routinely available	seeding	—
Eriophyllum confertiflorum	golden-yarrow	xeric pollinator garden	shrub	UPL	none	medium	routinely available	seeding	—
Euthamia occidentalis	western goldentop	mesic pollinator garden	perennial forb	FACW	low	medium	routinely available	seeding	—
Fraxinus velutina	velvet ash	riparian woodland	tree	FAC	low	medium	routinely available	container	18
Glycyrrhiza lepidota	American licorice	wet shrubland	perennial forb	FAC	high	none	limited availability	container	10
Heliotropium curassavicum	salt heliotrope	wet shrubland	perennial forb	FACU	low	medium	routinely available	seeding	—
Juncus mexicanus	Mexican rush	western marsh	graminoid	FACW	high	low	routinely available	container/plugs	6
Keckiella antirrhinoides	snapdragon penstemon	xeric pollinator garden	perennial forb	UPL	none	medium	limited availability	container	10
Larrea tridentata	creosote bush	desert scrub	shrub	UPL	none	high	routinely available	seeding	—
Leymus triticoides	beardless wildrye	wet shrubland; riparian shrubland and woodland	rhizomatous grass	FAC	high	high	routinely available	seeding	—
Lycium andersonii	Anderson wolfberry	wet shrubland	shrub	UPL	low	medium	limited availability	container	10
Muhlenbergia rigens	deergrass	western marsh; riparian shrubland and woodland	rhizomatous grass	FAC	medium	low	routinely available	container	5
Panicum urvilleanum	desert panicgrass	desert scrub	rhizomatous grass	UPL	low	high	limited availability	seeding	—
Penstemon palmeri	Palmer's penstemon	xeric pollinator garden	perennial forb	UPL	none	high	routinely available	seeding	—
Pleuraphis rigida	big galleta	wet shrubland; desert scrub	bunch grass	UPL	none	high	routinely available	seeding	—
*Populus fremontii**	Fremont cottonwood	riparian woodland	tree	FAC	medium	medium	routinely available	poles/container	15
*Prosopis glandulosa**	honey mesquite	wet shrubland	tree	FACU	low	high	routinely available	seeding	15
*Prosopis pubescens**	screwbean mesquite	riparian woodland	tree	FAC	none	medium	routinely available	container	15

Species Name	Common Name	Vegetation Type	Growth Form	Wetland Indicator Status	Inundation Tolerance	Drought Tolerance	Commercial Availability	Proposed Method of Installation	Spacing (feet on center)
Prunus ilicifolia	holly-leaf cherry	mesic pollinator garden	shrub	UPL	none	medium	routinely available	container	8
Rosa californica	California wildrose	mesic pollinator garden	shrub	FAC	none	medium	routinely available	container	8
*Salix exigua**	coyote willow	riparian woodland and shrubland	tree	FACW	high	medium	routinely available	whips	8
*Salix laevigata**	red willow	riparian woodland	tree	FACW	high	medium	routinely available	whips/container	15
*Salix lasiolepis**	arroyo willow	riparian woodland and shrubland	tree	FACW	high	none	routinely available	whips/container	8
Salvia dorrii	purple sage	xeric pollinator garden	shrub	UPL	none	medium	limited availability	seeding	—
Salvia mellifera	black sage	xeric pollinator garden	shrub	UPL	none	medium	routinely available	seeding	—
*Schoenoplectus acutus**	hardstem bulrush	western marsh	perennial forb	OBL	high	medium	routinely available	plugs	10
*Schoenoplectus americanus**	chairmaker's bulrush	western marsh	perennial forb	OBL	high	low	limited availability	plugs	10
Sphaeralcea ambigua	desert globemallow	wet shrubland; xeric pollinator garden	perennial forb	UPL	none	high	routinely available	seeding	—
Sporobolus airoides	alkali sacaton	riparian shrubland; wet shrubland	bunch grass	FAC	medium	high	routinely available	seeding	—
Sporobolus wrightii	big sacaton	riparian shrubland; wet shrubland	bunch grass	FAC	none	medium	limited availability	seeding	—
Vitis girdiana	desert wild grape	riparian woodland	vine	FAC	none	medium	routinely available	container	15
Yucca brevifolia	Joshua tree	desert scrub	shrub	UPL	none	high	routinely available	container	20

Sources: California Native Plant Society (2020); USDA (2020)
Wetland status abbreviations: OBL = obligate; FACW = facultative wetland; FAC = facultative; FACU = facultative upland; UPL = upland
* Indicates plant material on-site that could be collected and used for revegetation.

4.2 Riparian Enhancement

In addition to the river restoration project, 32 hectares (80 acres) are recommended for riparian enhancement consisting of areas identified with extensive perennial pepperweed invasion and areas where planting may result in establishment of riparian forest or shrubland (Figure 41). Methods for controlling noxious weeds and recommended competitive native plants are provided in Chapter 4.2.1. Monitoring annual weed treatment progress and effectiveness will allow adaptive management of riparian enhancement strategies.

Groundwater depth measurements in 2020 suggest that areas near Piezometer 15 have groundwater depths similar to the existing riparian forest and shrubland (Piezometer 6 and 17) (see Figure 9). Therefore, establishment of riparian forest or shrubland in the unvegetated area east of the island near Piezometer 15 is recommended as a 15-acre pilot project with deep planting of willow and cottonwoods. Planting with a Waterjet Stinger is recommended for efficient, effective planting of willow whips and cottonwood pools (Hoag et al. 2001). Cuttings from no more than 40% of a stand should be harvested (Tamarisk Coalition 2014). As suggested by the low groundwater depths at Piezometer 12, riparian plantings may have difficulty establishing farther upstream. Results from initial plantings at the recommended location will inform future potential riparian planting areas.

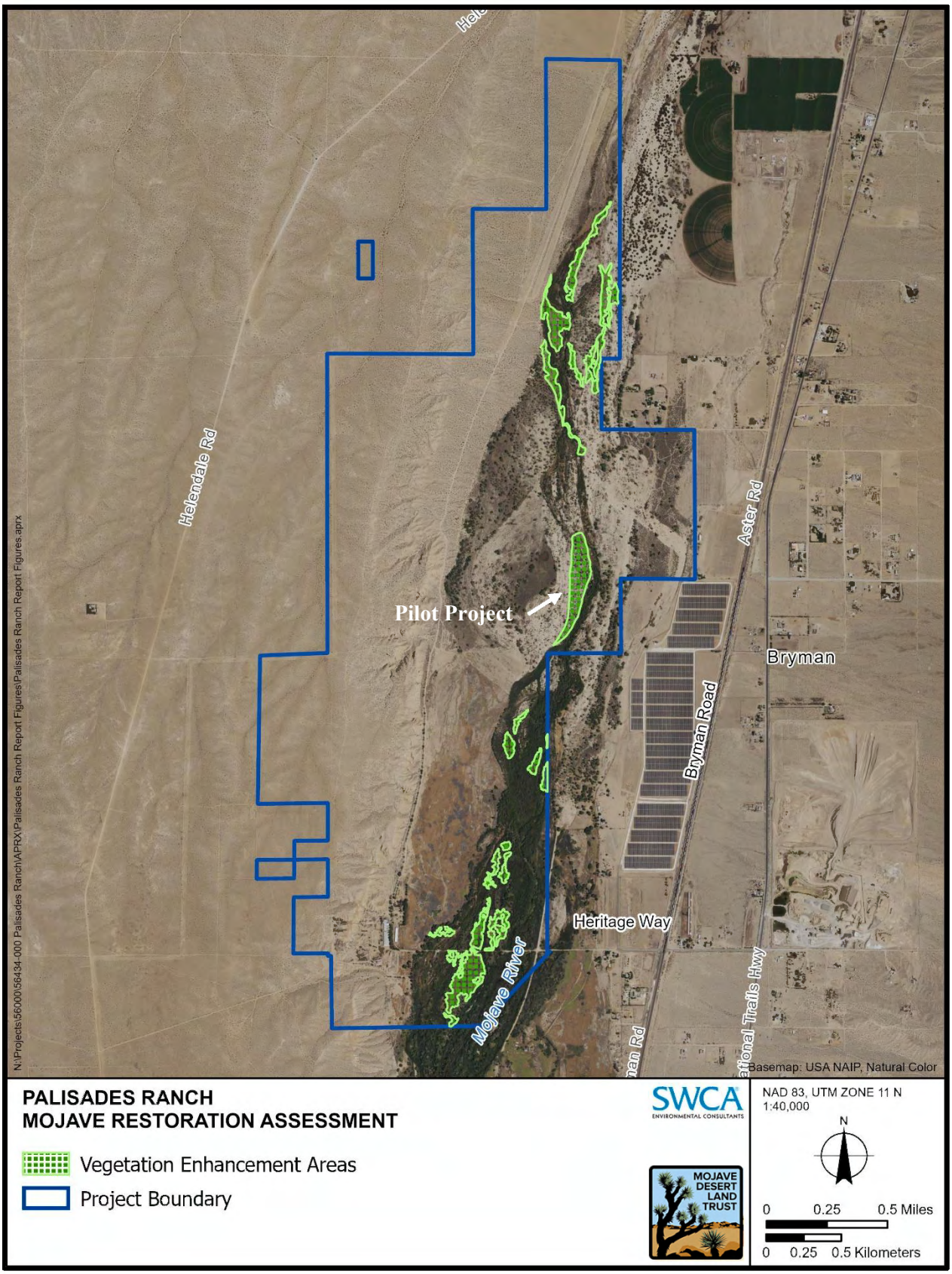

Figure 41. Areas recommended for riparian enhancement.

4.2.1 *Integrated Weed Management Plan*

As stated in Chapter 1.2, Objective 3 of this conceptual restoration plan is to minimize occurrence and spread of noxious weeds in riparian habitats to increase the integrity of vegetation communities. This objective is focused on avoiding monocultures to allow for diversity and habitat complexity to increase habitat for riparian and aquatic species of conservation concern. Strategies designed to address this objective are listed below.

- S8: Prioritize noxious weed species for treatment or monitoring.
- S9: Identify areas of existing noxious weed infestations.
- S10: Coordinate with Mojave Water Agency and the Mojave Desert Resource Conservation District to identify the most effective methods for weed management.

SWCA documented 10 plant species within the Property deemed to be invasive by the California Invasive Plant Council (Cal-IPC), including four plants listed as noxious weeds in California (Table 18). The Cal-IPC invasiveness rating is based on several criteria, including the plant's ubiquity, ability to reproduce and invade new areas, and the severity of impacts on ecological systems. Cal-IPC ratings are described as follows (Cal-IPC 2020a):

High – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.

Moderate – These species have substantial and apparent, but generally not severe, ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

Limited – These species are invasive but their ecological impacts are minor on a statewide level, or there is not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of spread. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

Table 18. Invasive Plant Species Documented at Palisades Ranch and Ranked by Cal-IPC

Species Name	Common Name	Cal-IPC Rating
*Arundo donax**	giant reed	High
Bromus tectorum	cheatgrass	High
*Lepidium latifolium**	perennial pepperweed	High
*Tamarix ramosissima**	tamarisk	High
Cynodon dactylon	Bermudagrass	Moderate
Bassia hyssopifolia	fivehorn smotherweed	Limited
Descurainia sophia	flixweed	Limited
Polypogon monspeliensis	rabbitsfoot grass	Limited
*Salsola tragus**	prickly Russian thistle	Limited
Schismus sp.	Mediterranean grass	Limited

Source: Cal-IPC (2020b)

* Indicates noxious weed listed by the California Department of Food and Agriculture (2020)

Ideally, managers would control all invasive plants present, but with finite resources, invasive plants must be prioritized based on the greatest positive ecological effect. For this conceptual restoration plan, we focus on state-listed noxious weeds but also consider plants with a Cal-IPC invasiveness rating of high. Of the 10 invasive plants observed within Palisades Ranch, SWCA identified 5 focal species that are state-listed noxious weeds: giant reed, cheatgrass (*Bromus tectorum*), perennial pepperweed, prickly Russian thistle, and tamarisk. Plants rated with high invasiveness that are newly documented on the Property and occur in small, isolated patches should be treated immediately.

The Mojave Water Agency and Mojave Desert Resource Conservation District work collaboratively to control invasive plants, primarily tamarisk and giant reed, along the Mojave River (Mojave Basin Area Watermaster 2019). At Palisades Ranch, giant reed and tamarisk were treated using the aquatic-label imazapyr (Habitat) and the cut stump method in 2009, and from 2015 through 2019, 720 hectares (1,780 acres) of weeds were treated throughout the Mojave River Basin. This watershed approach to weed treatment is very important to the overall success along the Mojave River because propagules often spread from upstream to downstream. For this reason, coordination between MDLT, regional agencies, and nearby landowners should be an integral component of integrated weed management planning. Integrated weed management involves using a combination of techniques, including prevention, for long-term weed management. Information about the life history of noxious weeds, prevalence and distribution of these plants within the Property, and recommended integrated management treatments are provided below. Multiple discussions and communications with MDRCD, especially Ken Lair, informed the recommended management treatments.

4.2.1.1 FOCAL SPECIES AND RECOMMENDED TREATMENTS

Giant Reed

Giant reed is a tall perennial grass that forms dense monotypic stands along riparian areas and wetlands (Cal-IPC 2011). Native to eastern Asia, this species was used for erosion control along drainage canals in the 1820s and has now invaded many of southern California's waterways (Bell 1998; Hoshovsky 1987). Giant reed can grow in dense clonal clumps that can alter flow regimes (Dudley 2000; Spencer et al. 2013), increase fire severity and frequency (Scott 1994), and outcompete native vegetation (Cal-IPC 2011). This species does not seem to provide forage or habitat for wildlife (Bell 1998). It spreads through lateral rhizome growth and does not produce viable seed in North America. During storm events, plant fragments can disperse and form into separate plants if conditions are favorable (Decruyenaere and Holt 2005). Once established, it can quickly outgrow surrounding native vegetation.

Within the Property, 36 individuals and 10 large infestations containing giant reed were mapped (see Figure 19). These infestations were typically observed in areas with high water saturation near active channels and open water. Giant reed was especially prevalent on the east side of the Heritage Road bridge near the levee road.

Recommended Treatment: The MDRCD recommends applying imazapyr (Habitat) to giant reed using the cut stump method in late summer. MDLT should continue to cooperate with MDRCD to arrange these herbicide treatments on the Property, if possible, at least every 5 years. Herbicide treatments for giant reed could be combined with treatments for tamarisk because the application method and recommended herbicide are the same. Establishing native plants after treatment will provide long-term control. Willows are well-suited to the environmental conditions where giant reed grows. Willow whips should be harvested and planted during the dormant season according to protocols established in Tamarisk Coalition (2014). In order to follow weed treatments with planting, locations where giant reed is treated must be marked with a GPS or flagging.

Cheatgrass

Cheatgrass is an annual bunchgrass native to Eurasia. It is found throughout the U.S. and is especially prolific in the western states. It was introduced to America in the late 1800s via multiple introductions from ships, contaminated crop seed, and packing material. Initially, the infestations were confined to croplands and railroads but rapidly spread by livestock grazing (Zouhar 2003). It can grow in most soil types and is often found in dry, sandy soils in desert shrubland communities. Cheatgrass is present in a variety of land uses and habitats, including roadsides, fields, rangelands, croplands, grasslands, and forests (Di Tomaso et al. 2013). Cheatgrass will invade areas with sparse vegetation where there is less competition and will out-compete other native grasses and shrubs by reducing soil moisture with its extensive and shallow roots (U.S. Department of the Interior and National Invasive Species Council Secretariat 2016). Cheatgrass is highly flammable and creates a fire hazard once established in an area. Its annual lifecycle consists of flowering in spring, dispersing its sharp florets by attaching to passing by animals and people, and seed germination in thatch or shallow burial during the following fall after a sufficient rain. The seedbank may remain in the soil for up to 5 years (Di Tomaso et al. 2013).

Recommended Treatment:

Cheatgrass was not mapped during riparian plant surveys but was observed throughout the Property. The population density of cheatgrass is low, and eradication may be feasible using the early detection rapid response (EDRR) model. The EDRR model includes identifying invasive, non-native species before a population is established (early detection) and then eradicating it while treatments are still effective (rapid response). EDRR for cheatgrass is currently being employed by agencies to conserve grasslands for greater sage-grouse and other sage-dependent species (U.S. Department of the Interior and National Invasive Species Council Secretariat 2016). There are many treatment methods for cheatgrass outlined by DiTomaso et al. (2013).

Perennial Pepperweed

Perennial pepperweed is an extremely competitive herbaceous perennial forb that can form dense monotypic stands (CABI 2020; Renz and Blank 2004). Native to southern Europe and western Asia, it has a wide ecological range and can tolerate most soil moisture and salinity conditions (CABI 2020; Young et al. 1995). Perennial pepperweed spreads easily through wetlands and riparian areas within the western United States. It typically infests marshes, roadsides, railways, waste ground, ditches, and irrigated cropland (CABI 2020). While this species has low germination success in North America, its aggressive rhizomatous growth allows populations to expand several meters per year in wetlands and floodplain habitats (Renz 2002). Furthermore, perennial pepperweed can reproduce vegetatively via root and stem fragmentation (Wotring et al. 1997). This habit contributes to its ability to colonize waterways rapidly, especially in flood years as root fragments float downstream (Renz 2000).

Perennial pepperweed was first documented along the Mojave River in 2012 and has spread profusely since then (Lair and Lair 2020). MDRCD has experimented with control techniques in Mojave Narrows Park, but large efforts to control the spread of perennial pepperweed have not been conducted within the Mojave River Basin. MDRCD mowed perennial pepperweed and tested two herbicides for control, chlorsulfuron (Telar) and imazapyr (Polaris), and determined that imazapyr was most effective at controlling perennial pepperweed.

Perennial pepperweed is the second most abundant noxious weed present within the Property with 17.8 hectares (44 acres) of dominant cover mapped (Figure 18). While the 44-acre area represents patches where perennial pepperweed is the dominant species, it does not represent the entirety of the areas infested. Perennial pepperweed varies in density throughout Palisades Ranch riparian corridor depending

on soil saturation and overstory cover. Perennial pepperweed occupies the understory of riparian forests and open areas (Figure 42).

Figure 42. Two types of perennial pepperweed stands occurring at Palisades Ranch, mixed and open.

Recommended Treatment: Perennial pepperweed will be the most difficult weed to treat on the Property and will require a phased approach. Best practices for controlling perennial pepperweed within mixed stands of riparian trees and shrubs, as occur on the Property, are not well established. Three steps will be required for control: 1) removal of thatch, 2) application of herbicide, and 3) planting of competitive native plants suited to the environmental conditions of the site.

Three methods for thatch removal are recommended for trial treatments, to be conducted in the early spring when plants are bolting or budding. In more open areas, perennial pepperweed thatch should be mowed using a tracked vehicle (e.g., skidsteer) with mower attachment. In large patches of perennial pepperweed mixed with trees and shrubs, early spring grazing by goats or sheep may clear the plant biomass after thatching has been removed. MDLT will need to coordinate with local herders to discuss the feasibility of using goats to reduce thick thatch on the Property. Manual removal with weed-eaters may also be an option in smaller patches that are nearer to surface water.

After the perennial pepperweed thatch is cleared, herbicide is necessary for control. Most of the areas dominated by perennial pepperweed on the Property are in moist sites and will require use of an aquatic-label herbicide. Imazapyr (Habitat) has been recommended by the MDRCD which is a non-selective herbicide (treats forbs [broadleaf plants] and grasses). Application via backpack sprayer, wicking, or hand wiping to specifically target perennial pepper weed plants and avoid contact with the soil is recommended in April or May (Lair and Lair 2020). Applicators must be careful not to apply the herbicide to native riparian plants.

Planting or seeding should occur late fall after herbicide application. Seeding with beardless wildrye (*Leymus triticoides*), especially in partially shaded sites, is one of the most effective revegetation methods. Other species should be tested for competitiveness. Inland saltgrass (*Distichlis spicata*) plugs or mats should be tested in more open areas. Fourwing saltbush or quailbush is suitable for revegetation in drier areas, and seed could be collected on the Property. Willow whips may be appropriate for wet areas near surface water. An ecologist should be on-site to assist with microsite selection for each species.

SWCA recommends treating 4 hectares (10 acres) per year starting upstream and working downstream across the Property. Records of the treatments that are applied and plant species used for revegetation

should be kept to assist in determining the most effective methods for use on the Property and to inform other land managers in the Mojave River Valley. The area and frequency of treatments should diminish over time as perennial pepperweed control becomes more successful.

Prickly Russian Thistle

Prickly Russian thistle, typically known as tumbleweed, is an herbaceous annual forb native to Russia and Siberia. In 1873, the species was introduced by contamination to South Dakota and reached California by 1895 (Orloff et al. 2008). Prickly Russian thistle invades disturbed substrates such as ditches, vacant lots, and agricultural fields. Currently, the species inhabits approximately 40,468,600 hectares (100 million acres) throughout the western United States, where it has adapted to winter precipitation and summer drought conditions. The plant is drought tolerant and produces a deep taproot to reach subsurface groundwater. By late summer, an individual may mature, detach at its base, and spread up to 200,000 seeds by travelling with the wind. The following spring, germination occurs in the loose soils of disturbed substrates when temperature and moisture conditions are optimal. Prickly Russian thistle is highly competitive, especially in drought conditions, to the detriment of native plant communities. Additionally, the species is considered an agricultural pest, creates fire hazards when windblown individuals accumulate, and interferes with water infrastructure.

Prickly Russian thistle is the most abundant noxious weed present within the Property with 66 hectares (164 acres) mapped. The largest patch of prickly Russian thistle on the Property is in the abandoned agricultural field within the footprint of the riparian restoration project that is currently being designed (Figure 43). Fivehorn smotherweed (*Bassia hyssopifolia*) is mixed with prickly Russian thistle throughout the field, and a large amount of biomass has accumulated and tumbled into the riparian zone.

Figure 43. Abandoned agricultural field dominated by prickly Russian thistle and fivehorn smotherweed.

Recommended Treatment: Options for treatment of prickly Russian thistle and fivehorn smotherweed will depend on timing and phasing of riparian restoration implementation and the ability to irrigate. Ideally, prickly Russian thistle and fivehorn smotherweed would be treated prior to riparian restoration implementation. Exhausting the weed seed bank in the restoration site prior to construction will reduce vegetation maintenance requirements after restoration. Dense thatch should be burned, tilled in as deeply as possible, or masticated. Biomass removal should be followed by herbicide treatments for 2 years to significantly reduce the prickly Russian thistle and fivehorn smotherweed seed bank. Prickly Russian thistle and fivehorn smotherweed seeds persist for 2 years (DiTomaso et al. 2013). Follow-up treatments during this period are extremely important to take advantage of the opportunity of having a "clean slate" following earthwork.

MDLT should plan for follow-up control treatments for three growing seasons to provide long-term management (DiTomaso et al. 2013). Lair and Lair (2020) recommend treatment with contact herbicides with low or short residual activity in the soil, such as a mixture of fluroxypyr (e.g., Vista), which is effective on fivehorn smotherweed, and 2,4-D and/or light rates of dicamba, which is more effective on prickly Russian thistle. Other herbicide options are possible and should be evaluated in coordination with
a pest control advisor. For the first year of herbicide treatment following weed residue mastication and/or tillage, certain short-residual herbicides such as chlorsulfuron (e.g., Telar XP) may also be feasible, in tank mix with the contact herbicides, providing season-long control of newly germinating annual weeds.

Depending on the feasibility of irrigation, a cover crop of sorghum sudangrass would be very effective in preventing reestablishment of prickly Russian thistle and fivehorn smotherweed, but this crop would require maintenance (e.g., clipping to prevent from going to seed). Saltbush could also be grown out with minimal irrigation to revegetate wet shrubland post-restoration.

Discussions about riparian restoration project phasing are in process. MDLT may wish to phase the restoration project by excavating terraces for the 2- and 5-year flood RI a year or more before other implementation begins. This phasing would allow propagation of wetland vegetation for revegetation and control of prickly Russian thistle and fivehorn smotherweed. Organic material such as weed-free grass hay or weed-free straw (not rice straw) should be spread and crimped into the soil. Depending on the placement in the floodplain and soil types, beardless wildrye, alkali sacaton (*Sporobolus airoides*), scratchgrass (*Muhlenbergia asperifolia*), big sacaton (*Sporobolus wrightii*), inland saltgrass, slender wheatgrass (*Elymus trachycaulus*), and rushes (*Juncus* species) would create a matrix for plugs and would allow the use of herbicide targeting broadleaf plants during the first year of establishment. Forbs could be seeded into the plugs the second year prior to restoration and revegetation. Beardless wildrye is aggressive and able to compete with perennial pepperweed but would not be compatible with forbs. Most of these plugs would be harvested and planted according to specifications in the 60% restoration design within 1 year of construction.

Tamarisk

Tamarisk is a woody phreatophyte shrub or tree that has invaded floodplain habitat in the southwest (Di Tomaso 1998). Native to the Mediterranean, this species was brought to the eastern United States as an ornamental in 1823 and has now invaded over 600,000 hectares of the southwest United States (Di Tomaso 1998; Horton 1964). Large patches of tamarisk can use surface and groundwater to such an extent as to reduce underground water tables, which dry up surface water and wetlands and reduce streamflow (Busch et al. 1992). Tamarisk is a facultative halophyte that can utilize salt-laden groundwater and excrete the excess salts through salt glands within its leaves (DeLoach et al. 2000). Leaves are deciduous and accumulate on the soil surface, killing saline-intolerant willows and other native riparian

species (DeLoach et al. 2000). Tamarisk can spread through stem fragments if buried or submerged, but it primarily spreads through seed (Nissen et al. 2010). The longer tamarisk is established along waterways, the greater the effect on groundwater (Brotherson et al. 1984), increased local soil salinity (Shafroth et al. 1995), disrupted flood cycles due to channel narrowing (Di Tomaso 1998), increased fire severity and frequency (Di Tomaso 1998), and displaced natural vegetation (Lovich et al. 1994).

Within Palisades Ranch, 56 points and eight polygons were mapped that contained tamarisk. While tamarisk can be found near active channels, most were identified along sandbars and historic channel alignments. Tamarisk occurs as scattered individuals, especially near the island in the middle portion of the Property, instead of large patches.

Recommended Treatment: The recommended treatment method for tamarisk is the same as that for giant reed. A cut stump application of Imazapyr (Habitat) during the late summer should be effective. We recommend that MDLT hire crews for giant reed and tamarisk control every 3 years at the onset of treatment and then every 5 years when infestations are more manageable and effective treatments identified. In more moist areas, planting willow or cottonwood poles where tamarisk is treated will provide more long-term control. Saltbush or mesquite planting should be considered for drier areas where tamarisk is treated. Planting following weed treatment will require marking locations with GPS units or flagging where tamarisk is treated.

4.2.1.2 MONITORING

Records of noxious weed treatments should be maintained to track the effectiveness of methods, especially methods for perennial pepperweed control. Vegetation mapping and monitoring to track the extent of noxious weed patches and search for potential new occurrences of noxious weeds that could become problematic if not treated swiftly should occur at least every 5 years and more frequently in recently disturbed sites. Some potential weeds to be aware of include Russian knapweed (*Acroptilon repens*), Asian mustard (*Brassica tournefortii*), Russian olive (*Elaeagnus angustifolia*), purple loosestrife (*Lythrum salicaria*), hybrid common reed (*Phragmites australis* ssp. *americanus* x ssp. *australis*), and plants rated as highly invasive by Cal-IPC. Lair and Lair (2020) suggest monitoring noxious weeds that occur in Mojave Narrows Park may indicate which species could be expected downstream on the Mojave River.

4.3 Zones for Encouragement of Public Access

MDLT is currently planning management strategies to reduce illegal OHV use. These plans will inform which areas in the uplands on the Property should be available for public access. The 60% Mojave River restoration plan includes a 2.9-kilometer (1.8-mile) trail system to the existing Heritage Road bridge where a wildlife-viewing platform will be installed, a short loop around the pollinator gardens, and a long, nested loop trail system around the restoration area with a boardwalk over the restored side channel; pond overlook; and promontory overlook of the Mojave River and riparian restoration area. These areas will be the focus of public access on the Property, providing opportunities for compatible public uses, such as hiking, bird watching, wildlife viewing, and photography. The area surrounding the western yellow-billled cuckoo detected in 2020 was avoided in the restoration design. If this bird is detected on the Property in the future, all efforts should be made to limit disturbance in the vicinity. We recommend discouragement of vehicular use from the east side along Heritage Way. Access along the levee should be further discouraged to limit potential disturbance of least Bell's vireo nesting pairs. If desired, MDLT may designate an additional site in the northern half of the Property for Mojave River access to concentrate public use.

4.4 Project Phasing and Prioritization

Riparian enhancement projects, phases of river restoration, and recreational improvements are provided below in the recommended order of implementation and also in Figure 44.

- **Riparian Enhancement Pilot Project**: Removal of some riparian trees and shrubs will be necessary to complete the river restoration project. The CDFW regulates alterations to riparian vegetation through the CDFW Section 1602 Lake and Streambed Alteration Agreement. Implementation of the river restoration design will result in an overall increase in wetlands, but MDLT may desire to establish riparian plants in the riparian enhancement pilot project (see Chapter 4.2) prior to implementation to establish new woody plants and expedite the CDFW permitting process.
- **Native Plant Propagation**: MDLT operates a native plant nursery, and the Property could be used to propagate native plants for revegetation. We recommend that seed and propagule collection begin immediately, especially for species listed in the plant palette or others that MDLT has experience propagating that would benefit habitat on the Property. Vegetative mats are specified in the river restoration plan for temporary stability of the restored channels and weed control. A mixture of bulrush, rushes, sedges, and grasses can be used to grow the vegetative mats in a field setting.
- **Species-specific Bird Surveys**: At least one season of species-specific surveys for least Bell's vireo, southwestern willow flycatcher, and western yellow-billed cuckoo should be conducted at the Property prior to the implementation of restoration activities to establish baseline distribution for each species. Surveys for each species follow standard protocols that can be easily replicated following restoration, which would inform assessments of restoration success.
- **Final Restoration Plan Design**: The final restoration plan design will include final grading, structural details, detailed construction specifications, plant quantities, irrigation design, an engineer's estimate of costs, an operations and maintenance plan, and development of a stormwater pollution prevention plan (SWPPP) by a contractor's qualified SWPPP Developer (QSD).
- **Mycorrhizae Restoration**: Fremont cottonwoods and willows form mycorrhizal associations, and mycorrhizae are depleted in disturbed soils (Beauchamp et al. 2006). Restoring an appropriate mycorrhizal community can improve native plant survival and growth, often by 25 to 50% (Markovchick et al. 2019). This task provides for site assessments and mycorrhizal collection, rearing, and application necessary restore mycorrhizal inoculum custom-matched to the restoration site and plants.
- **Phase I River Restoration**: Construct the main side channel and nested floodplain and install BDAs in the Mojave River at the downstream tie-in location. Phreatophytic riparian shrubs and trees will be planted to stabilize the restored area. Approximately 75 acres will be restored to riparian and wet shrubland vegetation. Temporary irrigation will be installed in areas planted with wet shrubland. 2,131 meters (6,991 feet) of channel will be constructed.
- **Phase II River Restoration**: Actions include removal of the coffer dam to activate the main side channel, construction of the pond, and construction of the west branch side channel to carry the outflow of the pond, and re-initiation of the channel west of the island to enhance riparian vegetation. Approximately 39 acres will be restored to riparian and wet shrubland vegetation, and 48 acres will be restored to desert scrub. Irrigation of transitional and upland plantings using the pond outflow will begin. Temporary irrigation will be installed in areas planted with wet shrubland or desert scrub. 1,329 meters (4,360 feet) of channel will be constructed.

- **Phase III River Restoration**: Actions included in the third phase of river restoration include excavation of the 5-year discharge channel, construction of the cottonwood field and permanent irrigation system, installation of BDAs in the side channels, final grading of hillocks, and installation of pollinator gardens. Approximately 15 acres will be restored to riparian and wet shrubland vegetation, and 13 acres of pollinator gardens will be planted. Temporary irrigation will be installed in areas planted with wet shrubland or pollinator gardens. 447 meters (1,465 feet) of channel will be constructed.
- **Construction of Recreation Amenities**: Construction of the trail to the bridge, nested loop trail, trail through the pollinator garden, and parking lot should occur in respective order. Generally, it is best to construct trails during restoration implementation to avoid having to re-disturb the area and native plants that have established in the trail footprint.
- **Irrigation:** Temporary irrigation of the restoration areas will need to continue for 1 to 3 years after revegetation.
- **Weed Management:** Weed management tasks will be needed every year, especially following restoration implementation. In total, 32 hectares (80 acres) of vegetation enhancement were identified for weed management with a focus on perennial pepperweed.
- **Monitoring:** Vegetation and wildlife monitoring should be conducted regularly to provide knowledge of the distribution and abundance of target species and evidence of restoration success in relation to project goals.

4.5 Budget for Restoration Phases

Appendix E provides an itemized cost estimate for the three phases of 60% river restoration implementation, revegetation, and construction of recreation amenities.

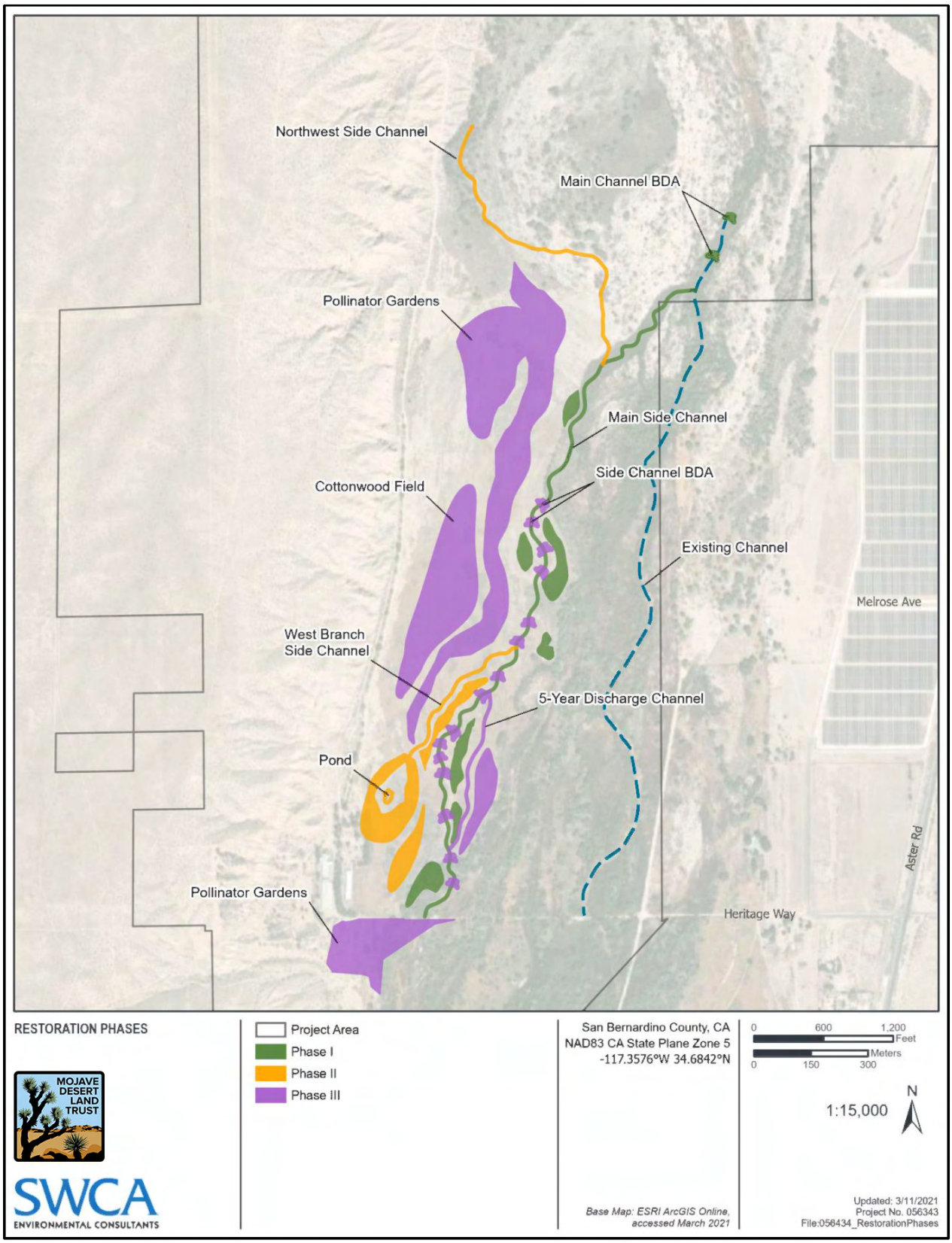

Figure 44. Phases proposed for 60% Mojave River restoration plan.

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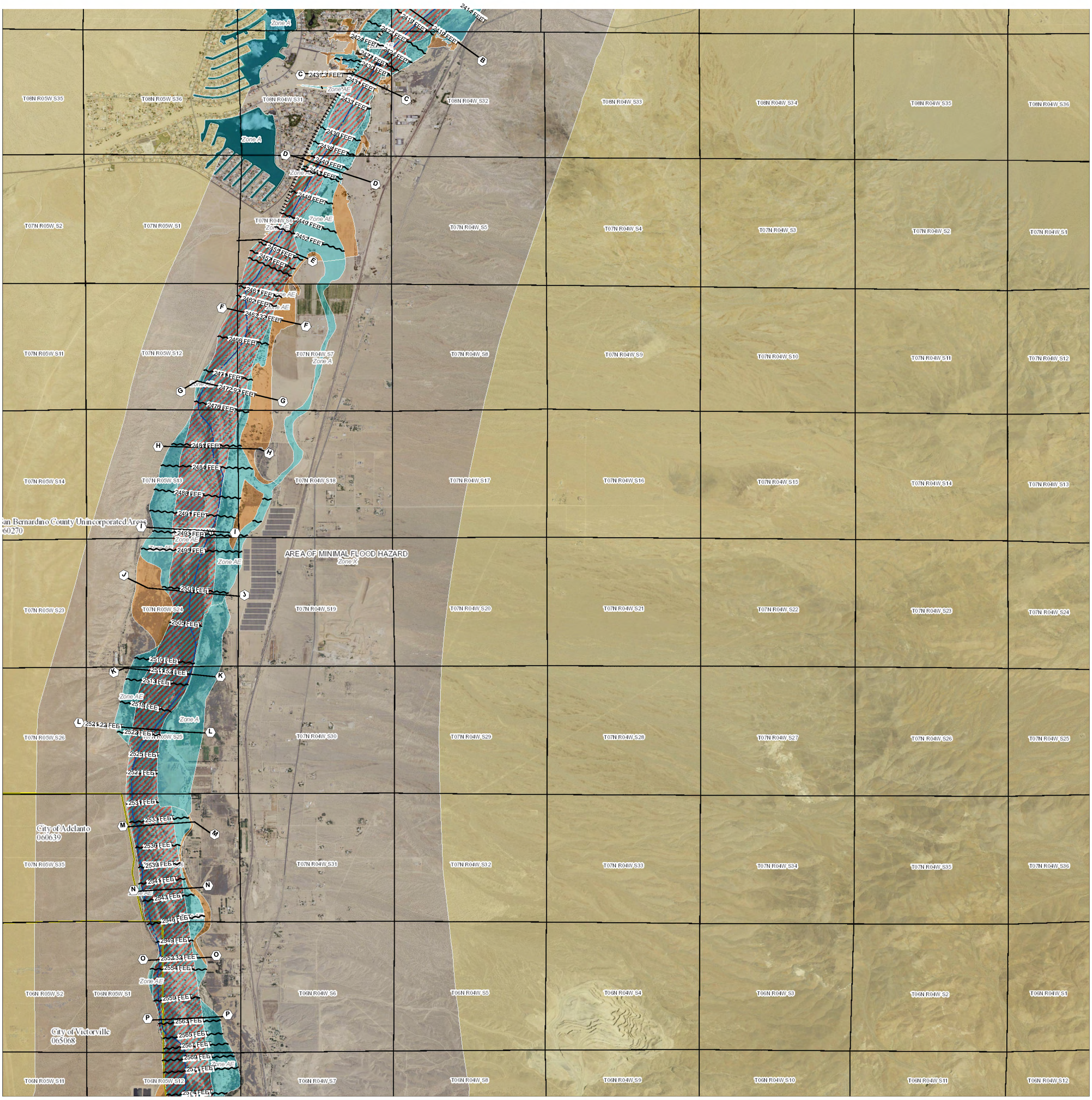
APPENDIX A

Federal Emergency Management Agency Flood Hazard Information for Palisades Ranch

34°45'26.65"N

117°22'32.01"W



USGS The National Map: Orthoimagery. Data refreshed April, 2019.

117°14'58.08"W

34°37'3.38"N

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS

- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES

- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can beordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study Report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Basemap information shown on this FIRM was provided in digital format by USDA, Farm Service Agency (FSA). This information was derived from NAIP, dated April 11, 2018.

This map was exported from FEMA's National Flood Hazard Layer (NFHL) on **2/11/2020 8:52:36 AM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time. For additional information, please see the Flood Hazard Mapping Updates Overview Fact Sheet at https://www.fema.gov/media-library/assets/documents/118418

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date.

SCALE

N

Map Projection:
GCS, Geodetic Reference System 1980;
Vertical Datum: NAVD88
For information about the specific vertical datum for elevation features, datum conversions, or vertical monuments used to create this map please see the Flood Insurance Study(FIS) Report for your community at https://msc.fema.gov

1 inch = 2,000 feet 1:24,000

0 1,000 2,000 4,000 6,000 8,000 Feet

0 210 420 840 1,260 1,680 Meters

FEMA National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

SAN BERNARDINO COUNTY CALIFORNIA AND INCORPORATED AREAS

PANEL 5150 OF 9375

Panel Contains:

COMMUNITY	NUMBER	PANEL
CITY OF VICTORVILLE CALIFORNIA	065068	5150
CITY OF ADELANTO CALIFORNIA	060639	5150
SAN BERNARDINO COUNTY UNINCORPORATED AREAS CALIFORNIA	060270	5150

MAP NUMBER
06071C5150J
EFFECTIVE DATE
09/02/2016

APPENDIX B

Hydrogeologic Map and Cross-Sections of Mojave River (Mojave Water Agency 2003)

Plate 1
Hydrogeologic Map

EXPLANATION

A — A' CROSS SECTION LINE

TRANSITION ZONE
ADMINISTRATIVE BOUNDARY

Stiff Diagram Explanation

URS

Modified From:
California Department Of Water Resources, 1960, Data On Wells In The West Part Of The Middle Mojave Valley Area, San Bernardino County, California, Bulletin No. 91-1.

EXPLANATION

UNCONSOLIDATED DEPOSITS

Recent

Qrc — River-channel deposits
Unconsolidated sand, along Mojave River; highly permeable, largely unsaturated but during periods of streamflow transmits large seepage losses from the streams to ground water

Qra — River alluvium
Unconsolidated gravel, sand, silt, and clay beneath the Mojave River; highly permeable, where saturated yields water freely to wells

Qyf — Younger fan deposits
Unconsolidated poorly sorted gravel, sand, silt, and mudflow debris locally derived; largely above water table; yield little water to wells

Qp — Playa deposits
Unconsolidated silt, and clay beneath small lakebeds; yield virtually no water to wells

Qds — Dune sand
Unconsolidated sand, actively drifting

Pleistocene

Qol — Old lacustrine deposits
Silt, clay, fresh-water marl, and lime-cemented gravel, sand and silt. Locally interfingers with the older alluvium or older fan deposits; is everywhere above the water table

Qoal — Older alluvium
Unconsolidated generally weathered gravel, sand, silt, and clay; where saturated yields water freely to wells

Qof — Older fan deposits
Moderately cemented to moderately indurated boulder, gravel, sand, and breccia; yield little water to wells

QUATERNARY

CONSOLIDATED ROCKS

Tb — Basalt
Consolidated extrusive amygdaloidal olivine basalt and intrusive diabasic basalt; yields little water to wells. Miocene(?) and Pliocene in age

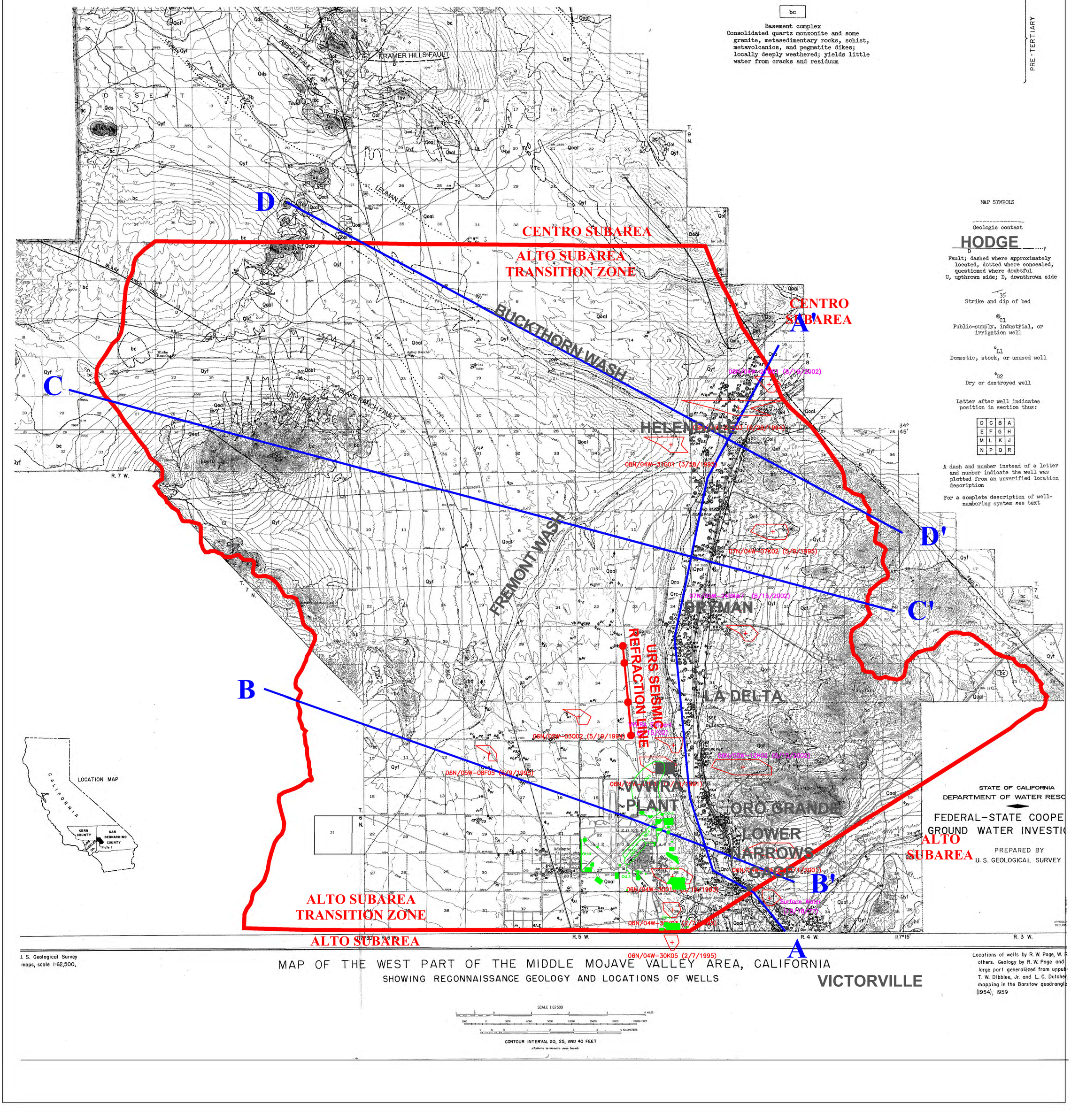
Tav — Acidic volcanic rocks
Consolidated intrusive and extrusive felsitic latite, andesite, quartz basalt, rhyolite, and dacite; yield little water to wells. Miocene and Pliocene in age

Tc — Continental rocks
Consolidated conglomerate sandstone, siltstone, shale, limestone, and water-laid volcanic tuff and agglomerate; yield little or no water to wells. Miocene and Pliocene in age

TERTIARY

bc — Basement complex
Consolidated quartz monzonite and some granite, metasedimentary rocks, schist, metavolcanics, and pegmatite dikes; locally deeply weathered; yields little water from cracks and residuum

PRE-TERTIARY



MAP SYMBOLS

Geologic contact

HODGE D ——?
Fault; dashed where approximately located, dotted where concealed, questioned where doubtful
U, upthrown side; D, downthrown side

35
Strike and dip of bed

C1
Public-supply, industrial, or irrigation well

L1
Domestic, stock, or unused well

G2
Dry or destroyed well

Letter after well indicates position in section thus:

D	C	B	A
E	F	G	H
M	L	K	J
N	P	Q	R

A dash and number instead of a letter and number indicate the well was plotted from an unverified location description

For a complete description of well-numbering system see text

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESO
FEDERAL-STATE COOPE
GROUND WATER INVESTI
PREPARED BY
U. S. GEOLOGICAL SURVEY

J. S. Geological Survey maps, scale 1:62,500,

MAP OF THE WEST PART OF THE MIDDLE MOJAVE VALLEY AREA, CALIFORNIA

SHOWING RECONNAISSANCE GEOLOGY AND LOCATIONS OF WELLS

Locations of wells by R. W. Page, W. R. others. Geology by R. W. Page and large part generalized from unpub T. W. Dibblee, Jr. and L. C. Dutcher mapping in the Barstow quadrangle (1954), 1959

SCALE 1:62500
CONTOUR INTERVAL 20, 25, AND 40 FEET
Datum is mean sea level

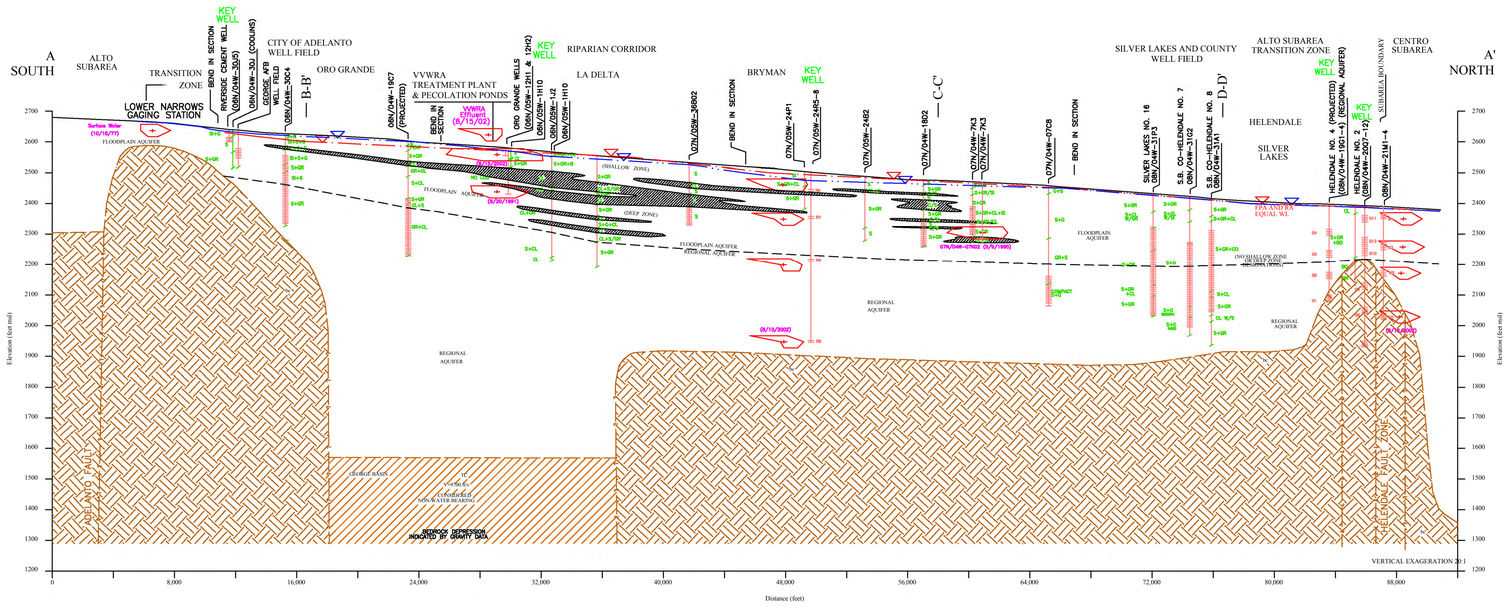


PLATE 2A
HYDROGEOLOGIC CROSS SECTION A-A'

URS

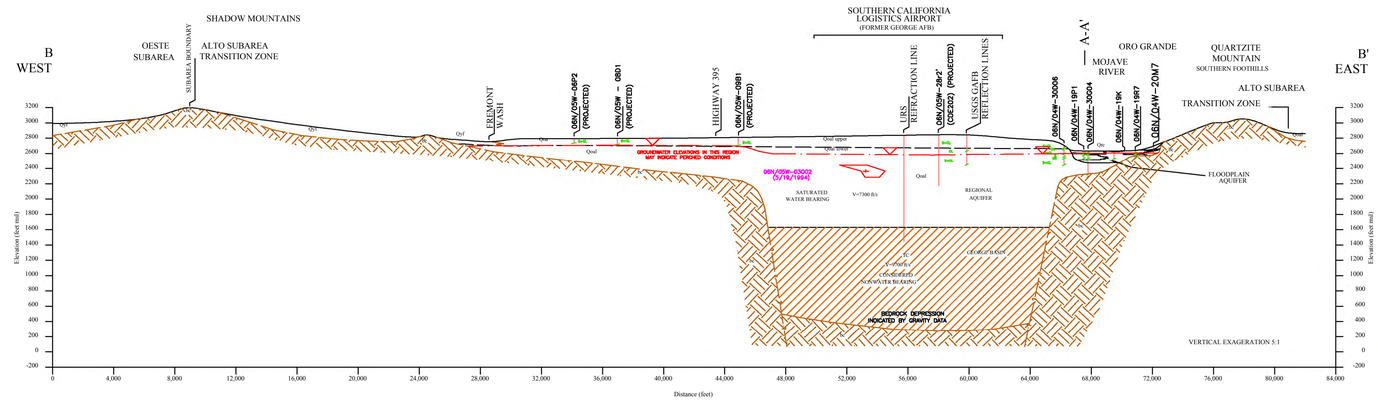


PLATE 2B
HYDROGEOLOGIC CROSS SECTION B-B'

URS

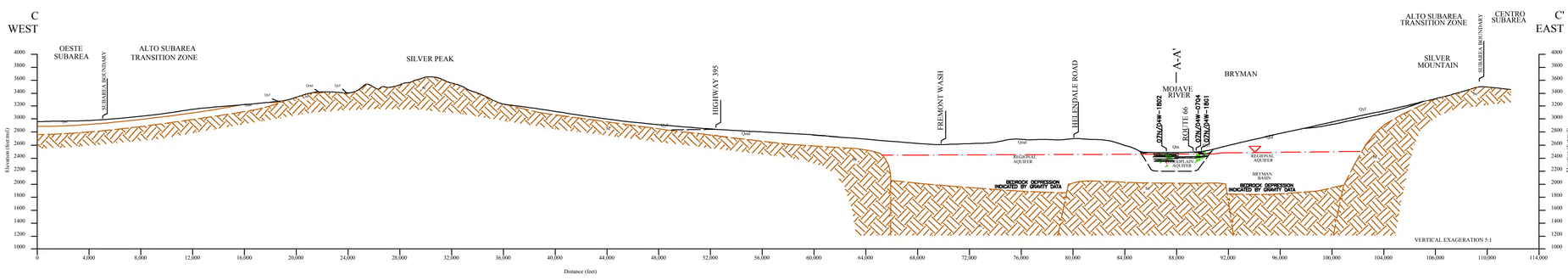


PLATE 2C
HYDROGEOLOGIC CROSS SECTION C-C'

URS

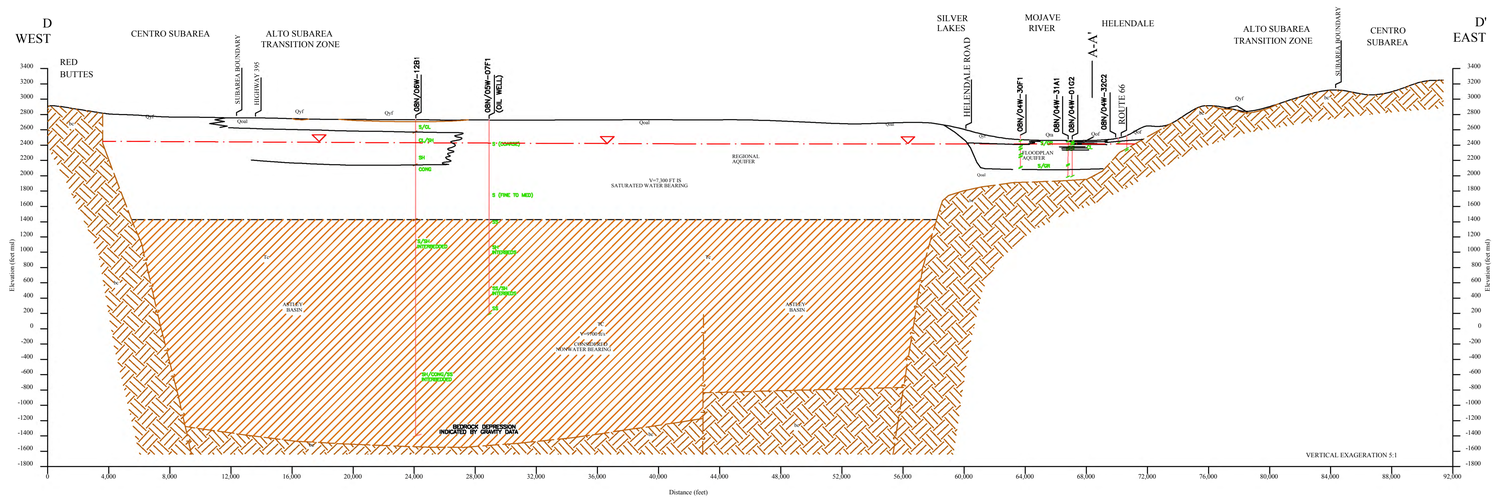
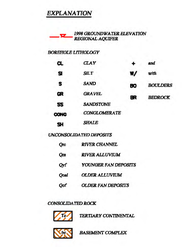


PLATE 2D
HYDROGEOLOGIC CROSS SECTION D-D'



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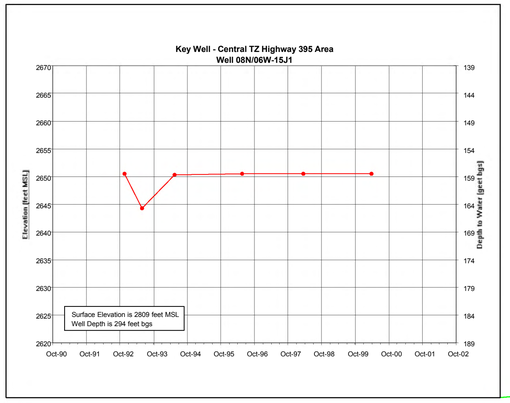

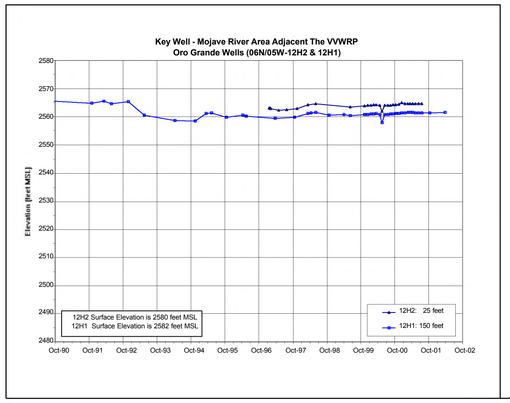

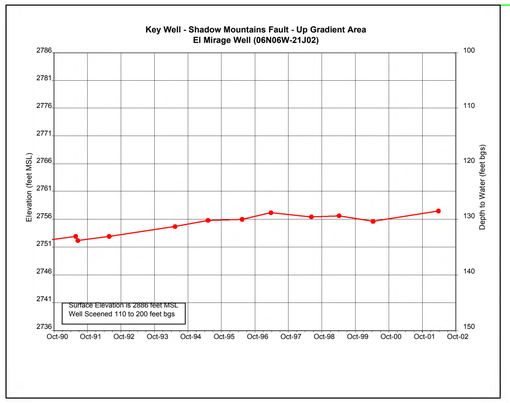

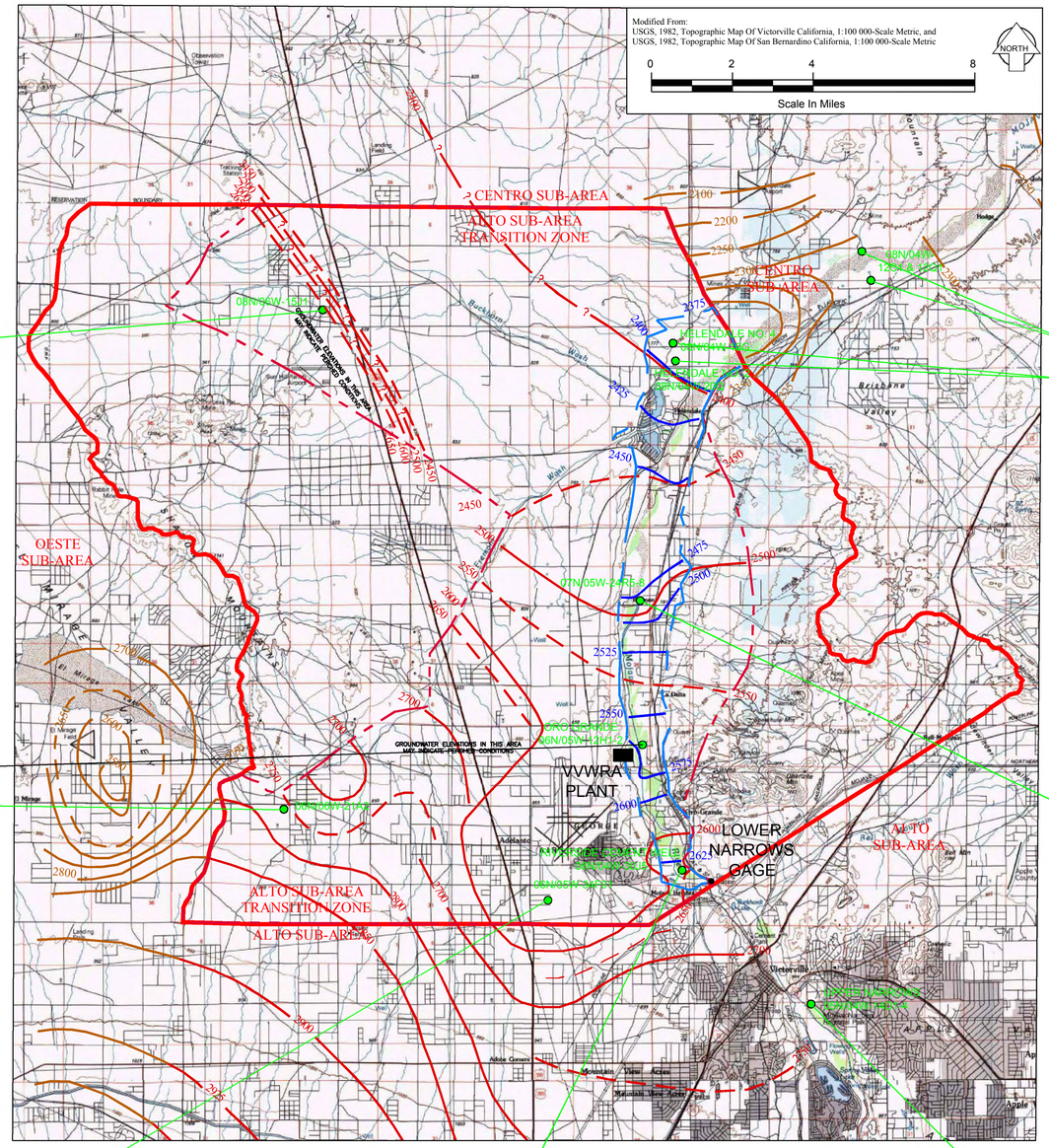

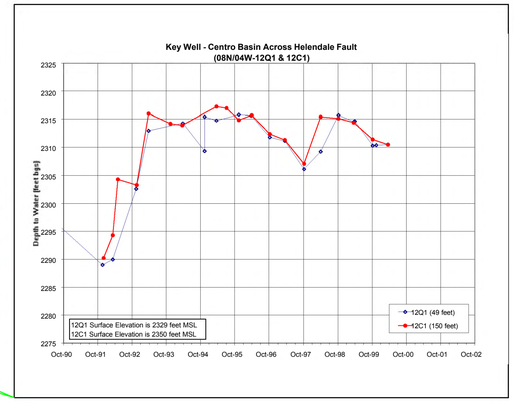

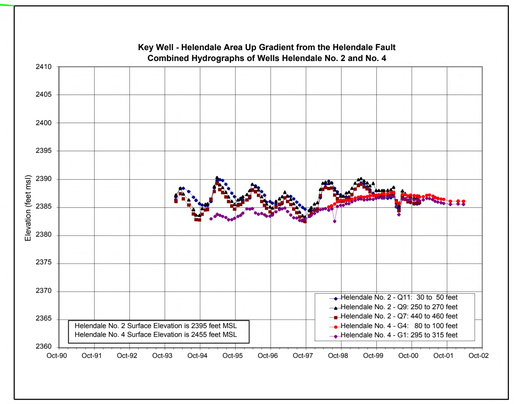

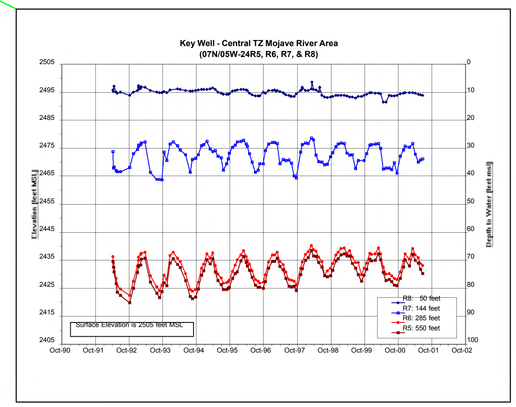

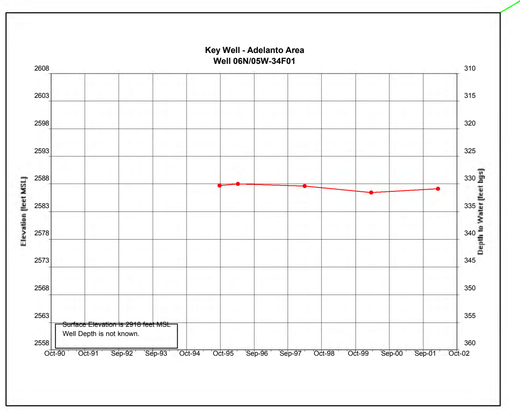

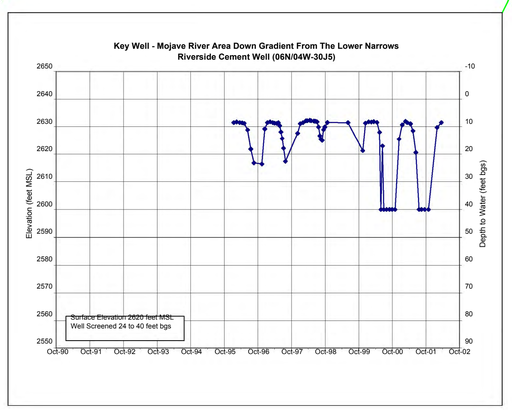

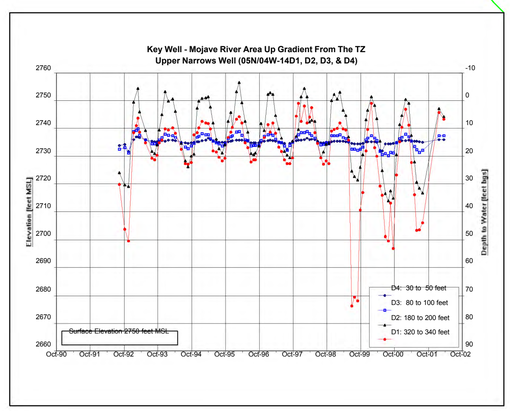

MAP EXPLANATION

- TRANSITION ZONE ADMINISTRATIVE BOUNDARY
- FLOODPLAIN AQUIFER LIMITS
- REGIONAL AQUIFER LIMITS
- KEY WELL
- FLOODPLAIN AQUIFER GROUNDWATER ELEVATION (FEET MSL)
- REGIONAL AQUIFER GROUNDWATER ELEVATION (FEET MSL)
- NON-ALTO SUBAREA GROUNDWATER ELEVATION (FEET MSL) NON-AQUIFER SPECIFIC

URS

Plate 3
Key Well Hydrographs

APPENDIX C

Historical Aerial Photograph Sequence

PALISADES RANCH -- 1929 AERIAL

Project Boundary

MDLT
MOJAVE DESERT LAND TRUST

SWCA
ENVIRONMENTAL CONSULTANTS

1:16,000
UTM ZONE 11, NAD 83
SAN BERNARDINO, CA

Basemap: 1929 Aerial

N

0 750 1,500 Feet

0 200 400 Meters

N:\Projects\56000\56434-000 Palisades Ranch\MXD\Working\56434_1929_Aerial_11x17 Portrait.mxd

PALISADES RANCH -- 1939 AERIAL

Project Boundary

MDLT
MOJAVE DESERT LAND TRUST
CONNECT WITH THE DESERT YOU LOVE

Basemap: 1939 Aerial
(Mojave Water Agency)

N

0 750 1,500 Feet

0 200 400 Meters

SWCA
ENVIRONMENTAL CONSULTANTS

1:16,000
UTM ZONE 11, NAD 83
SAN BERNARDINO, CA

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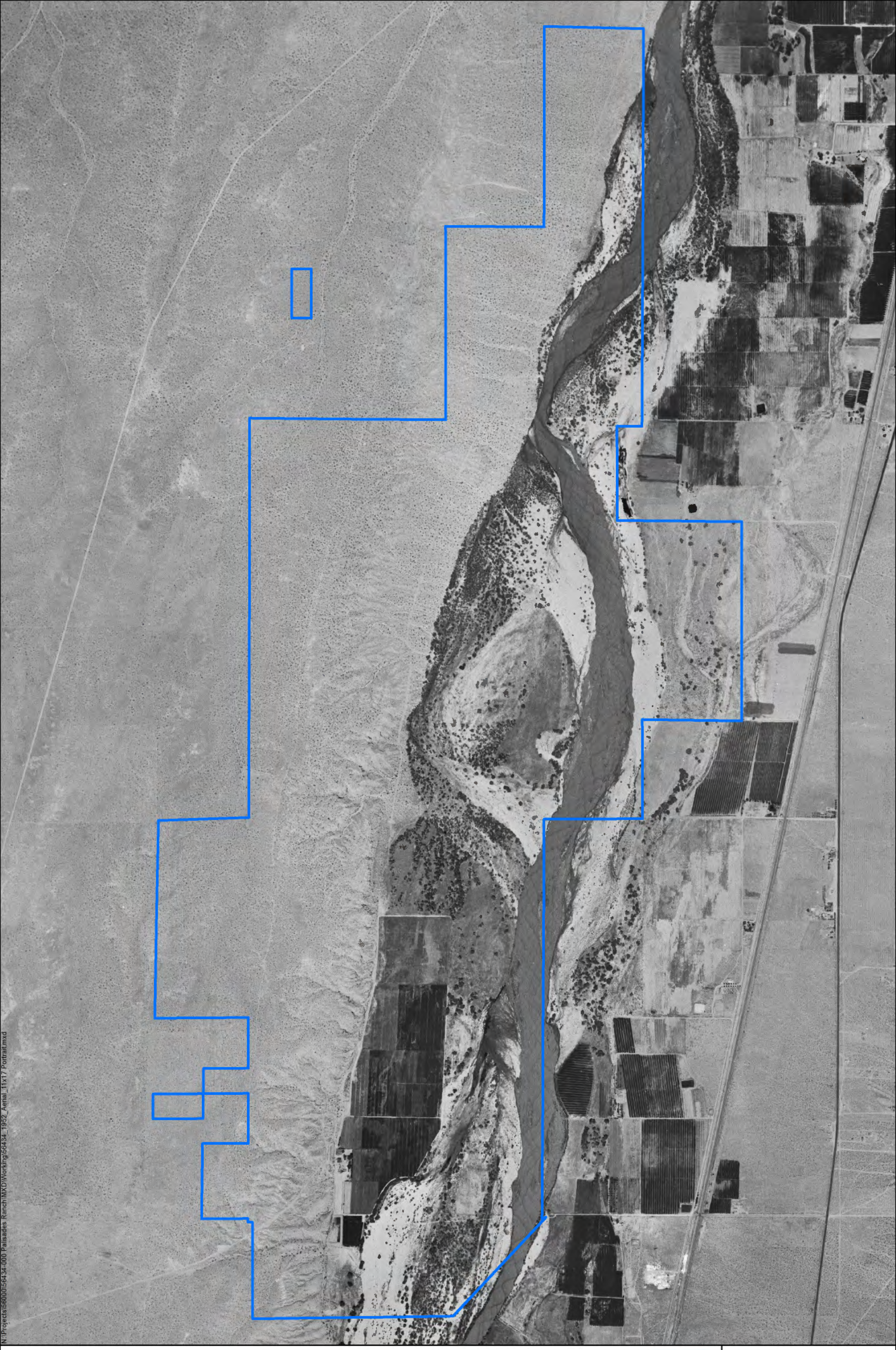

PALISADES RANCH -- 1952 AERIAL

Project Boundary

MDLT
MOJAVE DESERT LAND TRUST
CONNECT WITH THE DESERT YOU LOVE

SWCA
ENVIRONMENTAL CONSULTANTS

1:16,000
UTM ZONE 11, NAD 83
SAN BERNARDINO, CA

Basemap: 1952 Aerial

N

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0 200 400 Meters

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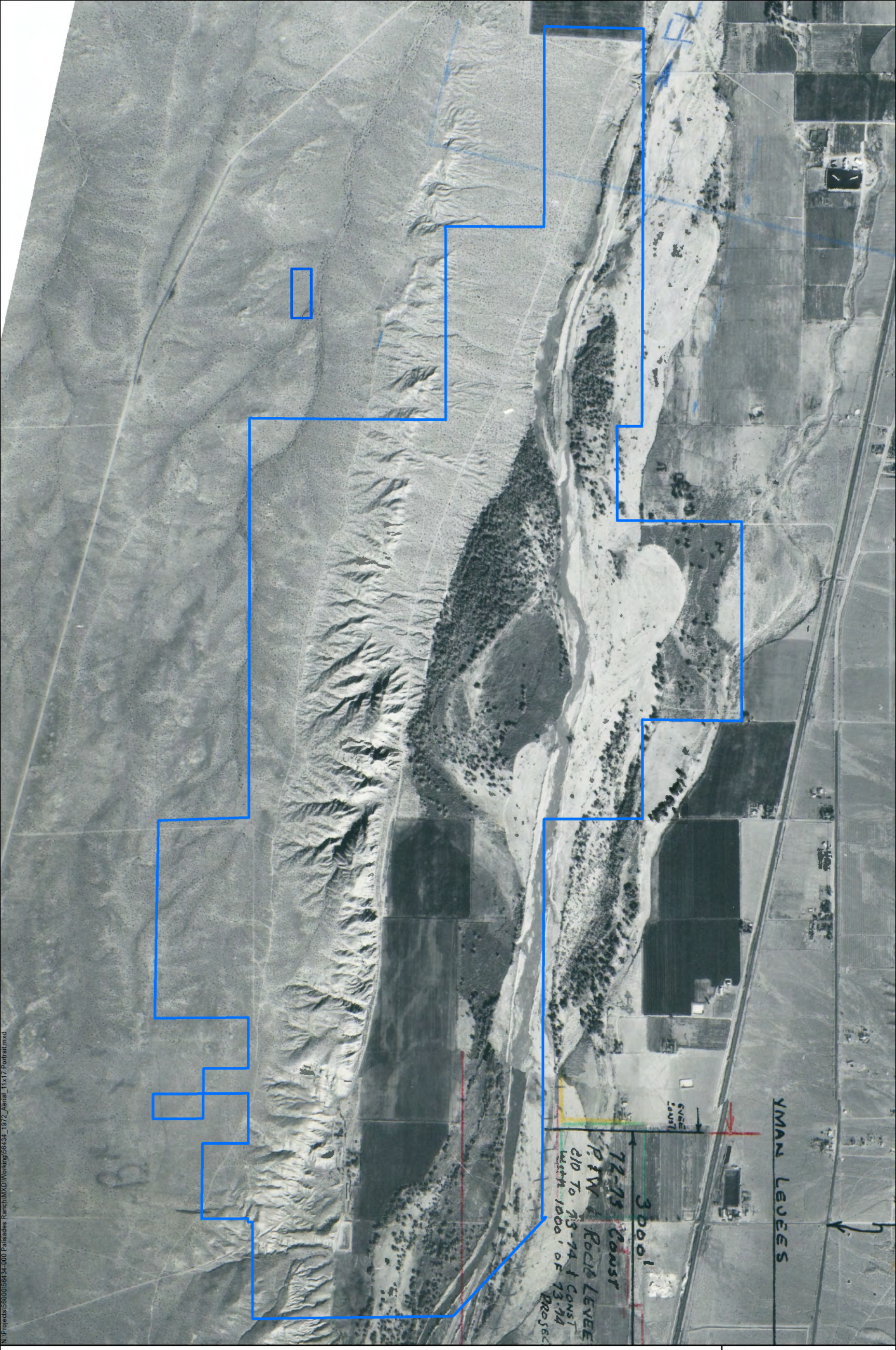

PALISADES RANCH -- 1972 AERIAL

Project Boundary

MDLT
MOJAVE DESERT LAND TRUST

SWCA
ENVIRONMENTAL CONSULTANTS

1:16,000
UTM ZONE 11, NAD 83
SAN BERNARDINO, CA

Basemap: 1972 Aerial
(Mojave Water Agency)

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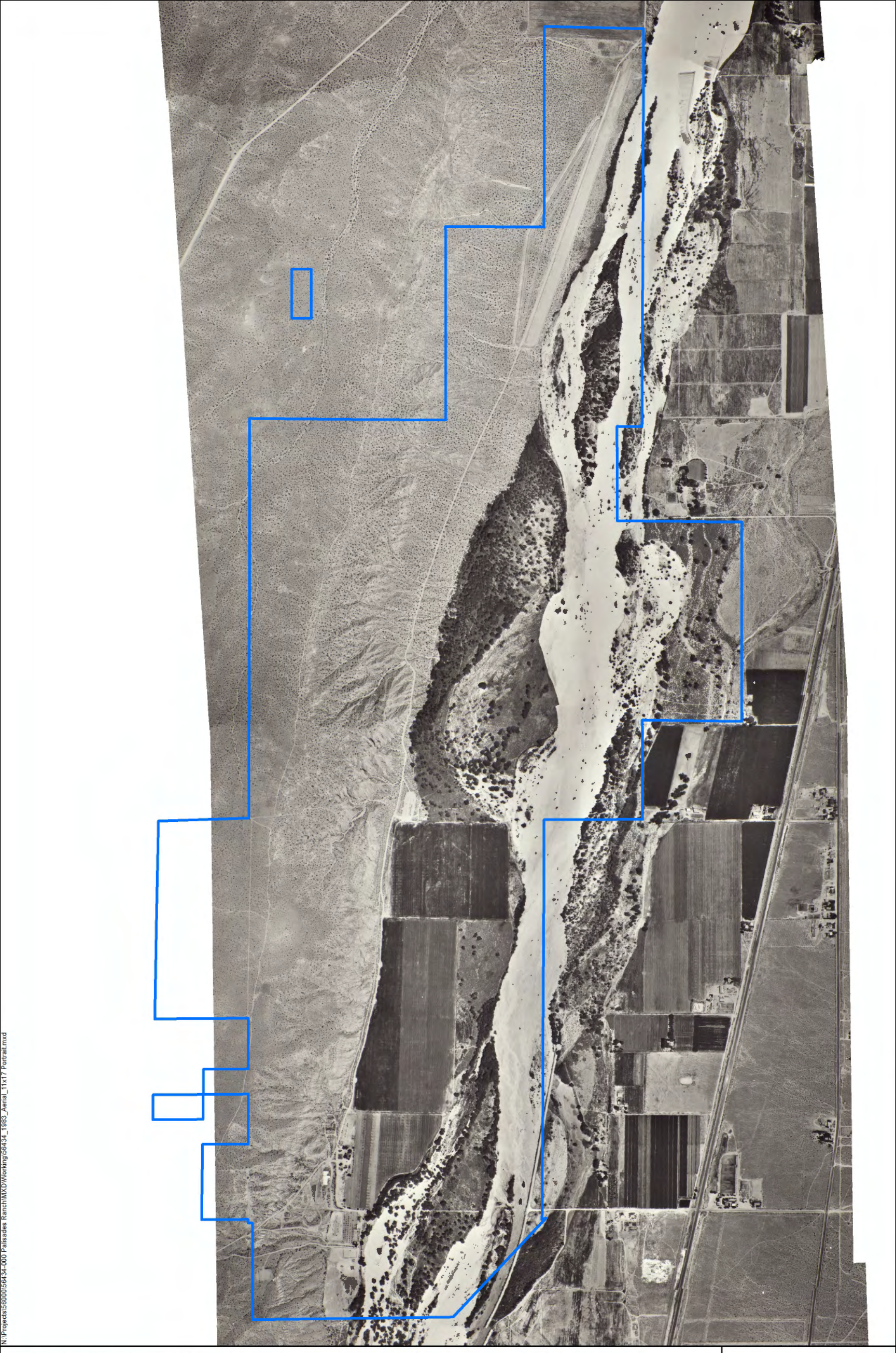

PALISADES RANCH -- 1983 AERIAL

Project Boundary

MDLT
MOJAVE DESERT LAND TRUST
CONNECT WITH THE DESERT YOU LOVE

SWCA
ENVIRONMENTAL CONSULTANTS

1:16,000
UTM ZONE 11, NAD 83
SAN BERNARDINO, CA

Basemap: 1983 Aerial
(Mojave Water Agency)

N

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0 200 400 Meters

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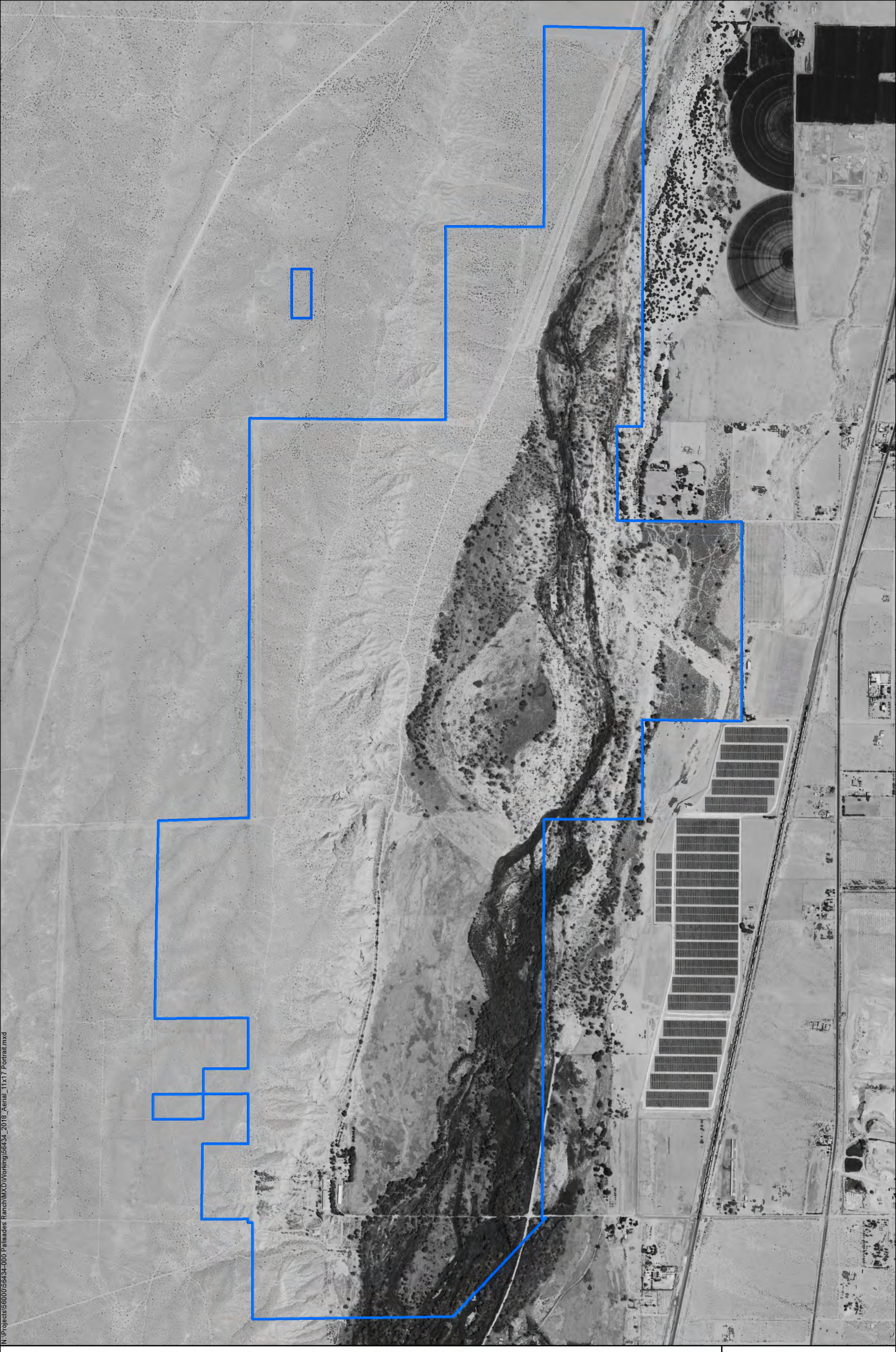


PALISADES RANCH -- NAIP 2018

Project Boundary

MDLT
MOJAVE DESERT LAND TRUST
CONNECT WITH THE DESERT YOU LOVE

SWCA
ENVIRONMENTAL CONSULTANTS

1:16,000
UTM ZONE 11, NAD 83
SAN BERNARDINO, CA

USGS 7.5' Quad: Helendale, CA

N

0 500 1,000 1,500 Feet

0 200 400 Meters

N:\Projects\56000\56434-000 Palisades Ranch\MXD\Working\56434_2018_Aerial_11x17 Portrait.mxd

APPENDIX D

Mojave River Restoration 60% Design Drawings

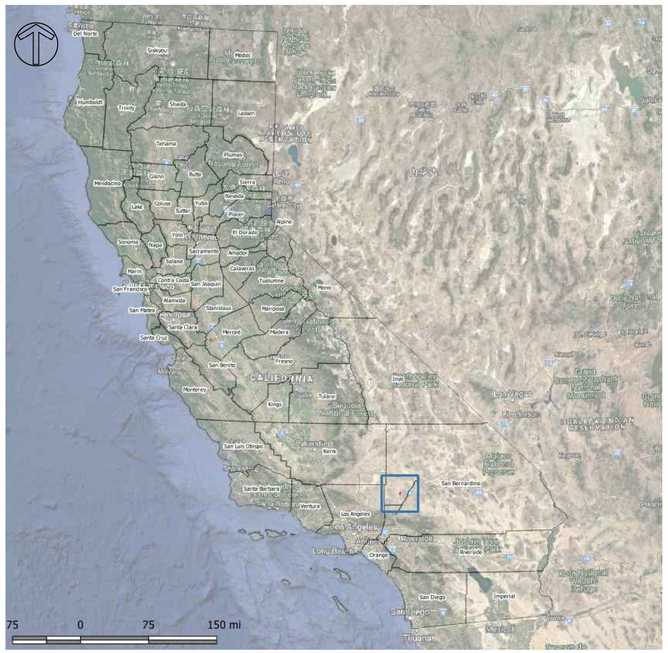
60% RESTORATION PLAN

PALISADE RANCH RESTORATION
NOT FOR CONSTRUCTION

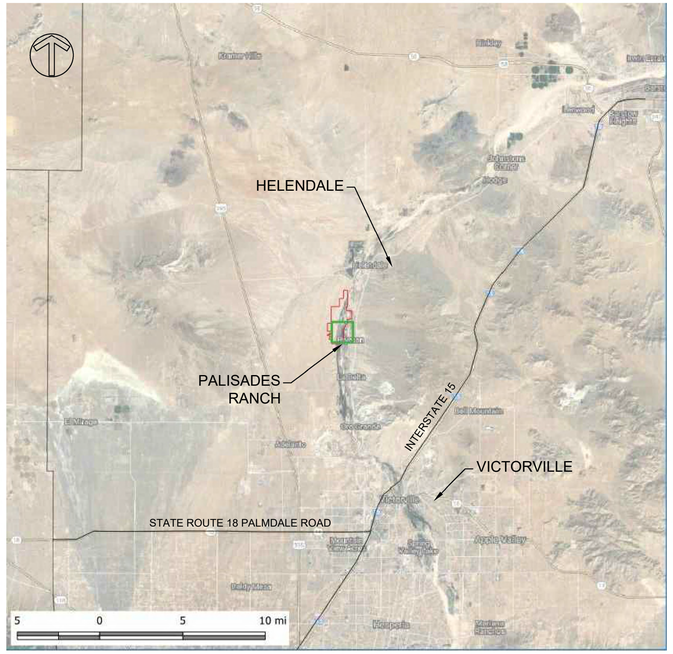
MOJAVE RIVER

SAN BERNARDINO COUNTY, CA

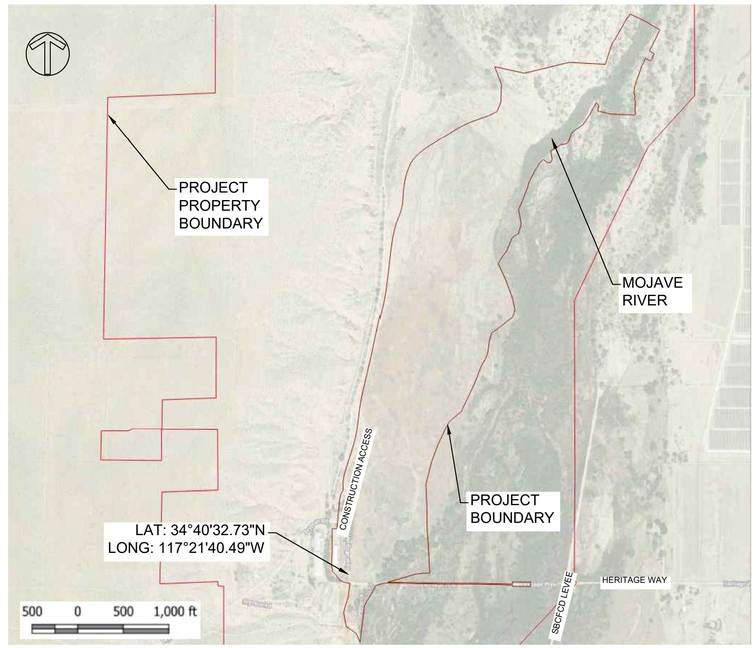
01/15/2021



VICINITY MAP



LOCATION MAP



DETAIL MAP

Know what's **below.**
Call before you dig.

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

REV	DESCRIPTION	CHECKED BY: SM	DRAWN BY: JYZ	APPRV
1	FOR REVIEW ONLY	APPROVED BY: ----		LWF
2	60% RESTORATION PLAN			BS
3	60% REVISION			BS
XX	XX			XX
XX	XX			XX
XX	XX			XX
XX	XX			XX
XX	XX			XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION

COVER

PROJECT ENGINEER:
SWCA
ENVIRONMENTAL & ENGINEERING
2996 107TH AVE.
OAKLAND, CA 94605

PROJECT OWNER:
MOJAVE DESERT LAND TRUST
MOJAVE DESERT LAND TRUST P.O. BOX 1544, 60124 29 PALMS HWY JOSHUA TREE, CA 92252

DATE: 01/15/2021

SHEET NUMBER
1 OF 37

D:\PALISADES_RANCH\0564345.0_ENGINEERING\C3D\SHEETS\COVER\TOC_LEGEND_PALISADESRANCH.DWG | BASITH.VEERASUNDARA | SAVED: Friday, January 15, 2021 6:36:52 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 6:38:23 PM

Sheet Index

Sheet Number	Sheet Title
1	COVER
2	SHEET INDEX
3	NOTES
4	STAGING OVERVIEW
5	PALISADES RANCH PROJECT OVERVIEW
6	SIDE CHANNEL PLAN AND PROFILE - (1)
7	SIDE CHANNEL PLAN AND PROFILE - (2)
8	SIDE CHANNEL PLAN AND PROFILE - (3)
9	SIDE CHANNEL PLAN AND PROFILE - (4)
10	SIDE CHANNEL PLAN AND PROFILE - (5)
11	SIDE CHANNEL PLAN AND PROFILE - (6)
12	SIDE CHANNEL PLAN AND PROFILE - (7)
13	SIDE CHANNEL PLAN AND PROFILE - (8)
14	SIDE CHANNEL PLAN AND PROFILE - (9)
15	SIDE CHANNEL PLAN AND PROFILE - (10)
16	POND TO WEST BRANCH SIDE CHANNEL PLAN AND PROFILE - (1)
17	POND TO WEST BRANCH SIDE CHANNEL PLAN AND PROFILE - (2)
18	WEST BRANCH PLAN AND PROFILE - (1)
19	WEST BRANCH PLAN AND PROFILE - (2)
20	WEST BRANCH PLAN AND PROFILE - (3)
21	5 YEAR DISCHARGE CHANNEL PLAN AND PROFILE - (1)
22	5 YEAR DISCHARGE CHANNEL PLAN AND PROFILE - (2)
23	5 YEAR DISCHARGE CHANNEL PLAN AND PROFILE - (3)
24	PROPOSED SIDE CHANNEL PLAN AND PROFILE - (1)
25	PROPOSED SIDE CHANNEL PLAN AND PROFILE - (2)
26	PROPOSED SIDE CHANNEL PLAN AND PROFILE - (3)
27	PROPOSED SIDE CHANNEL PLAN AND PROFILE - (4)
28	PROPOSED SIDE CHANNEL PLAN AND PROFILE - (5)
29	OVERVIEW - CROSS SECTIONS
30	CROSS SECTIONS - (1)
31	CROSS SECTIONS - (2)
32	PLANTING PLAN OVERVIEW
33	DETAILS - SWPPP BMP1
34	DETAILS - SWPPP BMP2
35	DETAILS - BEAVER SCREENS
36	DETAILS - WOOD TOE
37	DETAILS - BDA AND ROOTWAD

APPROVED BY: ---- | CHECKED BY: SM | DRAWN BY: CY

REV	DESCRIPTION	APPRV
1	30% FOR REVIEW	LWF
2	60% RESTORATION PLAN	BS
3	60% REVISION	BS
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION

SHEET INDEX

PROJECT ENGINEER:
SWCA ENVIRONMENTAL & ENGINEERING
2996 107TH AVE.
OAKLAND, CA 94605

PROJECT OWNER:
MOJAVE DESERT LAND TRUST
MOJAVE DESERT LAND TRUST P.O. BOX 1544, 60124 29 PALMS HWY
JOSHUA TREE, CA 92252

DATE: 01/15/2021

SHEET NUMBER
2 OF 37

D:\PALISADES RANCH (05843A5.0 ENGINEERING\C3D\SHEETS\COVERTOCLEGEND_PALISADESRANCH.DWG | BASITHWEERASUNDARA | SAVED: Friday, January 15, 2021 6:36:52 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 6:38:28 PM

GENERAL CONSTRUCTION

1. THESE PLANS ARE NOT FOR CONSTRUCTION; THEY ARE FOR PLANNING PURPOSES ONLY. A PROJECT MANUAL AND TECHNICAL SPECIFICATIONS SHALL BE PREPARED PRIOR TO FINALIZING PLANS.

2. ALL CONSTRUCTION ACTIVITIES SHALL BE CONFINED TO THE PROJECT LIMITS AS DEFINED ON THE PLANS. THE CONTRACTOR SHALL CLEARLY MARK THE STAGING AREAS AND PROJECT LIMITS PRIOR TO CONSTRUCTION ACTIVITIES.

3. THE CONTRACTOR IS WHOLLY RESPONSIBLE FOR MAINTAINING CONSTRUCTION BARRIERS, ACCESS AREAS, AND LOCKING OF GATES TO LIMIT PUBLIC ENTRY INTO DEFINED PROJECT LIMITS. THE CONTRACTOR SHALL HAVE OVERNIGHT USE OF THE STAGING AREA DURING THE DURATION OF THE PROJECT.

4. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A CLEAN AND SAFE ENVIRONMENT FOR ALL WORKERS ON THE JOB SITE. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING SANITARY FACILITIES. THE CONTRACTOR SHALL FOLLOW OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL ELECTRICAL, WATER AND UTILITY NEEDS. THE CONTRACTOR SHALL KEEP THE PROJECT LIMITS IN A NEAT AND ORDERLY MANNER. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING ALL TEMPORARY FACILITIES AND CONTROLS AFTER COMPLETION OF ALL WORK.

PERMITS

5. ALL APPLICABLE COUNTY, STATE, AND FEDERAL PERMITS SHALL BE OBTAINED AND COMPLIED WITH FOR THE CONSTRUCTION OF THE PROJECT.
6. CONTRACTOR SHALL ADHERE TO ALL GENERAL AND SPECIAL CONDITIONS OF THE PERMITS WHEN AUTHORIZED.
7. CONTRACTOR IS RESPONSIBLE FOR THE TERM LIMITS AND OBTAINING NECESSARY EXTENSIONS OF TIME CHANGES TO THE PROJECT PERMITS.
8. CONSTRUCTION OF WORK SHALL OCCUR OUTSIDE OF CONSERVATION SPECIES NESTING PERIODS, AQUATIC SPAWNING, AND OTHER TIME PERIODS AS DESCRIBED IN SAID PERMITS.
9. THE CONTRACTOR IS RESPONSIBLE TO PREPARE AND SUBMIT A STORM WATER POLLUTION PREVENTION PLAN TO THE STATE OF CALIFORNIA WATER QUALITY CONTROL DIVISION.
10. STORM WATER POLLUTION PREVENTION PLAN DETAILS AND CONSTRUCTION ACCESS PRESENTED IN THESE PLANS ARE PREPARED TO ASSIST THE CONTRACTOR IN PREPARING A FINAL APPROVED PLAN.
11. CONTRACTOR IS RESPONSIBLE FOR EXECUTING BEST MANAGEMENT PRACTICES AND DAILY INSPECTIONS TO MEET WATER QUALITY REQUIREMENTS.
12. PERMITS ANTICIPATED FOR THE PROJECT INCLUDE BUT ARE NOT LIMITED TO:
    USACE NW27
    CA SWRCB DWQ 401
    CDFW LSAA 1600
    SAN BERNARDINO GRADING AND LAND USE AND TRAFFIC CONTROL CONSTRUCTION PERMITS

CONSTRUCTION STAKING

13. THE CONTRACTOR SHALL PROVIDE ALL PROFESSIONAL LAND USE SURVEY AND STAKING OF PROPERTY BOUNDARIES AND ESTABLISHMENT OF BENCH MARKS FOR THE PROJECT.

14. DATUM IN THESE PLANS IS IN CALIFORNIA STATE PLAN ZONE V USF NAD83 HORIZONTAL DATUM AND NAVD88 IS THE VERTICAL DATUM.

15. CONTROL POINTS SHALL BE ESTABLISHED BY A PROFESSIONAL LAND SURVEYOR LICENSED IN THE STATE OF CALIFORNIA AND BE PROVIDED FOR THE CONTRACTOR TO ESTABLISH THE LINES AND GRADES SHOWN ON THE PLANS. INITIAL CONSTRUCTION STAKING OF CONTROL LINES AND HYDRAULIC FEATURES SHALL BE PROVIDED TO THE ENGINEER PRIOR TO CONSTRICTION ACTIVITIES. GRADE, ELEVATIONS AND ADDITIONAL CONSTRUCTION STAKING SHALL BE WHOLLY THE RESPONSIBILITY OF THE CONTRACTOR.

16. INITIAL CONSTRUCTION STAKING OF PROTECT IN PLACE (PIP) TREES, BIOLOGICAL HABITATS, AND SPECIAL AQUATIC HABITAT AREAS SHALL BE STAKED BY THE PROJECT BIOLOGIST PRIOR TO CONSTRUCTION. PROTECT IN PLACE AREAS SHALL BE MAINTAINED BY THE CONTRACTOR DURING THE DURATION OF THE PROJECT.

SITE INTEGRITY

17. THE CONTRACTOR IS REQUIRED TO DOCUMENT THE CONDITIONS OF THE PROJECT LIMITS, PIP AREAS, ROAD, AND ACCESS AREAS. THE CONTRACTOR IS RESPONSIBLE FOR REHABILITATING, REPAIR, OR REPLACING TO PRE-CONSTRUCTION CONDITIONS, ANY DAMAGE TO FACILITIES, UTILITIES, AND PIP AREAS.

TEMPORARY FACILITIES

18. STAGING AREAS ARE DEFINED ON THE PROJECT DRAWINGS. ALL CONSTRUCTION STAGING, STOCKPILING OF MATERIALS, EQUIPMENT STORAGE, ETC. SHALL TAKE PLACE IN DESIGNATED AREAS WITH ADEQUATE BARRIERS TO LIMIT PUBLIC ENTRY WITH ADEQUATE BMPS IN PLACE PRIOR TO COMMENCING WORK. STAGING AREAS SHALL HAVE DESIGNATED AREAS WITH CONTACT INFORMATION POSTED FOR PUBLIC INQUIRES. STAGING AREAS SHALL PROVIDE EMPLOYEES ALL NECESSARY FACILITIES, LEGAL POSTINGS, AND SAFETY PROTOCOL.

19. DISPOSAL AREAS: CONSTRUCTION ACTIVITIES ARE ANTICIPATED TO PRODUCE SIGNIFICANT NATURAL SOLID WASTE MATERIALS (EXCAVATED SOILS AND BRUSH MATERIAL). SOIL TESTING SHALL BE CONDUCTED PRIOR TO CONSTRUCTION TO ENSURE SUITABILITY FOR ONSITE PLACEMENT AND FILL AREAS FOR ESTABLISHMENT OF VEGETATION.

20. SANITARY FACILITIES: ALL TEMPORARY SANITARY FACILITIES SHALL BE STORED, MAINTAINED, AND PROPERLY HAULED OFF SITE AT COMPLETION OF CONSTRUCTION ACTIVITIES.

IN-STREAM CONSTRUCTION ACTIVITIES

21. CARE OF WATER AND BEST MANAGEMENT PRACTICES TO REDUCE TEMPORARY IMPACTS THAT MAY BE CAUSED DURING CONSTRUCTION ARE SOLELY THE RESPONSIBILITY OF THE CONTRACTOR. COFFER DAM(S) , SEDIMENT BASINS, IN-STREAM HAUL LOCATIONS AND BMPS PROVIDED IN THE PLANS ARE FOR REFERENCE ONLY. TURBIDITY LEVELS SHALL NOT EXCEED 10 NTUs.

EQUIPMENT MAINTENANCE AND OPERATIONS

22. EQUIPMENT SHALL BE ALLOWED TO OPERATE IN THE WET CHANNELS. EQUIPMENT OPERATING IN OR ADJACENT TO ANY WET CHANNELS SHALL BE FREE OF ANY FLUID LEAKS AND IN EXCELLENT OPERATING CONDITION.

23. BIODEGRADABLE HYDRAULIC FLUIDS SHALL BE UTILIZED FOR ANY EQUIPMENT OPERATING IN THE FLOWING RIVER CHANNEL. CONTRACTOR SHALL SUBMIT A LIST OF EQUIPMENT OPERATING WITH CERTIFIED BIO-DEGRADABLE HYDRAULIC FLUIDS TO THE ENGINEER PRIOR TO USE OF THE EQUIPMENT IN THE FLOWING CHANNEL. NO EQUIPMENT SHALL BE LEFT UNATTENDED, AT ANY TIME, IN ANY WET CHANNEL OR BELOW THE ORDINARY HIGH WATER LINE.

24. EQUIPMENT STORAGE SHALL OCCUR IN A DESIGNATED UPLAND LOCATION IN THE STAGING AREA.

25. ALL EQUIPMENT SHALL BE CLEANED PRIOR TO BEING MOBILIZED ON-SITE TO MINIMIZE POTENTIAL SPREADING OF INVASIVE SPECIES. EQUIPMENT SHALL BE POWER-SPRAYED AND FREE OF WEEDS. IF ANY EQUIPMENT BEING USED FOR THE PROJECT HAS BEEN PREVIOUSLY WORKING IN ANOTHER STREAM, RIVER, LAKE, POND OR WETLAND, ONE OF THE FOLLOWING DISINFECTION PRACTICES IS NECESSARY PRIOR TO CONSTRUCTION TO PREVENT THE SPREAD OF WHIRLING DISEASE, NEW ZEALAND MUD SNAILS, ZEBRA MUSSELS, DIDYMOSPHENIA, AND OTHER AQUATIC HITCHHIKERS. THESE PRACTICES INCLUDE GROUND CREW BOOTS, WADERS, SHOVELS OR OTHER TOOLS/CLOTHING THESE PRACTICES ARE ALSO NECESSARY AFTER PROJECT COMPLETION, PRIOR TO THE EQUIPMENT BEING USED IN ANOTHER STREAM, RIVER, LAKE, POND, OR WETLAND, FOR THE SAME PURPOSE:

    A. REMOVE ALL MUD AND DEBRIS FROM EQUIPMENT (TRACKS, TURRETS, BUCKETS, DRAGS, TEETH, HAND TOOLS, BOOTS, ECT.) AND SPRAY/SOAK EQUIPMENT IN A 1:15 SOLUTION OF SPARQUAT INSTITUTIONAL CLEANER AND WATER. KEEP EQUIPMENT MOIST FOR AT LEAST 10 MINUTES; OR

    B. REMOVE ALL MUD AND DEBRIS FROM EQUIPMENT (TRACKS, TURRETS, BUCKETS, DRAGS, TEETH, HAND TOOLS, BOOTS, ECT.) AND SPRAY/SOAK EQUIPMENT WITH WATER GREATER THAN 140 DEGREES FAHRENHEIT FOR AT LEAST 10 MINUTES.

    C. THE EXCAVATORS AND BACKHOES MAY NEED TO BE CLEANED ON SITE TO REMOVE EXCESS SEDIMENTS STUCK TO THE TRACK OR HOES. SEDIMENTS THAT ARE REMOVED WITH A SHOVEL SHALL BE PLACED IN DESIGNATED CLEAN FILL MATERIAL STORAGE AREAS. SEDIMENTS REMOVED WITH CLEAN WATER SHALL BE WASHED INTO THE DEWATERING AREA. ALL DEWATERING AREAS SHALL HAVE EROSION CONTROL LOGS STAKED AT FLOW LINES BEFORE POTENTIAL TRANSPORT TO THE YELLOWSTONE RIVER.

26. OILING AREAS. ANY AND ALL FUELING AND OILING OF EQUIPMENT SHALL BE IN DESIGNATED UPLAND LOCATIONS, WITH ADEQUATE BMP'S TO CONTAIN ANY POTENTIAL SPILL. ALL MAJOR EQUIPMENT/VEHICLE MAINTENANCE SHALL BE PERFORMED OFF-SITE. DOUBLE-WALLED FUEL TANK MAY BE KEPT ON-SITE IN THE STAGING AREA WITH DRIP PANS UNDERNEATH THE FUELING AREA. ALL EQUIPMENT FLUIDS GENERATED FROM MAINTENANCE ACTIVITIES SHALL BE DISPOSED OF INTO DESIGNATED DRUMS STORED ON SPILL PALLETS IN ACCORDANCE WITH HAZARDOUS WASTE MANAGEMENT PRACTICES. DRIP PANS SHALL BE PLACED UNDER ALL EQUIPMENT RECEIVING MINOR OR ROUTINE MAINTENANCE.

27. A SPILL CLEANUP PLAN IS WHOLLY THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE POSTED AND AVAILABLE AT ALL TIMES ON SITE FOR ALL WORK AREAS PRIOR TO ANY CONSTRUCTION ACTIVITIES AND SHALL INCLUDE COORDINATION WITH LOCAL EMERGENCY RESPONSE AGENCIES. IN THE EVENT OF A SPILL DURING REFUELING OR EQUIPMENT MAINTENANCE, PETROLEUM CONTAMINATED SOILS SHALL BE DISPOSED OF IN A CALIFORNIA DEPARTMENT OF ENVIRONMENTAL DIVISION OF SOLID AND HAZARDOUS WASTE QUALIFIED SOLID WASTE FACILITY.

28. A RELEASE OF ANY CHEMICAL, OIL, PETROLEUM PRODUCT, SEWAGE, ETC., WHICH MAY ENTER WATERS OF THE STATE OF CALIFORNIA (WHICH INCLUDE SURFACE WATER, GROUND WATER, DRY GULLIES OR STORM ROAD RUNOFF LEADING TO SURFACE WATER) SHALL BE REPORTED TO THE NATIONAL RESPONSE CENTER (NRC) (800-424-8802) IN ACCORDANCE WITH THE REQUIREMENTS OF 40 CFR 117, 40 CFR 110, AND 40 CFR 302 AND THE DIVISION OF WATER QUALITY (DWQ) (800-852-7550) AS SOON AS THE CONTRACTOR HAS KNOWLEDGE OF THE DISCHARGE AS REQUIRED UNDER THE CLEAN WATER ACT AND THE OIL POLLUTION ACT.

29. ANY INCIDENT SPILLS THAT DO NOT THREATEN WATER RESOURCES SHALL BE REPORTED TO THE CALIFORNIA STATE EMERGENCY RESPONSE COMMISSION AND DEPARTMENT OF PUBLIC SAFETY, AND THE DIVISION OF EMERGENCY SERVICES & HOMELAND SECURITY, CONTACT MUST IMMEDIATELY REPORT ANY SPILL INCIDENT, WITH THE OWNER AND ENGINEER. THE CONTRACTOR SHALL SUBMIT WITHIN 14 CALENDAR DAYS OF KNOWLEDGE OF THE RELEASE A WRITTEN DESCRIPTION OF: THE RELEASE (INCLUDING THE TYPE AND ESTIMATE OF THE AMOUNT OF MATERIAL RELEASED), THE DATE THAT SUCH RELEASE OCCURRED, THE CIRCUMSTANCES LEADING TO THE RELEASE, THE MEASURES TAKEN AND/OR PLANNED TO BE TAKEN TO CLEANUP THE RELEASE, AND STEPS TO BE TAKEN TO MINIMIZE THE CHANCE OF FUTURE OCCURRENCES TO THE EXECUTIVE SECRETARY.

ROAD ACCESS AND HAUL ROUTES

30. THE IMPORT AND EXPORT OF MATERIALS FROM THE PROJECT LIMITS SHALL OCCUR AT DESIGNATED LOCATIONS AT DEFINED ROAD ACCESS AND HAUL ROUTES.

31. ROADS AND HAUL ROUTES MAY NEED GRADING TO IMPROVE EQUIPMENT ACCESS AND SHALL BE MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT. ADEQUATE BMPS SHALL BE IN PLACE DOWN GRADIENT OF ALL DISTURBED ROADS WITHIN THE PROJECT LIMITS.

32. PRIVATE PROPERTY ACCESS GATES SHALL REMAIN LOCKED AT ALL TIMES OR AT THE DISCRETION OF THE PROPERTY OWNER.

33. CONSTRUCTION ACCESS ROADS AND STAGING AREA SHALL ALSO BE FLAGGED BY THE CONTRACTOR WITHIN THE PROJECT LIMITS AND RANDOM ACCESS SHALL BE PREVENTED.

34. ADEQUATE DUST SUPPRESSION, SUCH AS WATERING OF HAUL ROUTES, SHALL BE MAINTAINED AT ALL TIMES. DUST CONTROL SHALL BE IMPLEMENTED AS NEEDED. SPRAYING WATER AT A RATE OF 300 GALLONS PER ACRE OR LESS SHALL BE PERFORMED BY A MOBILE PRESSURE-TYPE DISTRIBUTOR TRUCK WHEREVER THE DRYNESS OF THE SOIL WARRANTS IT.

35. ACCESS ROADS EXCLUDING DESIGNATED MAINTENANCE ROADS SHALL BE RESTORED TO PRE-CONSTRUCTION CONDITIONS. HAUL ROUTES ALONG THE TWO-TRACK UNOFFICIAL ROAD(S) SHALL BE SOLELY THE RESPONSIBILITY OF THE CONTRACTOR TO RESTORE TO PRE-CONSTRUCTION CONDITIONS. THE USE OF THE UNOFFICIAL ROADS SHALL BE RESTORED WITH A NATIVE SEED MIX, AND THE INSTALLATION OF TEMPORARY EROSION CONTROL MEASURES AT DRAINAGE PATHWAYS SHALL BE MAINTAINED UNTIL VEGETATION HAS ESTABLISHED 30% COVER.

36. CONTRACTOR IS RESPONSIBLE FOR THE CLEAN UP AND REMOVAL OF ALL TEMPORARY EROSION CONTROL MEASURES . BMPS SHALL BE REMOVED AFTER 30% VEGETATION COVER HAS ESTABLISHED.

37. CONTRACTOR MAY ACCESS SITE FROM HERITAGE ROAD; HOWEVER NO EQUIPMENT IS ALLOWED ACROSS RIPARIAN AREA OUTSIDE OF DESIGNATED CHANNEL ACCESS LOCATIONS. CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH SAN BERNARDINO FLOOD CONTROL DISTRICT FOR ANY POTENTIAL STAGING OR USE OF THE LEVEE/MAINTENANCE BERM.

PROTECT IN PLACE TREES, AQUATIC RESOURCES, RIPARIAN AREAS AND SPECIAL GUARANTEES

38. ENGINEER AND THE PROJECT BIOLOGIST WILL MARK ALL TREES FOR REMOVAL AND SELECTIVE CLEARING AND PRUNING FOR EQUIPMENT ACCESS AND SITE RESTORATION.
39. CONTRACTOR GUARANTEES THAT CARE, CAUTION AND BEST MANAGEMENT TECHNIQUES ARE IMPLEMENTED TO MAXIMIZE THE SURVIVABILITY OF NATIVE MATURE TREES NOT DESIGNATED FOR REMOVAL.
    A. ALL PIP VEGETATION SHALL HAVE A MINIMUM OF 99% SUCCESS RATE, SHOWING VIGOR AND GENERAL HEALTH, FOR 24 MONTHS AFTER PIP MEASURES ARE CONDUCTED.

    B. DURING CONSTRUCTION ADDITIONAL PRUNING, IRRIGATION, OR FERTILIZER TO RESTORE HEALTH TO THE PIP VEGETATION SHALL BE CONDUCTED AT THE CONTRACTORS EXPENSE.

    D. USFWS/DWR AQUATIC PERSONNEL SHALL BE NOTIFIED TWO WEEKS PRIOR TO CONSTRUCTION OF THE PROJECT. ALL COFFER DAMS AND IN-STREAM WORK SHALL COORDINATE WITH THE PROJECT BIOLOGIST AT LEAST TWO WEEKS PRIOR TO CONSTRUCTION OF THE PROJECT. INITIAL IN-STREAM CONSTRUCTION SHALL HAVE A PROJECT BIOLOGIST MONITOR CONSTRUCTION AT THE START OF IN-STREAM CONSTRUCTION AREAS. CONTRACTOR SHALL NOTIFY AT ALL TIMES IF THERE ARE ANY OBSERVED AQUATIC SPECIES TRAPPED IN RESIDUAL POOLS OR NEAR THE DESIGNATED IN-STREAM CONSTRUCTION AREAS. THE HANDLING AND AND RELOCATION OF AQUATIC AND TERRESTRIAL SPECIES SHALL BE DONE BY THE PROJECT BIOLOGIST UNDER SPECIAL PROVISIONS OUTLINED IN PERMIT APPROVALS.

    G. ANY AND ALL RIPARIAN AREAS AND RIPARIAN VEGETATION OUTSIDE OF THE LIMITS OF DISTURBANCE SHALL BE PROTECTED IN PLACE.

    H. NO CONSTRUCTION SUPPLIES, FUELS NOR OILS SHALL BE STORED IN RIPARIAN AREAS, NO VEHICLES NOR HEAVY EQUIPMENT SHALL BE ALLOWED INTO RIPARIAN AREAS OTHER THAN THE DESIGNATED CHANNEL ACCESS SITES, AND ROUTES. NO DISCHARGE OF ANY UNSPECIFIED MATERIALS SHALL BE ALLOWED INTO ANY RIPARIAN AREAS. RIPARIAN AREAS OUTSIDE OF DESIGNATED EQUIPMENT AREAS SHALL BE TRAVERSED ONLY BY FOOT AND LEAK FREE HOSES MAY CROSS RIPARIAN VEGETATION. ANY INCIDENTALLY DISTURBED RIPARIAN AREAS SHALL BE RESTORED TO PRE-CONSTRUCTION CONDITIONS.

CULTURAL RESOURCES

40. THE PROJECT AREA IS LOCATED IN A PREVIOUSLY-DISTURBED AGRICULTURAL FIELD. CULTURAL RESOURCES ARE NOT ANTICIPATED TO BE IMPACTED BY THE PROJECT. IF POTENTIAL CULTURAL RESOURCES IN THE PROJECT AREA ARE DISCOVERED DURING CONSTRUCTION AND CANNOT BE AVOIDED, CONTRACTOR SHALL SUSPEND CONSTRUCTION ACTIVITIES IN THAT AREA UNTIL THE PROPERTIES CAN BE EVALUATED BY A PROFESSIONAL ARCHAEOLOGIST IN COORDINATION WITH THE CALIFORNIA OFFICE OF HISTORICAL PRESERVATION.

UTILITY CONFLICT STATEMENT

41. THE CONTRACTOR SHALL CONTACT DIGALERT (8-1-1) AT LEAST TWO (2) FULL WORKING DAYS IN ADVANCE OF ANY CONSTRUCTION WORK TO ALLOW UTILITY OPERATORS TO VERIFY AND MARK THE LOCATIONS AND/OR ELEVATION OF EXISTING UTILITIES WHICH PERTAIN TO AND AFFECT THE CONSTRUCTION OF THIS PROJECT.

42. IF UNANTICIPATED CONDITIONS ARE ENCOUNTERED DURING THE COURSE OF CONSTRUCTION, THE CONTRACTOR SHALL IMMEDIATELY BRING THE CONDITION TO THE ATTENTION OF THE DESIGNER AND OWNER BEFORE CONTINUING WITH WORK WHICH MAY BE IMPACTED BY THE UNANTICIPATED CONDITIONS. ANY DISCREPANCIES BETWEEN THESE PLANS AND ACTUAL EXISTING CONDITIONS DISCOVERED BY THE CONTRACTOR SHALL BE REPORTED TO THE DESIGNER IMMEDIATELY.

VEGETATION MAINTENANCE

43. TEMPORARY IRRIGATION (1-2 YEARS) USING DRIP AND SPRINKLER SYSTEM IS ANTICIPATED AND WILL BE INCLUDED IN THE FINAL DESIGN.

44. CONTRACTOR SHALL PERFORM CONTINUOUS WEED CONTROL AND WARRANTY ALL PLANTINGS FOR 24 MONTH PERIOD.

APPROVED BY: ---	CHECKED BY: SM	DRAWN BY: CY	APPRV
REV	DESCRIPTION		
1	FOR REVIEW ONLY		LWF
2	60% RESTORATION PLAN		BS
3	60% REVISION	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION

GENERAL NOTES

PROJECT ENGINEER:
SWCA
ENVIRONMENTAL & ENGINEERING
2996 107TH AVE.
OAKLAND, CA 94605

PROJECT OWNER:
MOJAVE DESERT LAND TRUST
MOJAVE DESERT LAND TRUST P.O. BOX 1544, 60124 29 PALMS HWY JOSHUA TREE, CA 92252

DATE: 01/15/2021

SHEET NUMBER
3 OF 37

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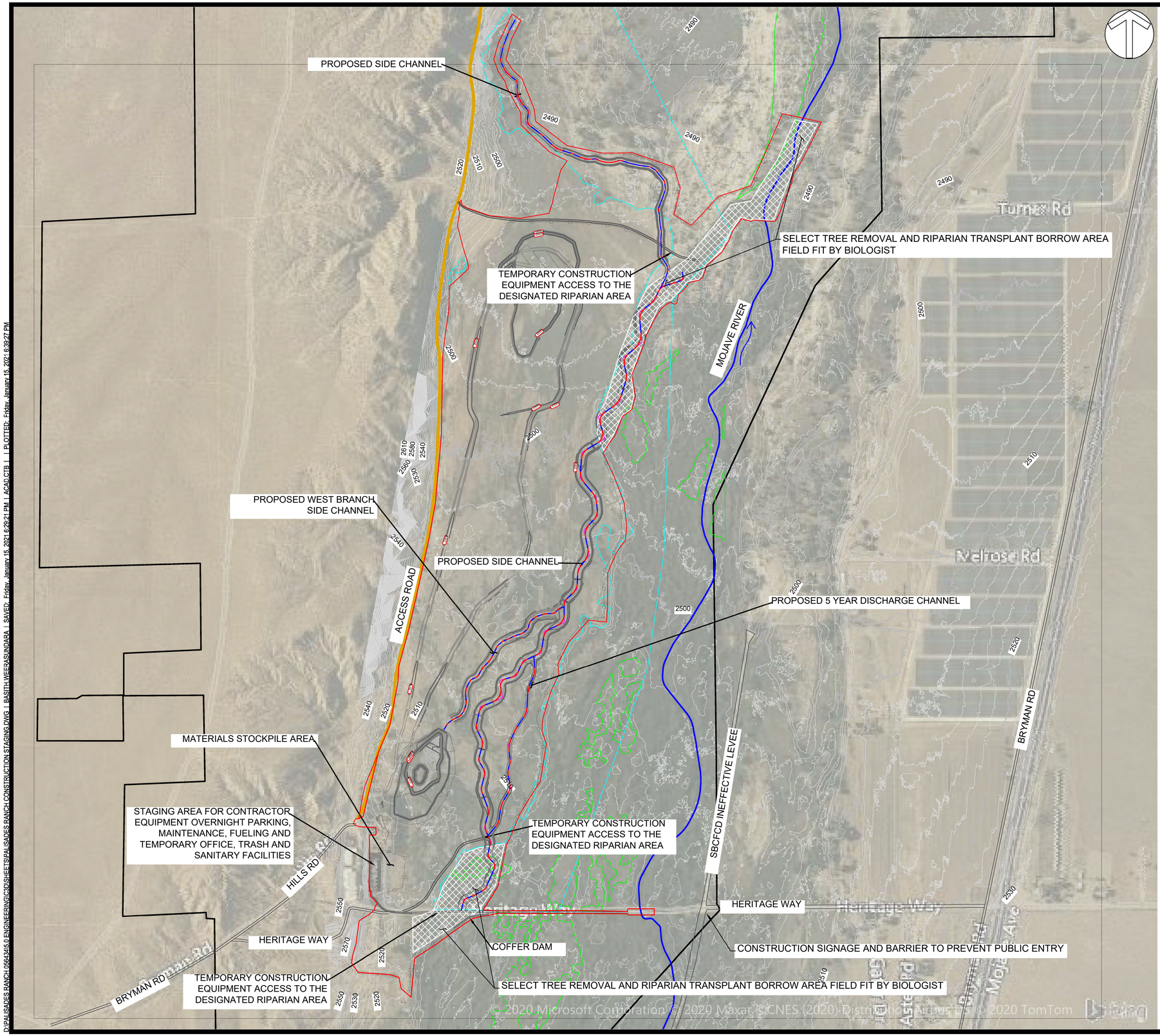

STAGING AREA LEGEND

- PROJECT PROPERTY BOUNDARY
- PROJECT LIMITS
- SILT FENCE
- EXISTING MAJOR CONTOUR W/ ELEVATION
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR W/ ELEVATION
- PROPOSED MINOR CONTOUR
- CONSTRUCTION ACCESS AND HAUL ROAD
- VEGETATION ENHANCEMENT AREAS
- USACE WETLANDS

NOTES

1.) THIS 60% DESIGN PLAN IS FOR PLANNING PURPOSES ONLY AND NOT FOR CONSTRUCTION.

2.) PROJECT IS ANTICIPATED TO BE PERMITTED UNDER CEQA AND A USACE NATIONWIDE 27. FINAL PLANS FOR CONSTRUCTION SHALL ADHERE TO ALL SPECIAL PROVISIONS OUTLINED IN SAID PERMITS. CONTRACTOR SHALL FINALIZE A STORMWATER POLLUTION PREVENTION PLAN.

3.) CONTRACTOR SHALL OBTAIN LOCAL CONSTRUCTION PERMITS AND ADHERE TO ALL PROVISIONS AND REQUIREMENTS.

4.) NO HEAVY EQUIPMENT SHALL OPERATE IN THE VEGETATION ENHANCEMENT AREAS. AREAS SHALL BE TRAVERSED BY FOOT TRAFFIC ONLY.

5.) CONSTRUCTION EQUIPMENT SHALL ACCESS RIPARIAN AREAS AT DESIGNATED LOCATIONS ONLY.

6.) CONSTRUCTION ACTIVITIES IN THE DESIGNATED RIPARIAN AREAS SHALL BE DIRECTED BY FIELD BIOLOGIST.

7.) WORK IN RIPARIAN AREAS SHALL ONLY OCCUR DURING BASE FLOW CONDITIONS. CONTRACTOR SHALL MONITOR WEATHER AND PLAN EACH DAYS WORK ACCORDING TO CONDITIONS. CONTRACTOR SHALL STABILIZE AREAS TO ANTICIPATE FOR STORM FLOW DURING OFF WORK HOURS. FLOWS IN THE MOJAVE RIVER ARE VARIABLE AND FLASH FLOOD MAY OCCUR DURING THE CONSTRUCTION PERIOD. AREAS MAY NEED ADDITIONAL TEMPORARY BEST MANAGEMENT PRACTICES TO ISOLATE THE WORKING AREA FROM STORM WATER EVENT FLOWS. COFFER DAM TO BE PLACED UPSTREAM OF THE CONSTRUCTED SIDE CHANNEL WORK AREA.

7.) SELECT TREE REMOVAL AND TRANSPLANTING OF EXISTING RIPARIAN PLANTS SHALL BE DIRECTED BY FIELD BIOLOGIST.

8.) ALL LARGE BRANCH AND ROOT CUTS TO PROTECT IN PLACE TREES IN THE DESIGNATED RIPARIAN AREAS SHALL BE PERFORMED BY A STATE OF CA CERTIFIED ARBORIST.

9.) CONSTRUCTION OF BOARDWALK PIERS, OVERLOOK WALL, AND PUMP UTILITIES SHALL ISOLATE AREAS FROM FLOWING WATER. ANY PUMPED GROUND WATER SHALL BE FILTERED PRIOR TO DISCHARGING TO THE MOJAVE RIVER. CONCRETE WASHOUT SHALL BE DISPOSED OFFSITE.

10.) EQUIPMENT FUELING AND MAINTENANCE AREAS SHALL BE IN DESIGNATED UPLAND STAGING AREA ONLY .

11.) EQUIPMENT SHALL NOT BE LEFT IN RIPARIAN AREAS DURING OFF-WORK HOURS AND SHALL BE STORED IN UPLAND STAGING AREA ONLY.

12.) CONTRACTOR SHALL HAVE SIGNS AND BARRIERS TO PREVENT PUBLIC ENTRY DURING CONSTRUCTION ACTIVITIES.

13.) ALL AREAS SHALL BE RESTORED WITH ADEQUATE COVER AND TEMPORARY STABILIZATION TECHNIQUES UNTIL CONDITIONS WARRANT.

14.) CONTRACTOR SHALL MAINTAIN/REPAIR/REPLACE BEST MANAGEMENT PRACTICES AS NEEDED UNTIL ADEQUATE VEGETATION COVER IS ESTABLISHED.

15.) SILT FENCING SHALL BE PLACED DOWN GRADIENT OF EARTH WORK AT ALL TIMES.

REV	DESCRIPTION	CHECKED BY: SM	DRAWN BY: CY	APPRV
1	FOR REVIEW ONLY			LWF
2	60% RESTORATION PLAN			BS
3	60% REVISION	XX	XX	BS
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX

APPROVED BY: ----

PALISADE RANCH RESTORATION

MOJAVE RIVER

SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN

CONSTRUCTION STAGING AREA OVERVIEW

NOT FOR CONSTRUCTION

PROJECT ENGINEER:
SWCA
ENVIRONMENTAL & ENGINEERING
2996 107TH AVE.
OAKLAND, CA 94605

PROJECT OWNER:
MOJAVE DESERT LAND TRUST
MOJAVE DESERT LAND TRUST P.O. BOX 1544, 60124 29 PALMS HWY JOSHUA TREE, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 375'
SCALE (17"X11"): 1" = 750'

0 375 750
SCALE IN FEET

SHEET NUMBER
4 OF 37

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PROPOSED SIDE CHANNEL
PLAN AND PROFILE (SEE SHEETS 24 - 28)
PROPOSED TRAIL
PALISADES RANCH BOUNDARY
EXISTING MOJAVE RIVER CENTERLINE
CONFLUENCE OF PROPOSED SIDE CHANNEL AND WEST BRANCH SIDE CHANNEL
PROPOSED WEST BRANCH SIDE CHANNEL
PLAN AND PROFILE WEST BRANCH SIDE CHANNEL (SEE SHEETS 18 - 20)
UTILITY HOUSING GROUND WATER PUMP IRRIGATION SYSTEM
5-YEAR DISCHARGE CHANNEL
PLAN AND PROFILE (SEE SHEETS 21 - 23)
PROPOSED POND
PLAN AND PROFILE PROPOSED POND (SEE SHEETS 16 - 17)
PROPOSED SIDE CHANNEL
PLAN AND PROFILE SIDE CHANNEL (SEE SHEETS 6 - 15)
CONSTRUCTION ACCESS
HILLS RD
HERITAGE WAY
BRYMAN RD
FLOW

PLAN LEGEND

- PROPOSED CHANNEL CENTER LINE
- PROPOSED CHANNEL TOP OF BANK
- EXISTING MOJAVE RIVER CENTER LINE
- PROJECT LIMIT OF DISTURBANCE
- PALISADES RANCH PROPERTY BOUNDARY
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 2500 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- WESTERN MARSH
- RIPARIAN FOREST (RED WILLOW) / RIPARIAN SHRUBLAND (WILLOW/ MULE-FAT)
- RIPARIAN FOREST COTTONWOOD WET SHRUBLAND (SALTBRUSH)
- DESERT SCRUB (CREOSOTE)
- XERIC POLLINATOR LANDSCAPE
- MESIC POLLINATOR LANDSCAPE
- VEGETATION ENHANCEMENT

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1	FOR REVIEW ONLY			LWF
2	60% RESTORATION PLAN			BS
3	60% REVISION	XX	XX	BS
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN

PLAN AND PROFILE OVERVIEW
NOT FOR CONSTRUCTION

PROJECT ENGINEER:
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SCALE (34"X22"): 1" = 350'
SCALE (17"X11"): 1" = 700'

0 350 700
SCALE IN FEET

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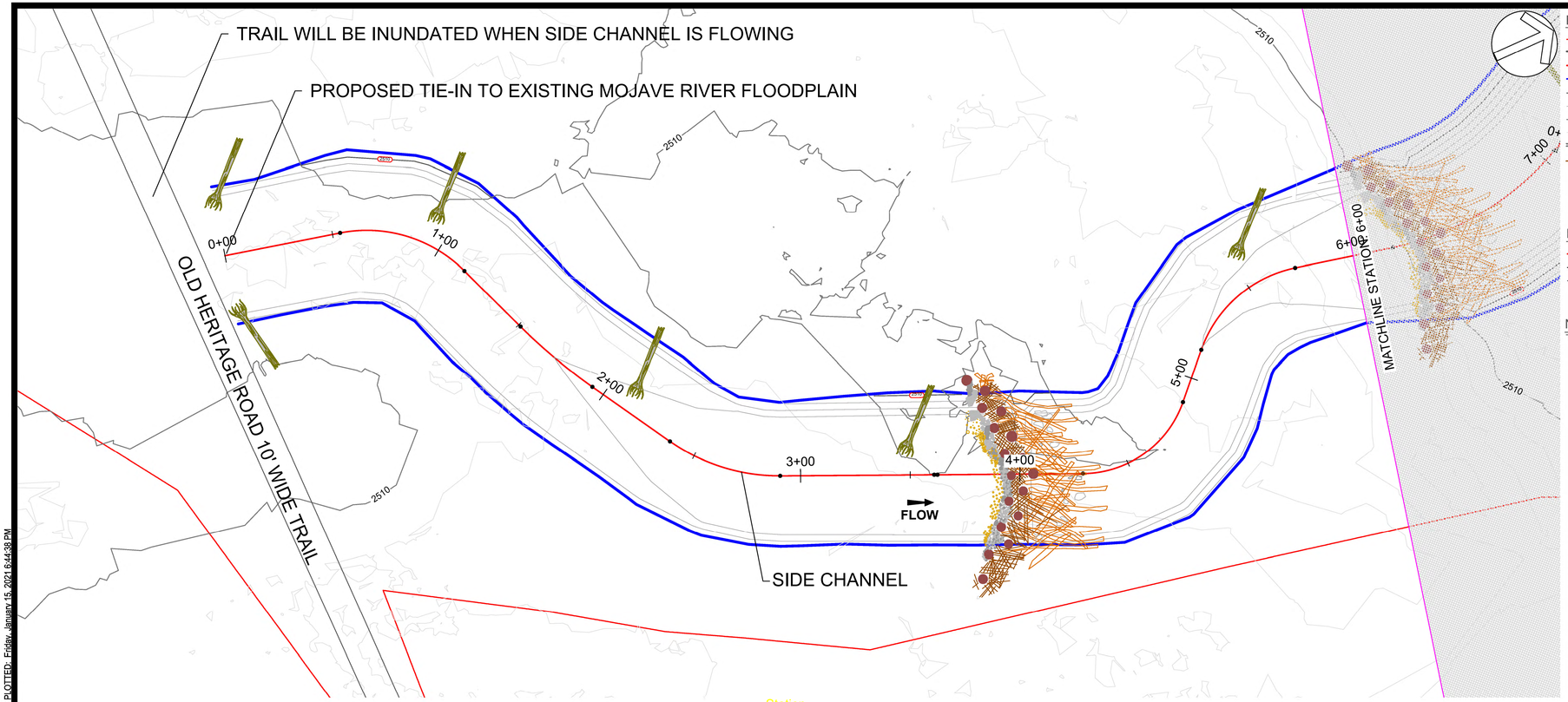
5 OF 37

D:\PALISADES RANCH\ 0843435.0 ENGINEERING\C3D\SHEETS\PALISADES RANCH OVERVIEW.DWG | BASITH.WEERASUNDARA | SAVED: Friday, January 15, 2021 7:31:10 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 7:31:31 PM



PLAN LEGEND

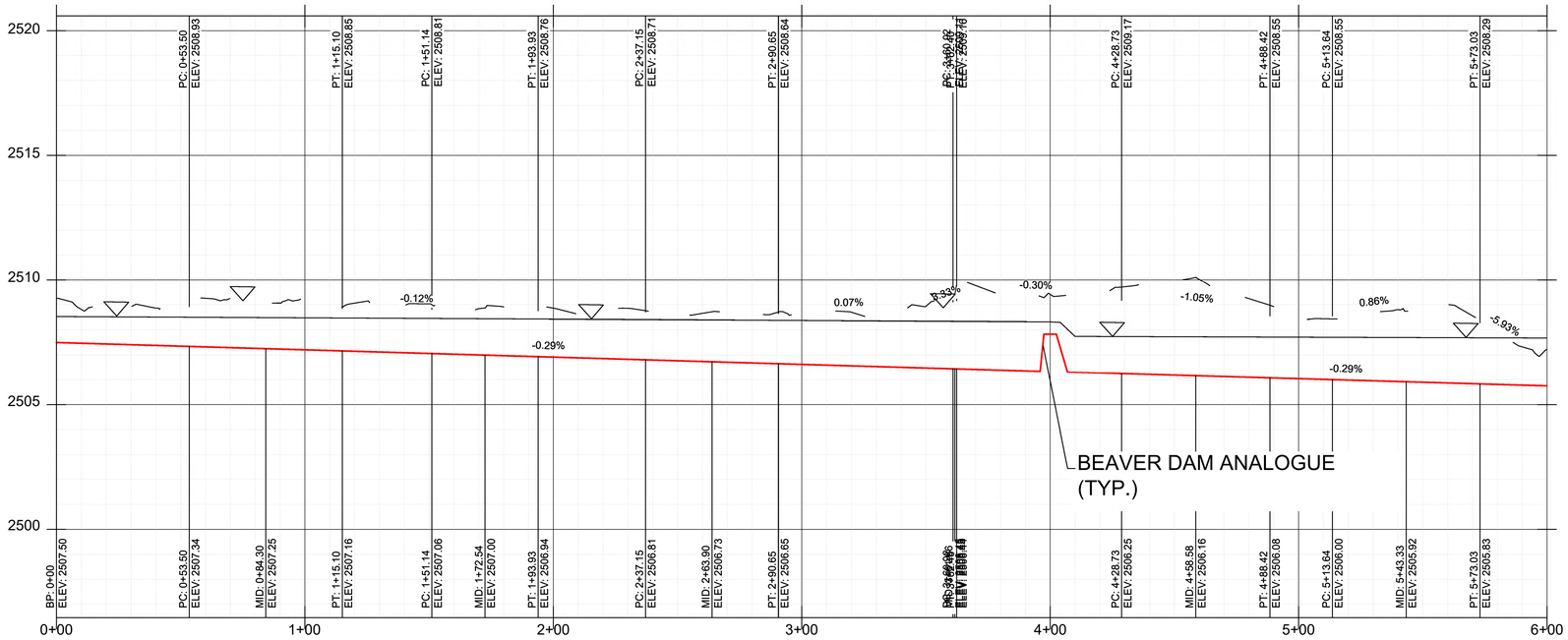
- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED SIDE CHANNEL TOP OF BANK
- PROPOSED MAJOR CONTOUR (2505)
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR (2500)
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

PROFILE LEGEND

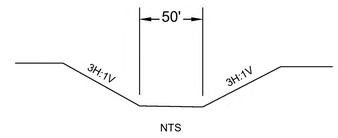
- PROPOSED THALWEG
- EXISTING GROUND
- WINTER BASE FLOW WATER SURFACE

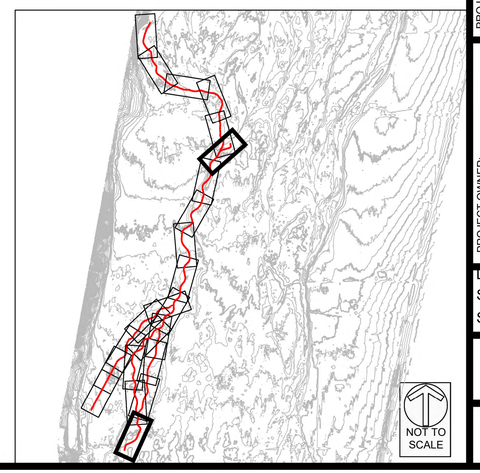
NOTE:
THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.

REV	APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: JVZ	APPRV
1		FOR REVIEW ONLY	LWF	
2		60% RESTORATION PLAN	BS	
3		60% REVISION	BS	
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX



Side Channel SCALE: HOR 1" =30'; VERT 1"= 3'





NOT TO SCALE

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
SIDE CHANNEL
PLAN AND PROFILE - (1)
NOT FOR CONSTRUCTION

PROJECT ENGINEER:
SWCA ENVIRONMENTAL & ENGINEERING
2996 107TH AVE.
OAKLAND, CA 94605

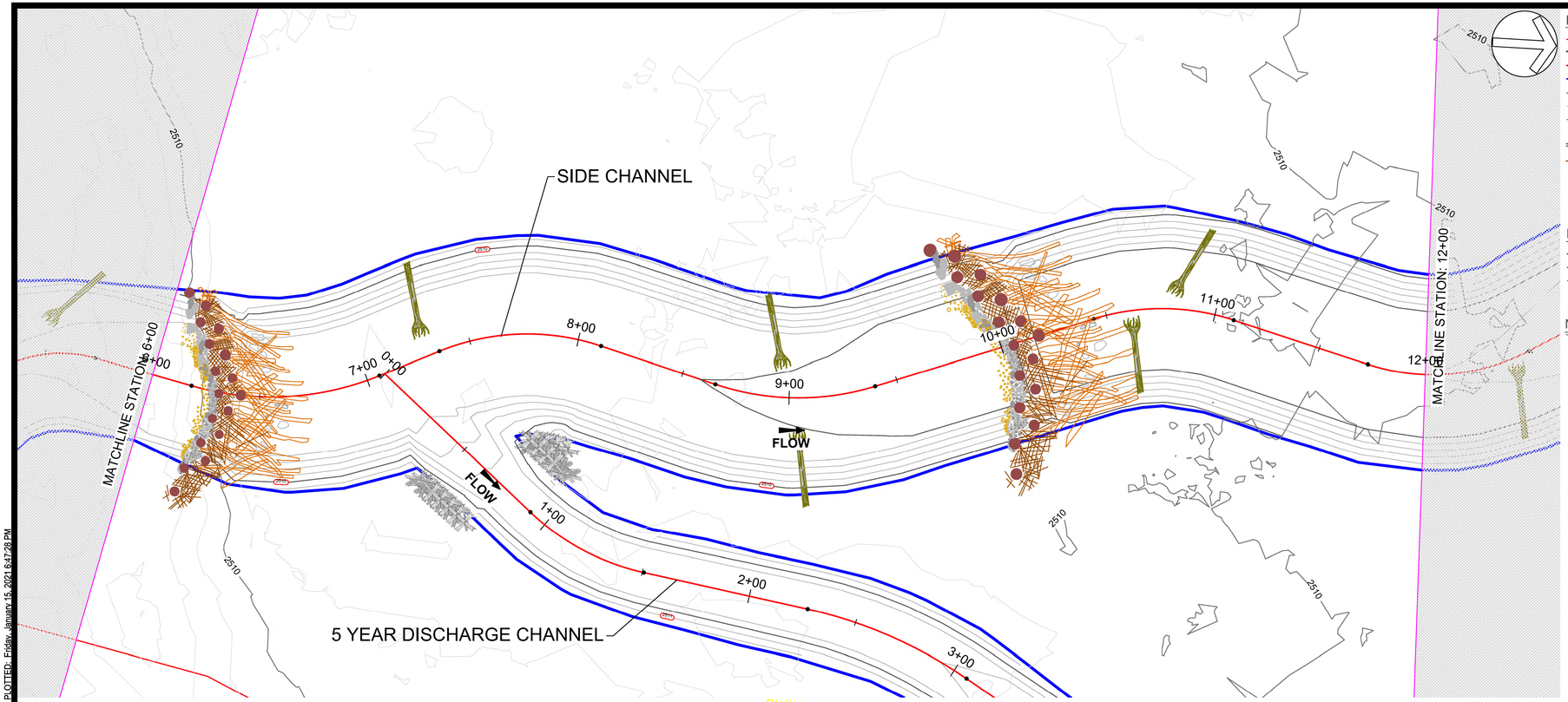
PROJECT OWNER:
MOJAVE DESERT LAND TRUST
MOJAVE DESERT LAND TRUST P.O. BOX 1544, 60124 29 PALMS HWY
JOSHUA TREE, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
6 OF 37

D:\PALISADES_RANCH\0564345.0 ENGINEERING\C3D\SHEETS\60.SIDE CHANNEL PP.DWG | BASITH.WEERASUNDARA | SAVED: Friday, January 15, 2021 6:34:08 PM | ACAD.CTB | PLOTTED: Friday, January 15, 2021 6:44:38 PM



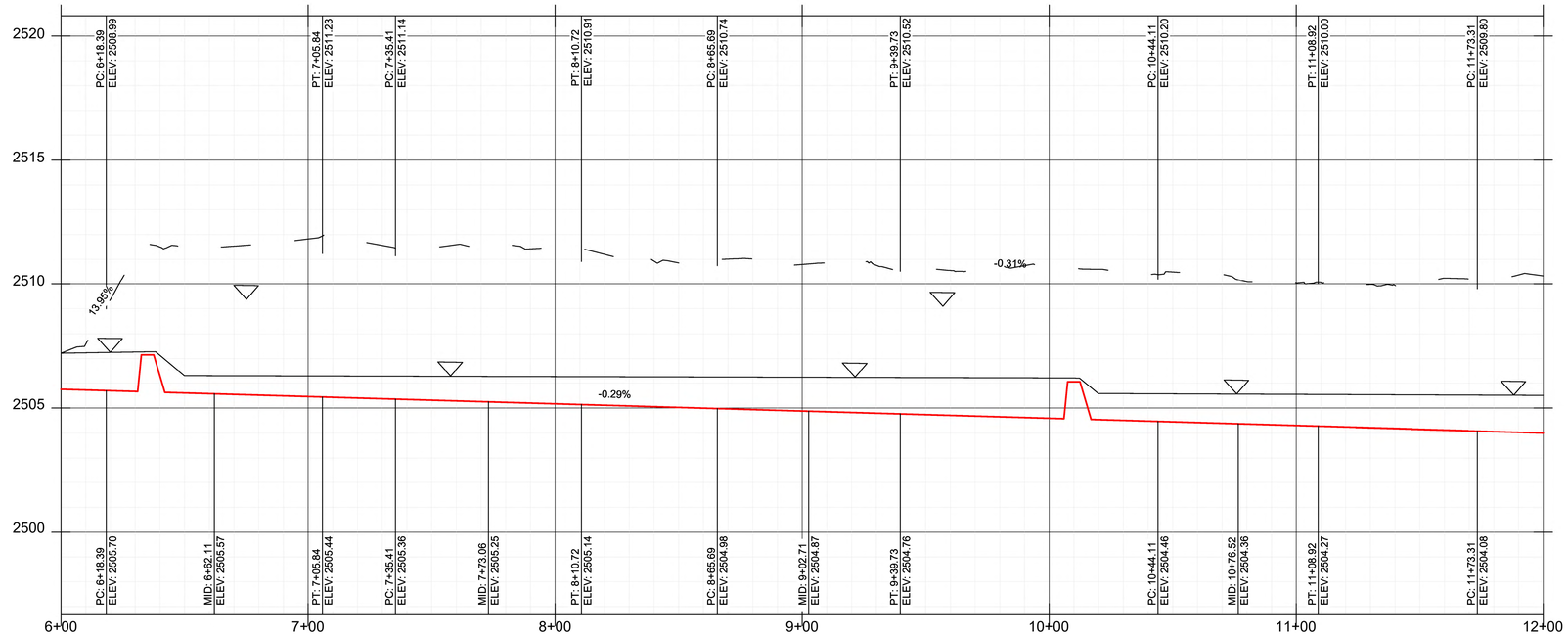
PLAN LEGEND

- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED SIDE CHANNEL TOP OF BANK
- 2505 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 2500 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

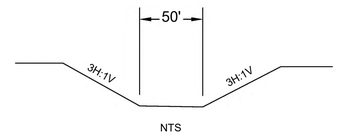
PROFILE LEGEND

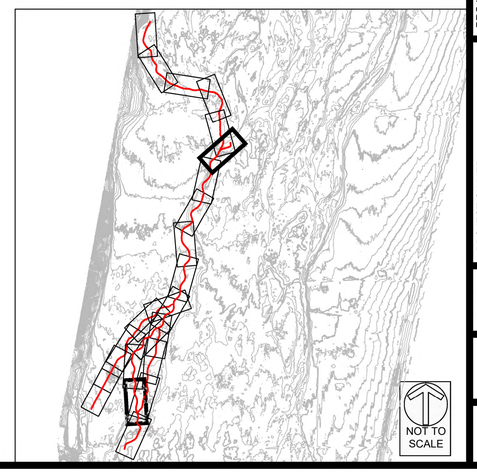
- PROPOSED THALWEG
- EXISTING GROUND
- WINTER BASE FLOW WATER SURFACE

NOTE:
THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.



Side Channel SCALE: HOR 1" =30'; VERT 1"= 3'





APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: JYZ

REV	DESCRIPTION	APPRV
1	FOR REVIEW ONLY	LWF
2	60% RESTORATION PLAN	BS
3	60% REVISION	BS
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION
SIDE CHANNEL
PLAN AND PROFILE - (2)

PROJECT ENGINEER:
SWCA
ENVIRONMENTAL & ENGINEERING
2996 107TH AVE.
OAKLAND, CA 94605

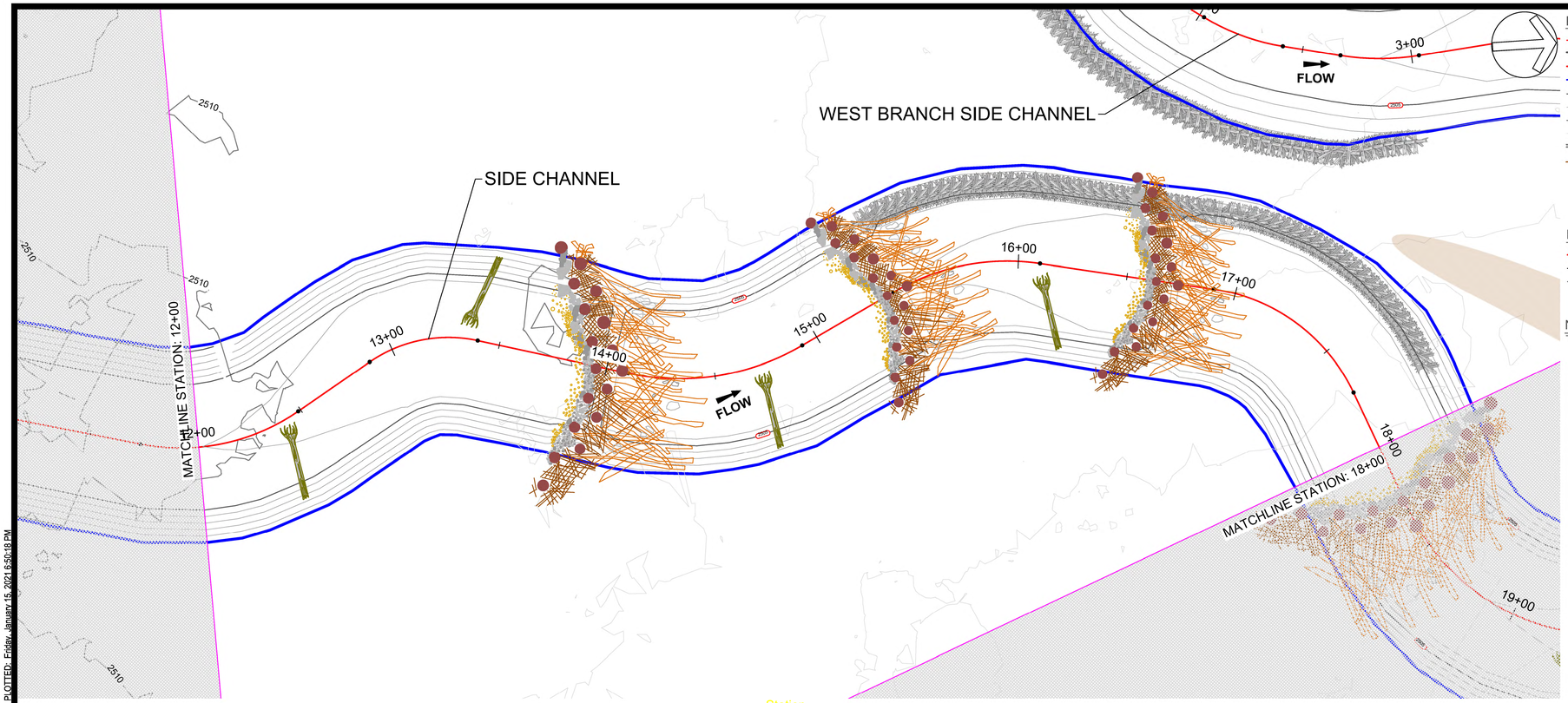
PROJECT OWNER:
MOJAVE DESERT LAND TRUST
MOJAVE DESERT LAND TRUST P.O. BOX 1544, 60124 29 PALMS HWY
JOSHUA TREE, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
7 OF 37

D:\PALISADES_RANCH\0564345.0 ENGINEERING\C3D\SHEETS\60.SIDE CHANNEL PP.DWG | BASITH.WEERASUNDARA | SAVED: Friday, January 15, 2021 6:42:28 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 6:47:28 PM



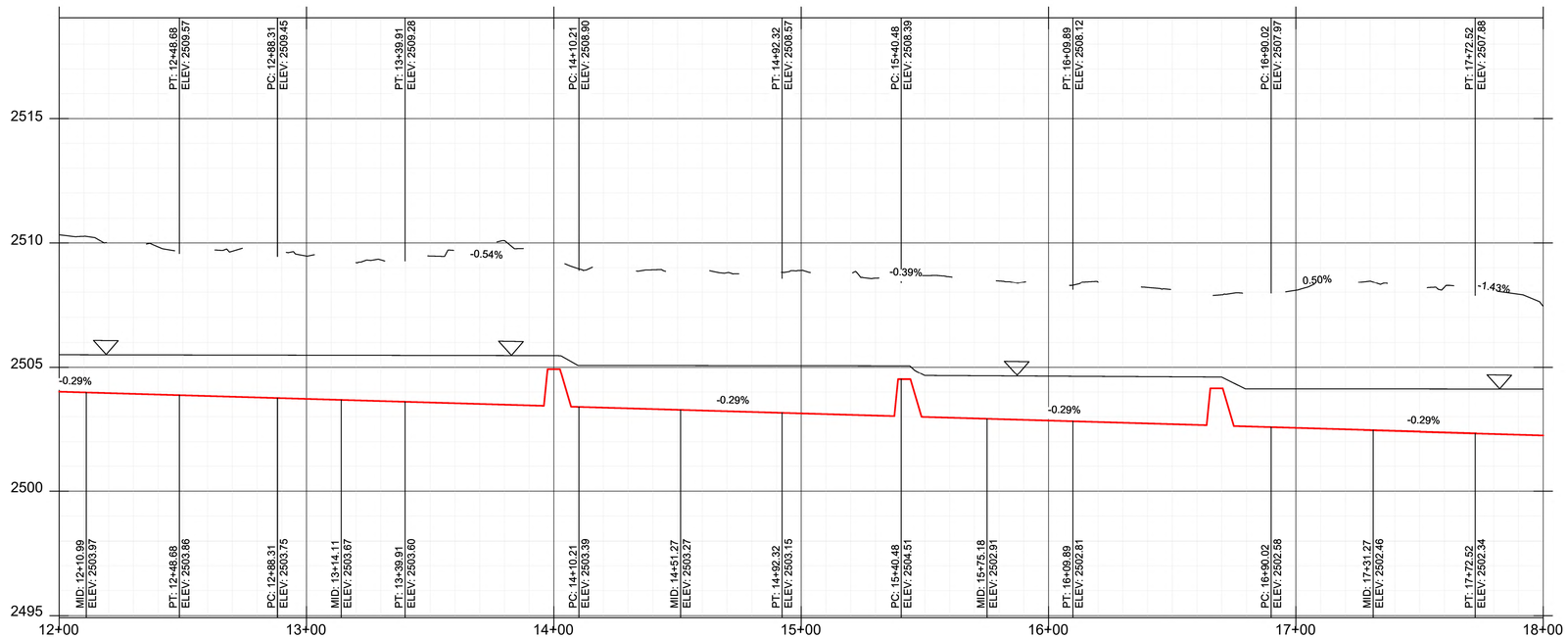
PLAN LEGEND

- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED SIDE CHANNEL TOP OF BANK
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

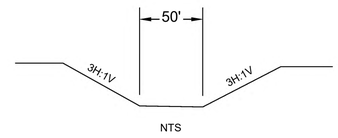
PROFILE LEGEND

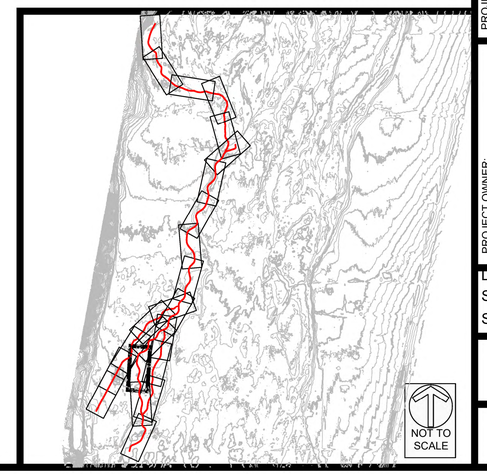
- PROPOSED THALWEG
- EXISTING GROUND
- WINTER BASE FLOW WATER SURFACE

NOTE:
THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.



Side Channel SCALE: HOR 1" =30'; VERT 1"= 3'





NOT TO SCALE

REV	APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: JYZ
1		FOR REVIEW ONLY	LWF
2		60% RESTORATION PLAN	BS
3	XX	60% REVISION	BS
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION
SIDE CHANNEL
PLAN AND PROFILE - (2)

PROJECT ENGINEER:
SWCA
ENVIRONMENTAL & ENGINEERING
2996 10TH AVE.
OAKLAND, CA 94605

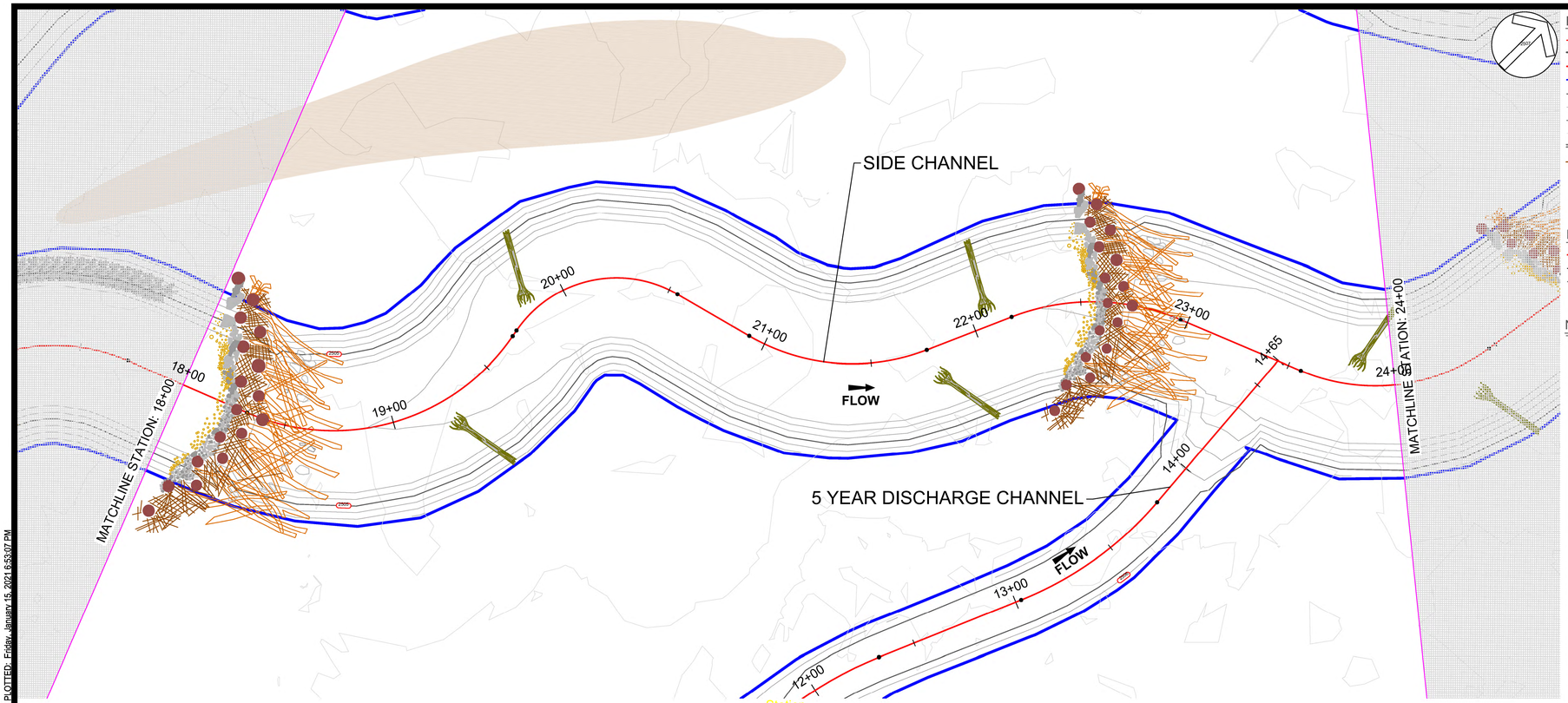
PROJECT OWNER:
MOJAVE DESERT LAND TRUST
MOJAVE DESERT LAND TRUST P.O. BOX 1544, 60124 29 PALMS HWY
JOSHUA TREE, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
8 OF 37

D:\PALISADES_RANCH\05643450.ENGINEERING\CSD\SHEETS\60.SIDE_CHANNEL_RP.DWG | BASITH.MEERASUNDARA | SAVED: Friday, January 15, 2021 6:34:08 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 6:50:18 PM



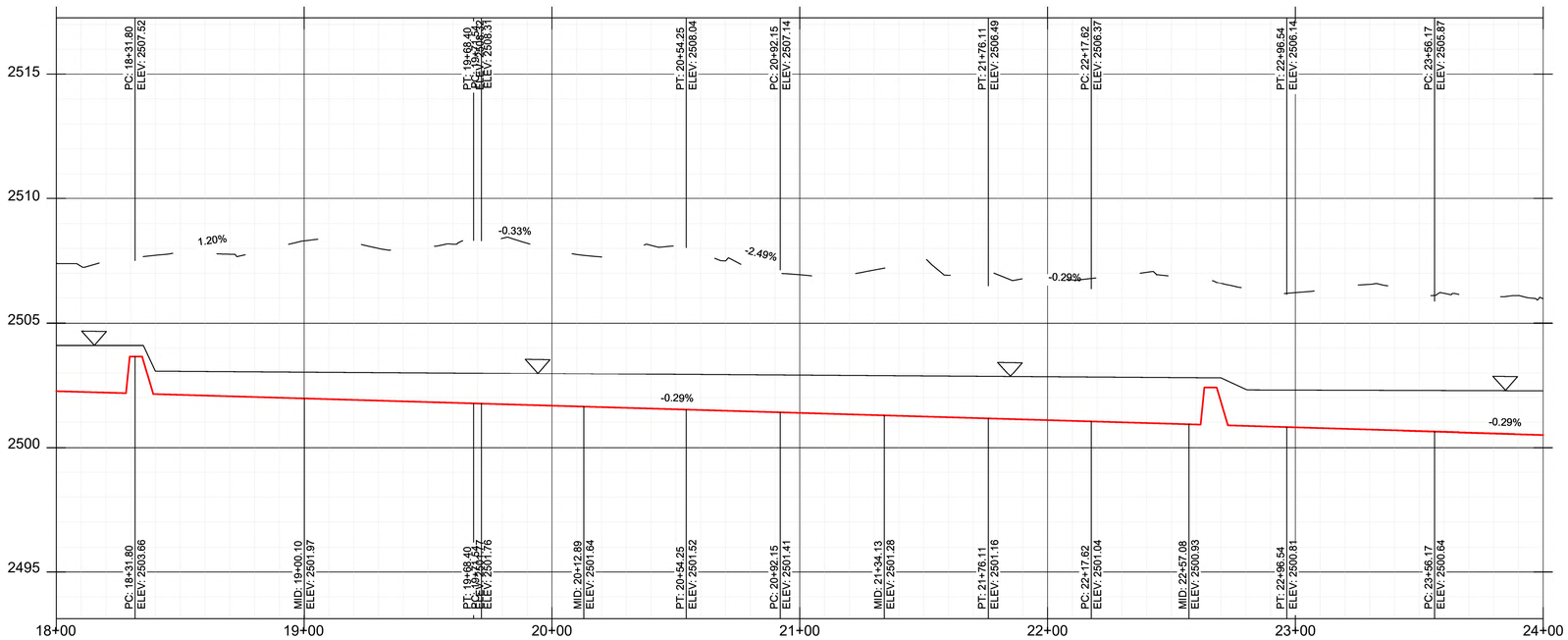
PLAN LEGEND

- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED SIDE CHANNEL TOP OF BANK
- PROPOSED MAJOR CONTOUR (2505)
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR (2500)
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

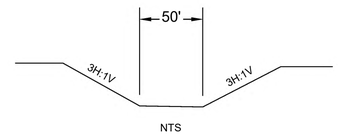
PROFILE LEGEND

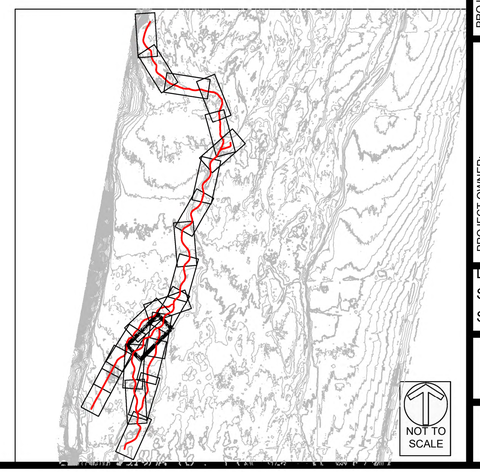
- PROPOSED THALWEG
- EXISTING GROUND
- WINTER BASE FLOW WATER SURFACE

NOTE:
THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.



Side Channel SCALE: HOR 1" =30'; VERT 1"= 3'





NOT TO SCALE

REV	APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: JVZ	APPRV
1		FOR REVIEW ONLY	LWF	
2		60% RESTORATION PLAN	BS	
3		60% REVISION	BS	XX
XX		XX	XX	XX
XX		XX	XX	XX
XX		XX	XX	XX
XX		XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION
SIDE CHANNEL
PLAN AND PROFILE - (4)

PROJECT ENGINEER:
SWCA ENVIRONMENTAL & ENGINEERING
2996 107TH AVE.
OAKLAND, CA 94605

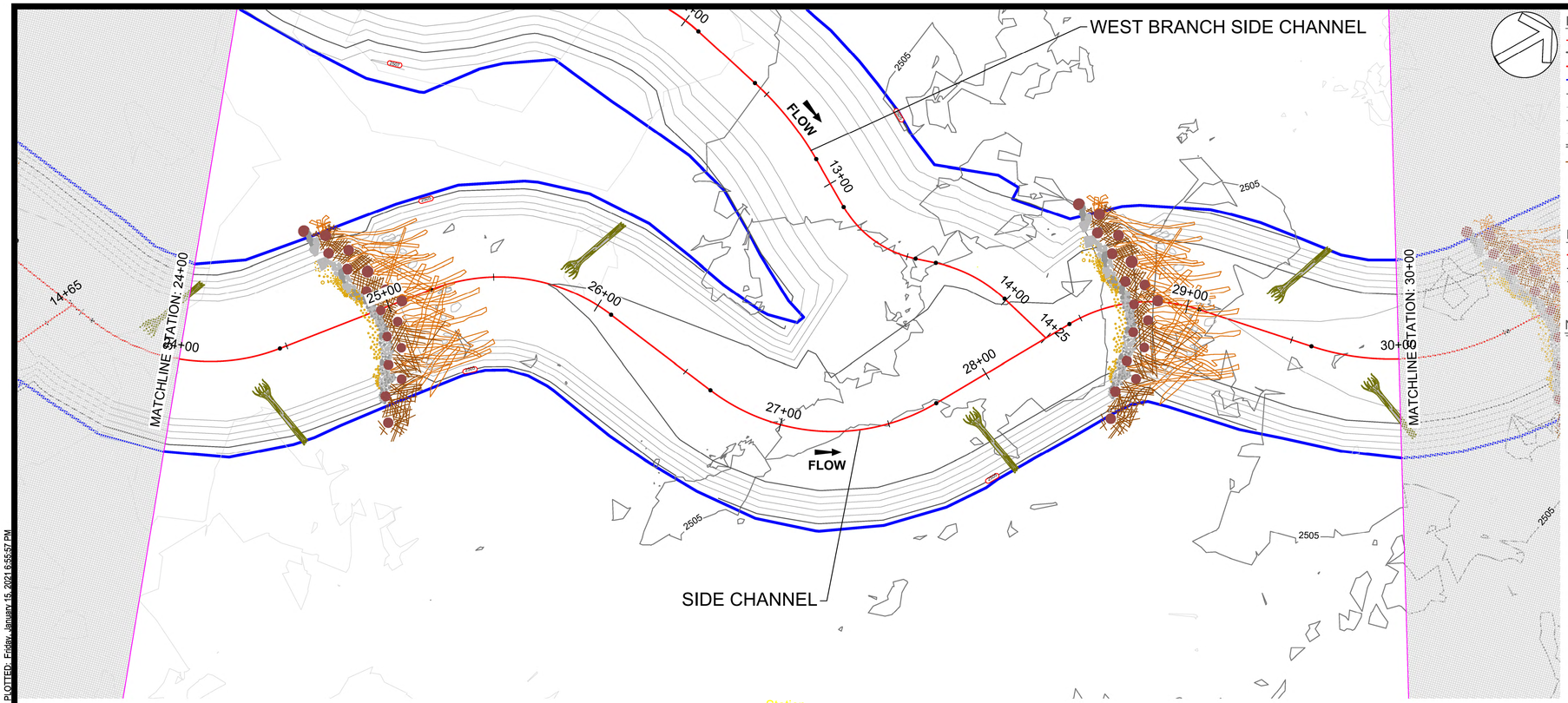
PROJECT OWNER:
MOJAVE DESERT LAND TRUST
MOJAVE DESERT LAND TRUST P.O. BOX 1544, 60124 29 PALMS HWY
JOSHUA TREE, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
9 OF 37

D:\PALISADES_RANCH_0564345.0_ENGINEERING\C3D\SHEETS\60_SIDE_CHANNEL_RP.DWG | BASITH.WEERASUNDARA | SAVED: Friday, January 15, 2021 6:34:08 PM | ACAD.CTB | PLOTTED: Friday, January 15, 2021 6:53:07 PM



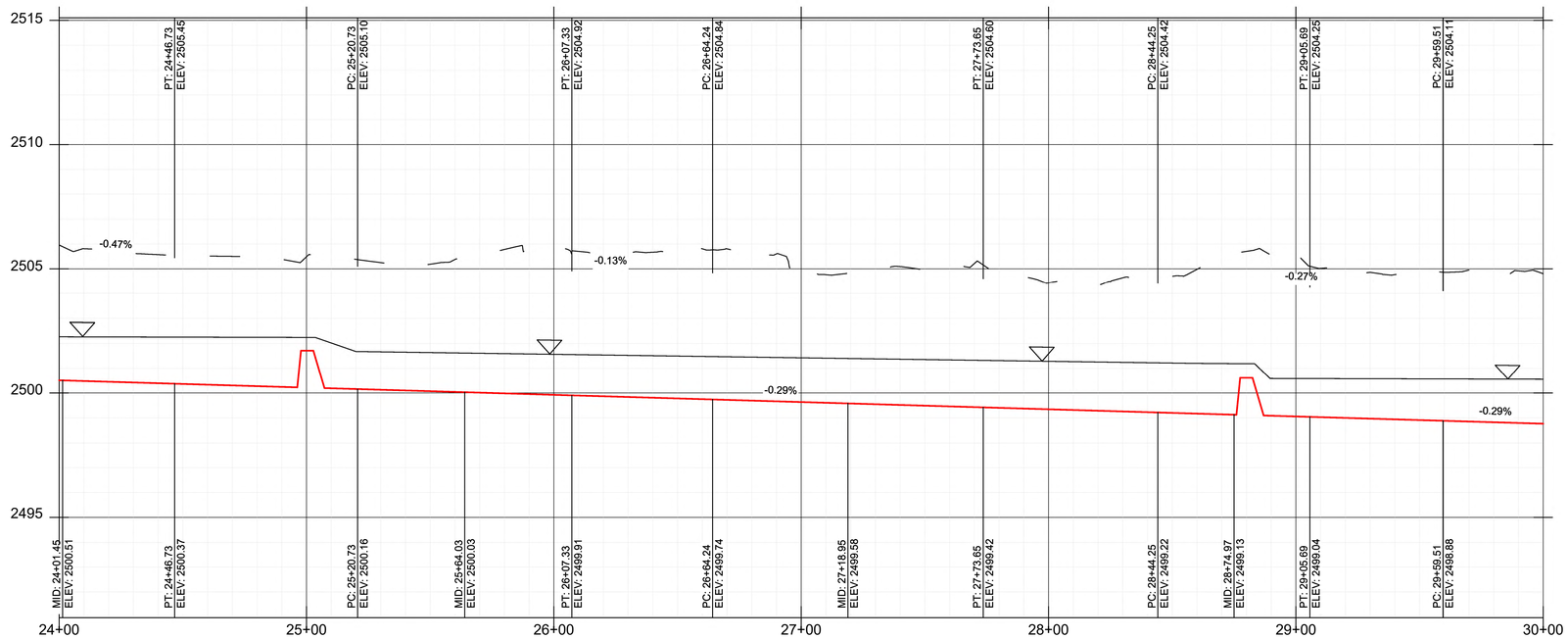
PLAN LEGEND

- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED SIDE CHANNEL TOP OF BANK
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

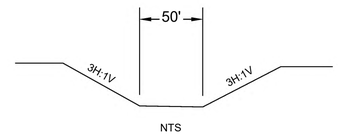
PROFILE LEGEND

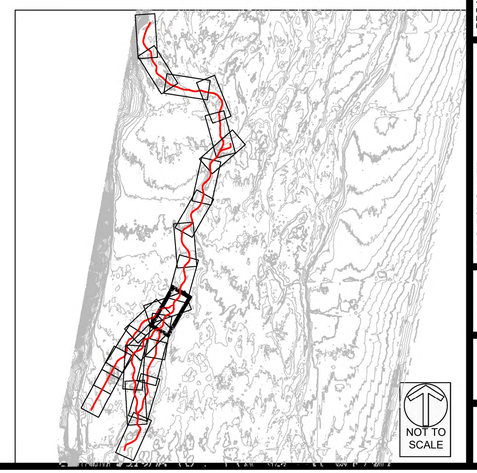
- PROPOSED THALWEG
- EXISTING GROUND
- WINTER BASE FLOW WATER SURFACE

NOTE:
THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.



Side Channel SCALE: HOR 1" =30'; VERT 1"= 3'





NOT TO SCALE

REV	APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: JYZ	APPRV
1		FOR REVIEW ONLY	LWF	
2		60% RESTORATION PLAN	BS	
3		60% REVISION	BS	
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION
SIDE CHANNEL
PLAN AND PROFILE - (5)

PROJECT ENGINEER:
SWCA
ENVIRONMENTAL & ENGINEERING
2996 10TH AVE.
OAKLAND, CA 94605

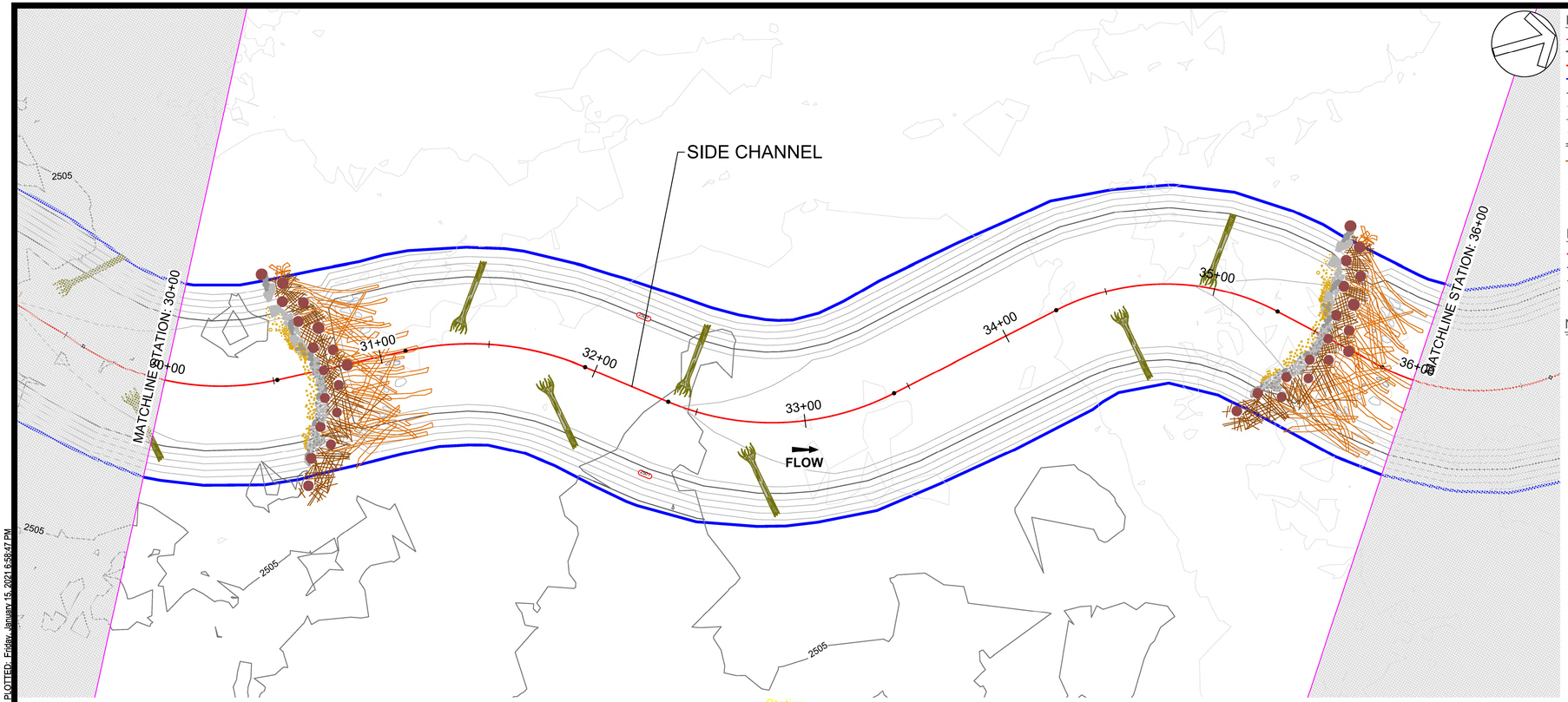
PROJECT OWNER:
MOJAVE DESERT LAND TRUST
MOJAVE DESERT LAND TRUST P.O. BOX 1544, 60124 29 PALMS HWY
JOSHUA TREE, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
10 OF 37

D:\PALISADES_RANCH\05643A\5.0 ENGINEERING\C3D\SHEETS\60.SIDE_CHANNEL_PP.DWG | BASITH.WEERASUNDARA | SAVED: Friday, January 15, 2021 6:34:08 PM | ACAD.CTB | PLOTTED: Friday, January 15, 2021 6:55:57 PM



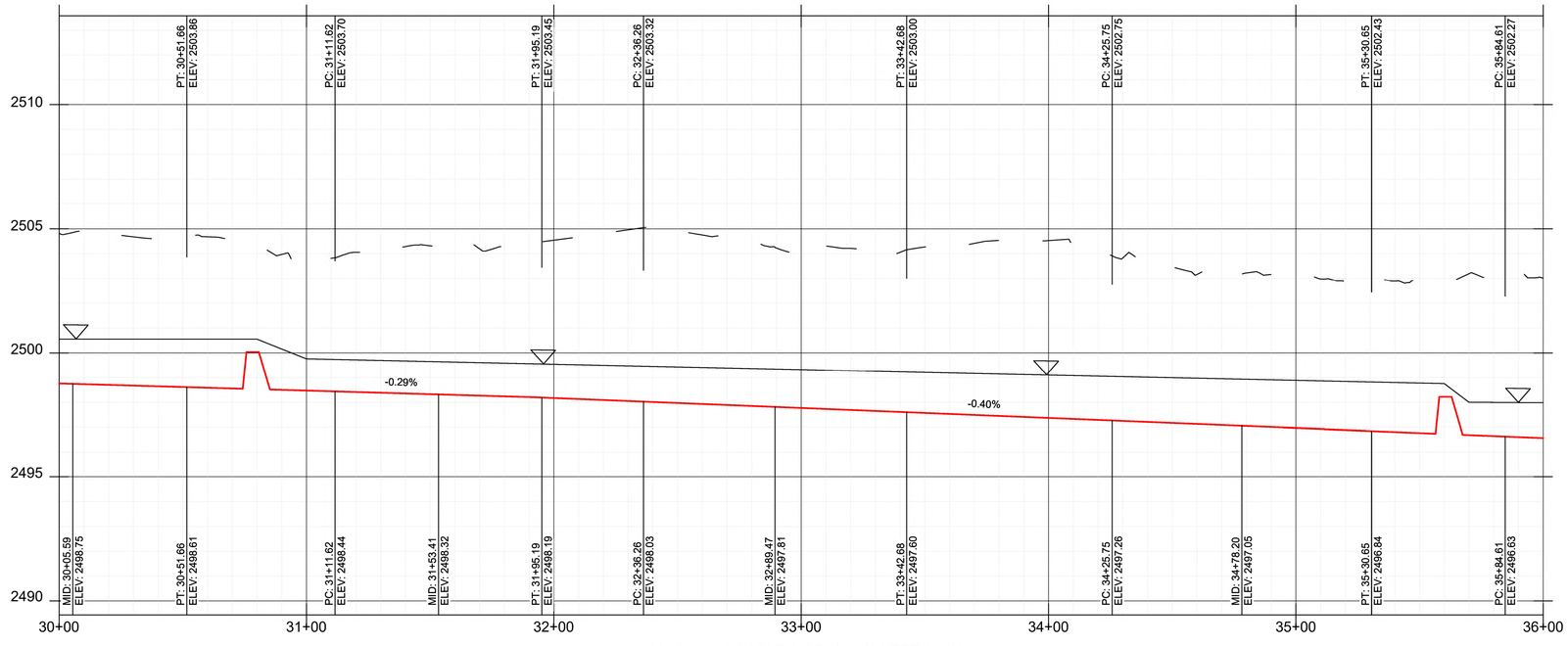
PLAN LEGEND

- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED SIDE CHANNEL TOP OF BANK
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

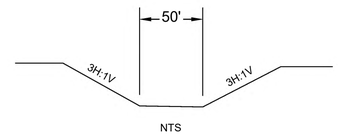
PROFILE LEGEND

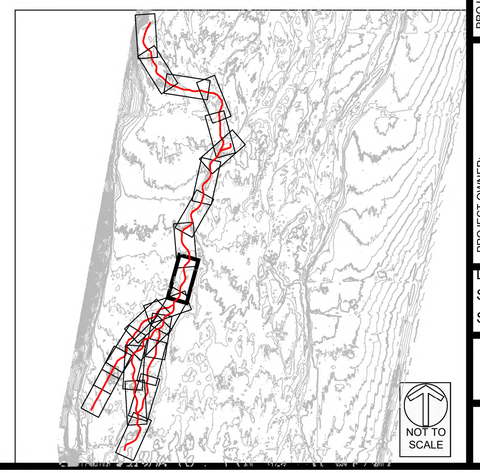
- PROPOSED THALWEG
- EXISTING GROUND
- WINTER BASE FLOW WATER SURFACE

NOTE:
THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.



Side Channel SCALE: HOR 1" =30'; VERT 1"= 3'





NOT TO SCALE

APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: JYZ
REV	DESCRIPTION	APPRV
1	FOR REVIEW ONLY	LWF
2	60% RESTORATION PLAN	BS
3	60% REVISION	BS
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION
SIDE CHANNEL
PLAN AND PROFILE - (6)

PROJECT ENGINEER:
SWCA
ENVIRONMENTAL & ENGINEERING
2996 10TH AVE.
OAKLAND, CA 94605

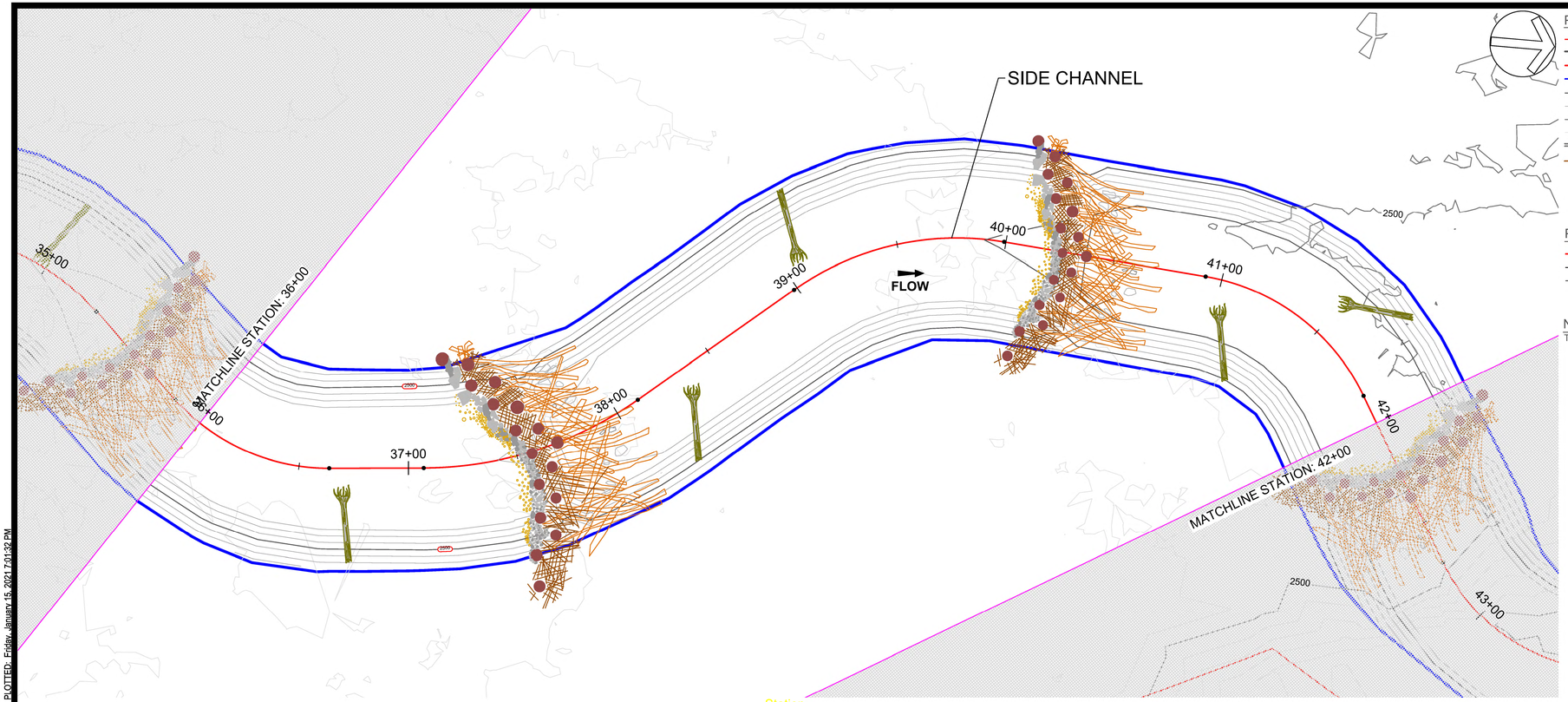
PROJECT OWNER:
MOJAVE DESERT LAND TRUST
MOJAVE DESERT LAND TRUST P.O. BOX 1544, 60124 29 PALMS HWY
JOSHUA TREE, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
11 OF 37

D:\PALISADES_RANCH_05643450.ENGINEERING\C3D\SHEETS\60.SIDE_CHANNEL.PP.DWG | BASITH.WEERASUNDARA | SAVED: Friday, January 15, 2021 6:34:08 PM | ACAD.CTB | PLOTTED: Friday, January 15, 2021 6:59:47 PM



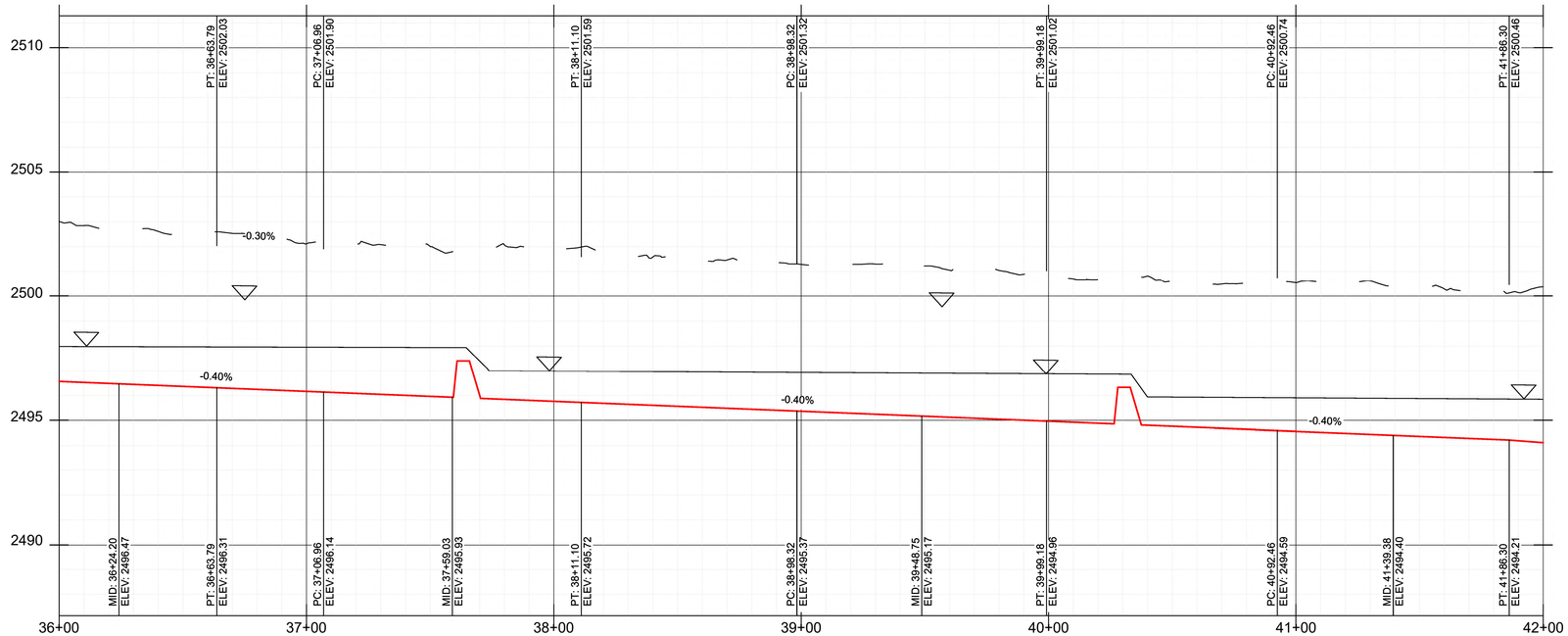
PLAN LEGEND

- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED SIDE CHANNEL TOP OF BANK
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

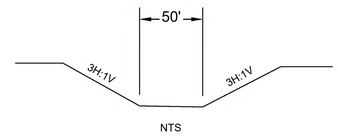
PROFILE LEGEND

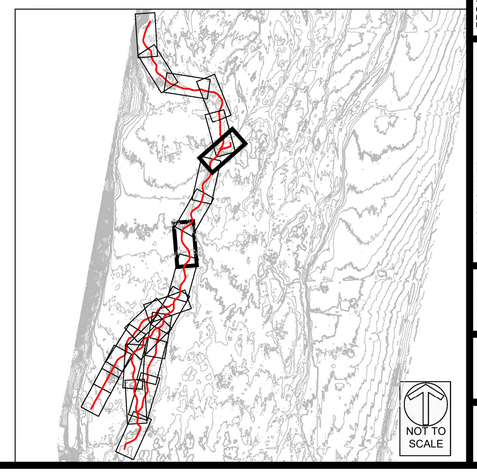
- PROPOSED THALWEG
- EXISTING GROUND
- WINTER BASE FLOW WATER SURFACE

NOTE:
THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.



Side Channel SCALE: HOR 1" =30'; VERT 1"= 3'





NOT TO SCALE

APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: JYZ	APPRV
REV	DESCRIPTION		
1	FOR REVIEW ONLY		LWF
2	60% RESTORATION PLAN		BS
3	60% REVISION		BS
XX	XX		XX
XX	XX		XX
XX	XX		XX
XX	XX		XX
XX	XX		XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION
SIDE CHANNEL
PLAN AND PROFILE - (7)

PROJECT ENGINEER:
SWCA
ENVIRONMENTAL & ENGINEERING
2996 107TH AVE
OAKLAND, CA 94605

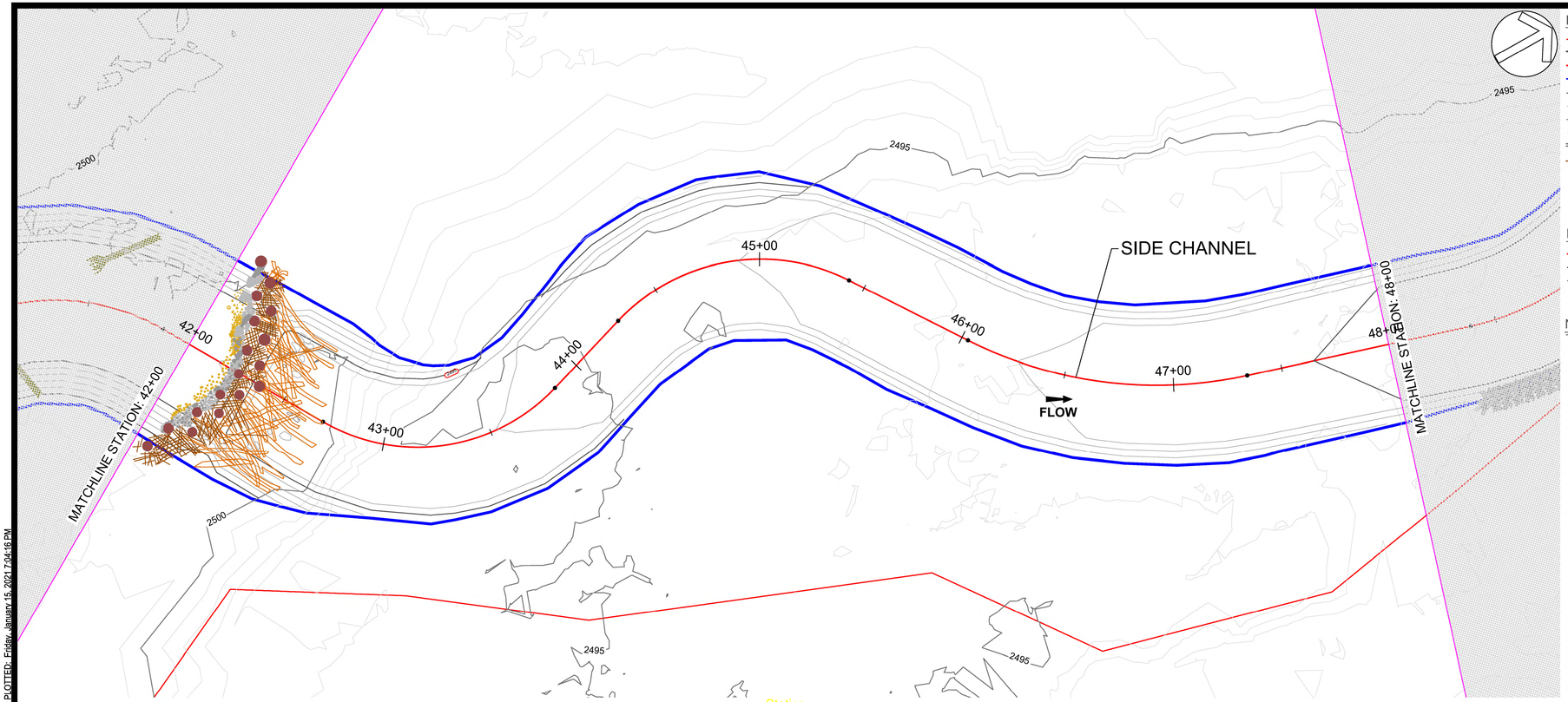
PROJECT OWNER:
MOJAVE DESERT LAND TRUST
MOJAVE DESERT LAND TRUST P.O. BOX 1544, 60124 29 PALMS HWY JOSHUA TREE, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
12 OF 37

D:\PALISADES_RANCH_0564345.0_ENGINEERING\CSD\SHEETS\60_SIDE_CHANNEL_PP.DWG | BASITH.WEERASUNDARA | SAVED: Friday, January 15, 2021 7:01:32 PM | ACAD.CTB | PLOTTED: Friday, January 15, 2021 7:01:32 PM



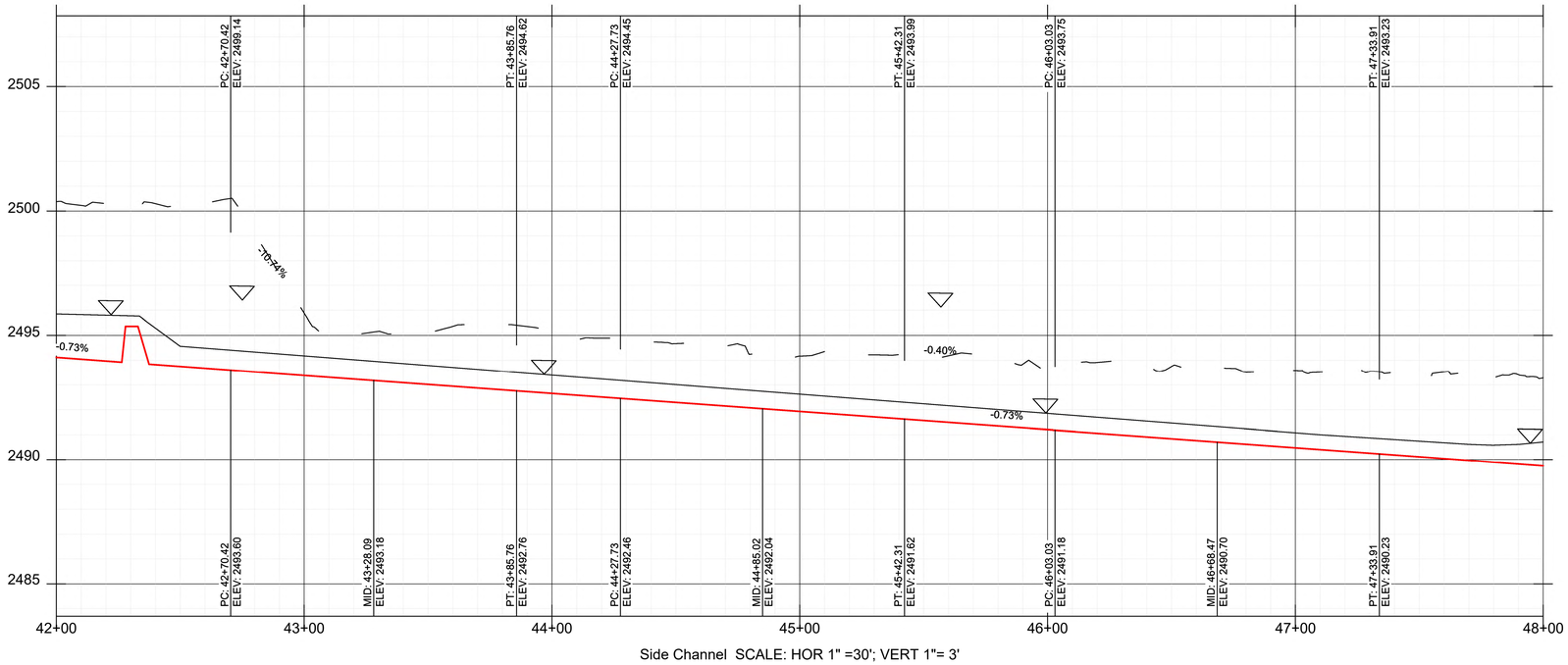
PLAN LEGEND

- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED SIDE CHANNEL TOP OF BANK
- PROPOSED MAJOR CONTOUR (2505)
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR (2500)
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

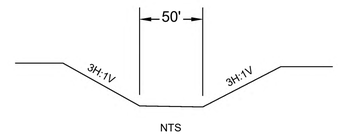
PROFILE LEGEND

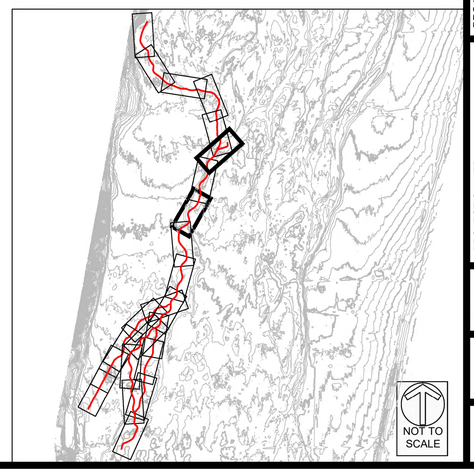
- PROPOSED THALWEG
- EXISTING GROUND
- WINTER BASE FLOW WATER SURFACE

NOTE:
THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.



Side Channel SCALE: HOR 1" =30'; VERT 1"= 3'





NOT TO SCALE

REV	APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: JVZ	APPRV
1		FOR REVIEW ONLY	LWF	
2		60% RESTORATION PLAN	BS	
3	XX	60% REVISION	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION
SIDE CHANNEL
PLAN AND PROFILE - (8)

PROJECT ENGINEER:
SWCA
ENVIRONMENTAL & ENGINEERING
2996 10TH AVE.
OAKLAND, CA 94605

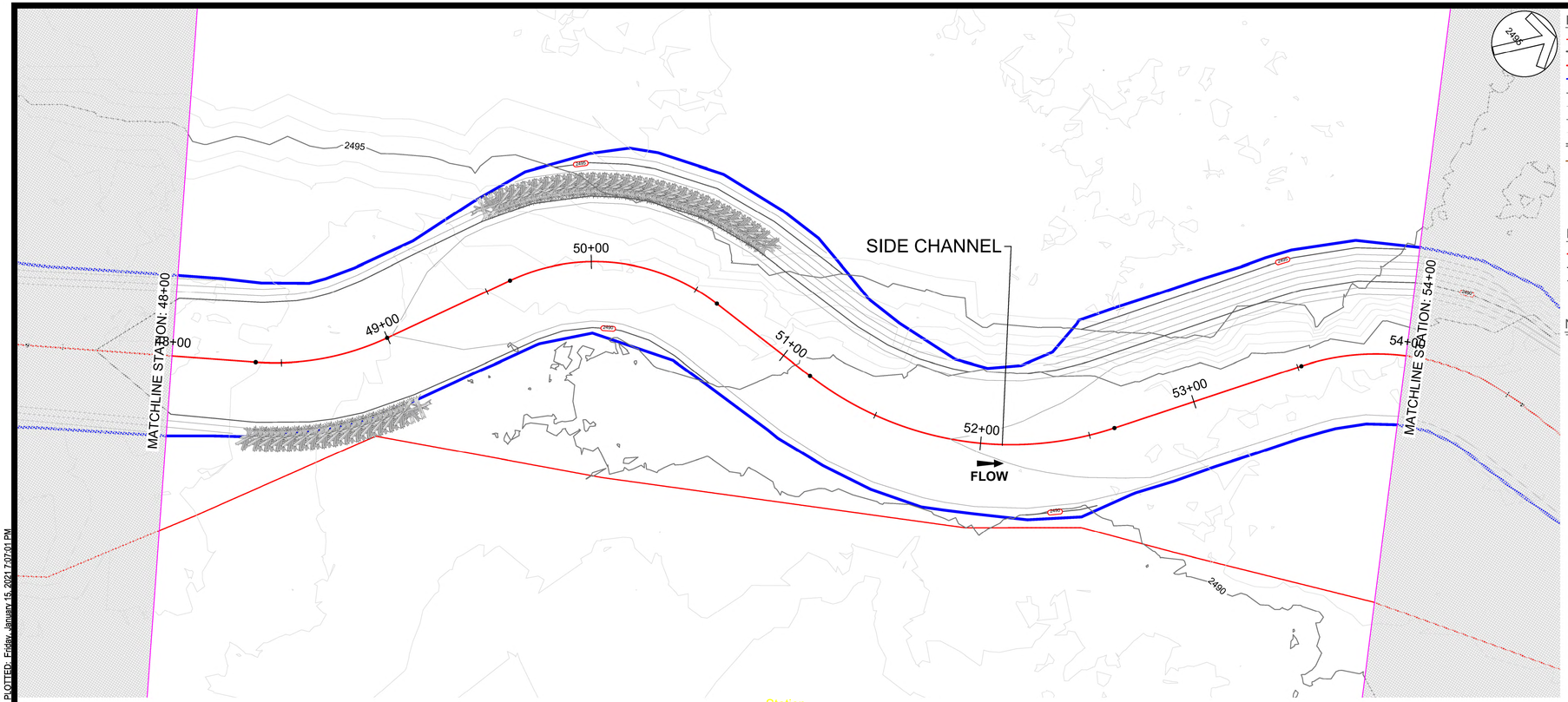
PROJECT OWNER:
MOJAVE DESERT LAND TRUST
MOJAVE DESERT LAND TRUST P.O. BOX 1544, 60124 29 PALMS HWY JOSHUA TREE, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
13 OF 37

D:\PALISADES_RANCH\056343\0.ENGINEERING\C3D\SHEETS\60.SIDE_CHANNEL_PP.DWG, I. BASITH.WEERASUNDARA, I. SAVED: Friday, January 15, 2021 6:34:08 PM, I. ACAD.CTB, I. I. PLOTTED: Friday, January 15, 2021 7:04:16 PM



PLAN LEGEND

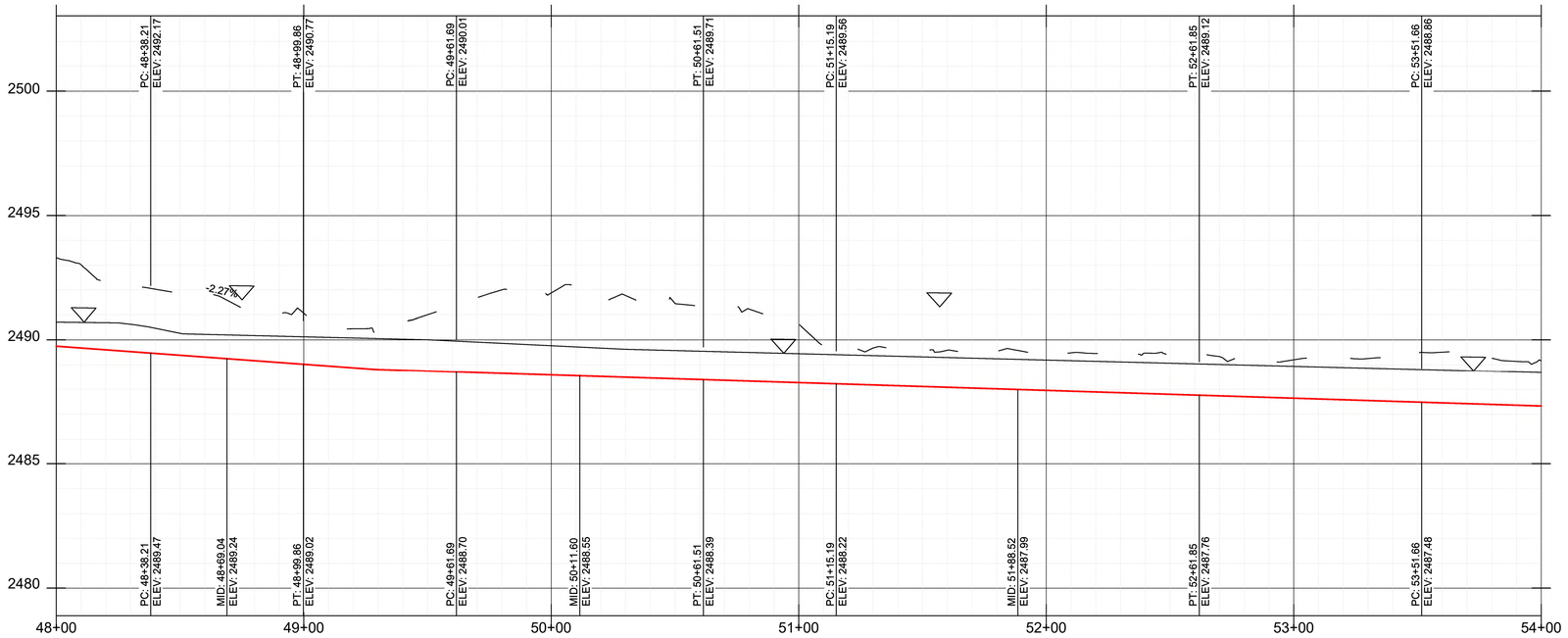
- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED SIDE CHANNEL TOP OF BANK
- PROPOSED MAJOR CONTOUR (2505)
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR (2500)
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

PROFILE LEGEND

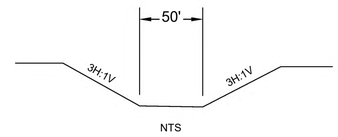
- PROPOSED THALWEG
- EXISTING GROUND
- WINTER BASE FLOW WATER SURFACE

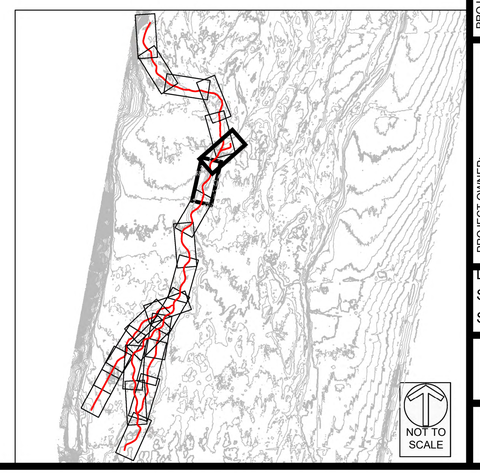
NOTE:
THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.

REV	DESCRIPTION	CHECKED BY: SM	DRAWN BY: JYZ	APPRV
1	FOR REVIEW ONLY	APPROVED BY: ---	LWF	
2	60% RESTORATION PLAN		BS	
3	60% REVISION		BS	
XX	XX		XX	
XX	XX		XX	
XX	XX		XX	
XX	XX		XX	
XX	XX		XX	



Side Channel SCALE: HOR 1" =30'; VERT 1"= 3'





NOT TO SCALE

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION
SIDE CHANNEL
PLAN AND PROFILE - (9)

PROJECT ENGINEER:
SWCA ENVIRONMENTAL & ENGINEERING
2996 10TH AVE.
OAKLAND, CA 94605

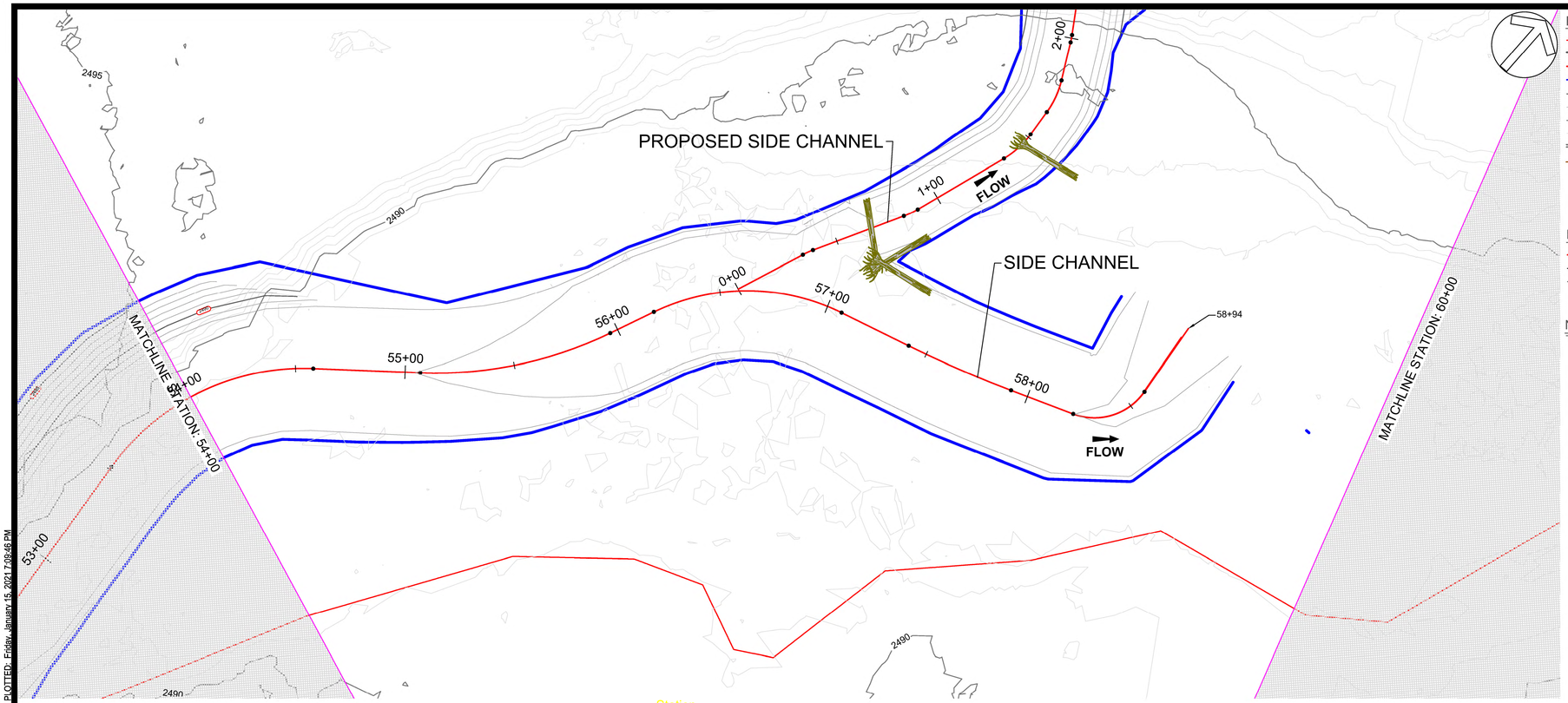
PROJECT OWNER:
MOJAVE DESERT LAND TRUST P.O. BOX 1544, 60124 29 PALMS HWY
JOSHUA TREE, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
14 OF 37

D:\PALISADES_RANCH\0563435.0 ENGINEERING\C3D\SHEETS\60.SIDE CHANNEL PP.DWG | BASITH.WEERASUNDARA | SAVED: Friday, January 15, 2021 6:34:08 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 7:07:01 PM



PLAN LEGEND

- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED SIDE CHANNEL TOP OF BANK
- 2505 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 2500 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

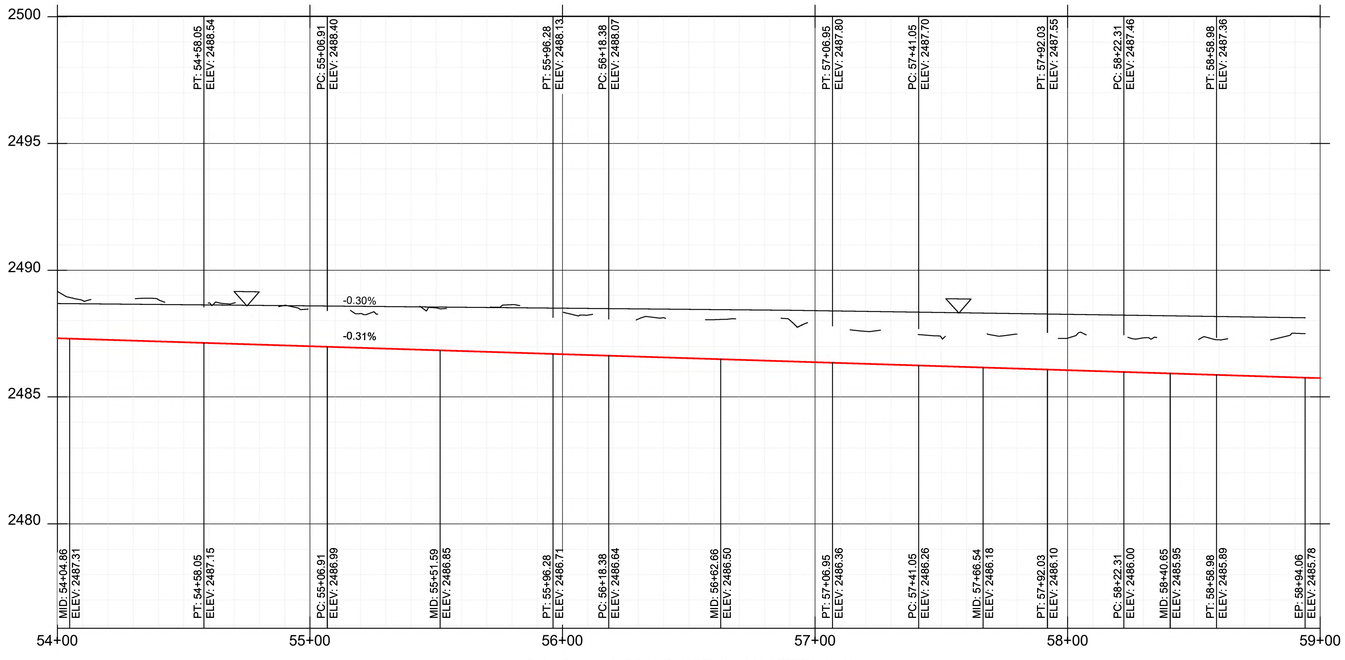
PROFILE LEGEND

- PROPOSED THALWEG
- EXISTING GROUND
- WINTER BASE FLOW WATER SURFACE

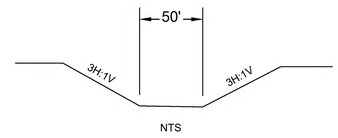
NOTE:
THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.

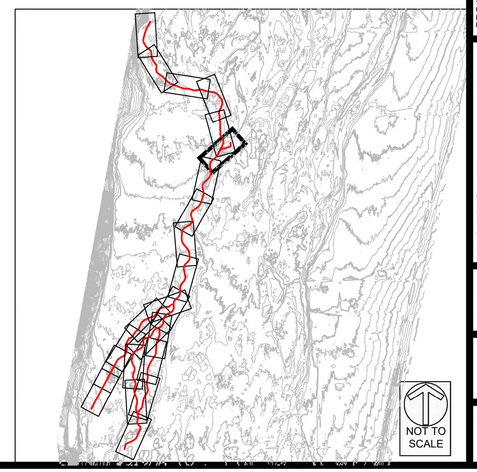
REV	DESCRIPTION	CHECKED BY: SM	DRAWN BY: JYZ	APPRV
1	FOR REVIEW ONLY			LWF
2	60% RESTORATION PLAN			BS
3	60% REVISION			BS
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX

APPROVED BY: ----



Side Channel SCALE: HOR 1" =30'; VERT 1"= 3'





NOT TO SCALE

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION

SIDE CHANNEL
PLAN AND PROFILE - (10)

PROJECT ENGINEER:
SWCA ENVIRONMENTAL & ENGINEERING
2996 107TH AVE
OAKLAND, CA 94605

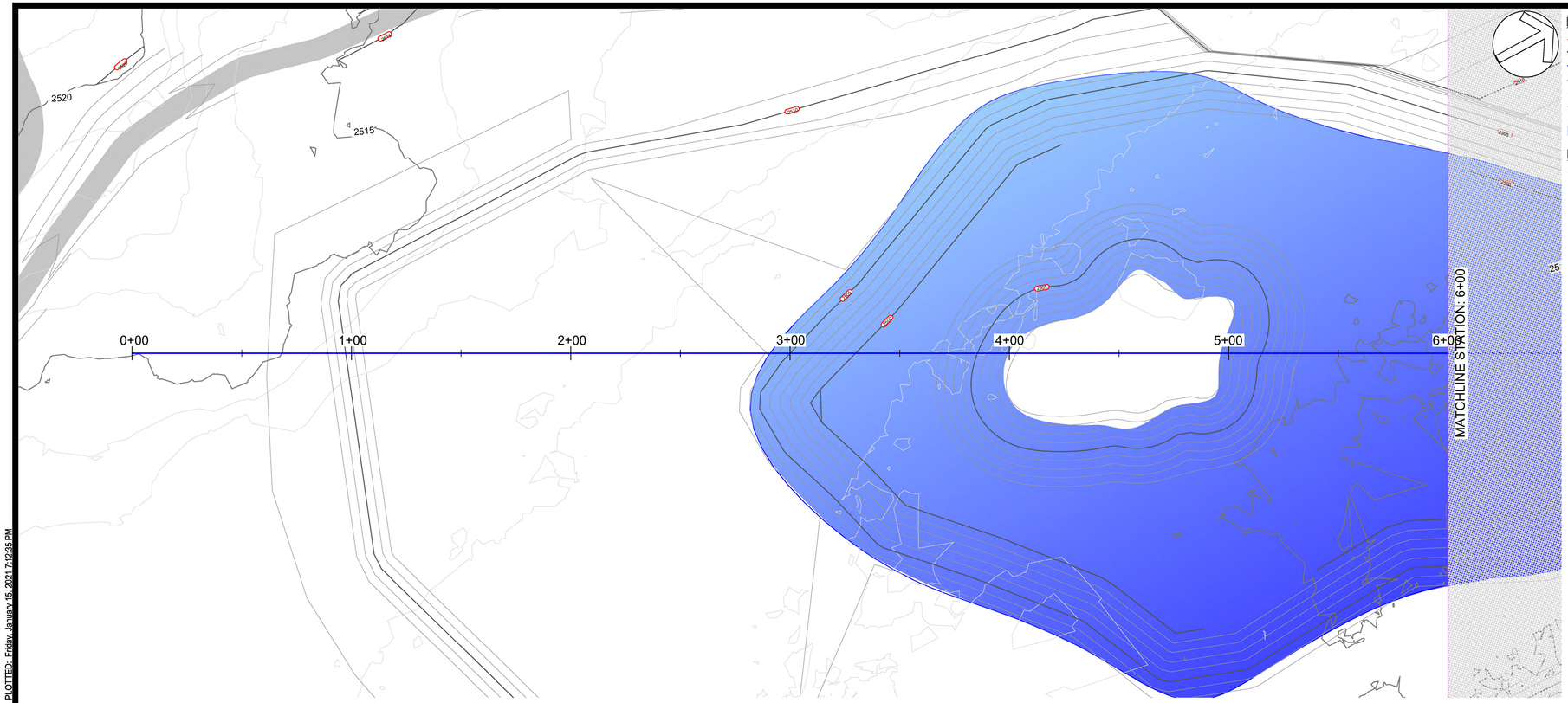
PROJECT OWNER:
MOJAVE DESERT LAND TRUST
MOJAVE DESERT LAND TRUST P.O. BOX 1544, 60124 29 PALMS HWY
JOSHUA TREE, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
15 OF 37

D:\PALISADES_RANCH\056343\0.ENGINEERING\C3D\SHEETS\60.SIDE_CHANNEL.PP.DWG | BASITH.WEERASUNDARA | SAVED: Friday, January 15, 2021 6:34:08 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 7:09:45 PM

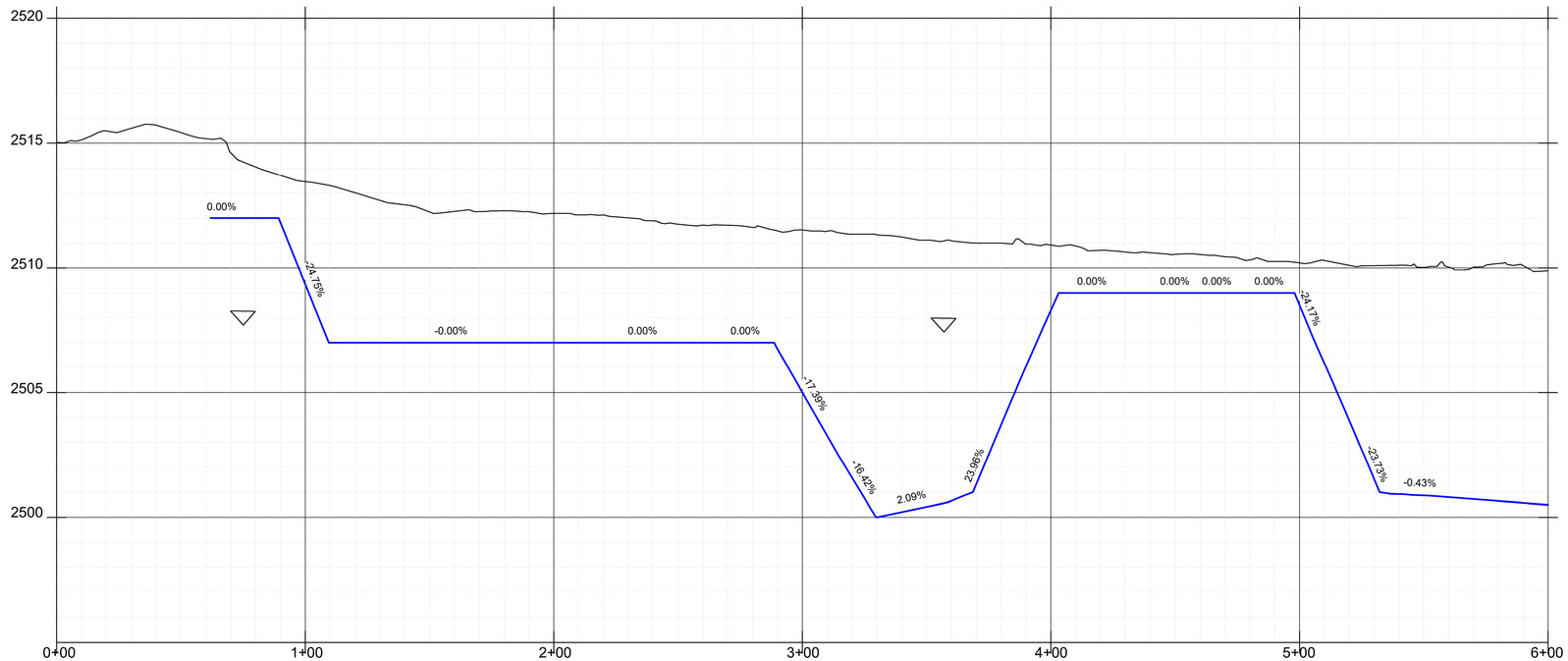


PLAN LEGEND

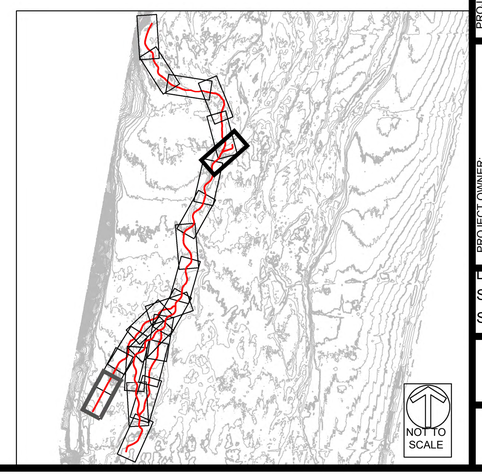
- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED POND CENTERLINE
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- POND SURFACE

PROFILE LEGEND

- PROPOSED POND PROFILE
- EXISTING GROUND



Pond_Profile SCALE: HOR 1" =30'; VERT 1"= 3'



NOT TO SCALE

APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: JYZ	APPRV
REV	DESCRIPTION		
1	FOR REVIEW ONLY		LWF
2	60% RESTORATION PLAN		BS
3	60% REVISION		BS
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION
POND TO WEST BRANCH SIDE CHANNEL
PLAN AND PROFILE - (1)

PROJECT ENGINEER:

SWCA
ENVIRONMENTAL & ENGINEERING
2996 107TH AVE
OAKLAND, CA 94605

PROJECT OWNER:

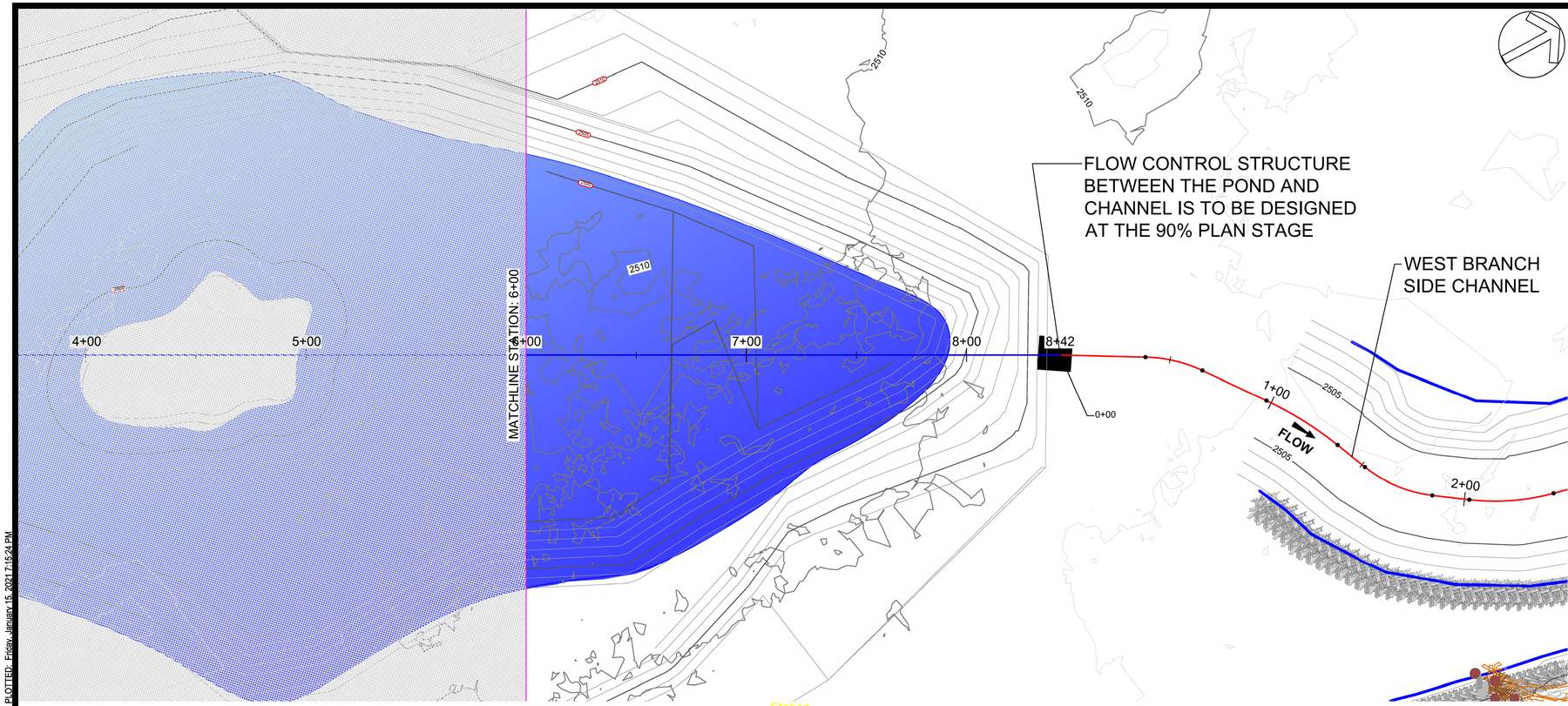
MOJAVE DESERT LAND TRUST
MOJAVE DESERT LAND TRUST P.O. BOX 1544, 60124 29 PALMS HWY JOSHUA TREE, CA 92252

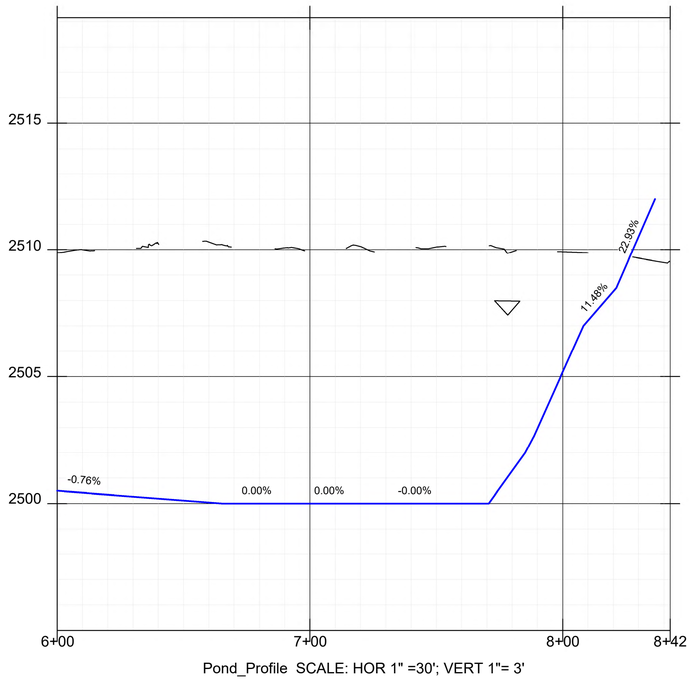
DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

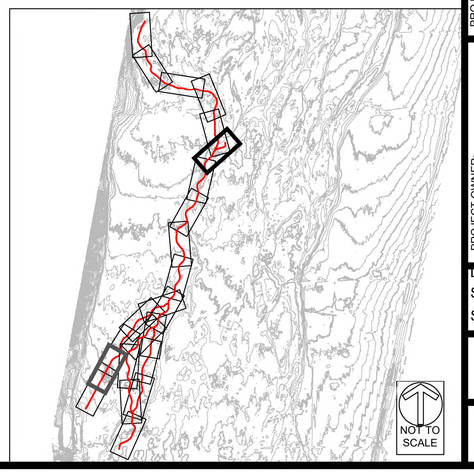
0 30 60
SCALE IN FEET

SHEET NUMBER
16 OF 37

D:\PALISADES RANCH 05634\5.0 ENGINEERING\C3D\SHEETS\60 SIDE CHANNEL PP.DWG | BASITH.WEERASUNDARA | SAVED: Friday, January 15, 2021 6:34:08 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 7:12:35 PM







REV	DESCRIPTION	CHECKED BY: SM	DRAWN BY: JYZ
APPROVED BY: ----			APPRV
1	FOR REVIEW ONLY		LWF
2	60% RESTORATION PLAN		BS
3	60% REVISION	XX	BS
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION
POND TO WEST BRANCH SIDE CHANNEL
PLAN AND PROFILE - (2)

PROJECT ENGINEER:
SWCA
ENVIRONMENTAL & ENGINEERING
2996 107TH AVE.
OAKLAND, CA 94605

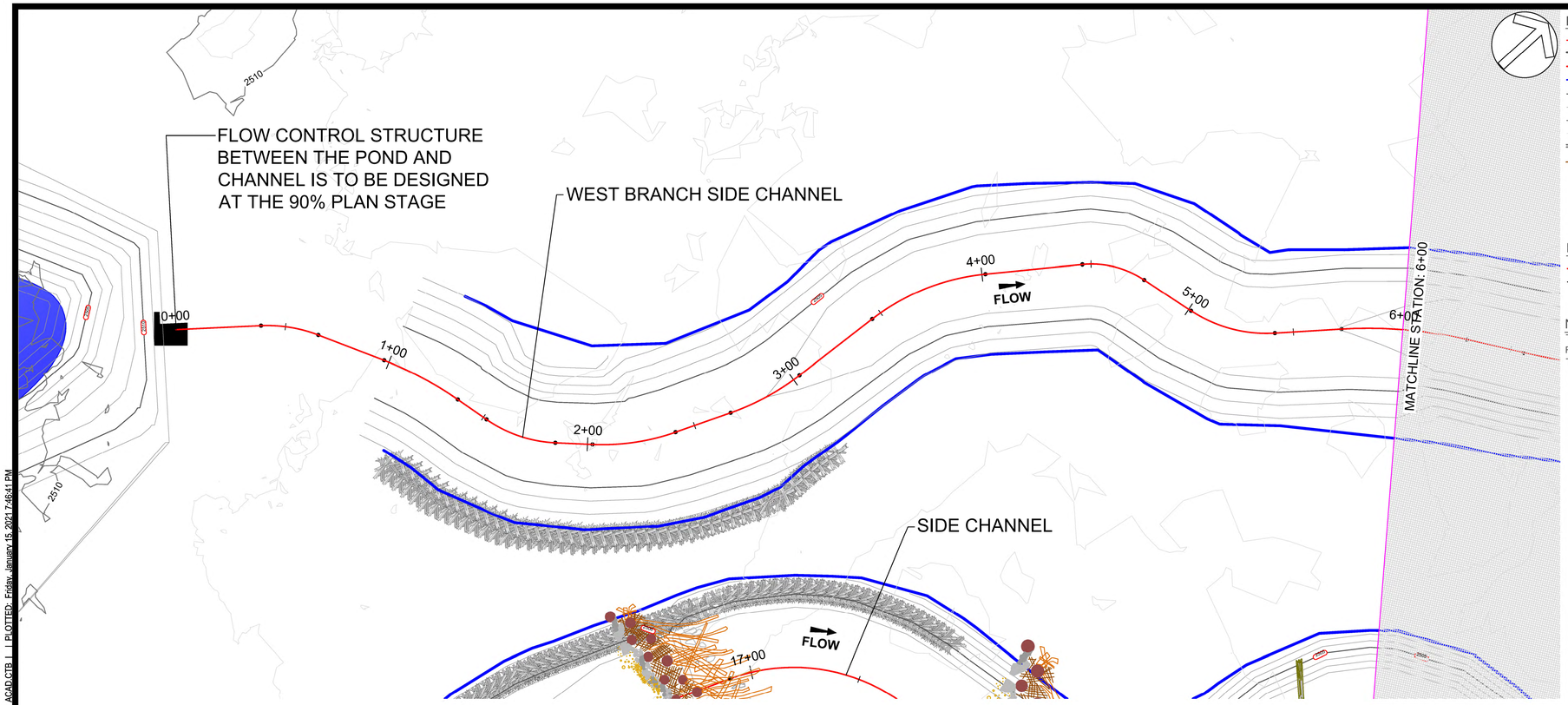
PROJECT OWNER:
MOJAVE DESERT LAND TRUST
MOJAVE DESERT LAND TRUST P.O. BOX 1544, 60124 29 PALMS HWY
JOSHUA TREE, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
17 OF 37

D:\PALISADES RANCH 05643450 ENGINEERING\C3D\SHEETS\60 SIDE CHANNEL PP.DWG | BASITH.WEERASUNDARA | SAVED: Friday, January 15, 2021 6:34:08 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 7:15:24 PM



PLAN LEGEND

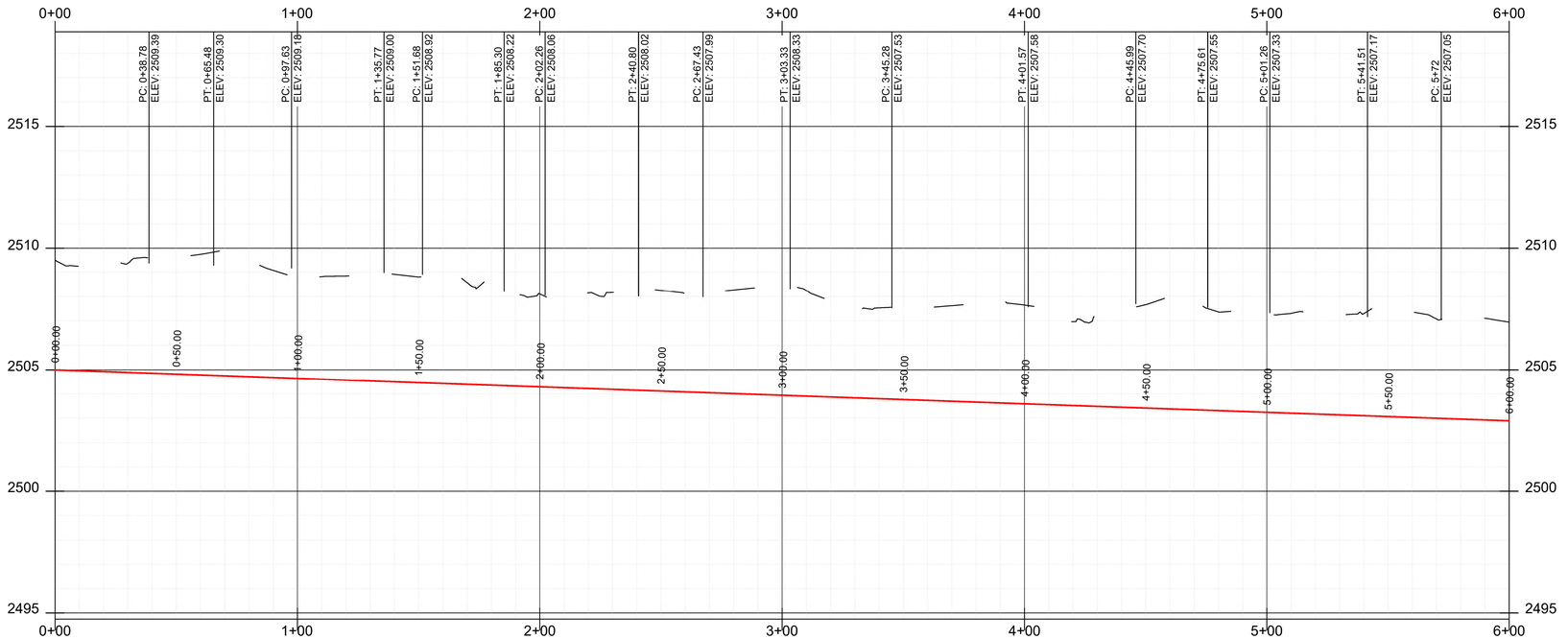
- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED WEST BRANCH SIDE CHANNEL TOP OF BANK
- 2505 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 2500 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

PROFILE LEGEND

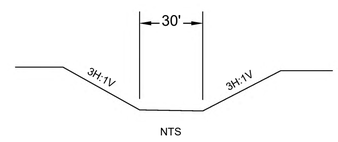
- PROPOSED WEST BRANCH SIDE CHANNEL THALWEG
- EXISTING GROUND
- WATER SURFACE

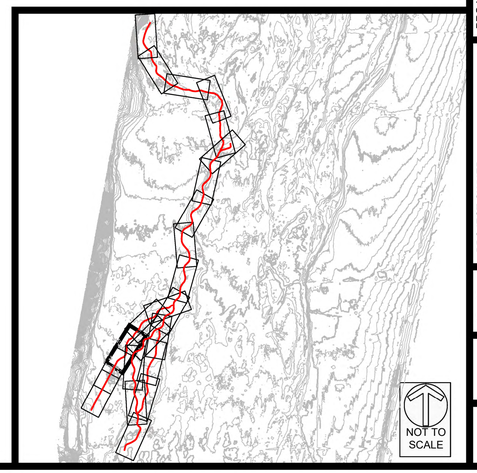
NOTES:

THE WEST BRANCH SIDE CHANNEL IS NOT INUNDATED DURING WINTER BASE FLOW.
THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.



West Branch Side Channel SCALE: HOR 1" =30'; VERT 1"= 3'





REV	APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: JYZ
		DESCRIPTION	APPRV
1		FOR REVIEW ONLY	LWF
2		60% RESTORATION PLAN	BS
3		60% REVISION	BS
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION

WEST BRANCH SIDE CHANNEL
PLAN AND PROFILE - (1)

PROJECT ENGINEER:
SWCA ENVIRONMENTAL & ENGINEERING
1575 Delucchi Lane, Ste 220
Reno, NV 89502

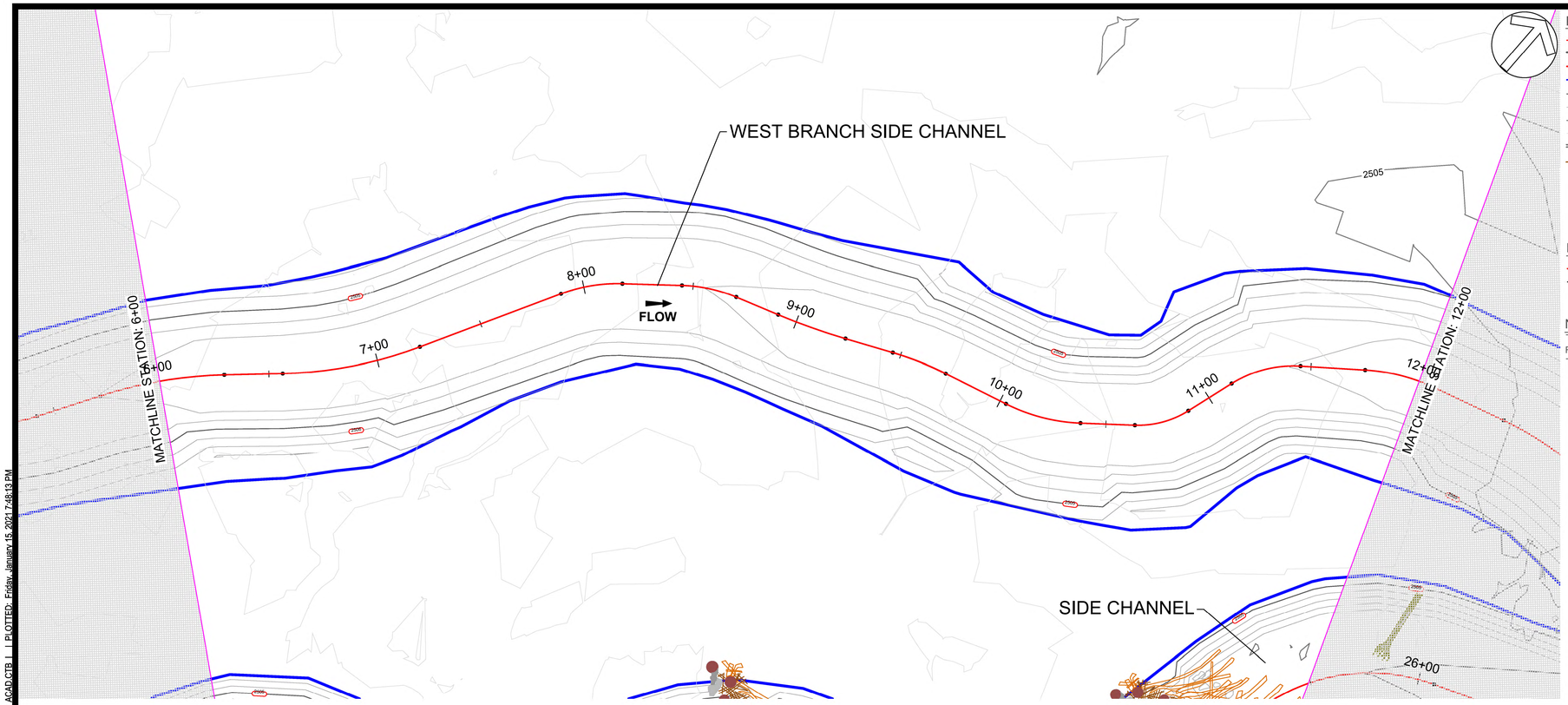
PROJECT OWNER:
MOJAVE DESERT LAND TRUST
Mojave Desert Land Trust P.O. Box 1544, 60124 29 Palms Hwy Joshua Tree, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
18 OF 37

D:\PALISADES RANCH\05643\05.0 ENGINEERING\C3D\SHEETS\60 WEST BRANCH SIDE CHANNEL PP.DWG | BASUTH.WEERASUNDARA | LSAVED: Friday, January 15, 2021 7:46:41 PM | LPLOTTED: Friday, January 15, 2021 7:46:48 PM | ACAD.CTB | |



PLAN LEGEND

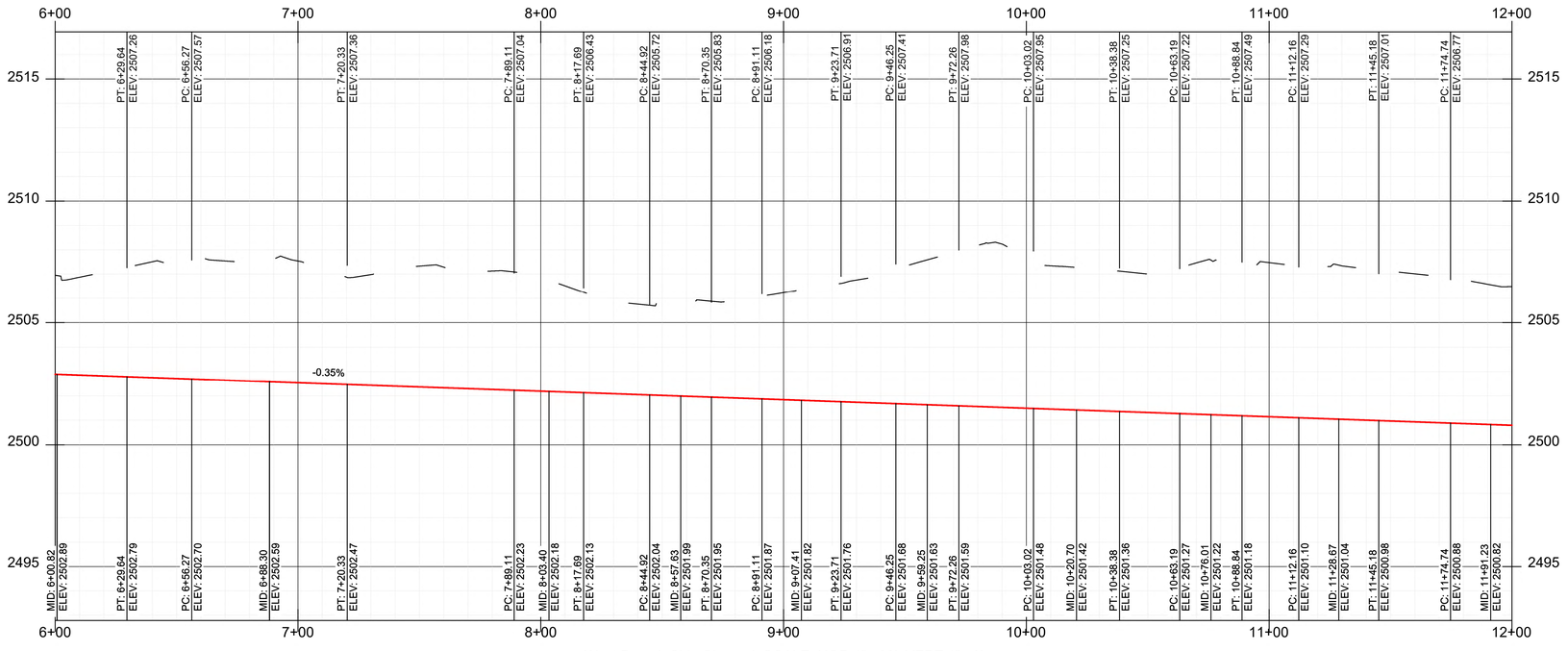
- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED WEST BRANCH SIDE CHANNEL TOP OF BANK
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

PROFILE LEGEND

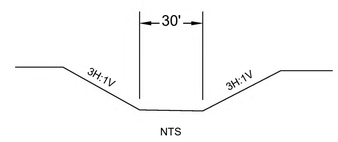
- PROPOSED WEST BRANCH SIDE CHANNEL THALWEG
- EXISTING GROUND
- WATER SURFACE

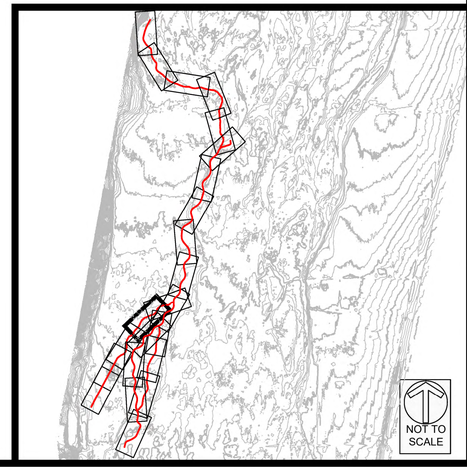
NOTES:

THE WEST BRANCH SIDE CHANNEL IS NOT INUNDATED DURING WINTER BASE FLOW.
THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.



West Branch Side Channel SCALE: HOR 1" =30'; VERT 1"= 3'





NOT TO SCALE

REV	APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: JYZ	APPRV
1		FOR REVIEW ONLY	LWF	
2		60% RESTORATION PLAN	BS	
3		60% REVISION	BS	
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION

WEST BRANCH SIDE CHANNEL
PLAN AND PROFILE - (2)

PROJECT ENGINEER:
SWCA ENVIRONMENTAL & ENGINEERING
1575 Delucchi Lane, Ste 220
Reno, NV 89502

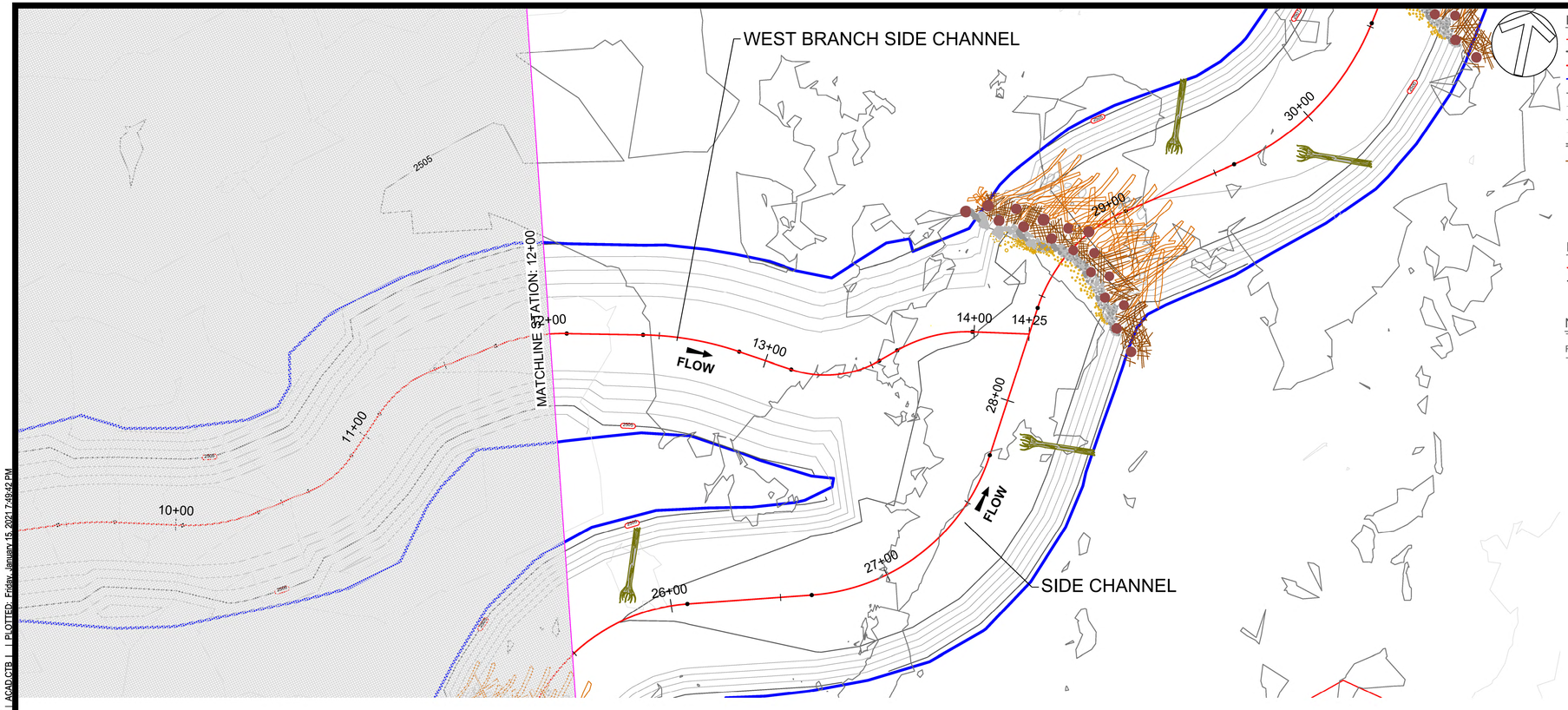
PROJECT OWNER:
MOJAVE DESERT LAND TRUST
Mojave Desert Land Trust P.O. Box 1544, 60124 29 Palms Hwy Joshua Tree, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
19 OF 37

D:\PALISADES RANCH\05643\05.0 ENGINEERING\C3D\SHEETS\60\WEST BRANCH SIDE CHANNEL PP.DWG | BASUTH.WEERASUNDARA | SAVED: Friday, January 15, 2021 7:48:13 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 7:48:13 PM



PLAN LEGEND

- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED WEST BRANCH SIDE CHANNEL TOP OF BANK
- 2505 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 2500 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

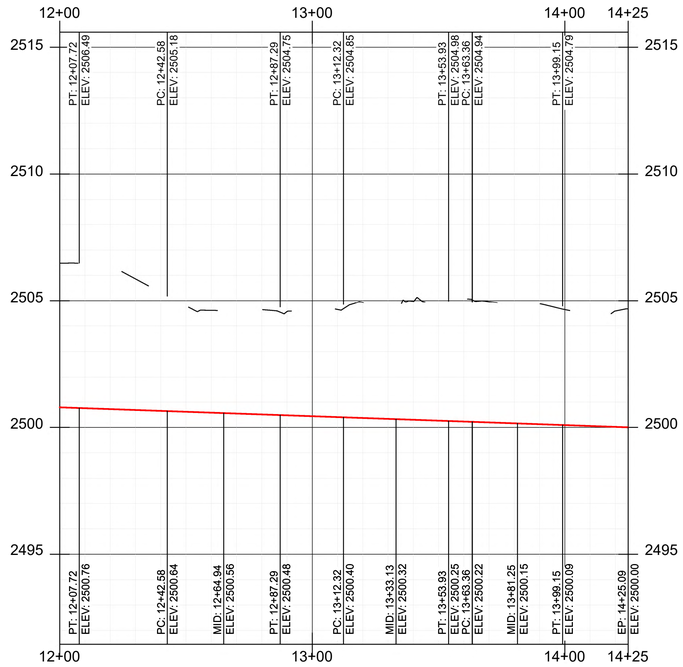
PROFILE LEGEND

- PROPOSED WEST BRANCH SIDE CHANNEL THALWEG
- EXISTING GROUND
- WATER SURFACE

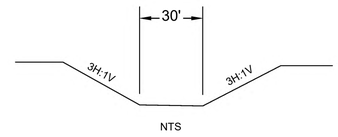
NOTES:

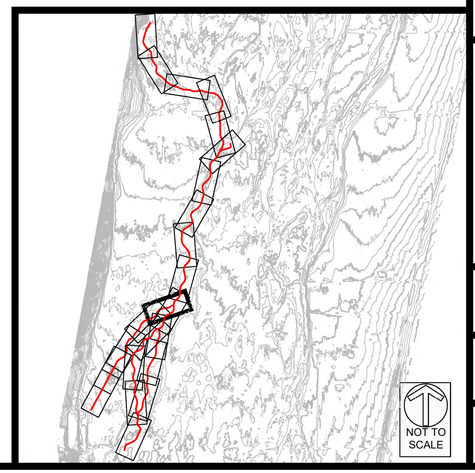
THE WEST BRANCH SIDE CHANNEL IS NOT INUNDATED DURING WINTER BASE FLOW.

THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.



West Branch Side Channel SCALE: HOR 1" =30'; VERT 1"= 3'





NOT TO SCALE

REV	APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: JYZ	APPRV
1		FOR REVIEW ONLY	LWF	
2		60% RESTORATION PLAN	BS	
3		60% REVISION	XX	XX
XX		XX	XX	XX
XX		XX	XX	XX
XX		XX	XX	XX
XX		XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER

SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN

NOT FOR CONSTRUCTION

WEST BRANCH SIDE CHANNEL

PLAN AND PROFILE - (3)

PROJECT ENGINEER:

SWCA ENVIRONMENTAL & ENGINEERING

1575 Delucchi Lane, Ste 220
Reno, NV 89502

PROJECT OWNER:

MOJAVE DESERT LAND TRUST

Mojave Desert Land Trust P.O. Box 1544, 60124 29 Palms Hwy Joshua Tree, CA 92252

DATE: 01/15/2021

SCALE (34"X22"): 1" = 30'

SCALE (17"X11"): 1" = 60'

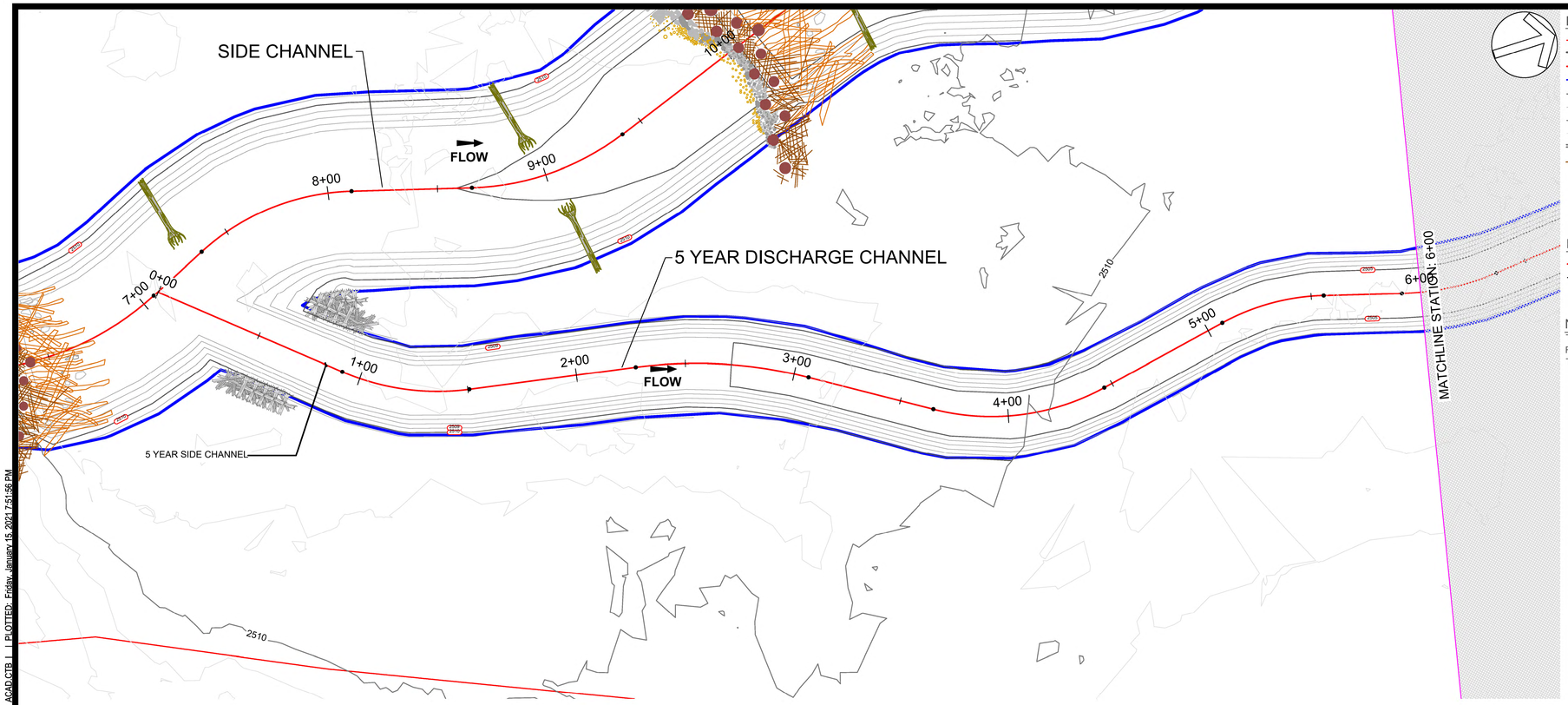
0 30 60

SCALE IN FEET

SHEET NUMBER

20 OF 37

D:\PALISADES RANCH\05643\05.0 ENGINEERING\C3D\SHEETS\60 WEST BRANCH SIDE CHANNEL PP.DWG | BASITH.WEERASUNDARA | SAVED: Friday, January 15, 2021 7:45:48 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 7:49:42 PM



PLAN LEGEND

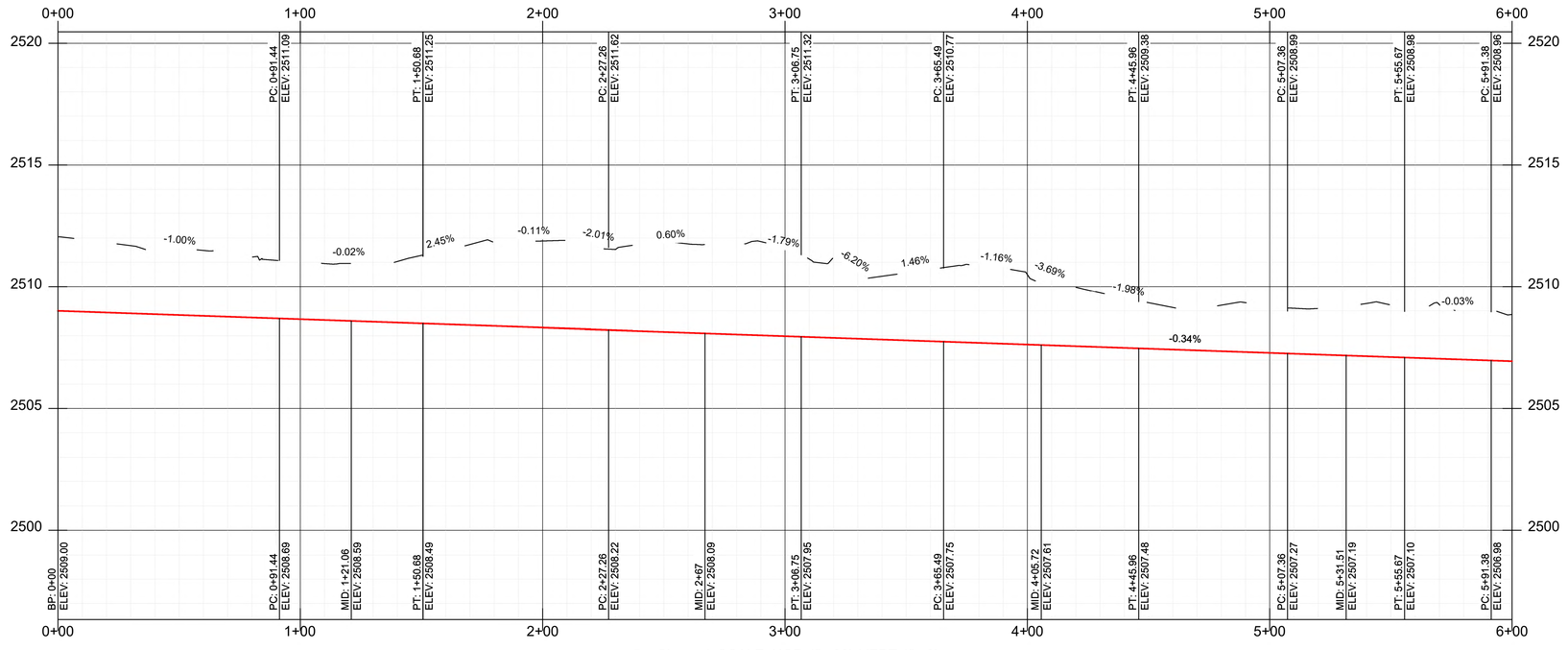
- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED 5 YEAR DISCHARGE CHANNEL TOP OF BANK
- 2505 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 2500 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

PROFILE LEGEND

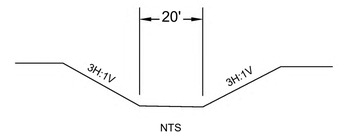
- PROPOSED 5 YEAR DISCHARGE CHANNEL THALWEG
- EXISTING GROUND

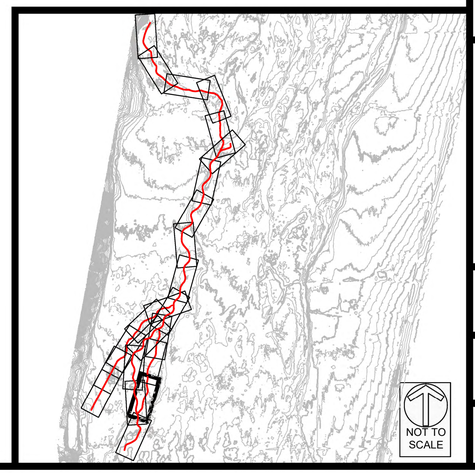
NOTES:

THE 5 YEAR DISCHARGE CHANNEL IS NOT INUNDATED DURING WINTER BASE FLOW.
THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.



5yr Channel SCALE: HOR 1" =30'; VERT 1"= 3'





NOT TO SCALE

APPROVED BY: ---	CHECKED BY: SM	DRAWN BY: JYZ

REV	DESCRIPTION	APPRV
1	FOR REVIEW ONLY	LWF
2	60% RESTORATION PLAN	BS
3	60% REVISION	BS
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN

NOT FOR CONSTRUCTION

5 YEAR DISCHARGE CHANNEL PLAN AND PROFILE - (1)

PROJECT ENGINEER:

SWCA ENVIRONMENTAL & ENGINEERING
1575 Delucchi Lane, Ste 220
Reno, NV 89502

PROJECT OWNER:

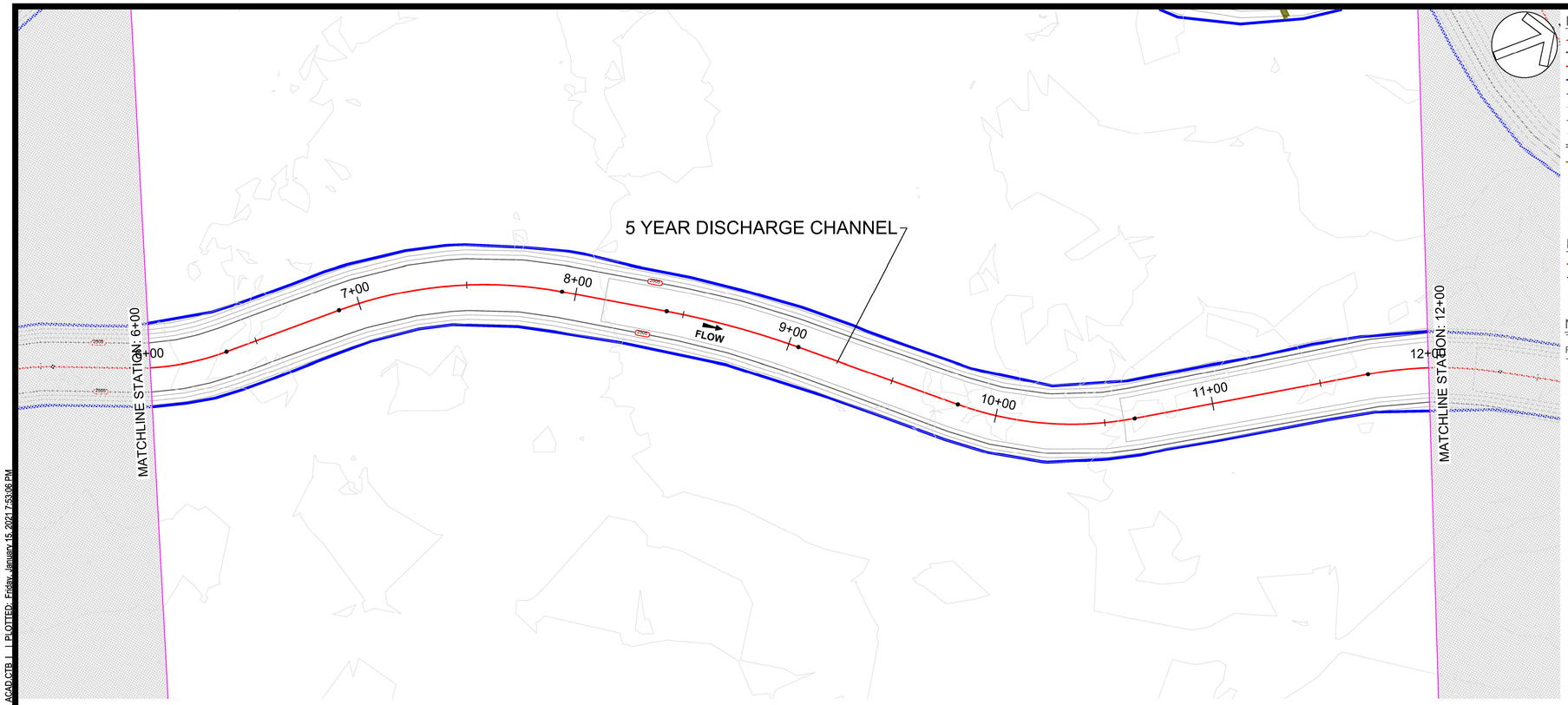
MOJAVE DESERT LAND TRUST
Mojave Desert Land Trust P.O. Box 1544, 60124 29 Palms Hwy Joshua Tree, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
21 OF 37

D:\PALISADES RANCH\05643\05.0 ENGINEERING\C3D\SHEETS\60 WEST BRANCH SIDE CHANNEL PP.DWG | BASUTH.WEERASUNDARA | SAVED: Friday, January 15, 2021 7:45:48 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 7:51:56 PM



PLAN LEGEND

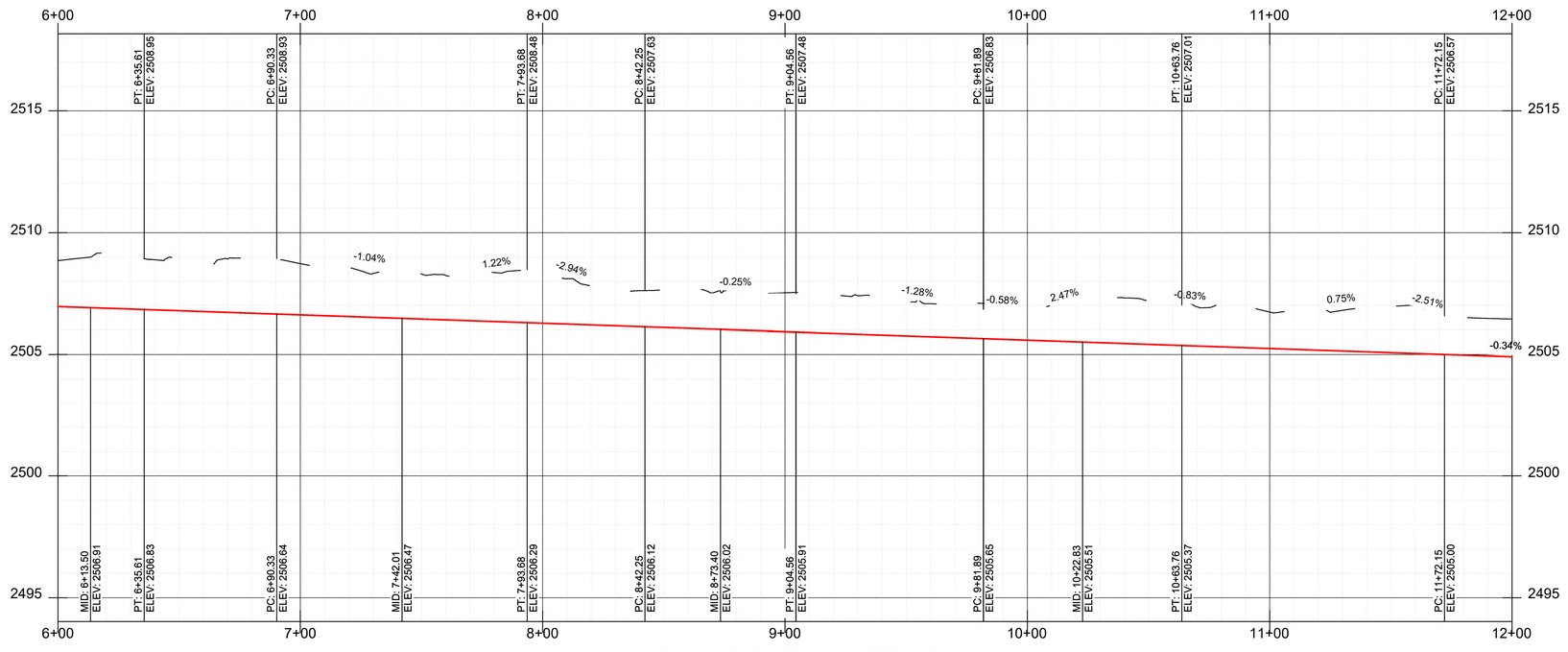
- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED 5 YEAR DISCHARGE CHANNEL TOP OF BANK
- 2505 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 2500 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

PROFILE LEGEND

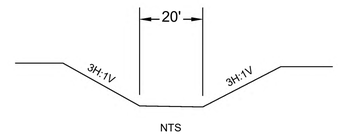
- PROPOSED 5 YEAR DISCHARGE CHANNEL THALWEG
- EXISTING GROUND

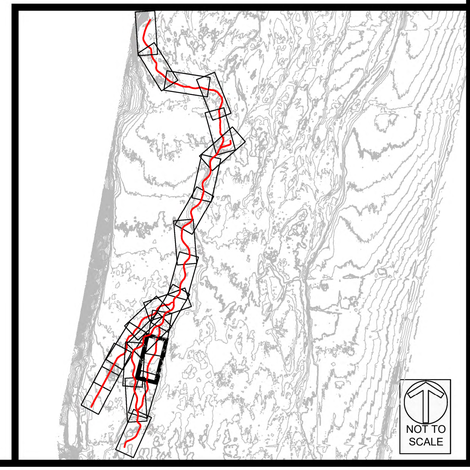
NOTES:

THE 5 YEAR DISCHARGE CHANNEL IS NOT INUNDATED DURING WINTER BASE FLOW.
THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.



5yr Channel SCALE: HOR 1" =30'; VERT 1"= 3'





NOT TO SCALE

REV	APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: JYZ	APPRV
1		FOR REVIEW ONLY	LWF	
2		60% RESTORATION PLAN	BS	
3	XX	60% REVISION	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION

5 YEAR DISCHARGE CHANNEL
PLAN AND PROFILE - (2)

PROJECT ENGINEER:
SWCA
ENVIRONMENTAL & ENGINEERING
1575 Delucchi Lane, Ste 220
Reno, NV 89502

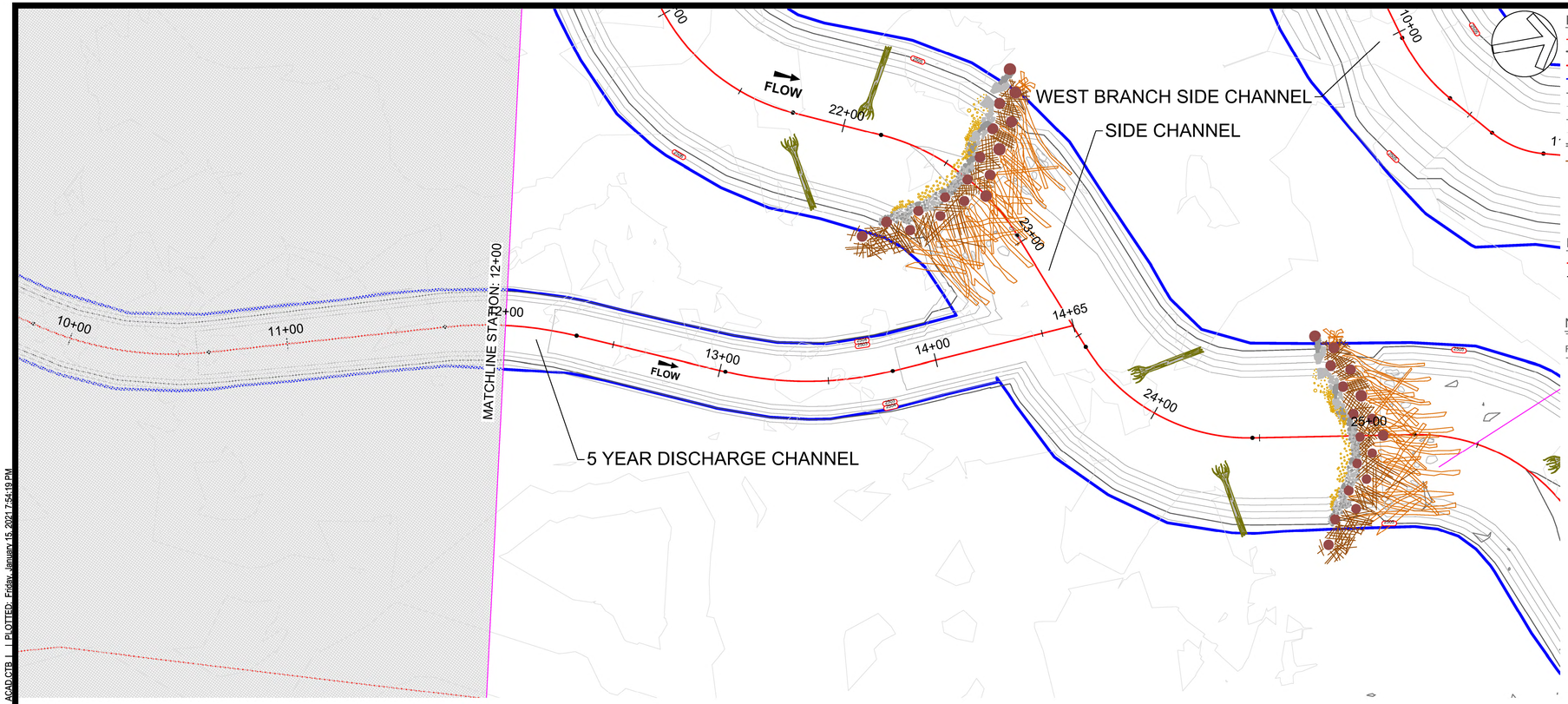
PROJECT OWNER:
MOJAVE DESERT LAND TRUST
Mojave Desert Land Trust P.O. Box 1544, 60124 29 Palms Hwy Joshua Tree, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
22 OF 37

D:\PALISADES RANCH\05643\05.0 ENGINEERING\C3D\SHEETS\60 WEST BRANCH SIDE CHANNEL PP.DWG | BASUTH.WEERASUNDARA | SAVED: Friday, January 15, 2021 7:53:06 PM
D:\PALISADES RANCH\05643\05.0 ENGINEERING\C3D\SHEETS\60 WEST BRANCH SIDE CHANNEL PP.DWG | BASUTH.WEERASUNDARA | PLOTTED: Friday, January 15, 2021 7:45:48 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 7:53:06 PM



PLAN LEGEND

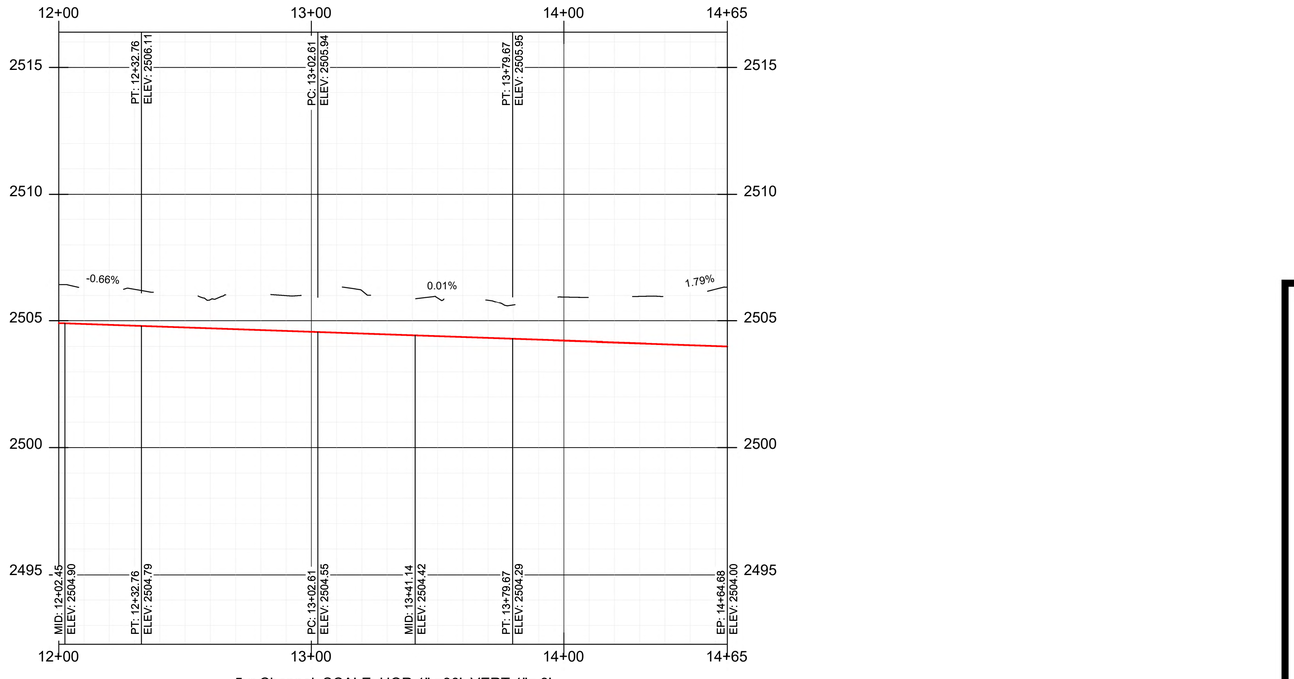
- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED 5 YEAR DISCHARGE CHANNEL TOP OF BANK
- PROPOSED MAJOR CONTOUR (2505)
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR (2500)
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

PROFILE LEGEND

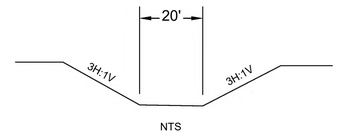
- PROPOSED 5 YEAR DISCHARGE CHANNEL THALWEG
- EXISTING GROUND

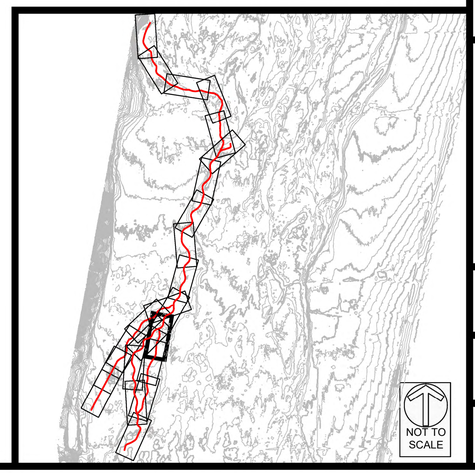
NOTES:

THE 5 YEAR DISCHARGE CHANNEL IS NOT INUNDATED DURING WINTER BASE FLOW.
THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.



5yr Channel SCALE: HOR 1" =30'; VERT 1"= 3'





NOT TO SCALE

APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: JYZ
REV	DESCRIPTION	APPRV
1	FOR REVIEW ONLY	LWF
2	60% RESTORATION PLAN	BS
3	60% REVISION	BS
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION

5 YEAR DISCHARGE CHANNEL
PLAN AND PROFILE - (3)

PROJECT ENGINEER:
SWCA ENVIRONMENTAL & ENGINEERING
1575 Delucchi Lane, Ste 220
Reno, NV 89502

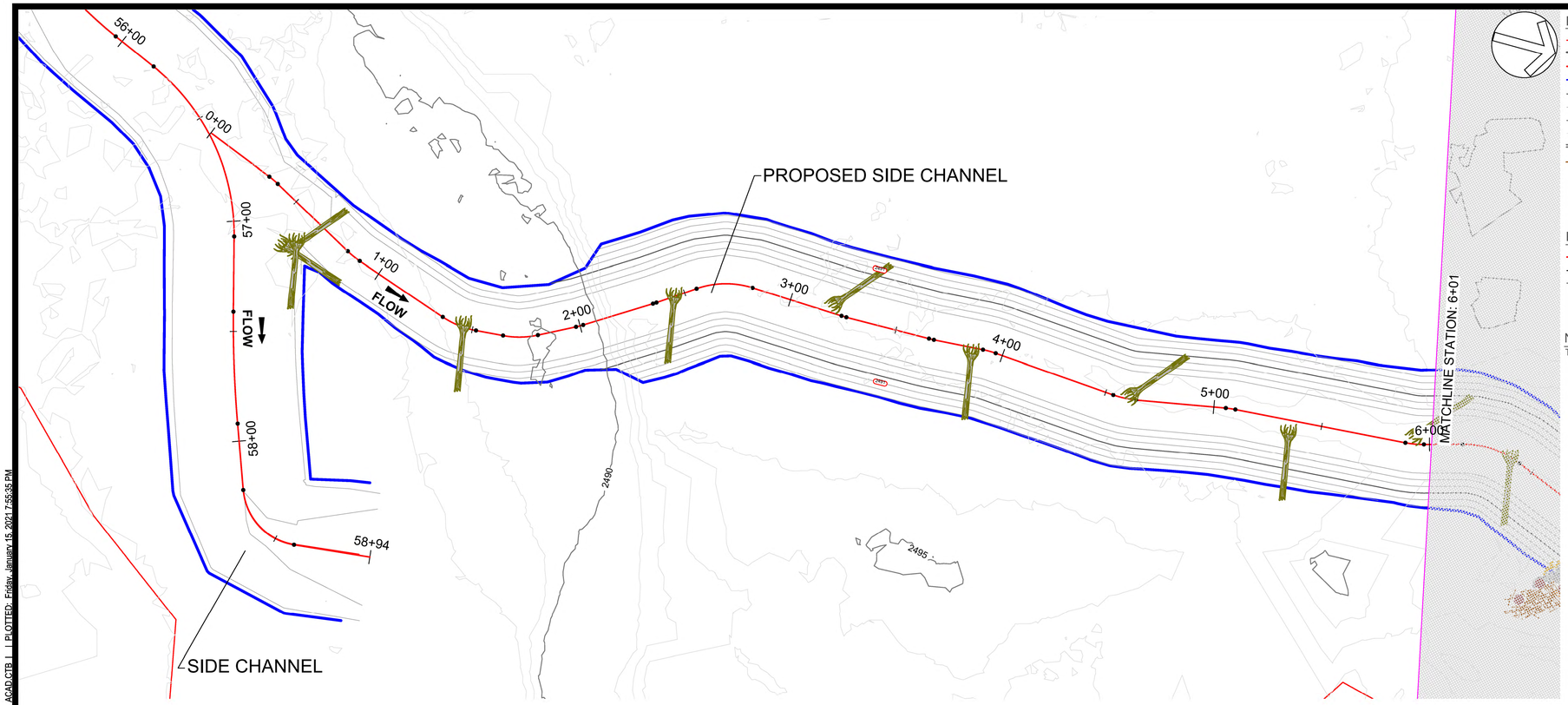
PROJECT OWNER:
MOJAVE DESERT LAND TRUST
Mojave Desert Land Trust P.O. Box 1544, 60124 29 Palms Hwy Joshua Tree, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
23 OF 37

D:\PALISADES RANCH\05643A\5.0 ENGINEERING\C3D\SHEETS\60 WEST BRANCH SIDE CHANNEL PP.DWG | BASITH.WEERASUNDARA | SAVED: Friday, January 15, 2021 7:54:19 PM | ACAD CFB | PLOTTED: Friday, January 15, 2021 7:45:48 PM



PLAN LEGEND

- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED SIDE CHANNEL TOP OF BANK
- 2505 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 2500 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

PROFILE LEGEND

- PROPOSED SIDE CHANNEL THALWEG
- EXISTING GROUND
- WINTER BASE FLOW WATER SURFACE

NOTE:
THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.

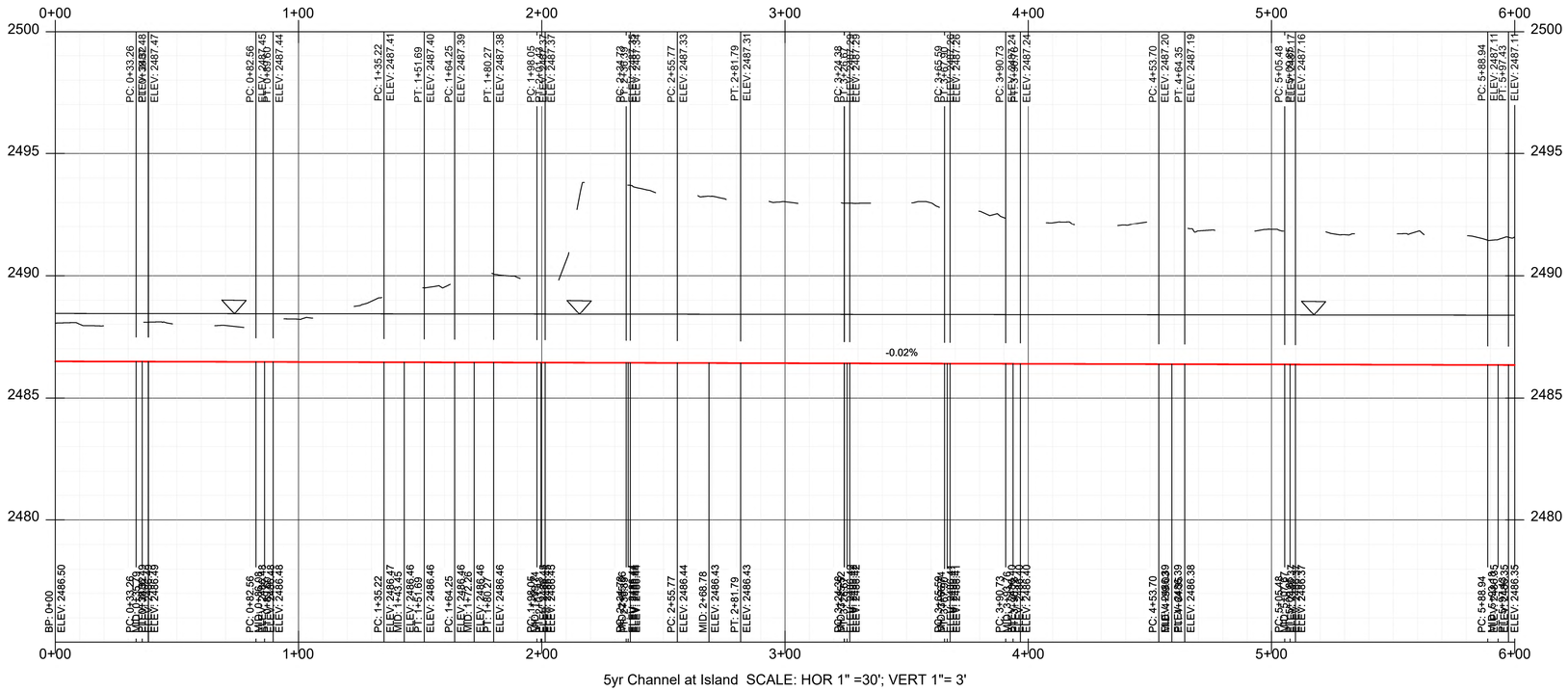
REV	APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: JYZ	APPRV
1		FOR REVIEW ONLY	LWF	
2		60% RESTORATION PLAN	BS	
3		60% REVISION	BS	
XX		XX	XX	XX
XX		XX	XX	XX
XX		XX	XX	XX
XX		XX	XX	XX
XX		XX	XX	XX

PALISADE RANCH RESTORATION

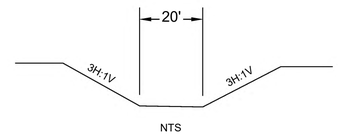
MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

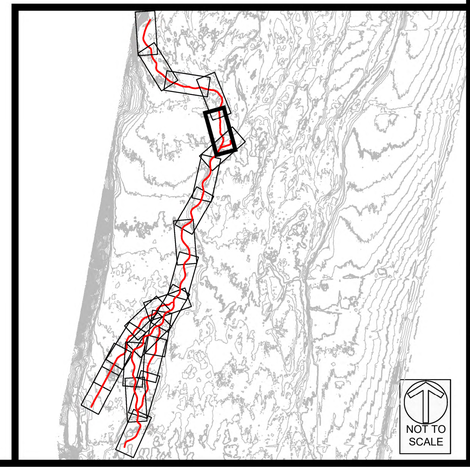
60% RESTORATION PLAN
NOT FOR CONSTRUCTION

PROPOSED SIDE CHANNEL
PLAN AND PROFILE - (1)



5yr Channel at Island SCALE: HOR 1" =30'; VERT 1"= 3'





NOT TO SCALE

PROJECT ENGINEER:

SWCA
ENVIRONMENTAL & ENGINEERING
1575 Delucchi Lane, Ste 220
Reno, NV 89502

PROJECT OWNER:

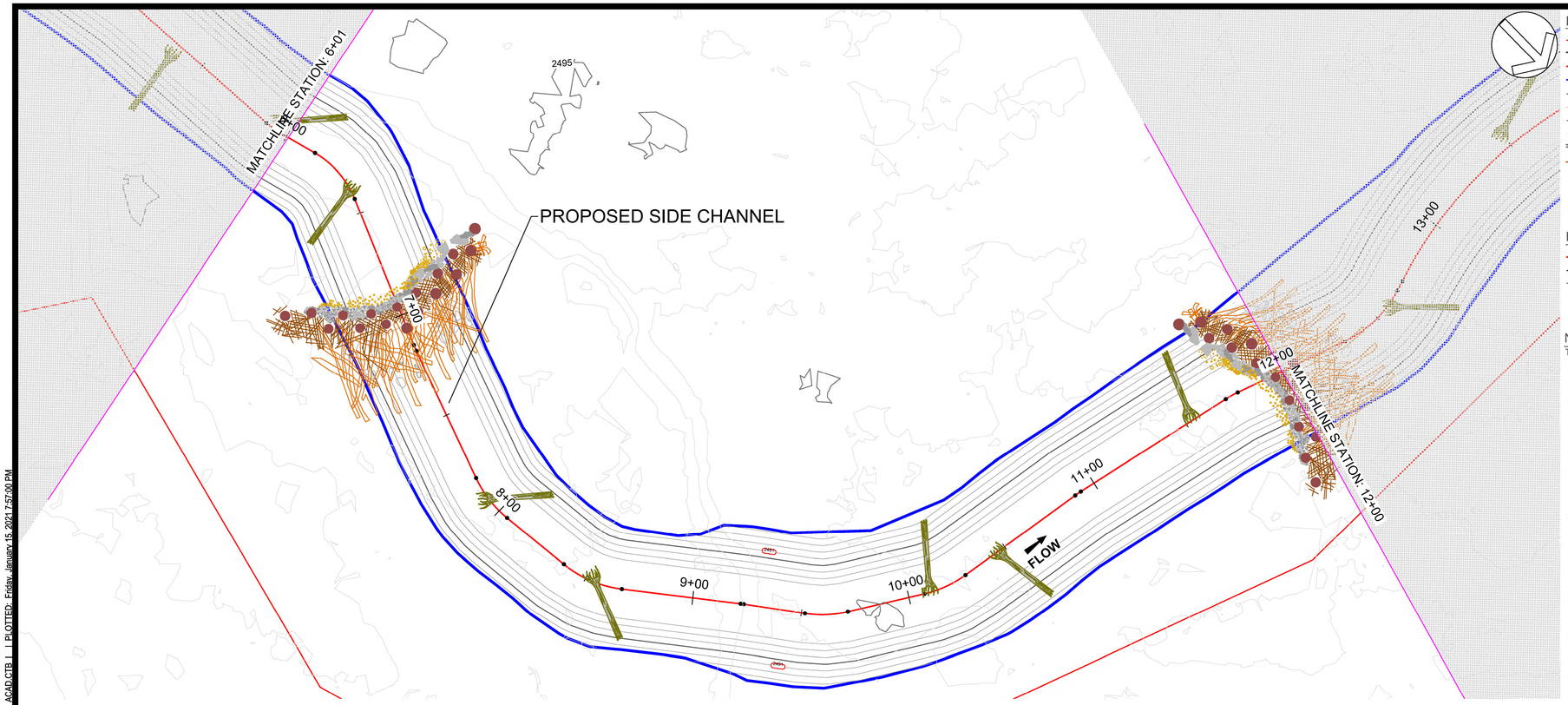
MOJAVE DESERT LAND TRUST
Mojave Desert Land Trust P.O.
Box 1544, 60124 29 Palms Hwy
Joshua Tree, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
24 OF 37

D:\PALISADES RANCH\05643\05.0 ENGINEERING\C3D\SHEETS\60 WEST BRANCH_SIDE CHANNEL PP.DWG | BASUTH.WEERASUNDARA | LSAVED: Friday, January 15, 2021 7:45:48 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 7:55:35 PM



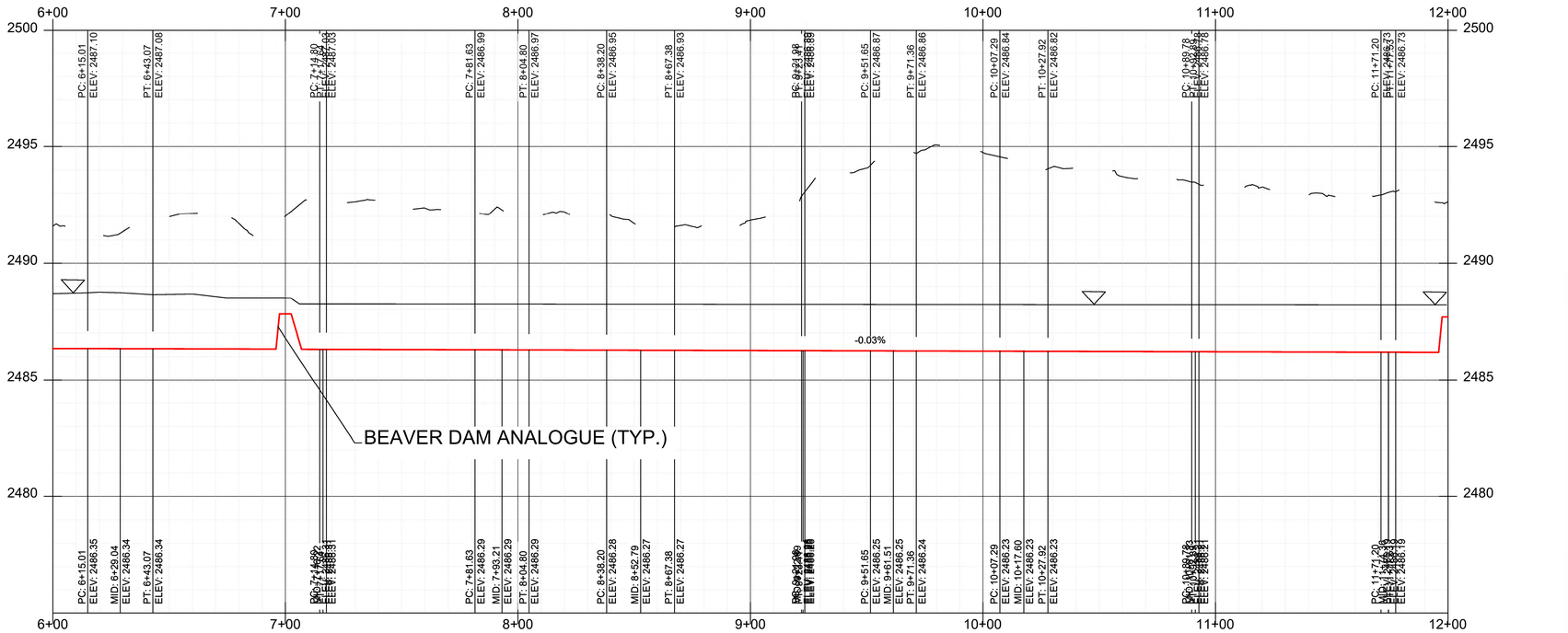
PLAN LEGEND

- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED SIDE CHANNEL TOP OF BANK
- 2505 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 2500 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

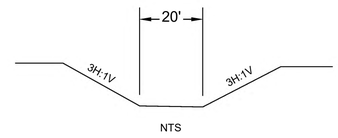
PROFILE LEGEND

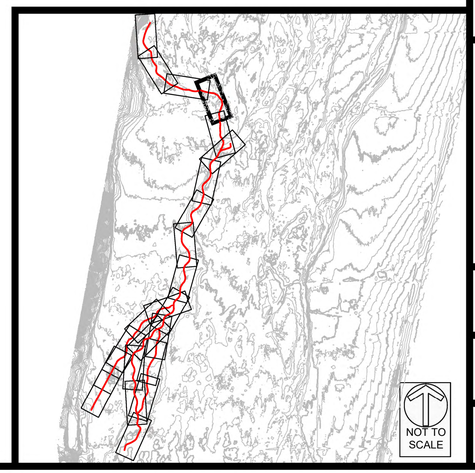
- PROPOSED SIDE CHANNEL THALWEG
- EXISTING GROUND
- WINTER BASE FLOW WATER SURFACE

NOTE:
THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.



5yr Channel at Island SCALE: HOR 1" =30'; VERT 1"= 3'





NOT TO SCALE

REV	APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: JYZ	APPRV
1		FOR REVIEW ONLY		LWF
2		60% RESTORATION PLAN		BS
3		60% REVISION		BS
XX		XX		XX
XX		XX		XX
XX		XX		XX
XX		XX		XX
XX		XX		XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION

PROPOSED SIDE CHANNEL PLAN AND PROFILE - (2)

PROJECT ENGINEER:
SWCA ENVIRONMENTAL & ENGINEERING
1575 Delucchi Lane, Ste 220
Reno, NV 89502

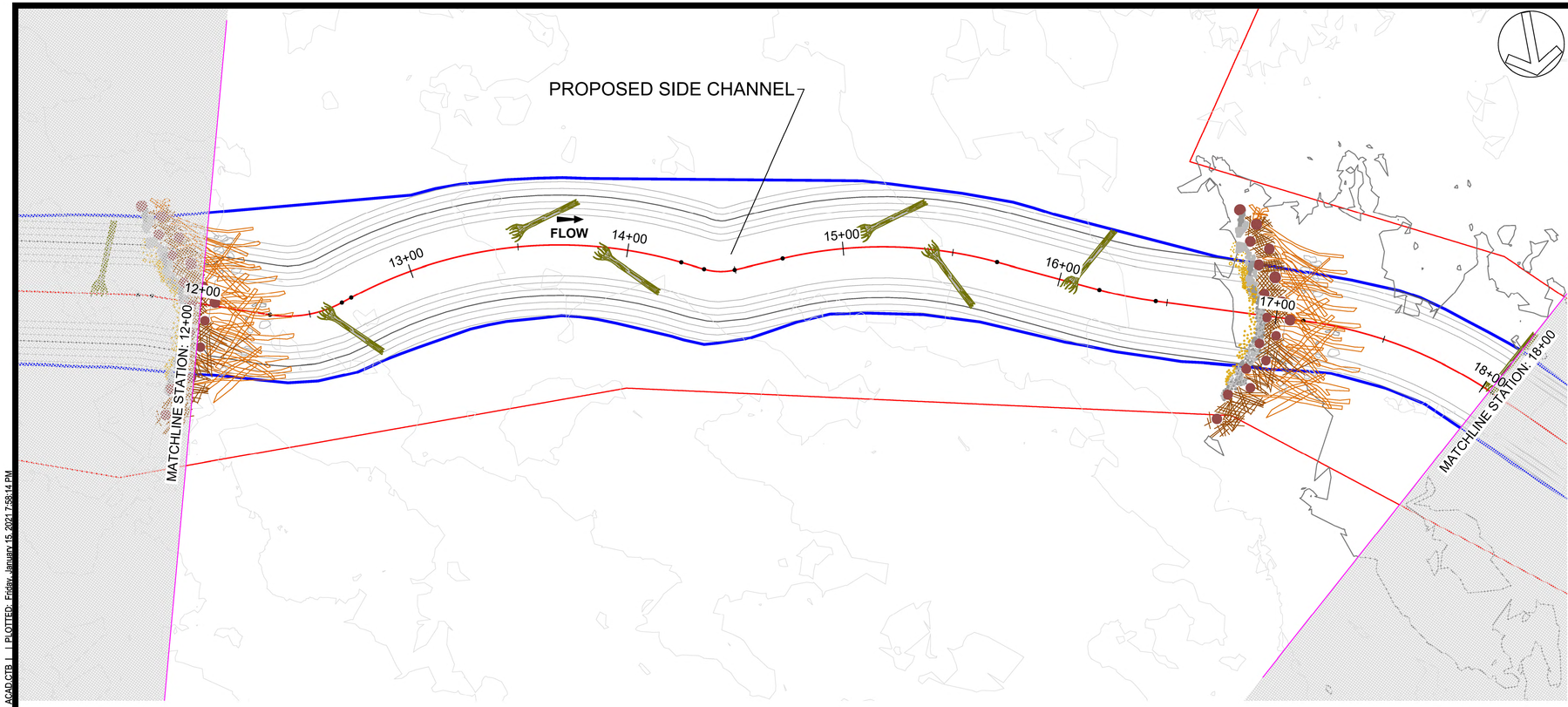
PROJECT OWNER:
MOJAVE DESERT LAND TRUST
Mojave Desert Land Trust P.O. Box 1544, 60124 29 Palms Hwy Joshua Tree, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
25 OF 37

D:\PALISADES RANCH\05643\05.0 ENGINEERING\C3D\SHEETS\60 WEST BRANCH SIDE CHANNEL PP.DWG | BASUTH.WEERASUNDARA | LSAVED: Friday, January 15, 2021 7:45:48 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 7:57:00 PM



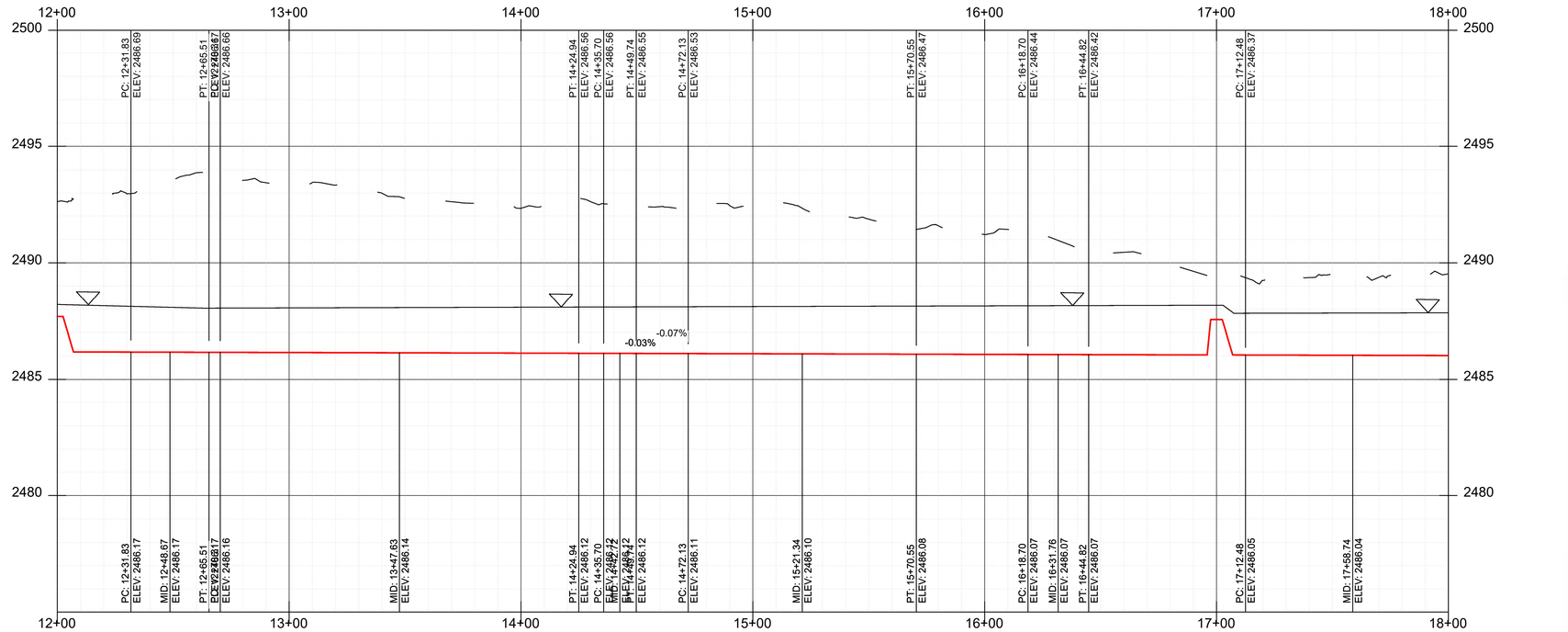
PLAN LEGEND

- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED SIDE CHANNEL TOP OF BANK
- 2505 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 2500 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

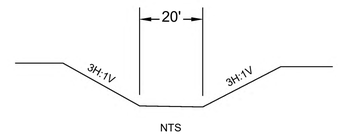
PROFILE LEGEND

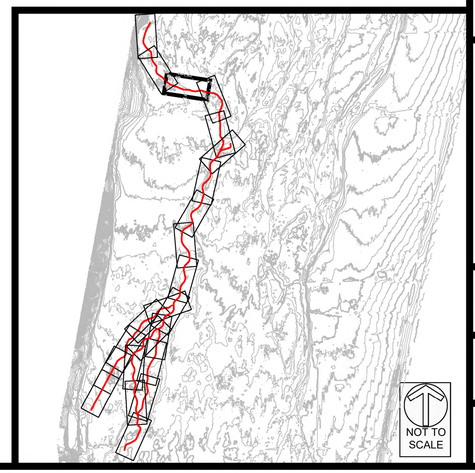
- PROPOSED SIDE CHANNEL THALWEG
- EXISTING GROUND
- WINTER BASE FLOW WATER SURFACE

NOTE:
THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.



5yr Channel at Island SCALE: HOR 1" =30'; VERT 1"= 3'





NOT TO SCALE

APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: JYZ	APPR'D
REV	DESCRIPTION		
1	FOR REVIEW ONLY		LWF
2	60% RESTORATION PLAN		BS
3	60% REVISION		BS
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION

PROPOSED SIDE CHANNEL
PLAN AND PROFILE - (3)

PROJECT ENGINEER:
SWCA
ENVIRONMENTAL & ENGINEERING
1575 Delucchi Lane, Ste 220
Reno, NV 89502

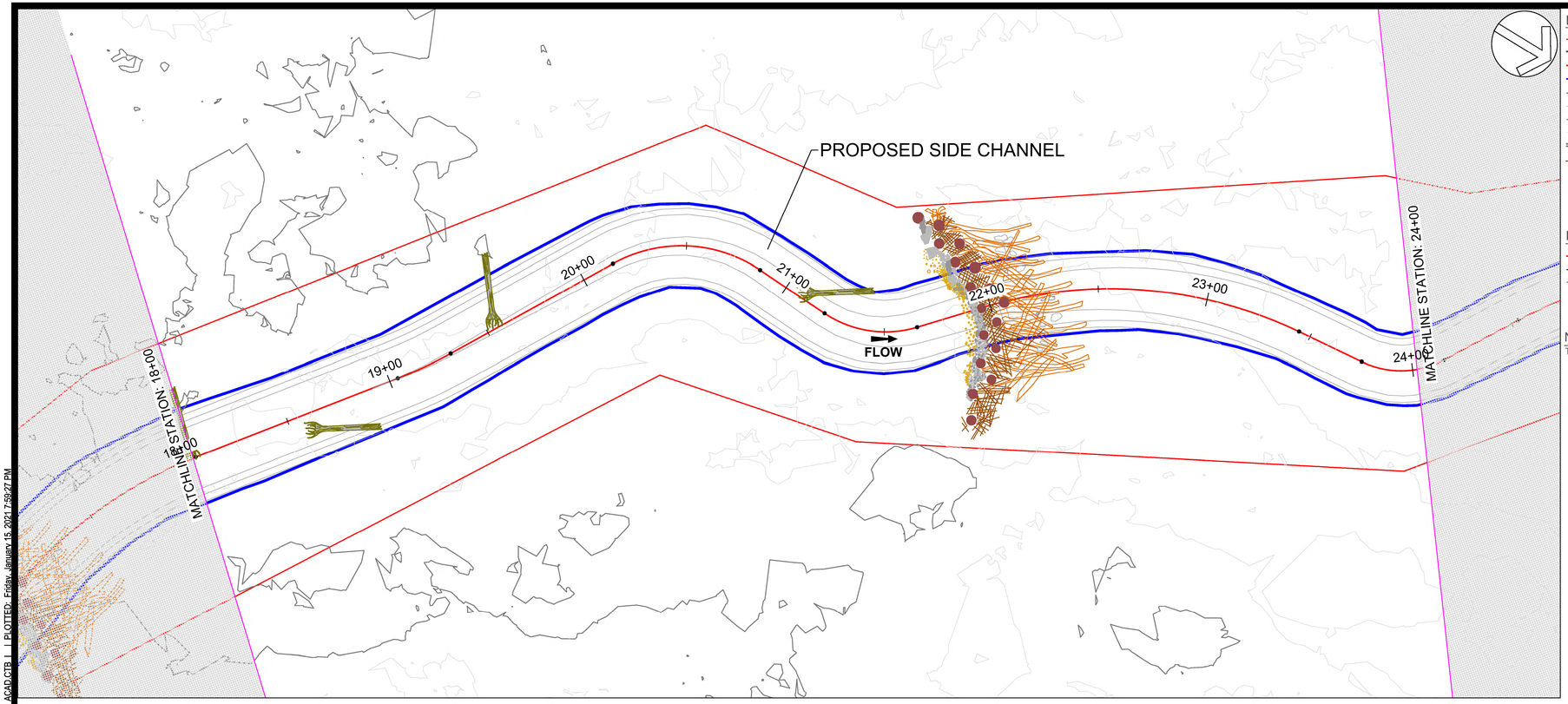
PROJECT OWNER:
MOJAVE DESERT LAND TRUST
Mojave Desert Land Trust P.O. Box 1544, 60124 29 Palms Hwy Joshua Tree, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
26 OF 37

D:\PALISADES RANCH\05643\05.0 ENGINEERING\C3D\SHEETS\60 WEST BRANCH SIDE CHANNEL PP.DWG | BASUTH.WEERASUNDARA | LSAVED: Friday, January 15, 2021 7:45:48 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 7:58:14 PM



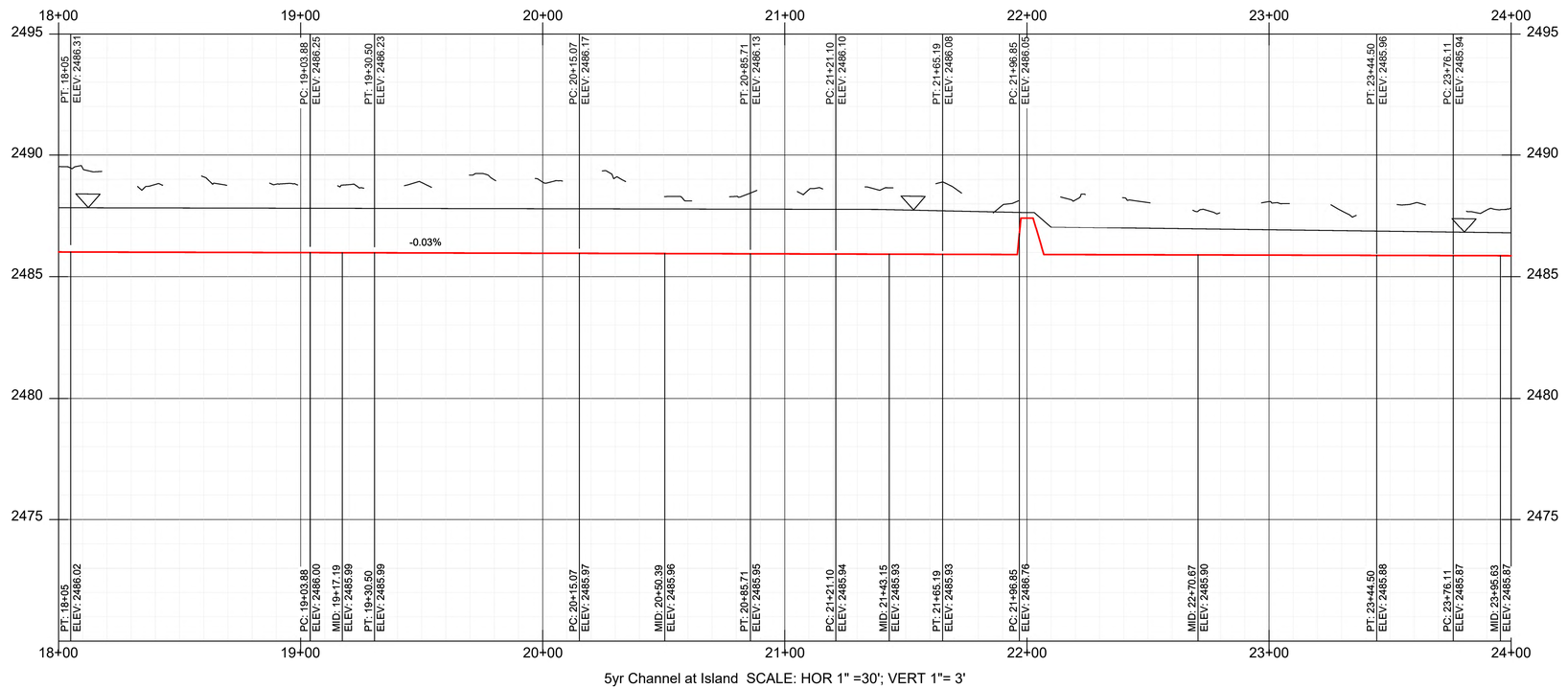
PLAN LEGEND

- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED SIDE CHANNEL TOP OF BANK
- 2505 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 2500 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

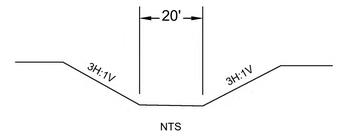
PROFILE LEGEND

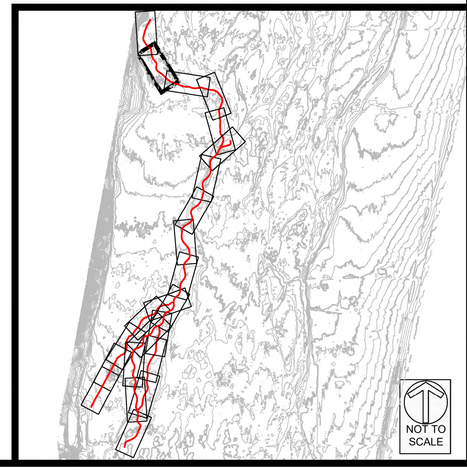
- PROPOSED SIDE CHANNEL THALWEG
- EXISTING GROUND
- WINTER BASE FLOW WATER SURFACE

NOTE:
THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.



5yr Channel at Island SCALE: HOR 1" =30'; VERT 1"= 3'





NOT TO SCALE

APPROVED BY: ---	CHECKED BY: SM	DRAWN BY: JYZ
REV	DESCRIPTION	APPRV
1	FOR REVIEW ONLY	LWF
2	60% RESTORATION PLAN	BS
3	60% REVISION	BS
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION

PROPOSED SIDE CHANNEL
PLAN AND PROFILE - (4)

PROJECT ENGINEER:
SWCA
ENVIRONMENTAL & ENGINEERING
1575 Delucchi Lane, Ste 220
Reno, NV 89502

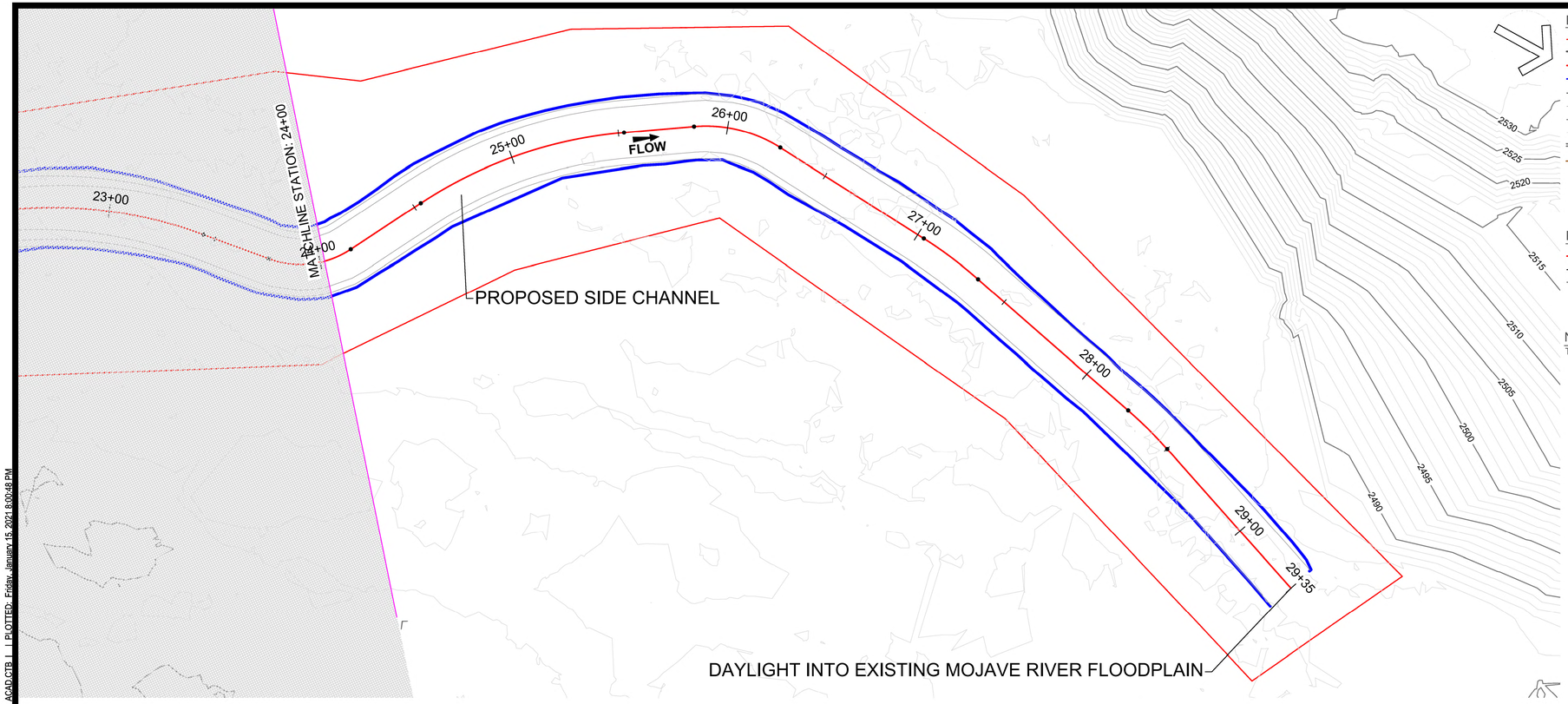
PROJECT OWNER:
MOJAVE DESERT LAND TRUST
Mojave Desert Land Trust P.O. Box 1544, 60124 29 Palms Hwy Joshua Tree, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
27 OF 37

D:\PALISADES RANCH\05643\05.0 ENGINEERING\C3D\SHEETS\60 WEST BRANCH SIDE CHANNEL PP.DWG | BASUTH.WEERASUNDARA | SAVED: Friday, January 15, 2021 7:45:48 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 7:59:27 PM



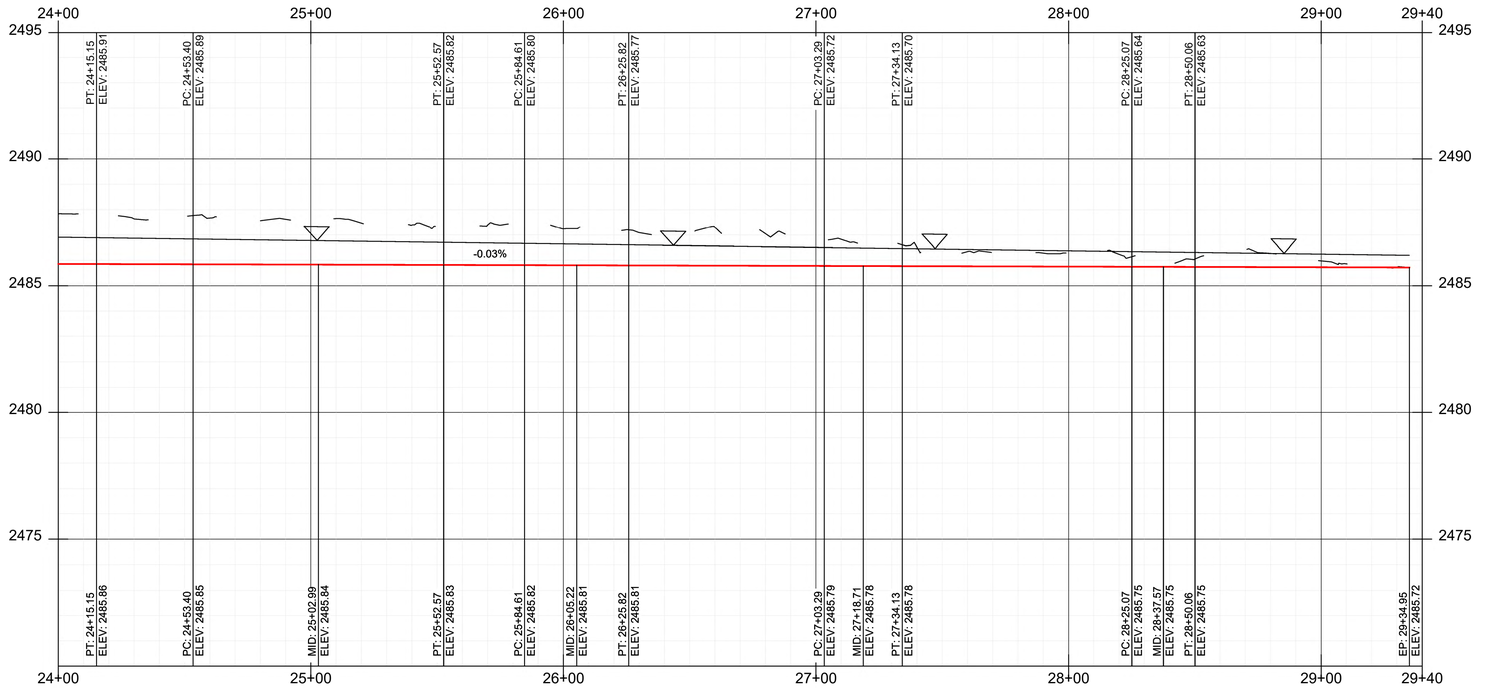
PLAN LEGEND

- PROJECT LIMITS
- PALISADE RANCH PROPERTY BOUNDARY
- PROPOSED THALWEG
- PROPOSED SIDE CHANNEL TOP OF BANK
- 2505 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 2500 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- BEAVER DAM ANALOG (BDA)
- LARGE WOOD AND BRUSH BANK PROTECTION
- ROOTWAD

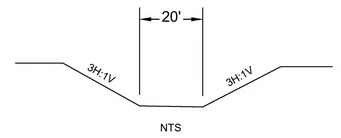
PROFILE LEGEND

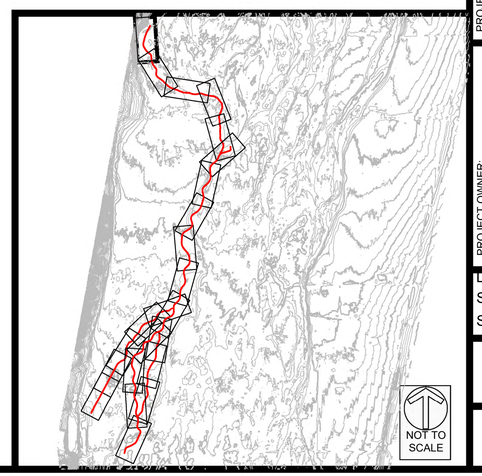
- PROPOSED SIDE CHANNEL THALWEG
- EXISTING GROUND
- WINTER BASE FLOW WATER SURFACE

NOTE:
THE DASHED EXISTING GROUND LINE IN THE PROFILE INDICATE TOP OF BANK.



5yr Channel at Island SCALE: HOR 1" =30'; VERT 1"= 3'





NOT TO SCALE

APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: JVZ
REV	DESCRIPTION	APPRV
1	FOR REVIEW ONLY	LWF
2	60% RESTORATION PLAN	BS
3	60% REVISION	BS
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION

PROPOSED SIDE CHANNEL
PLAN AND PROFILE - (5)

PROJECT ENGINEER:
SWCA
ENVIRONMENTAL & ENGINEERING
1575 Delucchi Lane, Ste 220
Reno, NV 89502

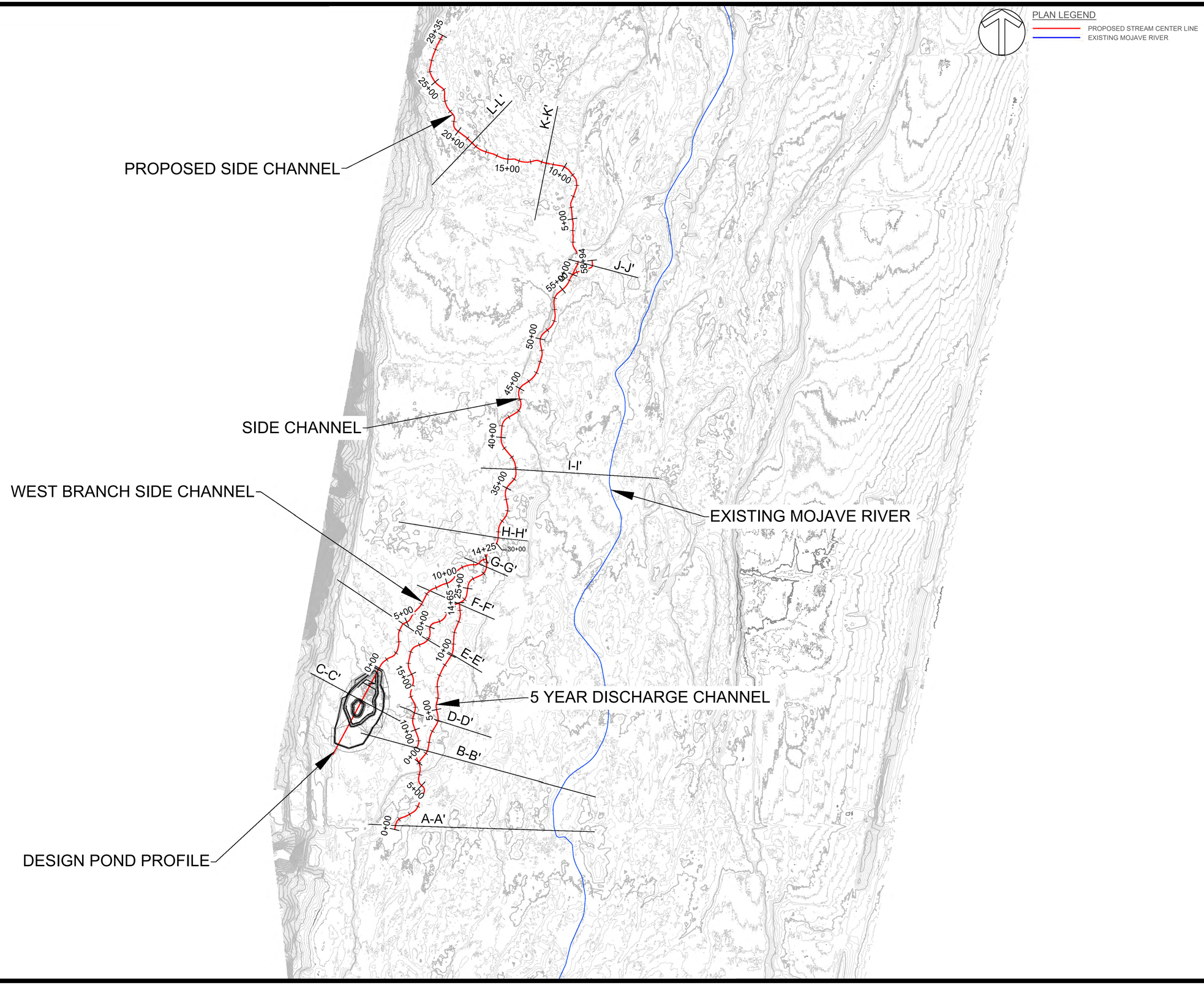
PROJECT OWNER:
MOJAVE DESERT LAND TRUST
Mojave Desert Land Trust P.O. Box 1544, 60124 29 Palms Hwy Joshua Tree, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

0 30 60
SCALE IN FEET

SHEET NUMBER
28 OF 37

D:\PALISADES RANCH\05643\05.0 ENGINEERING\C3D\SHEETS\60 WEST BRANCH SIDE CHANNEL PP.DWG | BASUTH.WEERASUNDARA | LSAVED: Friday, January 15, 2021 7:45:48 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 8:00:48 PM



APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: JYZ

REV	DESCRIPTION	APPRV
1	FOR REVIEW ONLY	LWF
2	60% RESTORATION PLAN	BS
3	60% REVISION	BS
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION

OVERVIEW
SECTIONS

PROJECT ENGINEER:

SWCA
ENVIRONMENTAL & ENGINEERING
1575 Delucchi Lane, Ste 220
Reno, NV 89502

PROJECT OWNER:

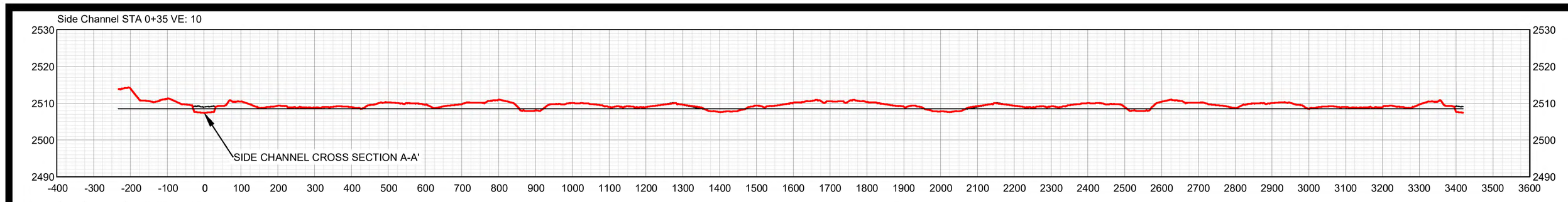
MOJAVE DESERT LAND TRUST
Mojave Desert Land Trust P.O. Box 1544, 60124 29 Palms Hwy Joshua Tree, CA 92252

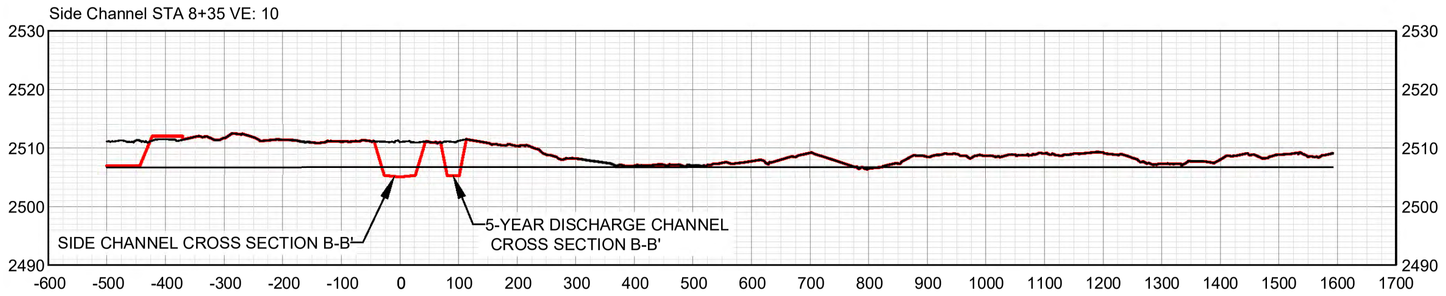
DATE: 01/15/2021
SCALE (34"X22"): 1" = 400'
SCALE (17"X11"): 1" = 800'

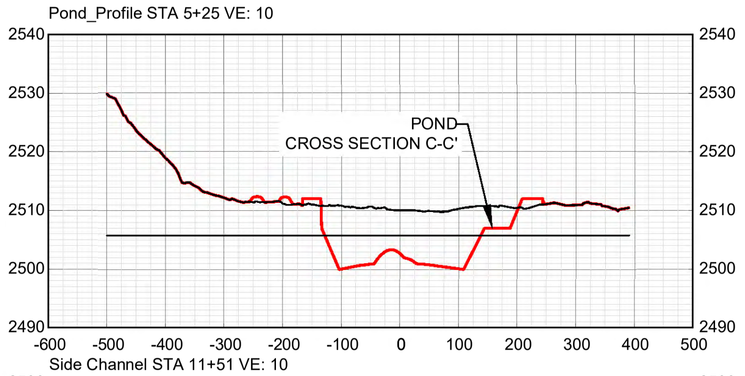
0 400 800
SCALE IN FEET

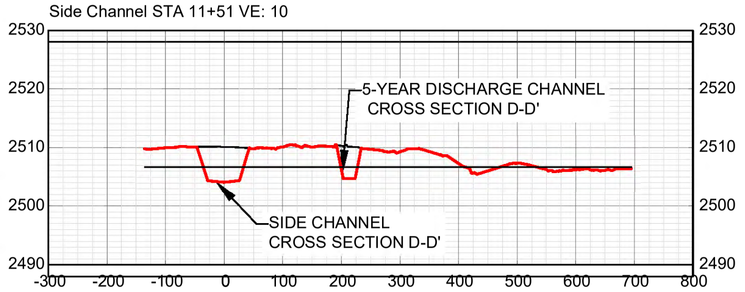
SHEET NUMBER
29 OF 37

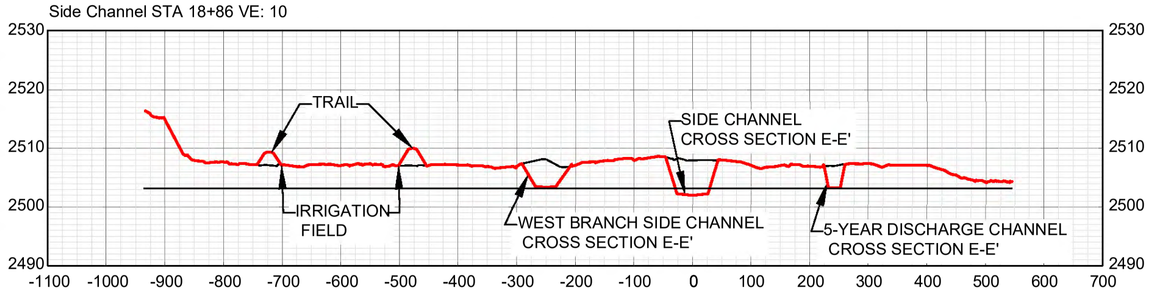
D:\PALISADES RANCH (05643415.0 ENGINEERING\C3D\SHEETS\PALISADES RANCH SECTIONS.DWG | BASITH.WEERASUNDARA | SAVED: Friday, January 15, 2021 6:34:03 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 7:23:06 PM

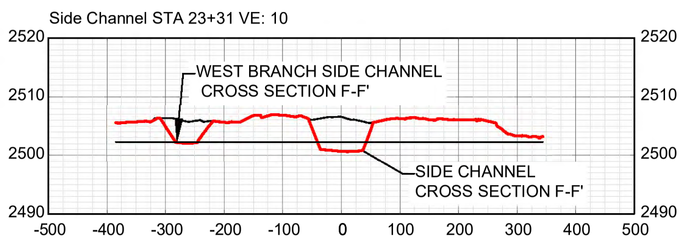


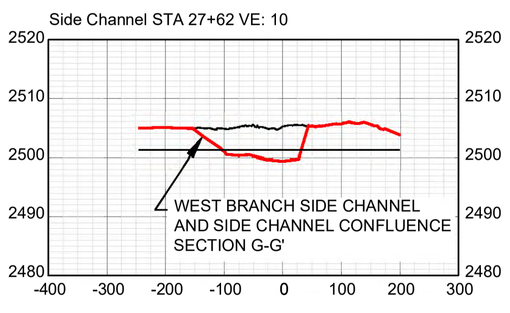


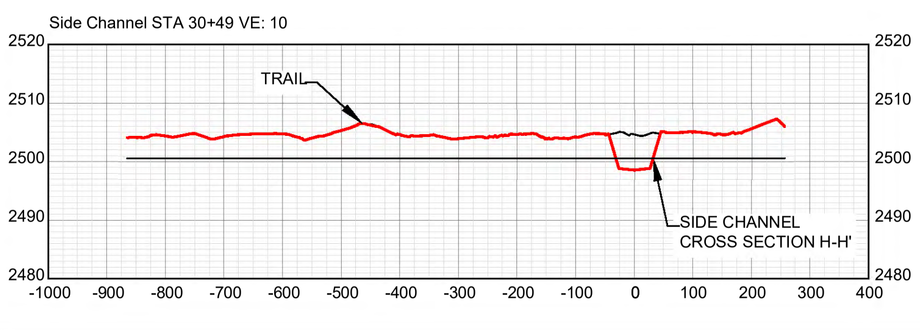












SECTION LEGEND

- DESIGN SURFACE
- EXISTING GROUND
- DESIGN WATER SURFACE

REV	DESCRIPTION	CHECKED BY: SM	DRAWN BY: JYZ
1	FOR REVIEW ONLY	APPROVED BY: ----	APPRV
			LWF
2	60% RESTORATION PLAN		BS
3	60% REVISION	XX	BS
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION

CROSS SECTIONS - (1)

PROJECT ENGINEER:

SWCA ENVIRONMENTAL & ENGINEERING
1575 Delucchi Lane, Ste 220
Reno, NV 89502

PROJECT OWNER:

MOJAVE DESERT LAND TRUST
Mojave Desert Land Trust P.O.
Box 1544, 60124 29 Palms Hwy
Joshua Tree, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 200'
SCALE (17"X11"): 1" = 400'

0 200 400
SCALE IN FEET

SHEET NUMBER
30 OF 37

D:\PALISADES RANCH 06934\5.0 ENGINEERING\C3D\SHEETS\PALISADES RANCH SECTIONS.DWG | BASITH.WEERASUNDARA | SAVED:: Friday, January 15, 2021 6:34:03 PM | ACAD.CTB | | PLOTTED:: Friday, January 15, 2021 7:23:19 PM

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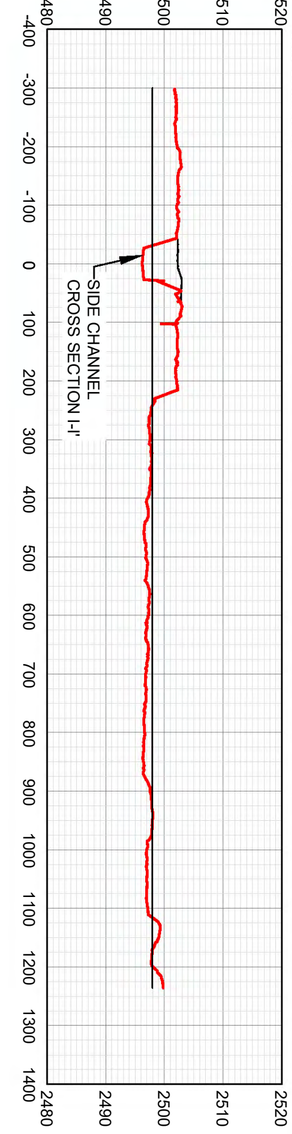

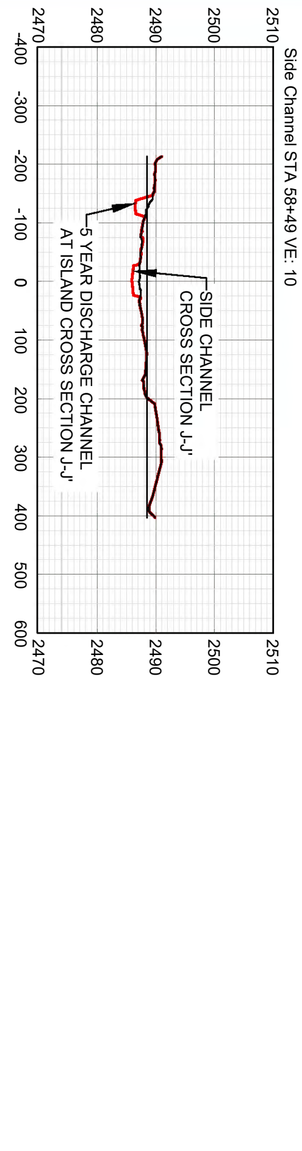

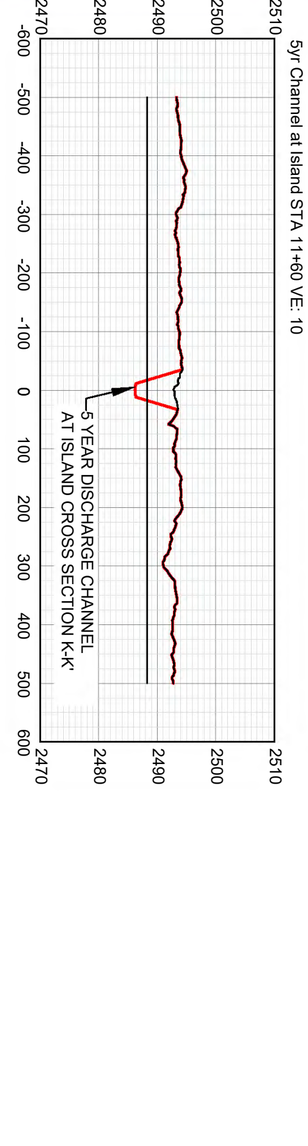

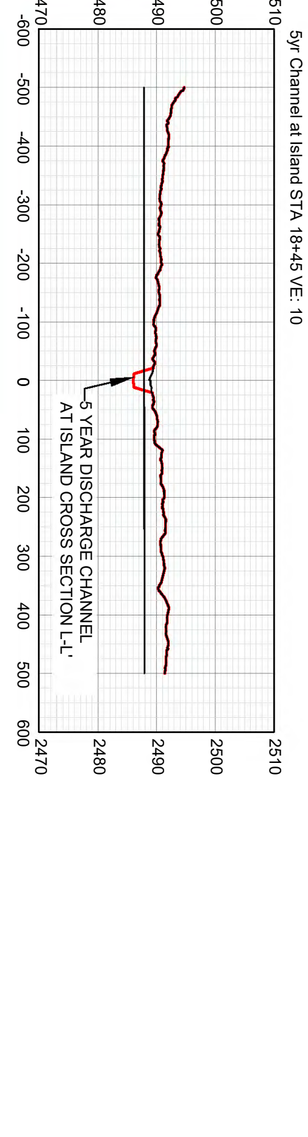

SECTION LEGEND

DESIGN SURFACE

EXISTING GROUND

DESIGN WATER SURFACE

SHEET NUMBER
31 OF 37

0 200 400
SCALE IN FEET

DATE: 01/15/2021
SCALE (34"X22"): 1" = 200'
SCALE (17"X11"): 1" = 400'

PROJECT OWNER:
MOJAVE DESERT LAND TRUST
Mojave Desert Land Trust P.O.
Box 1544, 60124 29 Palms Hwy
Joshua Tree, CA 92252

PROJECT ENGINEER:
SWCA ENVIRONMENTAL & ENGINEERING
1575 Delucchi Lane, Ste 220
Reno, NV 89502

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN

NOT FOR CONSTRUCTION

CROSS SECTIONS - (2)

APPROVED BY: ---- | CHECKED BY: SM | DRAWN BY: JYZ

REV	DESCRIPTION	APPRV
1	FOR REVIEW ONLY	LWF
2	60% RESTORATION PLAN	BS
3	60% REVISION	BS
XX	XX	XX
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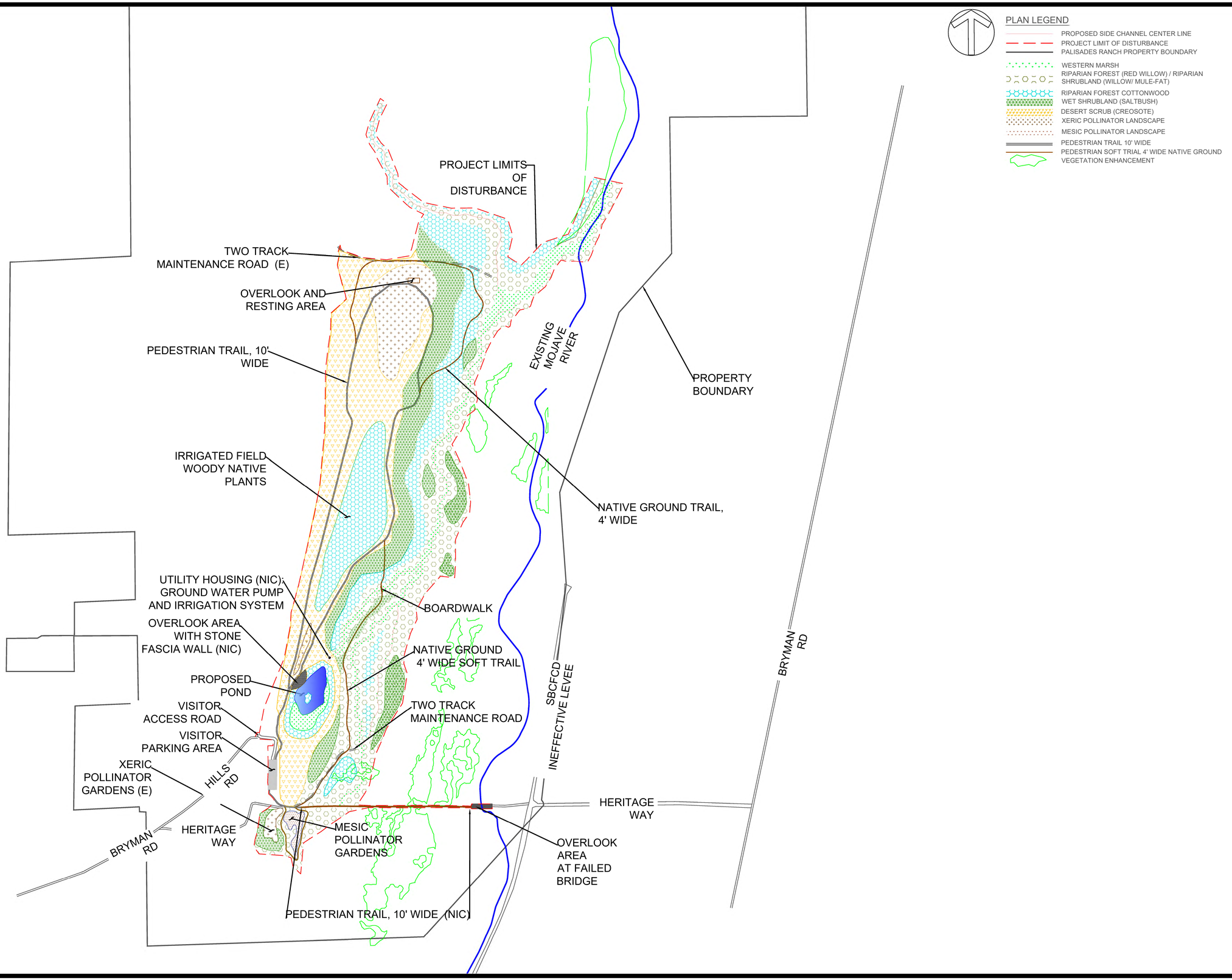
XX	XX	XX
XX	XX	XX



PLAN LEGEND

- PROPOSED SIDE CHANNEL CENTER LINE
- PROJECT LIMIT OF DISTURBANCE
- PALISADES RANCH PROPERTY BOUNDARY
- WESTERN MARSH
- RIPARIAN FOREST (RED WILLOW) / RIPARIAN SHRUBLAND (WILLOW/ MULE-FAT)
- RIPARIAN FOREST COTTONWOOD
- WET SHRUBLAND (SALTBUSH)
- DESERT SCRUB (CREOSOTE)
- XERIC POLLINATOR LANDSCAPE
- MESIC POLLINATOR LANDSCAPE
- PEDESTRIAN TRAIL 10' WIDE
- PEDESTRIAN SOFT TRIAL 4' WIDE NATIVE GROUND
- VEGETATION ENHANCEMENT

REV	DESCRIPTION	CHECKED BY: SM	DRAWN BY: GMZ	APPRV
1	FOR REVIEW ONLY	APPROVED BY: ----	LWF	LWF
2	60% RESTORATION PLAN		BS	BS
3	60% REVISION		BS	BS
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX
XX	XX	XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION

OVERVIEW
PLANTING PLAN

PROJECT ENGINEER:

SWCA ENVIRONMENTAL & ENGINEERING
2996 10TH AVE.
OAKLAND, CA 94605

PROJECT OWNER:

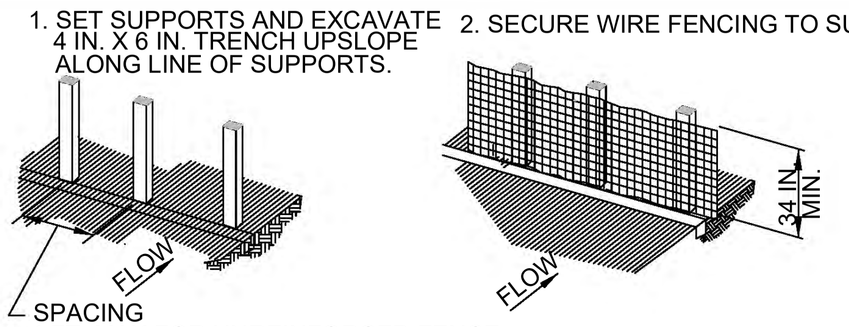
MOJAVE DESERT LAND TRUST
MOJAVE DESERT LAND TRUST P.O. BOX 1544, 60124 29 PALMS HWY
JOSHUA TREE, CA 92252

DATE: 01/15/2021
SCALE (34"X22"): 1" = 450'
SCALE (17"X11"): 1" = 900'

0 450 900
SCALE IN FEET

SHEET NUMBER
32 OF 37

D:\PALISADES RANCH\06943045.0 ENGINEERING\C3D\SHEETS\PALISADES\RANCH\RESTORATION\PLAN2.DWG | BASITH WEERASUNDARA | SAVED: Friday, January 15, 2021 8:59:41 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 9:00:22 PM



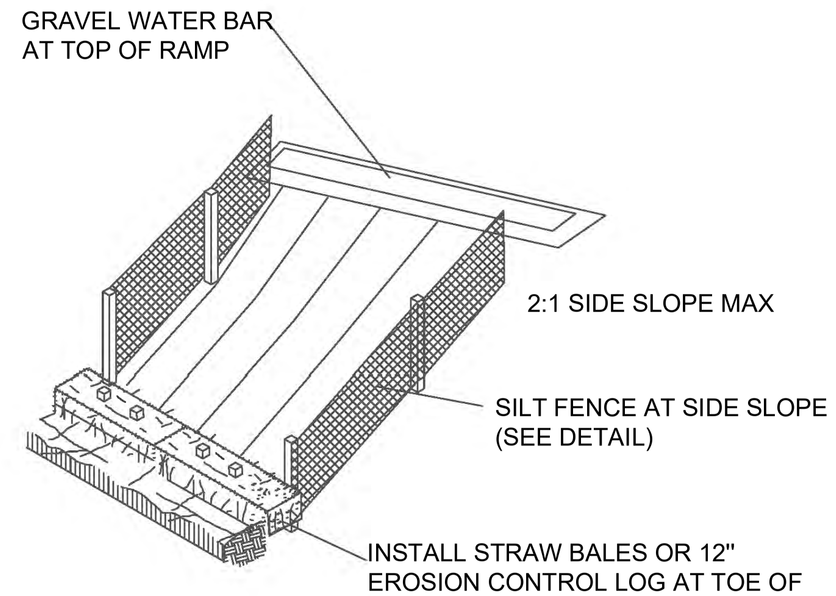
CONSTRUCTION NOTES:

1. SEE SPECIFICATION SECTION NO. 10.15.00 -SILT FENCES.

RSF SYMBOL — REINFORCED SILT FENCE

SF SYMBOL — SILT FENCE

TYPICAL SILT FENCE



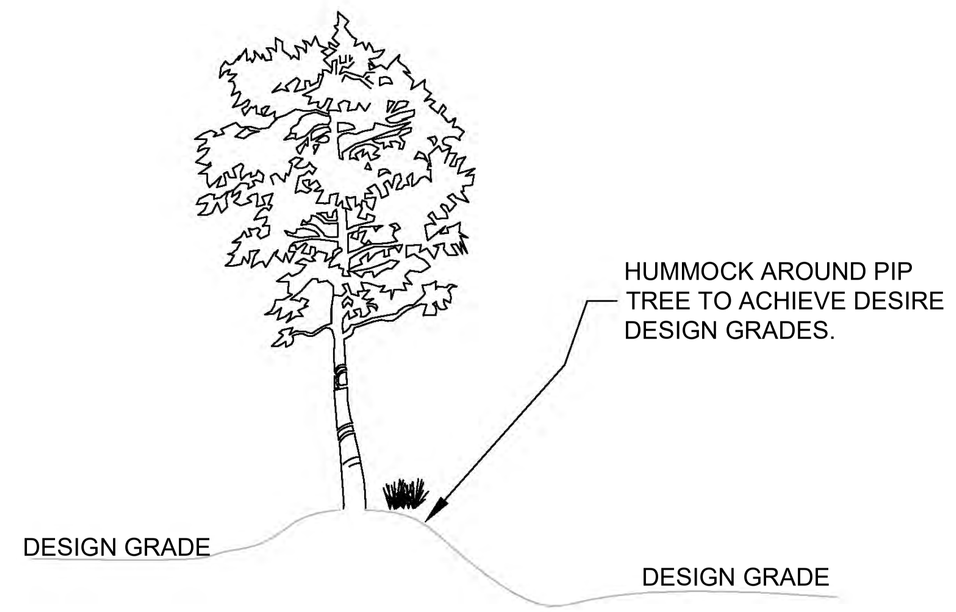
NOTE: USE ON SLOPE ACCESS THROUGH RIPARIAN AREAS FOR CHANNEL ACCESS.

TEMPORARY EQUIPMENT ACCESS RAMP AT RIPARIAN AND CHANNEL AREAS

NTS

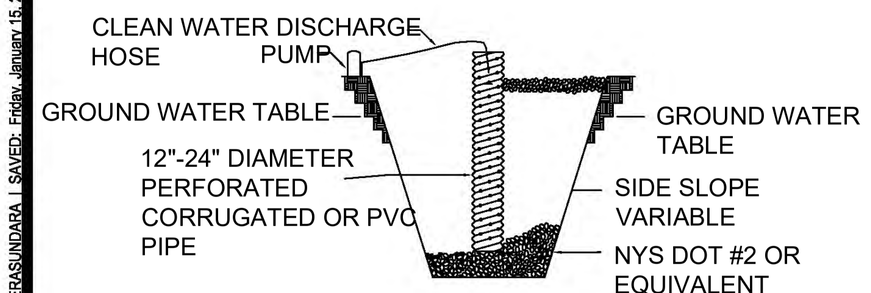
NOTES: ALL TREES FOR REMOVAL AND PROTECT IN PLACE (PIP) SHALL BE MARKED IN FIELD BY BIOLOGIST PRIOR TO CONSTRUCTION ACTIVITIES. ALL CUTS AND LIMING OF BRANCHES 6" OR GREATER FOR CONSTRUCTION ACTIVITIES SHALL BE PERFORMED BY A STATE OF CALIFORNIA CERTIFIED ARBORIST.

EXCAVATION IS REQUIRED NEAR PROTECT IN PLACE (PIP) TREES IN ORDER TO CUT GRADES TO DESIGN ELEVATIONS. EXCAVATION AND GRADING SHALL BE FIELD FIT TO HUMMOCK AROUND PIP TREES TO MINIMIZE DAMAGE DURING CONSTRUCTION. EXCAVATION WITHIN 6 FEET OF TRUNK OF TREE SHALL BE PERFORMED BY HAND. HEAVY EQUIPMENT MAY OCCUR UNDER THE DRIP LINE WITHIN 6' OF TREE TRUNK. EXCAVATION MAY REMOVE UP TO $\frac{1}{3}$ OF THE ROOTS TO ACHIEVE DESIRED DESIGN GRADES. ALL ROOT CUTS AND TREATMENTS SHALL BE PERFORMED BY A CALIFORNIA CERTIFIED ARBORIST.



TYPICAL PROTECT IN PLACE TREES

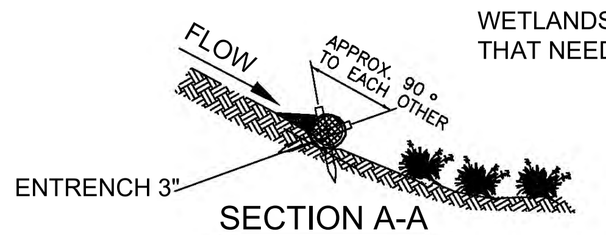
NTS



NOTES:
1.) PIT DIMENSIONS ARE VARIABLE
2.) BMP IS ANTICIPATED AT STONEWALL OR BOARDWALK AREAS TO ISOLATE WORKING AREA AND PUMP GROUND WATER FROM WORK AREA FOR THE CONSTRUCTION OF FOOTINGS.
2.) IF DISCHARGE WILL BE PUMPED DIRECTLY TO RIPARIAN AREAS OR STREAM CHANNEL THE STANDPIPE SHOULD BE WRAPPED WITH FILTER CLOTH AND THE OUTLET SHALL HAVE A BMP PLACED DOWNGRADIENT.

DEWATERING SUMP PIT

NTS



SECTION A-A

TYPICAL STAKING PATTERN AND EROSION LOG APPLICATION

SEDIMENT REMOVAL SHALL BE PERFORMED CONTINUOUSLY FOR PROPER FUNCTION.

EROSION CONTROL LOG BMP

NTS

NOTES:

CONTRACTOR SHALL OBTAIN A 401 WATER QUALITY CERTIFICATE WITH AN APPROVED STORM WATER POLLUTION PREVENTION PLAN (SWPPP). CONSTRUCTION STAGING SHOWN ON SHEET 5 SHOWS EXISTING AND PROPOSED CONTOURS TO PLAN BMPS FOR CONSTRUCTION. TYPICAL DETAILS REPRESENTED HEREIN ARE FOR EXAMPLE PURPOSES AND ARE NOT INCLUSIVE OF ALL BEST MANAGEMENT PRACTICES (BMPS) REQUIRED TO COMPLY WITH SWPPP REGULATIONS AND PERMIT REQUIREMENTS. CONTRACTOR IS RESPONSIBLE TO BE IN COMPLIANCE WITH ALL PERMITS AND FOR THE INSTALLATION AND MAINTENANCE OF AL BMPS TO MINIMIZE POTENTIAL DISTURBANCE AND IMPACTS THAT MAY BE CAUSED DURING CONSTRUCTION. CONTRACTOR SHALL PERFORM ALL SWPPP INSPECTIONS AND DAILY MONITORING TO ENSURE BMPS ARE MAINTAINED AND ADEQUATE THROUGHOUT THE DURATION OF CONSTRUCTION. CONTRACTOR SHALL PHASE THE INSTALLATION OF BMPS ACCORDING TO WORK ACTIVITIES.

SEE GENERAL NOTES SHEET 3 FOR OTHER INFORMATION REGARDING STANDARD PRACTICES FOR CONSTRUCTION ACTIVITIES.

TYPICAL DETAILS - SWPPP

NOT TO SCALE

APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: CY/BW
REV	DESCRIPTION	APPRV
1	FOR REVIEW ONLY	LWF
2	60% RESTORATION PLAN	BS
3	60% REVISION	BS
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION
DETAIL
SWPPP BMP 1

PROJECT ENGINEER:
SWCA ENVIRONMENTAL & ENGINEERING
1575 Delucchi Lane, Ste 220
Reno, NV 89502

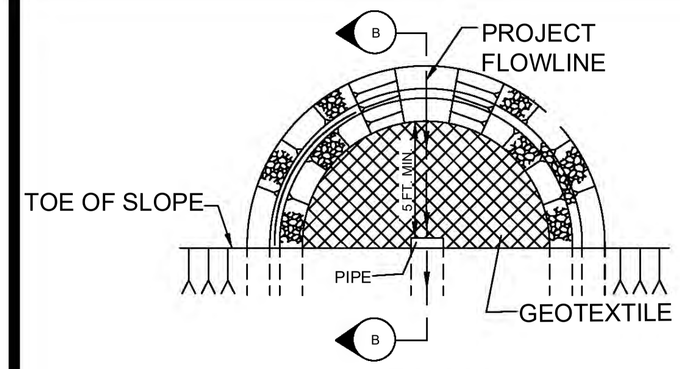
PROJECT OWNER:
MOJAVE DESERT LAND TRUST
Mojave Desert Land Trust P.O. Box 1544, 60124 29 Palms Hwy Joshua Tree, CA 92252

DATE: 01/15/2021

NTS

SHEET NUMBER
33 OF 37

D:\PALISADES RANCH (0563495.0 ENGINEERING\C3D\SHEETS\MASTERDETAIL - PALISADESRANCH.DWG | BASITH.WEERASUNDARA | SAVED: Friday, January 15, 2021 8:19:37 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 8:19:51 PM

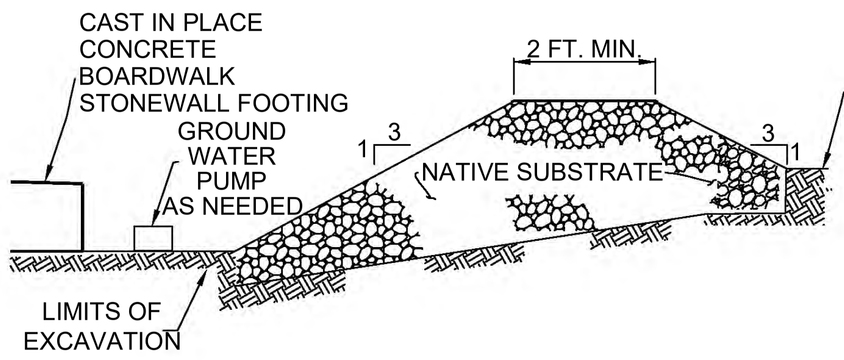


PLAN

TYPICAL COFFER DAM ALONG BANK DETAIL

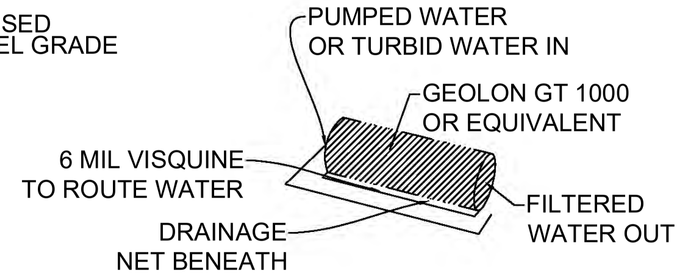
NTS

NOTES: MULTIPLE COFFER DAM(S) ARE ANTICIPATED TO ISOLATE WORK AREA FROM FLOWING WATER. COFFER DAMS MAY RUN PARALLEL ALONG A BANK, DEFLECT FLOW AND CONNECT TO AN ELEVATED SAND BAR, OR ISOLATE AN AREAS FOR SETTING OF BOARDWALK PIERS OR OTHER RESTORATION STRUCTURES. EQUIPMENT ACTIVITY IS ANTICIPATED TO OCCUR IN THE FLOWING WATER FOR SHORT DURATIONS WITH LIMITED EXCAVATION ACTIVITIES AND IN DESIGNATED LOCATIONS ONLY. ALL PUMPED GROUNDWATER SHALL BE FILTERED THROUGH A GEOTEXTILE FILTER SOCK PRIOR TO DISCHARGE TO MOJAVE RIVER AND RIPARIAN AREAS. CONTRACTOR IS WHOLLY RESPONSIBLE FOR CARE OF WATER, RIPARIAN RESOURCES, AND TO COMPLY WITH ALL FEDERAL AND STATE SPECIAL PERMIT CONDITIONS, AS WELL AS STORM WATER POLLUTION PREVENTION PLAN REQUIREMENTS.



TYPICAL COFFER DAM SECTION B-B'

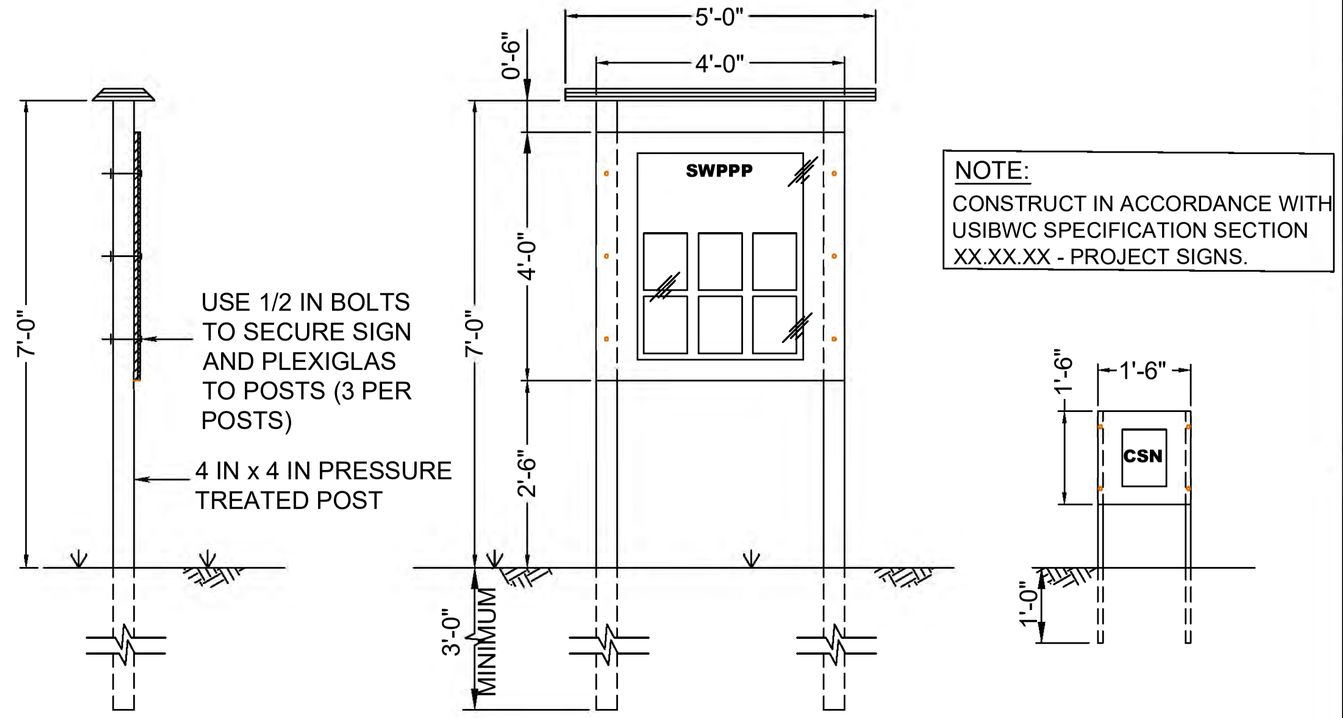
NTS



TYPICAL GEO-SOCK FILTER

NTS

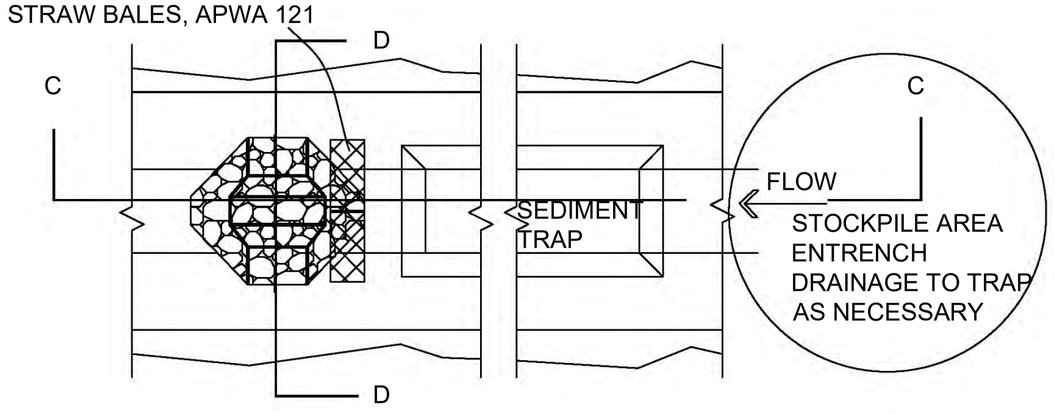
TYPICAL CARE OF WATER OPTION



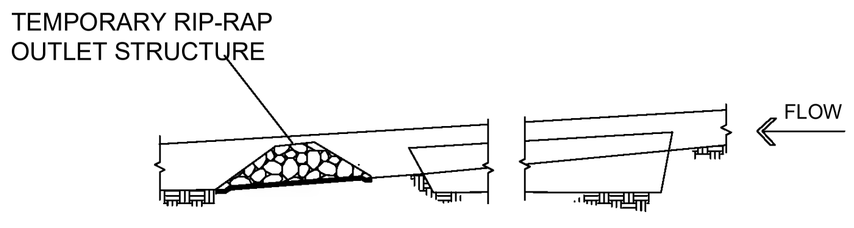
NOTE:
CONSTRUCT IN ACCORDANCE WITH USIBWC SPECIFICATION SECTION XX.XX.XX - PROJECT SIGNS.

LEFT SIDE | FRONT | CSN HOLDER

SWPPP / BMP SIGN AND CONSTRUCTION SITE NOTICE HOLDER DETAILS

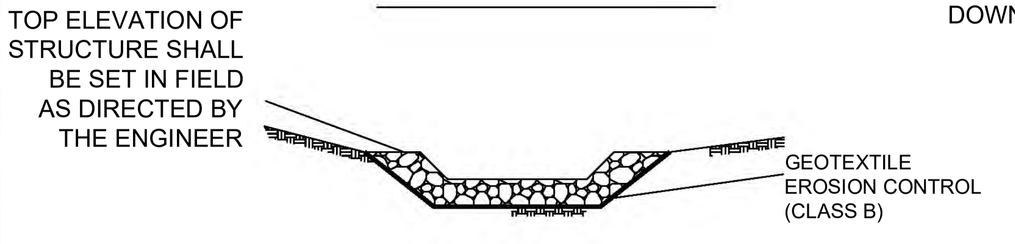


PLAN VIEW, TYPICAL



CROSS SECTION C-C

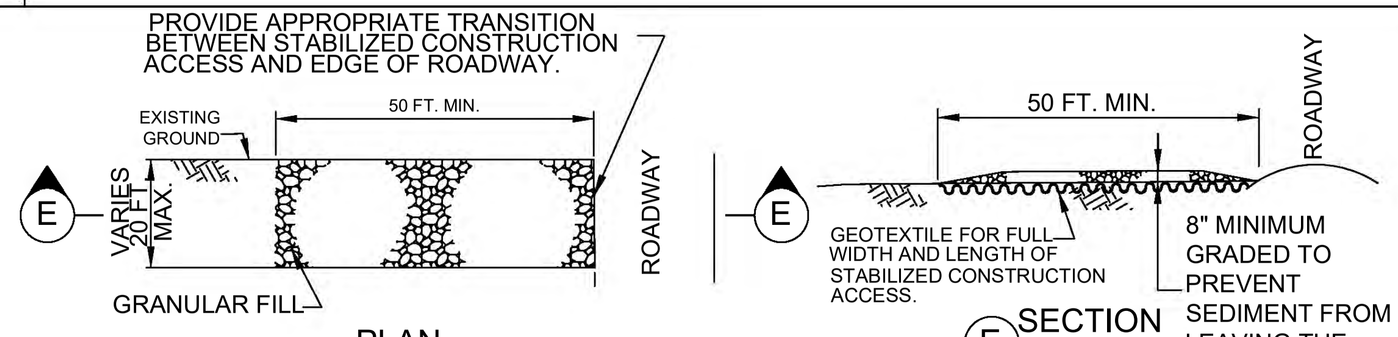
NOTES: ALL EXCAVATED WET MATERIALS SHALL BE PLACED IN UPLAND AREA WITH ADEQUATE SEDIMENT BASIN OR BMP PLACED DOWN GRADIENT.



CROSS SECTION D-D

SEDIMENT TRAP/DEWATERING STRUCTURE

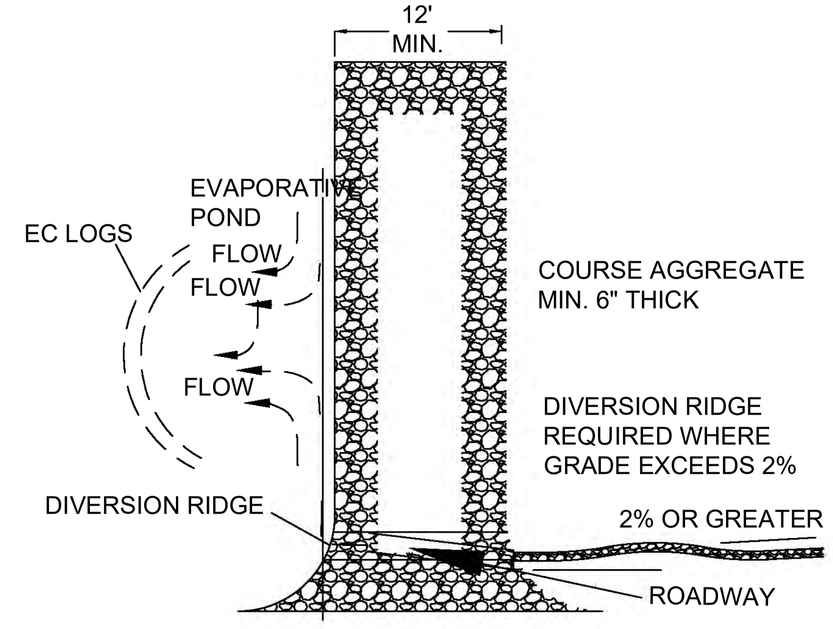
NTS



TYPICAL STABILIZED CONSTRUCTION ACCESS

NTS

CONTRACTOR SHALL SUPPLY WATER TO WASH WHEELS. ROUTE DRAINAGE TO TEMPORARY BASIN. INSTALL AS REQUIRED BY ACCESS AND TRAFFIC CONTROL PLAN.



TYPICAL TRACKING PAD AND WHEEL WASH AREA

NTS

TYPICAL DETAILS - SWPPP

NOT TO SCALE

REV	DESCRIPTION	CHECKED BY: SM.	DRAWN BY: CYBW
1	FOR REVIEW ONLY	APPROVED BY: ----	APPRV LWF
2	60% RESTORATION PLAN		BS
3	60% REVISION		BS
XX	XX		XX
XX	XX		XX
XX	XX		XX
XX	XX		XX
XX	XX		XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION

DETAIL
SWPPP BMP 2

PROJECT ENGINEER:
SWCA ENVIRONMENTAL & ENGINEERING
1575 Delucchi Lane, Ste 220
Reno, NV 89502

PROJECT OWNER:
MOJAVE DESERT LAND TRUST
Mojave Desert Land Trust P.O. Box 1544, 60124 29 Palms Hwy Joshua Tree, CA 92252

DATE: 01/15/2021

NTS

SHEET NUMBER
34 OF 37

D:\PALISADES RANCH (05634915.0 ENGINEERING\C3D\SHEETS\MASTERDETAIL - PALISADESRANCH.DWG | BASITH.WEERASUNDARA | SAVED: Friday, January 15, 2021 8:46:00 PM | ACAD.CTB | PLOTTED: Friday, January 15, 2021 8:46:18 PM

LIVE STAKES AND POLE PLANTING
N.T.S.

LIVE STAKES NOTES
REVEGETATION AND REPLACEMENT PLANTINGS SHALL CONSIST OF LOCALLY-OBTAINED, NATIVE SPECIES, PER SPECIFICATIONS.

LIVE STAKE PREPARATION
1. STAKE CUTTINGS SHALL BE TAKEN WITH SHARP PRUNING SHEARS OR WITH A SHARP SAW BLADE, WITHOUT CAUSING INJURY TO THE BARK OR SPLITTING OF THE ENDS. THE BUTT END OF THE CUTTING SHALL BE ANGLED AND THE TOP END SHALL BE SQUARE.

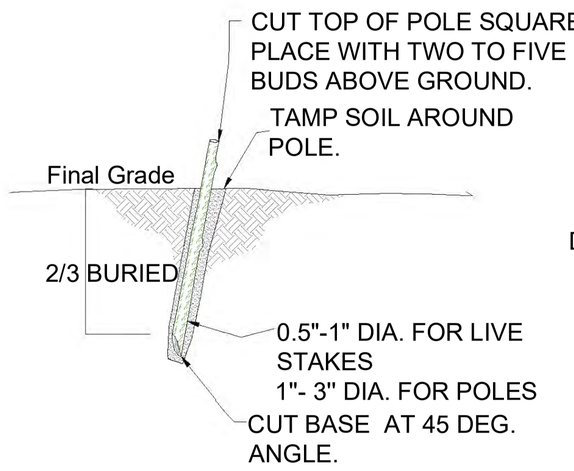
2. STAKES SHALL BE FROM 3' TO 6' FOOT IN LENGTH AND 0.5" TO 1" INCHES IN DIAMETER. POLES SHALL BE 4'-8' LENGTHS AND 1"-3" IN DIAMETER. All LIVE STAKES AND POLES BE CUT SO THAT A TERMINAL BUD SCAR IS WITHIN 1 TO 4 INCHES OF THE TOP. AT LEAST 2 BUDS AND/OR BUD SCARS SHALL BE ABOVE THE GROUND AFTER PLANTING. SIDE BRANCHES SHALL BE CUT WITH SHARP PRUNING SHEARS, FLUSH WITH POLE, WITHOUT CAUSING INJURY TO BUDS.

INSTALLATION
1. CUTTINGS SHALL BE INSTALLED ON THE SAME DAY AS CUT OR STAY SOAKED UNTIL INSTALLATION.

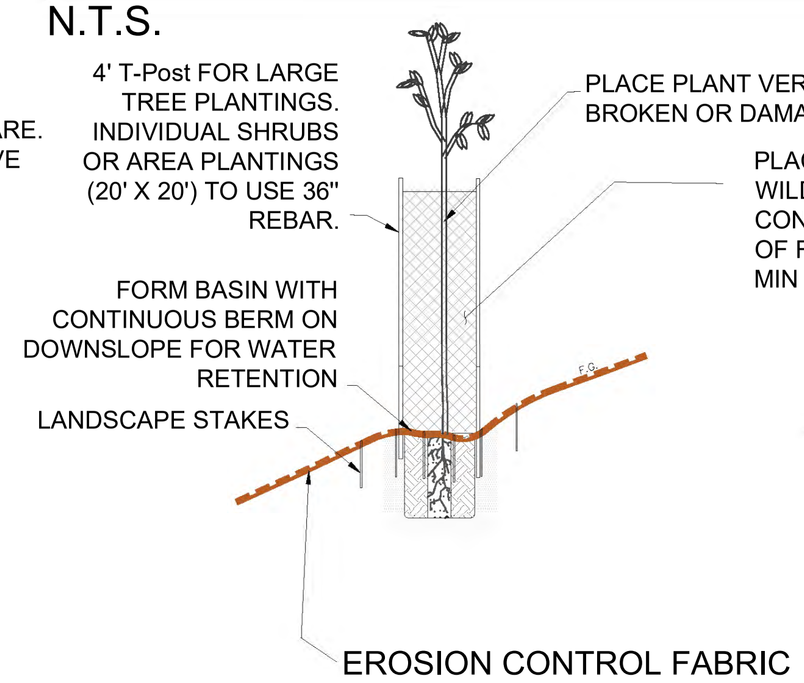
2. CUTTINGS SHALL BE INSTALLED TO THE DESIGN DEPTH OF THE CHANNEL BOTTOM, WITH 2/3 OF ITS LENGTH IN CONTACT WITH NATIVE SOIL, AND ⅓ ABOVE GROUND. USE OF A PILOT BAR MAY HELP WITH LIVE INSTALLATION, AND STINGER/AUGER FOR POLE INSTALLATION.

3. LIVE STAKES SHALL BE INSTALLED TO ASSIST STAKING THE EROSION CONTROL BLANKET (ECB) HOLES SHALL NOT BE EXCESSIVE. NO TEARING OR DAMAGE SHALL BE MADE TO THE ECB.

4. SPECIAL CARE SHALL BE TAKEN TO NOT DAMAGE THE BUDS, SPLIT POLE ENDS, OR STRIP THE BARK DURING INSTALLATION.

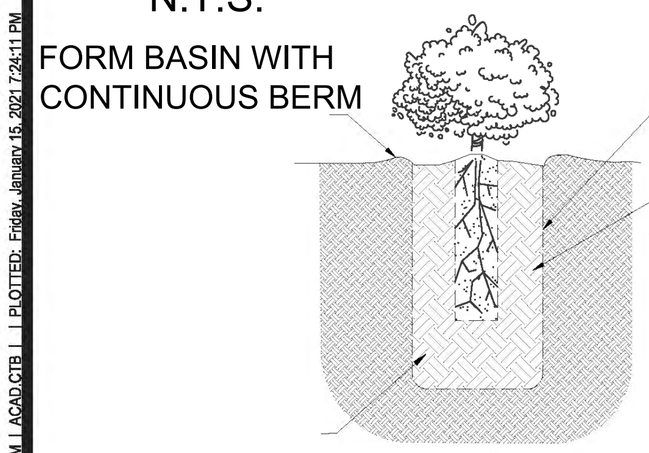


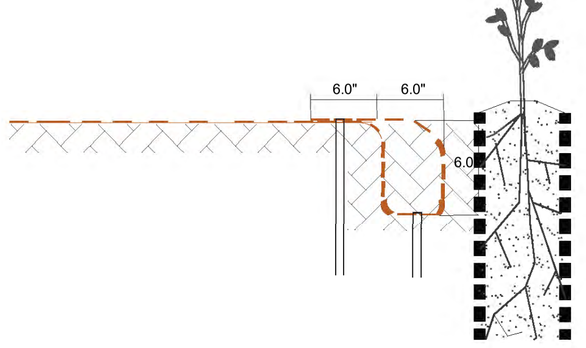
BEAVER/WILDLIFE SCREEN PLANTING
N.T.S.



NOTE:
1. ONLY INDIVIDUALLY PLACED TREES TO HAVE CAGES.
2. PLANTINGS WITHIN THE EROSION CONTROL FABRIC AREAS WILL REQUIRE CUTTING AND SECURING OF THE FABRIC.

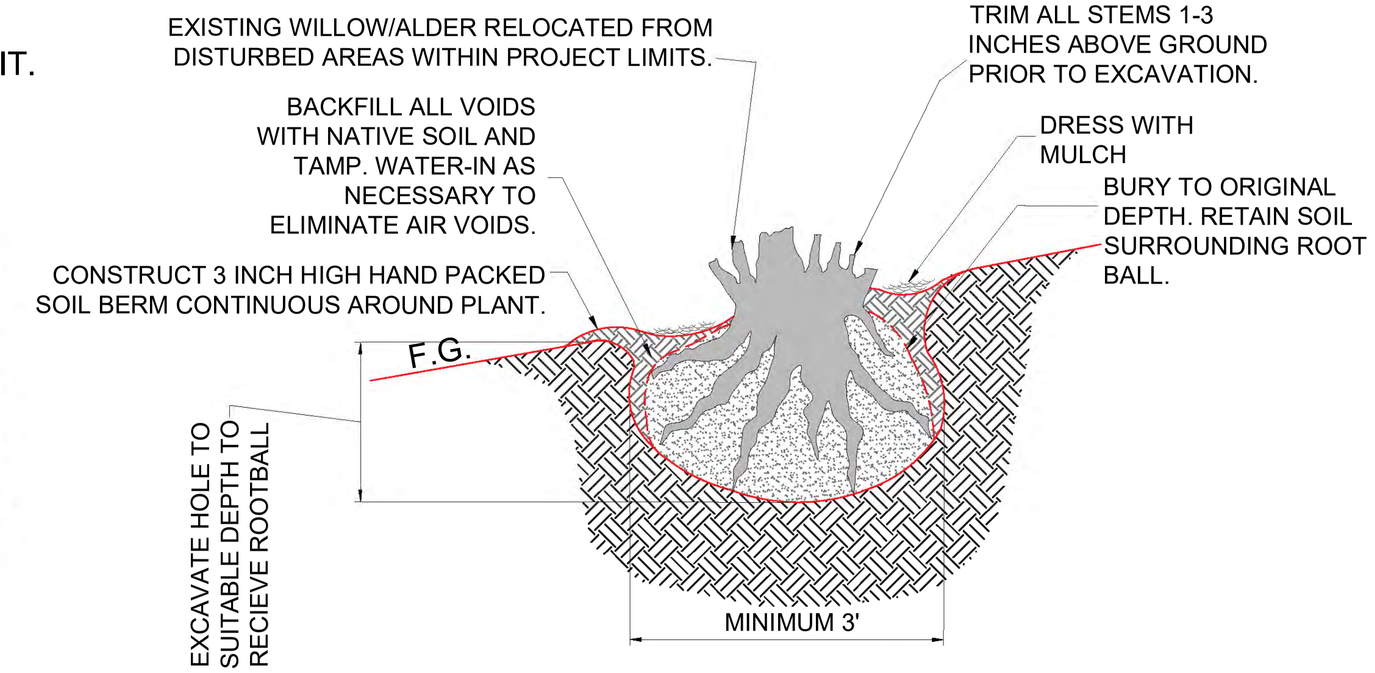
CONTAINER PLANTING
N.T.S.



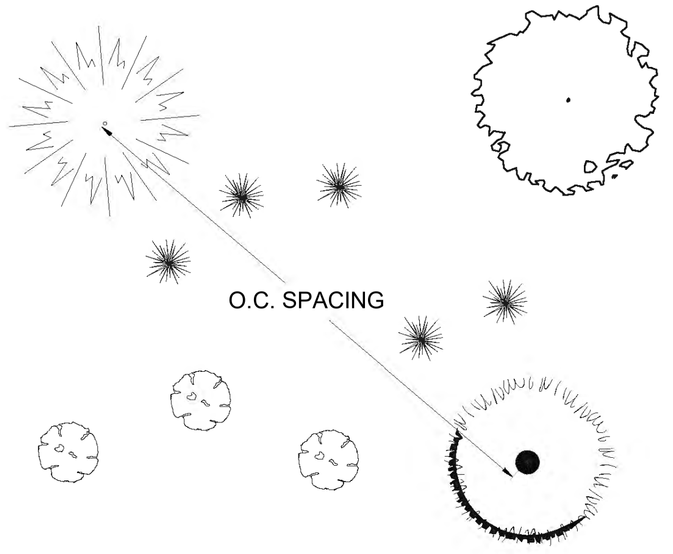


NOTE:
PLANTINGS WITHIN THE EROSION CONTROL FABRIC AREAS WILL REQUIRE CUTTING AND SECURING OF THE FABRIC, AS SHOWN ON THE FIGURE RIGHT.

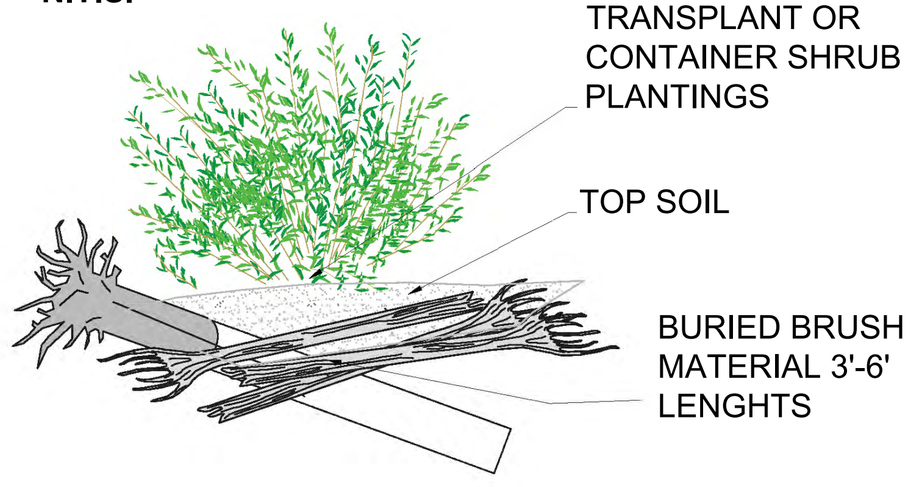
TRANSPLANTING DETAIL
N.T.S.



TYPICAL PLANTING LAYOUT
N.T.S.



ZONE A AND B HABITAT CLUSTER AND FLOODPLAIN ROUGHNESS FEATURE
N.T.S.



NOTES:

1. ALL MATERIALS SHALL BE FREE OF WEEDS AND NATIVE STRANDS.
2. PLANT SCHEDULE AND SEE SPECIFICATIONS ARE TO BE DETERMINED

PLANTING ZONE HABITAT AREAS:
10 ACRES WESTERN MARSH
52 ACRES RIPARIAN WILLOW WOODLANDS
24 ACRES RIPARIAN COTTONWOOD
24 ACRES WET SHRUBLAND
48 ACRES DESERT SCRUB
1.4 ACRES WESTERN MARSH AT POND AREA
2.5 ACRES RIPARIAN COTTONWOOD AT POND AREA
13 ACRES IRRIGATED FIELD
2 ACRES POND SURFACE AREA
1 ACRE MESIC POLLINATOR AREAS
12 ACRES XERIC POLLINATOR AREAS

APPROVED BY: ----	CHECKED BY: SM	DRAWN BY: CYBW
REV	DESCRIPTION	APPRV
1	FOR REVIEW ONLY	LWF
2	60% RESTORATION PLAN	BS
3	60% REVISION	BS
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX

PALISADES RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION
DETAIL
BEAVER SCREENS

PROJECT ENGINEER:
SWCA
ENVIRONMENTAL & ENGINEERING
1575 Delucchi Lane, Ste 220
Reno, NV 89502

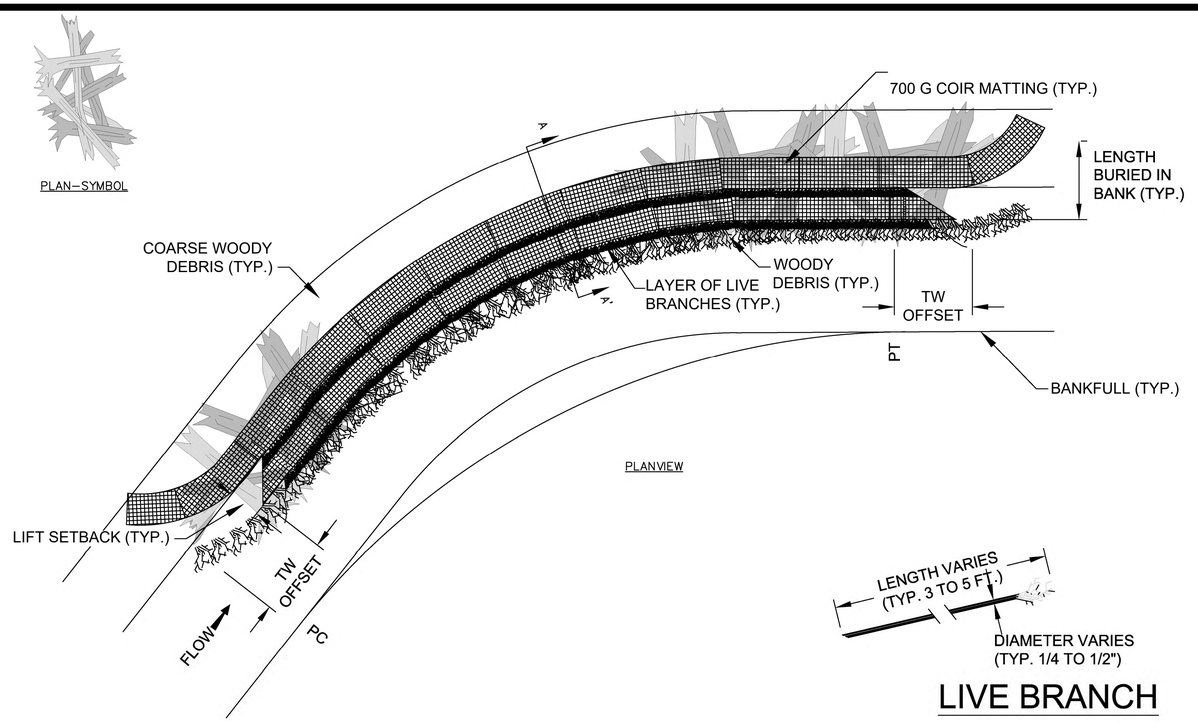
PROJECT OWNER:
MOJAVE DESERT LAND TRUST
Mojave Desert Land Trust P.O. Box 1544, 60124 29 Palms Hwy Joshua Tree, CA 92252

DATE: 01/15/2021

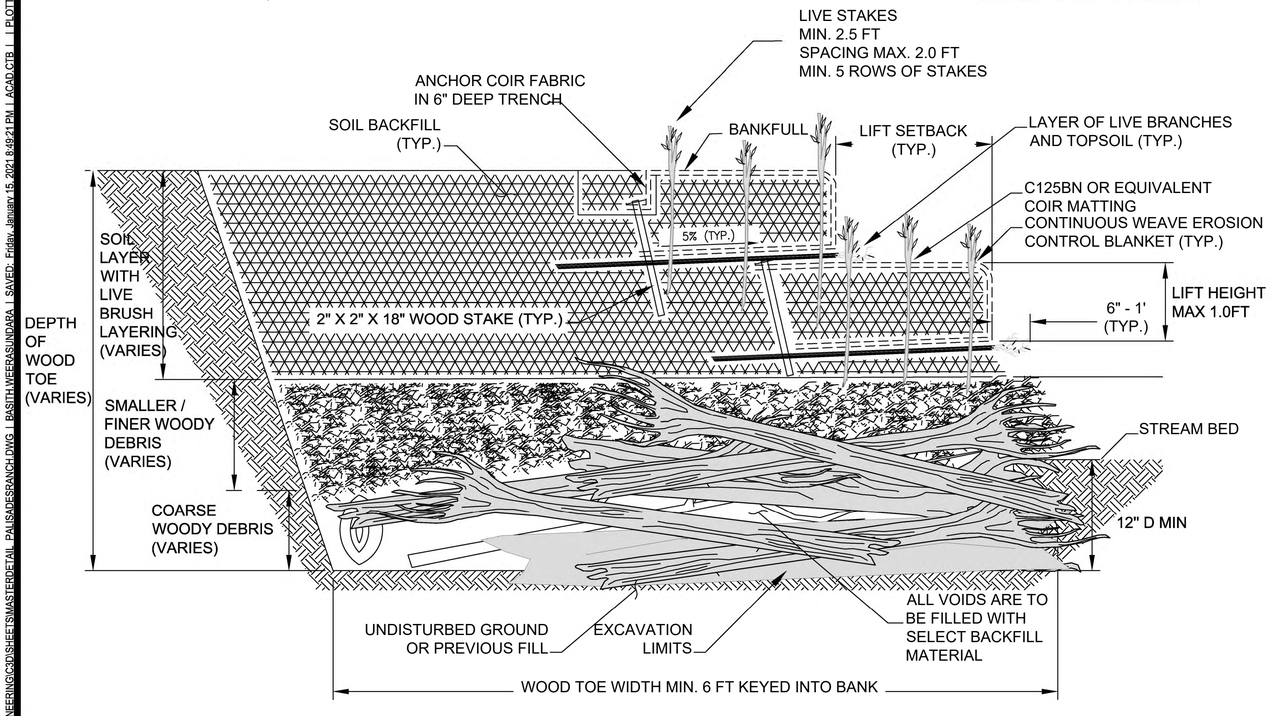
NTS

SHEET NUMBER
35 OF 37

D:\PALISADES RANCH 0664345.0 ENGINEERING\C3D\SHEETS\MASTERDETAIL PALISADESRANCH.DWG | BASITH.WEERASUNDARA | SAVED: Friday, January 15, 2021 6:30:48 PM | ACAD.CTB | | PLOTTED: Friday, January 15, 2021 7:24:11 PM



LIVE BRANCH



ZONE A TYPICAL DETAIL - LARGE WOOD AND BRUSH BANK PROTECTION

NOT TO SCALE

NOTES:

1. COARSE WOODY DEBRIS SHALL CONSIST OF LOGS, ROOTWADS, AND LARGE BRANCHES NOT SUITABLE FOR CONSTRUCTION OF LOG STRUCTURES. LOGS SHOULD BE A MIN. OF 10 FEET LONG AND A DIAMETER OF 6" INCHES AT THE BASE. ALL MATERIALS ARE TO BE APPROVED BY THE ENGINEER.
2. COARSE WOODY DEBRIS SHALL BE CONSTRUCTED WITH THE LARGEST MATERIAL PLACED FIRST. NO LOGS SHALL BE PLACED PARALLEL TO THE FLOW OF WATER, UNLESS DIRECTED BY THE ENGINEER. LOGS SHALL BE PLACED IN A CROSSING PATTERN OR WEAVE SUCH THAT EACH LOG IS ANCHORED BY ANOTHER LOG.
3. SMALL/FINE WOODY DEBRIS SHALL CONSIST OF MEDIUM TO SMALL LIMBS, BRANCHES, BUSHES, AND/OR LOGS. INVASIVE SPECIES SHALL NOT BE USED.
4. SMALL/FINE WOODY DEBRIS SHALL BE PLACED ABOVE THE COARSE WOODY DEBRIS WITH THE LARGEST MATERIAL BEING PLACED FIRST AND THE SMALLEST MATERIAL PLACED LAST.
5. ALL WOODY DEBRIS SHALL BE COMPACTED WITH THE EXCAVATOR BUCKET IN ORDER TO REDUCE THE PRESENCE OF VOIDS IN THE SMALL/FINE WOODY DEBRIS LAYER.
6. THE HORIZONTAL LOCATIONS OF ALL WOODY DEBRIS ARE LOCATED ON THE PLAN AND PROFILE SHEETS AND WILL BE PROVIDED TO THE CONTRACTOR. NO LOCATIONS OF WOODY DEBRIS SHALL VARY FROM THE PLAN LOCATIONS WITHOUT DIRECTION FROM THE ENGINEER.
7. GRAVEL LEVELING BASE SHALL BE INSTALLED ABOVE THE HIGHEST ELEVATION OF THE WOODY DEBRIS BEFORE THE SOIL LIFTS ARE INSTALLED.
8. THE SOIL BACKFILL USED FOR LIFTS AND TOPSOIL USED FOR LAYERING WITH THE LIVE BRANCHES SHALL BE FREE OF ANY LARGE ROOTS OR WOODY DEBRIS AND SHALL GENERALLY BE FREE FROM ANY GRAVEL OR COBBLE MATERIAL.
9. SOIL BACKFILL SHALL BE COMPACTED SUCH THAT FUTURE SETTLING WILL BE KEPT TO A MINIMUM; YET, NOT SUCH THAT THE UNDERLYING BRUSH IS DISPLACED OR DAMAGED.
10. THE TOP OF THE BACKFILL FOR THE FIRST LIFT SHALL BE SLOPED AT APPROXIMATELY 5% AWAY FROM THE STREAM.
11. PLACE A LAYER OF TOPSOIL AND LIVE BRANCHES ON TOP OF EACH SOIL LIFT SUCH THAT APPROXIMATELY 6 INCHES TO 1 FOOT OF EACH LIVE BRANCH WILL BE EXPOSED AND THE REMAINDER (2' TO 4') OF EACH LIVE BRANCH WILL BE COVERED BY THE NEXT SOIL LIFT.
12. LIVE BRANCHES SHALL BE OF THE SPECIES SPECIFIED FOR LIVE STAKES OR APPROVED BY THE ENGINEER AND SHALL EXCLUDE INVASIVE SPECIES.
13. PLACE A LAYER OF 6.5 FEET WIDE SC125BN EROSION CONTROL BLANKET, OR EQUIVALENT, ON TOP OF THE TOPSOIL AND LIVE BRANCHES SUCH THAT 2.5 FEET OF THE BLANKET WILL BE BURIED BELOW THE NEXT SOIL LIFT. ALLOW THE REMAINING 4.0 FEET OF BLANKET TO HANG OVER THE PRECEDING SOIL LIFT OR COIR FIBER LOGS.
14. SOIL CAN BE COMPACTED BY STACKING A PIECE OF 2 X 6 SAWN LUMBER EDGEWAYS UP TO THE LIFT HEIGHT SPECIFIED IN THE STRUCTURE TABLE AND SECURING WITH WOODEN STAKES TO PROVIDE A RIGID BACKSTOP FOR COMPACTING SOIL LIFT.
15. PLACE SOIL BACKFILL UP TO THE LIFT HEIGHT SPECIFIED OF NO GREATER THAN 1.0 FT BEING CAREFUL NOT TO PUSH/PULL OR TEAR THE FABRIC PREVIOUSLY PLACED.
16. THE TOP OF THE SOIL BACKFILL SHALL BE FLAT WITHIN THE LIFT SETBACK DISTANCE SPECIFIED IN THE STRUCTURE TABLE. BEYOND THE LIFT SETBACK DISTANCE, THE SOIL BACKFILL SHALL BE SLOPED AT AN APPROXIMATE 5% SLOPE AWAY FROM THE STREAM.
17. TOP DRESS THE SOIL LIFT WITH TOPSOIL FROM THE FACE OF THE SOIL LIFT BACK INTO THE FLOODPLAIN AT LEAST 4FT.
18. REMOVE THE SAWN LUMBER AND WOODEN STAKES FROM THE FACE OF THE SOIL LIFT AND WRAP THE FACE AND TOP OF THE SOIL LIFT USING THE WOVEN AND NON-WOVEN COIR MATTING HANGING OVER THE PREVIOUS LIFT/COIR FIBER LOGS.
19. THE EROSION CONTROL FABRIC SHALL BE PULLED AS TIGHT AS POSSIBLE WITHOUT TEARING OR EXCESSIVELY DISTORTING THE FABRIC.
20. SECURE THE EROSION CONTROL AND NON-WOVEN MATTING IN PLACE BY STAKING THE END OF THE EROSION CONTROL FABRIC WITH WOODEN STAKES ON 1.5-FOOT CENTERS.
21. BEGIN CONSTRUCTION OF THE NEXT SOIL LIFT BY REPEATING THE PREVIOUS NOTES STARTING WITH NOTE 11.
22. THE OVERALL SLOPE CREATED BY THE LIVE BRUSH LAYERING SHALL MATCH THE PROPOSED CROSS SECTION SHAPE FOR THE OUTER BANK OF THE THE TYPICAL POOL CROSS-SECTION FOR EACH REACH.
23. THE COIR BLANKETS AND GEOTEXTILE FABRIC USED FOR THE UPPER MOST SOIL LIFT WILL BE SECURED WITHIN A 6 INCH DEEP TRENCH AS SHOWN IN DETAIL.
24. THE SURFACE OF THIS STRUCTURE SHALL BE FINISHED TO A SMOOTH AND COMPACT SURFACE IN ACCORDANCE WITH THE LINES, GRADES, AND CROSS-SECTIONS OR ELEVATIONS SHOWN ON THE DRAWINGS. THE DEGREE OF FINISH FOR ELEVATIONS SHALL BE WITHIN +/-0.1 FT OF THE GRADES AND ELEVATIONS INDICATED OR APPROVED BY THE ENGINEER.
25. RE-DRESSING OF CHANNEL AND BANKFULL BENCH/FLOODPLAIN WILL LIKELY BE REQUIRED FOLLOWING INSTALLATION OF IN-STREAM STRUCTURES AND SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION.
26. THE LOWER BANK STABILIZATION IS CRITICAL TO THE DESIGN INTENT OF THIS PROJECT. VARIANCE FROM WOOD TOE BANK STABILIZATION WILL ONLY BE CONSIDERED IF THE WOOD IS NOT AVAILABLE ONSITE.

REV	DESCRIPTION	CHECKED BY: SM	DRAWN BY: CY/BW	APPRV
1	FOR REVIEW ONLY			LWF
2	60% RESTORATION PLAN			BS
3	60% REVISION			BS
XX	XX			XX
XX	XX			XX
XX	XX			XX
XX	XX			XX
XX	XX			XX

APPROVED BY: ----

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION

DETAIL
WOOD TOE

PROJECT ENGINEER:
SWCA ENVIRONMENTAL & ENGINEERING
1575 Delucchi Lane, Ste 220
Reno, NV 89502

PROJECT OWNER:
MOJAVE DESERT LAND TRUST
Mojave Desert Land Trust P.O. Box 1544, 60124 29 Palms Hwy Joshua Tree, CA 92252

DATE: 01/15/2021

NTS

SHEET NUMBER
36 OF 37

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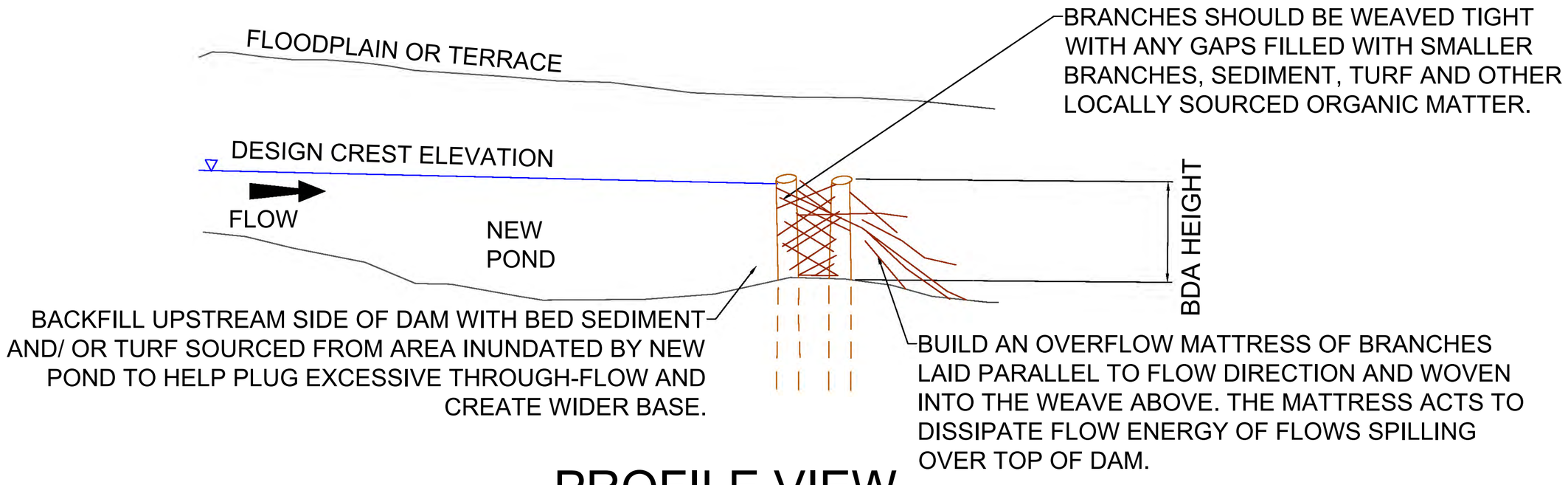
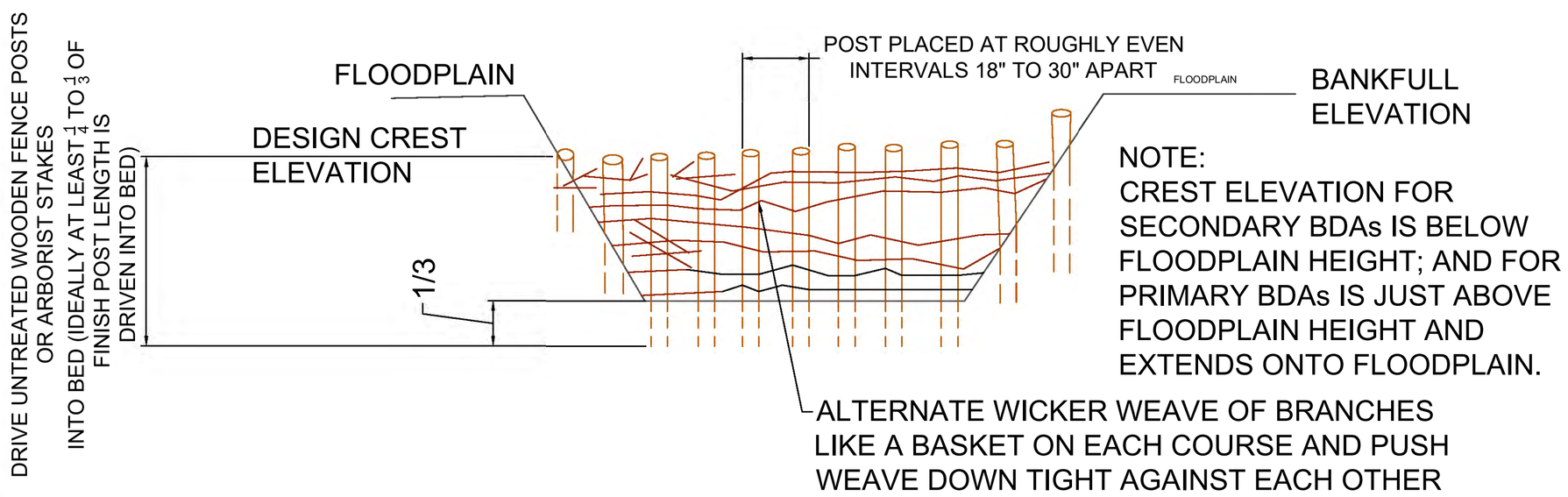
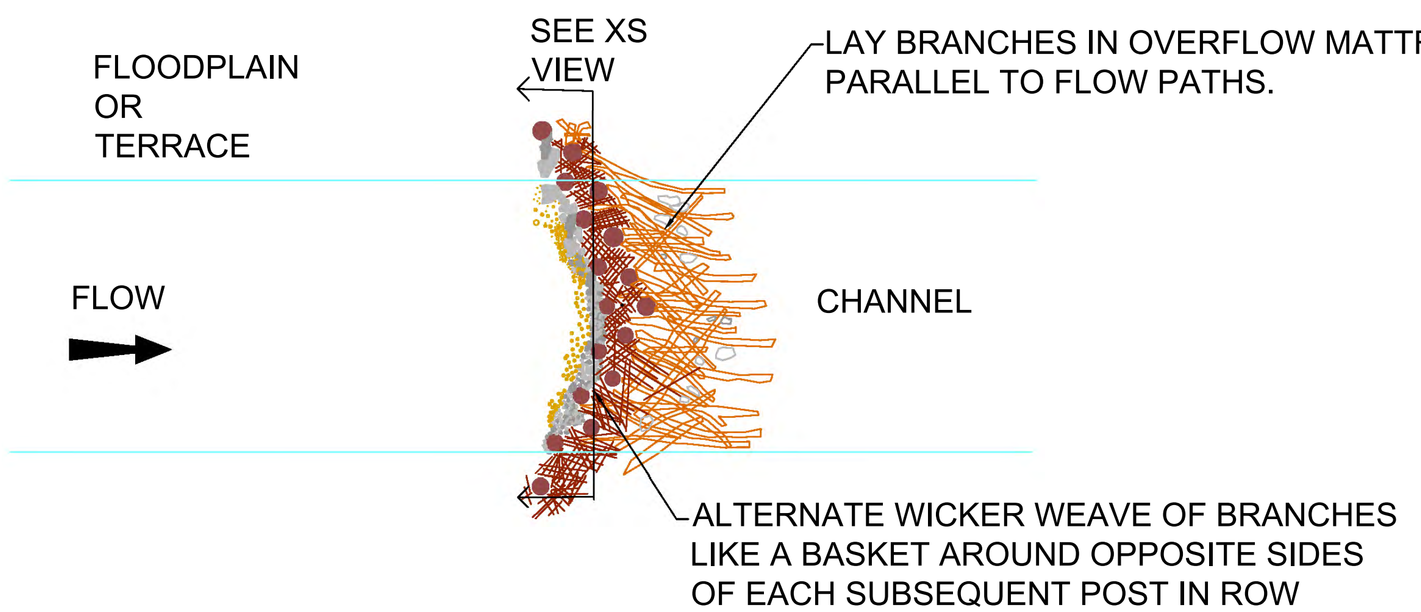


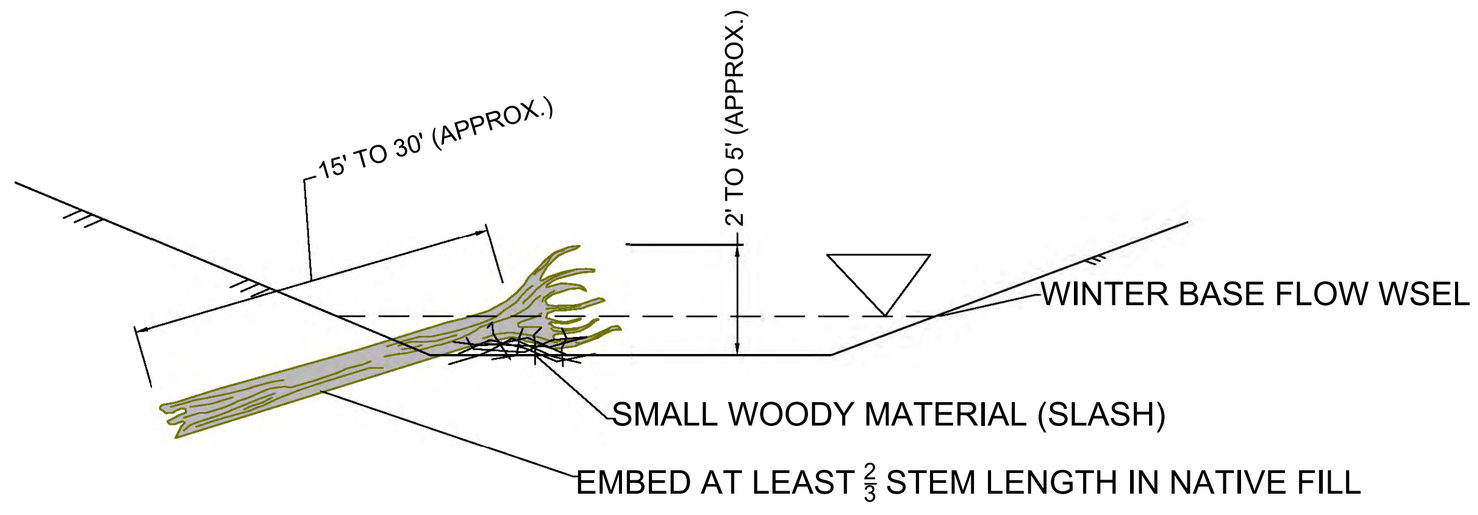
PROFILE VIEW



X-SECTION VIEW



PLAN FORM VIEW



X-SECTION VIEW

TYPICAL DETAILS - BEAVER DAM ANALOGUE AND ROOTWAD

NOT TO SCALE

REFERENCE:
SHAHVERDIAN, S.; WHEATON, J.M.; BENNETT, S.; BOUWES, N.; CAMP, R.; JORDAN, C.; PORTUGAL, E.W.; WEBER, N. LOW-TECH PROCESS BASED RESTORATION OF RIVERSCAPES DESIGN MANUAL. VERSION 1.0, CHAPTER 4, PAGE 59. UTAH STATE UNIVERSITY RESTORATION CONSORTIUM. LOGAN, UT. DOI 10.13140/RG2.2.19590.63049/2.

REV	DESCRIPTION	CHECKED BY: SM	DRAWN BY: JYZ
APPROVED BY: ----			APPRV
1	FOR REVIEW ONLY		LWF
2	60% RESTORATION PLAN		BS
3	60% REVISION		BS
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX

PALISADE RANCH RESTORATION

MOJAVE RIVER
SAN BERNARDINO COUNTY, CA

60% RESTORATION PLAN
NOT FOR CONSTRUCTION
DETAIL
BEAVER DAM ANALOGUE AND ROOTWAD

PROJECT ENGINEER:
SWCA
ENVIRONMENTAL & ENGINEERING
1575 Delucchi Lane, Ste 220
Reno, NV 89502

PROJECT OWNER:
MOJAVE DESERT LAND TRUST
Mojave Desert Land Trust P.O. Box 1544, 60124 29 Palms Hwy Joshua Tree, CA 92252

DATE: 01/15/2021

NTS

SHEET NUMBER
37 OF 37

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APPENDIX E

Cost Estimate for Mojave River Restoration Phases and Revegetation

Palisade Ranch 60% Restoration Plan Opinion of Costs and Quantities				
Phase I Side Channel and Floodplain Restoration				
Mobilization/Demobilization/Staging Area (7% of Total)	Lump Sum	1	$121,039.99	$113,945
SWPPP, Care of Water, and Environmental Protection	Lump Sum	1	$49,767.42	$49,767
Silt Fence	Linear Foot	12950	$2.40	$31,080
Excavation & On Site Disposal (Proposed Side Channel and Floodplain)	Cubic Yard	65220	$10.00	$652,200
Excavation & On Site Disposal (*Final Grading Topographic Features)	Cubic Yard	17104	$10.00	$171,040
Phase I Upland and Riparian Container Plantings and Hydromulch Seeding				
Mycorrhizal research and inoculation	LS	1		$8,561
Western Marsh	Acres	9.7	$4,418.40	$42,858
Riparian Forest (Red Willow)/ Riparian Shrubland (Willow/Mule-Fat)	Acres	24.8	$7,112.40	$176,388
Riparian Forest (Cottonwood)	Acres	16.3	$7,112.40	$115,932
Wet Shrubland (Saltbush)	Acres	23.7	$2,730.00	$64,701
*Spoil Pile Eroson Control Seed	Acres	10.6	$3,000.00	$31,800
Weed Control 24mo.	Acres/Yr	86.1	$200.00	$17,220
Phase I Zone A Temporary Stabilization Treatments				
Toe Wood/Brush with Coir Fabric	Linear Foot	1400	$37.00	$51,800
Large root wod Channel Structures	Each	23	$3,500.00	$79,479
Phase I Beaver Dam Analog in Mainstem Mojave	Each	3	$4,000.00	$12,000
Phase I Zone B Temporary Stabilization Treatments				
Weed-free (non-rice) Straw + Cover Crop Seed	Acres	50	$50.00	$2,500
Floodplain Sill/Roughness Features	Each	41	$125.00	$5,178
Upland Brush Bundles/Log/Straw Habitat Clusters	Each	41	$65.00	$2,693
Phase I PIP vegetation and transplating	Lump Sum	1	$100,000.00	$100,000
Phase I Sub Total				**$1,729,143**
Phase II Pond, Irrigation Field, West Branch Side Channel, West Island Connector				
SWPPP, Care of Water, and Environmental Protection	Lump Sum	1	$52,012.53	$52,013
Mobilization/Demobilization/Staging Area (7% of Total)	Lump Sum	1	$119,315.96	$103,960
Excavation & On Site Disposal (Pond)	Cubic Yard	42650	$10.00	$426,500
Excavation & On Site Disposal (Irrigation Field)	Cubic Yard	380	$9.00	$3,420
Excavation & On Site Disposal (West Branch Side Channel)	Cubic Yard	12000	$10.00	$120,000
Excavation & On Site Disposal (West Island Connector Channel)	Cubic Yard	17600	$9.00	$158,400
Excavation & On Site Disposal (*Final GradingTopographic Features)	Cubic Yard	11006	$9.00	$99,054
Headgate Outlet Structure	Lump Sum	1	$4,000.00	$4,000
Ground Water Pump and Utility Housing	Lump Sum	1	$15,000.00	$15,000
Pond Liner (EPDM 1.15mm)	Square Foot	87120	$2.50	$217,800
Island and Habitat Enhancement Bank Features	Lump Sum	1	1875	$1,875
Phase II Zone A Temporary Stabilization Treatments				
Weed-free (non-rice) Straw + Cover Crop Seed	Square Yard	20	50	$1,000
Phase II Zone B Temporary Stabilization Treatments				
Weed-free (non-rice) Straw + Cover Crop Seed	Square Yard	20	50	$1,000
Upland Brush Bundles/Log/Straw Habitat Clusters	Each	9.5	65	$618
Phase II Upland and Riparian Container Plantings				
Western Marsh	Acres	3	$4,418.40	$13,255
Riparian Forest (Red Willow)/ Riparian Shrubland (Willow/Mule-Fat)	Acres	9.3	$7,112.40	$66,145
Riparian Forest (Cottonwood)	Acres	25.7	$7,112.40	$182,789
Wet Shrubland (Saltbush)	Acres	1.4	$2,730.00	$3,822
Desert Scrub (Creosote)	Acres	48.1	$4,082.40	$196,363
Weed Control (24mo.)	Acres	87.5	$200.00	$17,500
Phase II PIP vegetation and transplanting	LS	1	$20,000.00	$20,000
Phase II Sub Total				**$1,704,514**
Phase III Polinator Gardens and Recreation Amenitites				
SWPPP, Care of Water, and Environmental Protection	Lump Sum	1	$22,423.08	$22,423
Mobilization/Demobilization/Staging Area (7% of Total)	Lump Sum	1	$52,646.05	$44,512
Western Marsh	Acres	3	$4,000.00	$12,000
Excavation & On Site Disposal (Proposed 5yr Discharge Channel)	Cubic Yard	2700	$9.00	$24,300
Excavation & On Site Disposal (Pollinator Garden Area)	Cubic Yard	29040	$10.00	$290,400
Riparian Forest (Red Willow)/ Riparian Shrubland (Willow/Mule-Fat)	Acres	11.7	$7,112.40	$83,215
Mesic Pollinator Gardens	Acres	1	$7,502.40	$10,503
Wet Shrubland (Saltbush)	Acres	4	$2,730.00	$9,828
Xeric Pollinator Gardens	Acres	12	$2,114.40	$24,316
Weed Control (12mo.)	Acres/Yr.	17	$200.00	$3,300
Crusher Trail - Crushed Aggregate Base	Square Yard	10651.1	$3.00	$31,953
Boardwalk 50-ft length	LS	1	$15,000.00	$15,000
Native Ground Nature Trail	Square Yard	7450	$0.30	$2,235
Overlook Wall with Stone Facia	LS	1	$17,000.00	$17,000
Overlook Flagstone Patio	Square Yard	1625.7	$36.00	$58,524
Educational Kiosk, Resting Areas, Birding Scope	LS	1	$55,000.00	$55,000
*Beaver Dam Analog Small	EA	25	$2,000.00	$50,000
*Beaver Dam Analog Large	EA	5	$4,000.00	$20,000
Phase III Sub Total				**$752,086**
Total All Phases Estimated Construction Costs				**4,185,743**
20% Construction Contingency				**$ 837,149**
Final Engineering Design (10% of Total)				**$ 358,574**
Irrigation System	**LS**			**$ 50,000**
Construction Oversight Engineer and Field Biologist All Phases (5% of Total)				**$ 251,145**
Total Estimated Project Budget				**$5,682,610**

*Final Grading Topographic Features are included in the cost table to account for the additional grading of islands and topographic variety to add habitat value and interest to the landscape. 60% Restoration Plans show general grading of the Side channels and floodplain and do not include the anticipated grading along the margins. Quantities included in the table assume grading would include an additional 20% of Excavation and On-site Placement.

* Beaver Dam Analogs in the restored area are anticipated to be installed during Phase II and Phase III. The timing of installation will be determined based on site conditions and the establishment of the Pilot Channel and Riparian Plantings

*Cover Crop (Sterile Sorghum) is assumed to be planted for entire Agricultural Field for 12 months (min.) prior to excavation

*Assumes that the Hillock area would be used as temporary spoil pile and need to be seeded between phases.

*Weed Control assumed for entire site for 12 months prior to construction. Thereafter, weed control is assumed for a 24 month period in areas planned for construction activities.

APPENDIX 2

AIR QUALITY and GHG IMPACT ANALYSES

MDL-274
MOJAVE DESERT LAND TRUST PALISADES RANCH RESTORATION PROJECT

COUNTY OF SAN BERNARDINO, CALIFORNIA

Prepared by:

Giroux & Associates

Prepared for:

Tom Dodson & Associates
Attn: Kaitlyn Dodson
PO Box 2307
San Bernardino, CA 92406

Date:

March 24, 2022

Project No.: P21-031 A

ATMOSPHERIC SETTING

The climate of the Victor Valley, technically called an interior valley subclimate of Southern California's Mediterranean-type climate, is characterized by hot summers, mild winters, infrequent rainfall, moderate afternoon breezes, and generally fair weather. The clouds and fog that form along the Southern California coastline rarely extend across the mountains to Victorville and surrounding high desert communities. The most important local weather pattern is associated with the funneling of the daily onshore sea breeze through El Cajon Pass into the upper desert to the northeast of the heavily developed portions of the Los Angeles Basin. This daily airflow brings polluted air into the area late in the afternoon from late spring to early fall. This transport pattern creates both unhealthful air quality as well as destroying the scenic vistas of the mountains surrounding the Victor Valley.

The low annual humidity, moderate temperature swings, very low rainfall and frequent breezy conditions are typical of California's "Upper Desert" subclimate. Most years do not see temperatures drop below about 20°F or above about 105°F. Occasionally, however, there are some very hot temperatures over 105°F with a record high of 113°F in 1995, and some colder temps down to a record low of -1°F in December 1949.

The Victor Valley is in a transition area between the semi-arid conditions of the Los Angeles Basin and the completely arid portions of the Mojave Desert. The Valley's location in the "rainshadow" of the San Gabriel Mountains further enhances its dryness. Rainfall averages around 6 inches per year, with light to moderate rain falling on only 10 days per year. Because of Southern California's location on the edge of the mid-latitude storm track, a shift in the jet stream aloft of a few hundred miles north or south can mean the difference between a year with twice the annual average rainfall and one with drought conditions where less than one-half of the normal rainfall is observed. The project area may occasionally experience a light winter snowfall (1-2 inches per year), but temperatures do not remain cold enough for the snow to stay on the ground for very long.

Winds blow primarily from south to north and from west to east in response to the regional pattern of airflow from the cool ocean to the heated interior. A large portion of the airflow across the proposed project area therefore has its origin in more developed areas of the Los Angeles Basin. Over 50 percent of all airflow derives from a narrow sector from south through west. These winds are moderately strong, averaging from 8-12 mph, but become light and variable at night with about 10 percent of all hours almost complete calm. Afternoon winds may, at times, exceed 20 mph and begin to pick up fine dust and other loose material.

The wind distribution is an important atmospheric parameter because it controls both the initial rate of pollutant dispersal near the source as well as the ultimate regional trajectory of air pollution. These prevailing winds provide a vehicle for visible smog to be transported from the South Coast Air Basin through the mountain passes to the Mojave Desert Air Basin (MDAB). The rapid daytime heating of the lower air leads to convective activity. This exchange of upper air tends to accelerate surface winds during the warm part of the day when convection is at a maximum. During the winter, the rapid cooling of the surface layers at night retards this exchange of momentum which often results in calm winds.

In addition to winds which govern the horizontal dispersion of locally generated emissions, vertical temperature structure controls the depth through which pollutants can be mixed. The strong surface heating by day in the Mojave Desert usually creates a vertical temperature distribution that decreases rapidly with height (unstable). At night, especially in winter, cool air settles in low-lying areas and forms shallow radiation-induced temperature inversions (stable) that may temporarily restrict the dispersion of low-level pollutant emissions. Such inversions "burn off" rapidly after sunrise. The elevated subsidence/marine inversions that create major air quality problems in coastal environments are rarely observed in the desert. When they do form, their bases are from 6 - 8,000 feet mean sea level and thus do not impede vertical dispersion. The low-level radiation inversions, however, play an important role in limiting the dispersive capacity of the local airshed from late evening to the next morning. Because they burn off rapidly in the morning, their importance to the dispersion of air contaminants is limited to localized effects.

AIR QUALITY SETTING

AMBIENT AIR QUALITY STANDARDS (AAQS)

In order to gauge the significance of the air quality impacts of the proposed project, those impacts, together with existing background air quality levels, must be compared to the applicable ambient air quality standards. These standards are the levels of air quality considered safe, with an adequate margin of safety, to protect the public health and welfare. They are designed to protect those people most susceptible to further respiratory distress such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and persons engaged in strenuous work or exercise, called "sensitive receptors." Healthy adults can tolerate occasional exposure to air pollutant concentrations considerably above these minimum standards before adverse effects are observed. Recent research has shown, however, that chronic exposure to ozone (the primary ingredient in photochemical smog) may lead to adverse respiratory health even at concentrations close to the ambient standard.

National AAQS were established in 1971 for six pollution species with states retaining the option to add other pollutants, require more stringent compliance, or to include different exposure periods. The initial attainment deadline of 1977 was extended several times in air quality problem areas like Southern California. In 2003, the Environmental Protection Agency (EPA) adopted a rule, which extended and established a new attainment deadline for ozone for the year 2021. Because the State of California had established AAQS several years before the federal action and because of unique air quality problems introduced by the restrictive dispersion meteorology, there is considerable difference between state and national clean air standards. Those standards currently in effect in California are shown in Table 1. Sources and health effects of various pollutants are shown in Table 2.

The Federal Clean Air Act Amendments (CAAA) of 1990 required that the U.S. Environmental Protection Agency (EPA) review all national AAQS in light of currently known health effects. EPA was charged with modifying existing standards or promulgating new ones where appropriate. EPA subsequently developed standards for chronic ozone exposure (8+ hours per day) and for very small diameter particulate matter (called "PM-2.5"). New national AAQS were adopted in 1997 for these pollutants.

Planning and enforcement of the federal standards for PM-2.5 and for ozone (8-hour) were challenged by trucking and manufacturing organizations. In a unanimous decision, the U.S. Supreme Court ruled that EPA did not require specific congressional authorization to adopt national clean air standards. The Court also ruled that health-based standards did not require preparation of a cost-benefit analysis. The Court did find, however, that there was some inconsistency between existing and "new" standards in their required attainment schedules. Such attainment-planning schedule inconsistencies centered mainly on the 8-hour ozone standard. EPA subsequently agreed to downgrade the attainment designation for a large number of communities to “non-attainment” for the 8-hour ozone standard.

Table 1

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)[8]	1 Hour	0.09 ppm (180 µg/m³)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m³)		0.070 ppm (137 µg/m³)		
Respirable Particulate Matter (PM10)[9]	24 Hour	50 µg/m³	Gravimetric or Beta Attenuation	150 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m³		—		
Fine Particulate Matter (PM2.5)[9]	24 Hour	—	—	35 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m³	Gravimetric or Beta Attenuation	12.0 µg/m³	15 µg/m³	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m³)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m³)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m³)		9 ppm (10 mg/m³)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m³)		—	—	
Nitrogen Dioxide (NO_2)[10]	1 Hour	0.18 ppm (339 µg/m³)	Gas Phase Chemiluminescence	100 ppb (188 µg/m³)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m³)		0.053 ppm (100 µg/m³)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1 Hour	0.25 ppm (655 µg/m³)	Ultraviolet Fluorescence	75 ppb (196 µg/m³)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m³)	
	24 Hour	0.04 ppm (105 µg/m³)		0.14 ppm (for certain areas)[11]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[11]	—	
Lead[12,13]	30 Day Average	1.5 µg/m³	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m³ (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m³		
Visibility Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 µg/m³	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m³)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 µg/m³)	Gas Chromatography			

See footnotes on next page ...

For more information please call ARB-PIO at (916) 322-2990

California Air Resources Board (5/4/16)

Table 1 (continued)

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7. Reference method as described by the U.S. EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the U.S. EPA.

8. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

9. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary standard of 15 $\mu g/m^3$. The existing 24-hour PM10 standards (primary and secondary) of 150 $\mu g/m^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

10. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

11. On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

    Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

12. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

13. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

14. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

For more information please call ARB PIO at (916) 322-2990 **California Air Resources Board (5/4/16)**

Table 2
Health Effects of Major Criteria Pollutants

Pollutants	Sources	Primary Effects
Carbon Monoxide (CO)	• Incomplete combustion of fuels and other carbon-containing substances, such as motor exhaust. • Natural events, such as decomposition of organic matter.	• Reduced tolerance for exercise. • Impairment of mental function. • Impairment of fetal development. • Death at high levels of exposure. • Aggravation of some heart diseases (angina).
Nitrogen Dioxide (NO_2)	• Motor vehicle exhaust. • High temperature stationary combustion. • Atmospheric reactions.	• Aggravation of respiratory illness. • Reduced visibility. • Reduced plant growth. • Formation of acid rain.
Ozone (O_3)	• Atmospheric reaction of organic gases with nitrogen oxides in sunlight.	• Aggravation of respiratory and cardiovascular diseases. • Irritation of eyes. • Impairment of cardiopulmonary function. • Plant leaf injury.
Lead (Pb)	• Contaminated soil.	• Impairment of blood function and nerve construction. • Behavioral and hearing problems in children.
Respirable Particulate Matter (PM-10)	• Stationary combustion of solid fuels. • Construction activities. • Industrial processes. • Atmospheric chemical reactions.	• Reduced lung function. • Aggravation of the effects of gaseous pollutants. • Aggravation of respiratory and cardio respiratory diseases. • Increased cough and chest discomfort. • Soiling. • Reduced visibility.
Fine Particulate Matter (PM-2.5)	• Fuel combustion in motor vehicles, equipment, and industrial sources. • Residential and agricultural burning. • Industrial processes. • Also, formed from photochemical reactions of other pollutants, including NOx, sulfur oxides, and organics.	• Increases respiratory disease. • Lung damage. • Cancer and premature death. • Reduces visibility and results in surface soiling.
Sulfur Dioxide (SO_2)	• Combustion of sulfur-containing fossil fuels. • Smelting of sulfur-bearing metal ores. • Industrial processes.	• Aggravation of respiratory diseases (asthma, emphysema). • Reduced lung function. • Irritation of eyes. • Reduced visibility. • Plant injury. • Deterioration of metals, textiles, leather, finishes, coatings, etc.

Source: California Air Resources Board, 2002.

Evaluation of the most current data on the health effects of inhalation of fine particulate matter prompted the California Air Resources Board (ARB) to recommend adoption of the statewide PM-2.5 standard that is more stringent than the federal standard. This standard was adopted in 2002. The State PM-2.5 standard is more of a goal in that it does not have specific attainment planning requirements like a federal clean air standard, but only requires continued progress towards attainment.

Similarly, the ARB extensively evaluated health effects of ozone exposure. A new state standard for an 8-hour ozone exposure was adopted in 2005, which aligned with the exposure period for the federal 8-hour standard. The California 8-hour ozone standard of 0.07 ppm is more stringent than the federal 8-hour standard of 0.075 ppm. The state standard, however, does not have a specific attainment deadline. California air quality jurisdictions are required to make steady progress towards attaining state standards, but there are no hard deadlines or any consequences of non-attainment. During the same re-evaluation process, the ARB adopted an annual state standard for nitrogen dioxide ($NO_{2)}$ that is more stringent than the corresponding federal standard, and strengthened the state one-hour NO_2 standard.

As part of EPA's 2002 consent decree on clean air standards, a further review of airborne particulate matter (PM) and human health was initiated. A substantial modification of federal clean air standards for PM was promulgated in 2006. Standards for PM-2.5 were strengthened, a new class of PM in the 2.5 to 10 micron size was created, some PM-10 standards were revoked, and a distinction between rural and urban air quality was adopted. In December, 2012, the federal annual standard for PM-2.5 was reduced from 15 $\mu g/m^3$ to 12 $\mu g/m^3$ which matches the California AAQS. The severity of the basin's non-attainment status for PM-2.5 may be increased by this action and thus require accelerated planning for future PM-2.5 attainment.

In response to continuing evidence that ozone exposure at levels just meeting federal clean air standards is demonstrably unhealthful, EPA had proposed a further strengthening of the 8-hour standard. A new 8-hour ozone standard was adopted in 2015 after extensive analysis and public input. The adopted national 8-hour ozone standard is 0.07 ppm which matches the current California standard. It will require three years of ambient data collection, then 2 years of non-attainment findings and planning protocol adoption, then several years of plan development and approval. Final air quality plans for the new standard are likely to be adopted around 2022. Ultimate attainment of the new standard in ozone problem areas such as Southern California might be after 2025.

Of the standards shown in Table 1, those for ozone (O_3), and particulate matter (PM-10) are exceeded at times in the MDAB. They are called "non-attainment pollutants." Because of the variations in both the regional meteorology and in area-wide differences in levels of air pollution emissions, patterns of non-attainment have strong spatial and temporal differences.

BASELINE AIR QUALITY

Monitoring of air quality in the MDAB is the responsibility of the Mojave Desert Air Quality Management District (MDAQMD) headquartered in Victorville, California. Existing levels of criteria air pollutants in the project area can generally be inferred from measurements conducted at the Victorville Station at 14306 Park Avenue. Although the Victorville Station monitors most of the spectrum of pollutants, data for CO is no longer monitored in the Mojave Desert. Table 4 summarizes the last four years of monitoring data from the available data at for this monitoring station. From these data one can infer that baseline air quality levels near the project site are occasionally unhealthful, but that such violations of clean air standards usually affect only those people most sensitive to air pollution exposure.

a. Photochemical smog (ozone) levels occasionally exceed standards. The 8-hour state ozone standard has been exceeded approximately nine percent of all days in the last four years while the 1-hour state standard has been exceeded less than one percent of all days. The 8-hour federal standard has been exceeded approximately four percent of all days in the past four years. Attainment of all clean air standards in the project vicinity is not likely to occur soon, but the severity and frequency of violations is expected to continue to slowly decline during the current decade

b. Respirable dust (PM-10) levels often exceed the state standard of 50 $\mu g/m^3$ but the less stringent federal PM-10 standard of 150 $\mu g/m^3$ is violated with much less frequency. However, given the high Max. 24-Hour concentrations it is clear that PM-10 is still of concern.

c. A substantial fraction of PM-10 is comprised of ultra-small diameter particulates capable of being inhaled into deep lung tissue (PM-2.5). There have only been four measured violations in the last four years and all four violations were in 2020 presumably impacted by wildfire.

Although complete attainment of every clean air standard is not yet imminent, extrapolation of the steady improvement trend suggests that such attainment could occur within the reasonably near future.

Table 3

Air Quality Monitoring Summary (2017-2020)
(Number of Days Standards Were Exceeded, and
Maximum Levels During Such Violations)
(Entries shown as estimated days exceeding standard)

Pollutant/Standard	2017	2018	2019	2020
Ozone				
1-Hour > 0.09 ppm (S)	0	5	3	4
8-Hour > 0.07 ppm (S)	17	55	29	35
8- Hour > 0.075 ppm (F)	7	27	13	17
Max. 1-Hour Conc. (ppm)	0.088	0.107	0.104	0.112
Max. 8-Hour Conc. (ppm)	0.082	0.096	0.081	0.094
Nitrogen Dioxide				
1-Hour > 0.18 ppm (S)	0	0	0	0
Max. 1-Hour Conc. (ppm)	0.057	0.051	0.056	0.059
Inhalable Particulates (PM-10)				
24-Hour > 50 $\mu g/m^3$ (S)	na	na	na	na
24-Hour > 150 $\mu g/m^3$ (F)	1	1	2	2
Max. 24-Hr. Conc. ($\mu g/m^3$)	182.5	165.2	170.0	261.4
Ultra-Fine Particulates (PM-2.5)				
24-Hour > 35 $\mu g/m^3$ (F)	0	0	0	4
Max. 24-Hr. Conc. ($\mu g/m^3$)	27.2	32.7	17.8	48.4

na = not available
S=State Standard
F=Federal Standard

Source: Victorville Station: Ozone, CO, NO_2, PM-10, PM-2.5
data: www.arb.ca.gov/adam/

AIR QUALITY IMPACTS

STANDARDS OF SIGNIFICANCE

The Mojave Desert AQMD has adopted numerical emissions thresholds as indicators of potential impact even if the actual air quality increment cannot be directly quantified. The MDAQMD thresholds are as follows:

Carbon Monoxide (CO)	548 pounds/day	100 tons/year
Nitrogen Oxides (NOx)	137 pounds/day	25 tons/year
Sulfur Oxides (SOx)	137 pounds/day	25 tons/year
Reactive Organic Gases (ROG)	137 pounds/day	25 tons/year
Particulate Matter (PM-10)	82 pounds/day	15 tons/year
Particulate Matter (PM-2.5)	65 pounds/day	12 tons/year
GHG	548,000 pounds/day	100,000 tons/year

SENSITIVE USES

The project site is located in the high desert region of San Bernardino County. The area surrounding the project site is rural in nature with very little development. For the most part, the property itself sits vacant, unimproved, and unused.

There are several residences on site. There are 3 unoccupied and uninhabitable houses, one house occupied by a caretaker and an office/apartment complex where one tenant lives. The rest of the office/apt complex is empty. The house and complex are next to each other. These two occupied residences are the nearest occupied residences to the project site.

PROJECT DESCRIPTION

The project will provide restoration measures for critical hydrological processes and habitat health. The major phases are:

1. Riparian Restoration The restoration plan involves reconnecting a 170-acre abandoned agricultural field that was historically riparian habitat to the Mojave River by reestablishing a nested floodplain that resembles historic floodplain conditions. This would entail constructing a 6,600-foot main side channel, a 1,425-foot west branch side channel with bank structures to provide long-term stability. Finally, facilitation of vegetation of the river restoration
2. Riparian Enhancement This will mostly involve weed management.
3. Zones of Encouragement of Public Access The project includes a 1.8-mile trail system.

Construction of the entire project has a target completion date of 6 years (72 months), with the anticipated start date of construction in October 2022.

During construction, many of the tools used will be manual tools for cutting and pruning: e.g. weed-eaters, backpack sprayers for herbicides, spades, hand trowels, rakes, hoes, buckets for manual broadcasting of erosion control seed and other manual digging tools. However, only diesel fueled equipment which can generate harmful emissions are analyzed for this study.

The project applicants have identified the following equipment expected for use in almost all activities: skid steer loader with mower attachment, backhoe/loader, excavator and water pump.

As a worst case it is assumed that two of each of these pieces of equipment are used daily for the entire anticipated six years of construction. The emissions generated from this equipment was then compared to their respective MDAQMD thresholds.

Operationally, it is anticipated that there will be an additional 10 visitor trips per day as a result of project implementation. A 40-mile round trip distance was assumed.

Temporary irrigation of the restoration areas is necessary for up to three years after revegetation. It is anticipated that the amount of water used per day would be approximately 66,000 gallons which would equate to 24,090,000 gallons per year if watering occurred 365 days per year.

CONSTRUCTION AND OPERATIONAL ACTIVITY IMPACTS

CalEEMod was developed by the SCAQMD to provide a model by which to calculate both construction emissions and operational emissions from a variety of land use projects. It calculates both the daily maximum and annual average emissions for criteria pollutants as well as total or annual greenhouse gas (GHG) emissions. CalEEMod2020.4.0 was used to analyze project impacts.

Utilizing the equipment fleet discussed, the following worst-case daily construction emissions are calculated by CalEEMod and are listed in Table 4 as compared to the MDAQMD thresholds. Maximum annual project-related air pollution emissions relative to the yearly MDAQMD thresholds are shown in Table 5.

Table 4
Daily Emissions (lbs/day)

Maximal Construction Emissions	ROG	NOx	CO	SO_2	PM-10	PM-2.5
2022	1.5	13.6	19.9	<0.1	0.8	0.7
2023	1.4	12.5	19.8	<0.1	0.8	0.6
2024	1.3	11.6	19.8	<0.1	0.7	0.5
2025	1.3	10.8	19.7	<0.1	0.6	0.5
2026	1.2	10.8	19.7	<0.1	0.6	0.5
2027	1.2	10.8	19.6	<0.1	0.6	0.5
2028	1.2	10.8	19.6	<0.1	0.6	0.5
Maximal Operational Emissions	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Peak Daily Project Emissions	**1.5**	**13.6**	**19.9**	**<0.1**	**0.8**	**0.7**
MDAQMD Thresholds	137	137	548	137	82	82
Exceeds Thresholds?	*No*	*No*	*No*	*No*	*No*	*No*

Table 5
Annual Emissions (tons/year)

Maximal Construction Emissions	ROG	NOx	CO	SO_2	PM-10	PM-2.5
2022	0.04	0.37	0.54	<0.01	0.02	0.02
2023	0.18	1.62	2.57	<0.01	0.10	0.08
2024	0.18	1.52	2.58	<0.01	0.09	0.07
2025	0.16	1.41	2.56	<0.01	0.08	0.06
2026	0.16	1.51	2.56	<0.01	0.08	0.06
2027	0.16	1.41	2.55	<0.01	0.08	0.06
2028	0.13	1.11	2.04	<0.01	0.06	0.05
Maximal Operational Emissions	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Peak Annual Project Emissions	**0.18**	**1.62**	**2.58**	**<0.01**	**0.10**	**0.08**
MDAQMD Thresholds	25	25	100	25	15	15
Exceeds Thresholds?	*No*	*No*	*No*	*No*	*No*	*No*

Maximum project-related air pollution emissions were compared to daily and annual MDAQMD thresholds. Maximum daily and annual emissions are less than their associated CEQA thresholds.

MITIGATION

CONSTRUCTION EMISSIONS MITIGATION

Short-term emissions are primarily related to the construction of the project and are recognized to be short in duration and without lasting impacts on air quality. With the enhanced dust control mitigation measures listed below, construction activity air pollution emissions are not expected to exceed MDAQMD CEQA thresholds for any pollutant. Regardless, the PM-10 non-attainment status of the Mojave Desert area requires that Best Available Control Measures (BACMs) be used as required by the Mojave AQMD Rule 403. Recommended construction activity mitigation includes:

Dust Control

- Apply soil stabilizers such as hay bales or aggregate cover to inactive areas.
- Prepare a high wind dust control plan and implement plan elements and terminate soil disturbance when winds exceed 25 mph.
- Stabilize previously disturbed areas if subsequent construction is delayed.
- Water exposed surfaces and haul roads 3 times/day.
- Cover all stockpiles with tarps.
- Replace ground cover in disturbed areas quickly.
- Reduce speeds on unpaved roads to less than 15 mph.
- Trenches shall be left exposed for as short a time as possible.

PROJECT RELATED GHG EMISSIONS GENERATION

GHG THRESHOLDS

The MDAQMD has published thresholds for Greenhouse Gases emissions (CO_2e). The daily threshold is 548,000 lbs/day and the annual threshold is 100,000 MT/year.

CONSTRUCTION ACTIVITY GHG EMISSIONS

The project is assumed to require at least six years to complete. The CalEEMod2020.4.0 computer model predicts that the construction activities will generate the annual CO_2e emissions identified in Table 6.

Table 6
Construction Emissions (Metric Tons CO_2e)

	CO_2e Daily	**MT CO_2e Annual**
Construction 2022	3,123.7	77.6
Construction 2023	3,120.2	366.4
Construction 2024	3,117.0	368.9
Construction 2025	3,113.7	367.2
Construction 2026	3,110.2	366.8
Construction 2027	3,106.9	366.4
Construction 2028	3,104.2	290.4
Operational	<0.1	47.7
Max Project Emissions	**3,123.7**	**416.6**
Threshold	548,000	100,000

CalEEMod Output provided in appendix

Construction GHG emissions are less than applicable thresholds.

CALEEMOD2020.4.0 COMPUTER MODEL OUTPUT

- **DAILY EMISISONS**
- **ANNUAL EMISSIONS**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

MOJAVE DESERT LAND TRUST

Mojave Desert Air Basin, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Recreational	1.00	User Defined Unit	10.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	31
Climate Zone	10			**Operational Year**	2023
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	390.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - 10 acre ground disturbance per day

Construction Phase - 6 years of construction

Off-road Equipment - 2 loader/backhoes, 2 skid steer loaders. 2 excavators, 2 pumps

Trips and VMT - 20 worker trips per day

Vehicle Trips - 10 visitors per day, 40 mile round trip

Water And Wastewater - 66,000 gallons water per day or 24,090,000 gallons per year for 365 days

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	10.00	1,567.00
tblLandUse	LotAcreage	0.00	10.00

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	2.00
tblVehicleTrips	CC_TL	7.30	40.00
tblVehicleTrips	CNW_TL	7.30	40.00
tblVehicleTrips	CW_TL	9.50	40.00
tblVehicleTrips	ST_TR	0.00	10.00
tblVehicleTrips	SU_TR	0.00	10.00
tblVehicleTrips	WD_TR	0.00	10.00
tblWater	OutdoorWaterUseRate	0.00	24,090,000.00

2.0 Emissions Summary

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	1.5380	13.6249	19.8955	0.0323	0.1643	0.6817	0.8460	0.0436	0.6521	0.6957	0.0000	3,106.9276	3,106.9276	0.6192	4.3700e-003	3,123.7096
2023	1.4283	12.4533	19.8147	0.0323	0.1643	0.5870	0.7513	0.0436	0.5617	0.6052	0.0000	3,103.7256	3,103.7256	0.6125	4.0200e-003	3,120.2362
2024	1.3467	11.6396	19.7750	0.0322	0.1643	0.5185	0.6828	0.0436	0.4958	0.5393	0.0000	3,100.6821	3,100.6821	0.6101	3.7200e-003	3,117.0440
2025	1.2539	10.7728	19.6972	0.0322	0.1643	0.4426	0.6069	0.0436	0.4233	0.4669	0.0000	3,097.5130	3,097.5130	0.6055	3.4700e-003	3,113.6839
2026	1.2497	10.7697	19.6643	0.0321	0.1643	0.4425	0.6068	0.0436	0.4233	0.4668	0.0000	3,094.0535	3,094.0535	0.6052	3.2600e-003	3,110.1533
2027	1.2459	10.7671	19.6362	0.0321	0.1643	0.4425	0.6068	0.0436	0.4232	0.4668	0.0000	3,090.9251	3,090.9251	0.6049	3.0800e-003	3,106.9646
2028	1.2424	10.7649	19.6128	0.0321	0.1643	0.4424	0.6067	0.0436	0.4232	0.4668	0.0000	3,088.1677	3,088.1677	0.6047	2.9300e-003	3,104.1567
Maximum	**1.5380**	**13.6249**	**19.8955**	**0.0323**	**0.1643**	**0.6817**	**0.8460**	**0.0436**	**0.6521**	**0.6957**	**0.0000**	**3,106.9276**	**3,106.9276**	**0.6192**	**4.3700e-003**	**3,123.7096**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

2.1 Overall Construction (Maximum Daily Emission)

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	1.5380	13.6249	19.8955	0.0323	0.1643	0.6817	0.8460	0.0436	0.6521	0.6957	0.0000	3,106.9276	3,106.9276	0.6192	4.3700e-003	3,123.7096
2023	1.4283	12.4533	19.8147	0.0323	0.1643	0.5870	0.7513	0.0436	0.5617	0.6052	0.0000	3,103.7256	3,103.7256	0.6125	4.0200e-003	3,120.2362
2024	1.3467	11.6396	19.7750	0.0322	0.1643	0.5185	0.6828	0.0436	0.4958	0.5393	0.0000	3,100.6821	3,100.6821	0.6101	3.7200e-003	3,117.0440
2025	1.2539	10.7728	19.6972	0.0322	0.1643	0.4426	0.6069	0.0436	0.4233	0.4669	0.0000	3,097.5130	3,097.5130	0.6055	3.4700e-003	3,113.6839
2026	1.2497	10.7697	19.6643	0.0321	0.1643	0.4425	0.6068	0.0436	0.4233	0.4668	0.0000	3,094.0535	3,094.0535	0.6052	3.2600e-003	3,110.1533
2027	1.2459	10.7671	19.6362	0.0321	0.1643	0.4425	0.6068	0.0436	0.4232	0.4668	0.0000	3,090.9251	3,090.9251	0.6049	3.0800e-003	3,106.9646
2028	1.2424	10.7649	19.6128	0.0321	0.1643	0.4424	0.6067	0.0436	0.4232	0.4668	0.0000	3,088.1677	3,088.1677	0.6047	2.9300e-003	3,104.1567
Maximum	**1.5380**	**13.6249**	**19.8955**	**0.0323**	**0.1643**	**0.6817**	**0.8460**	**0.0436**	**0.6521**	**0.6957**	**0.0000**	**3,106.9276**	**3,106.9276**	**0.6192**	**4.3700e-003**	**3,123.7096**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total	**1.0000e-005**	**0.0000**	**1.0000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total	**1.0000e-005**	**0.0000**	**1.0000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Clearing and Revegitating	Site Preparation	10/15/2022	10/17/2028	5	1567	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Clearing and Revegitating	Excavators	2	6.00	158	0.38
Clearing and Revegitating	Pumps	2	8.00	84	0.74
Clearing and Revegitating	Skid Steer Loaders	2	7.00	65	0.37
Clearing and Revegitating	Tractors/Loaders/Backhoes	2	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Clearing and Revegitating	8	20.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Water Exposed Area

3.2 Clearing and Revegitating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.4587	13.5794	19.2499	0.0308		0.6809	0.6809		0.6513	0.6513		2,949.2546	2,949.2546	0.6144		2,964.6154
Total	**1.4587**	**13.5794**	**19.2499**	**0.0308**	**0.0000**	**0.6809**	**0.6809**	**0.0000**	**0.6513**	**0.6513**		**2,949.2546**	**2,949.2546**	**0.6144**		**2,964.6154**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0793	0.0455	0.6456	1.5500e-003	0.1643	8.7000e-004	0.1652	0.0436	8.0000e-004	0.0444		157.6730	157.6730	4.8100e-003	4.3700e-003	159.0942
Total	**0.0793**	**0.0455**	**0.6456**	**1.5500e-003**	**0.1643**	**8.7000e-004**	**0.1652**	**0.0436**	**8.0000e-004**	**0.0444**		**157.6730**	**157.6730**	**4.8100e-003**	**4.3700e-003**	**159.0942**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.4587	13.5794	19.2499	0.0308		0.6809	0.6809		0.6513	0.6513	0.0000	2,949.2546	2,949.2546	0.6144		2,964.6154
Total	**1.4587**	**13.5794**	**19.2499**	**0.0308**	**0.0000**	**0.6809**	**0.6809**	**0.0000**	**0.6513**	**0.6513**	**0.0000**	**2,949.2546**	**2,949.2546**	**0.6144**		**2,964.6154**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0793	0.0455	0.6456	1.5500e-003	0.1643	8.7000e-004	0.1652	0.0436	8.0000e-004	0.0444		157.6730	157.6730	4.8100e-003	4.3700e-003	159.0942
Total	**0.0793**	**0.0455**	**0.6456**	**1.5500e-003**	**0.1643**	**8.7000e-004**	**0.1652**	**0.0436**	**8.0000e-004**	**0.0444**		**157.6730**	**157.6730**	**4.8100e-003**	**4.3700e-003**	**159.0942**

3.2 Clearing and Revegitating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.3552	12.4132	19.2243	0.0308		0.5862	0.5862		0.5609	0.5609		2,950.2315	2,950.2315	0.6082		2,965.4357
Total	**1.3552**	**12.4132**	**19.2243**	**0.0308**	**0.0000**	**0.5862**	**0.5862**	**0.0000**	**0.5609**	**0.5609**		**2,950.2315**	**2,950.2315**	**0.6082**		**2,965.4357**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0731	0.0401	0.5904	1.5000e-003	0.1643	8.2000e-004	0.1651	0.0436	7.5000e-004	0.0443		153.4942	153.4942	4.3100e-003	4.0200e-003	154.8005
Total	**0.0731**	**0.0401**	**0.5904**	**1.5000e-003**	**0.1643**	**8.2000e-004**	**0.1651**	**0.0436**	**7.5000e-004**	**0.0443**		**153.4942**	**153.4942**	**4.3100e-003**	**4.0200e-003**	**154.8005**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.3552	12.4132	19.2243	0.0308		0.5862	0.5862		0.5609	0.5609	0.0000	2,950.2315	2,950.2315	0.6082		2,965.4357
Total	**1.3552**	**12.4132**	**19.2243**	**0.0308**	**0.0000**	**0.5862**	**0.5862**	**0.0000**	**0.5609**	**0.5609**	**0.0000**	**2,950.2315**	**2,950.2315**	**0.6082**		**2,965.4357**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0731	0.0401	0.5904	1.5000e-003	0.1643	8.2000e-004	0.1651	0.0436	7.5000e-004	0.0443		153.4942	153.4942	4.3100e-003	4.0200e-003	154.8005
Total	**0.0731**	**0.0401**	**0.5904**	**1.5000e-003**	**0.1643**	**8.2000e-004**	**0.1651**	**0.0436**	**7.5000e-004**	**0.0443**		**153.4942**	**153.4942**	**4.3100e-003**	**4.0200e-003**	**154.8005**

3.2 Clearing and Revegitating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.2790	11.6041	19.2312	0.0308		0.5177	0.5177		0.4950	0.4950		2,950.9933	2,950.9933	0.6062		2,966.1489
Total	**1.2790**	**11.6041**	**19.2312**	**0.0308**	**0.0000**	**0.5177**	**0.5177**	**0.0000**	**0.4950**	**0.4950**		**2,950.9933**	**2,950.9933**	**0.6062**		**2,966.1489**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0677	0.0355	0.5438	1.4500e-003	0.1643	7.7000e-004	0.1651	0.0436	7.1000e-004	0.0443		149.6888	149.6888	3.8800e-003	3.7200e-003	150.8951
Total	**0.0677**	**0.0355**	**0.5438**	**1.4500e-003**	**0.1643**	**7.7000e-004**	**0.1651**	**0.0436**	**7.1000e-004**	**0.0443**		**149.6888**	**149.6888**	**3.8800e-003**	**3.7200e-003**	**150.8951**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.2790	11.6041	19.2312	0.0308		0.5177	0.5177		0.4950	0.4950	0.0000	2,950.9933	2,950.9933	0.6062		2,966.1489
Total	**1.2790**	**11.6041**	**19.2312**	**0.0308**	**0.0000**	**0.5177**	**0.5177**	**0.0000**	**0.4950**	**0.4950**	**0.0000**	**2,950.9933**	**2,950.9933**	**0.6062**		**2,966.1489**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0677	0.0355	0.5438	1.4500e-003	0.1643	7.7000e-004	0.1651	0.0436	7.1000e-004	0.0443		149.6888	149.6888	3.8800e-003	3.7200e-003	150.8951
Total	**0.0677**	**0.0355**	**0.5438**	**1.4500e-003**	**0.1643**	**7.7000e-004**	**0.1651**	**0.0436**	**7.1000e-004**	**0.0443**		**149.6888**	**149.6888**	**3.8800e-003**	**3.7200e-003**	**150.8951**

3.2 Clearing and Revegitating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.1910	10.7411	19.1928	0.0308		0.4418	0.4418		0.4226	0.4226		2,951.5189	2,951.5189	0.6020		2,966.5690
Total	**1.1910**	**10.7411**	**19.1928**	**0.0308**	**0.0000**	**0.4418**	**0.4418**	**0.0000**	**0.4226**	**0.4226**		**2,951.5189**	**2,951.5189**	**0.6020**		**2,966.5690**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0629	0.0317	0.5044	1.4000e-003	0.1643	7.3000e-004	0.1650	0.0436	6.8000e-004	0.0443		145.9941	145.9941	3.5000e-003	3.4700e-003	147.1149
Total	**0.0629**	**0.0317**	**0.5044**	**1.4000e-003**	**0.1643**	**7.3000e-004**	**0.1650**	**0.0436**	**6.8000e-004**	**0.0443**		**145.9941**	**145.9941**	**3.5000e-003**	**3.4700e-003**	**147.1149**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.1910	10.7411	19.1928	0.0308		0.4418	0.4418		0.4226	0.4226	0.0000	2,951.5188	2,951.5188	0.6020		2,966.5690
Total	**1.1910**	**10.7411**	**19.1928**	**0.0308**	**0.0000**	**0.4418**	**0.4418**	**0.0000**	**0.4226**	**0.4226**	**0.0000**	**2,951.5188**	**2,951.5188**	**0.6020**		**2,966.5690**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0629	0.0317	0.5044	1.4000e-003	0.1643	7.3000e-004	0.1650	0.0436	6.8000e-004	0.0443		145.9941	145.9941	3.5000e-003	3.4700e-003	147.1149
Total	**0.0629**	**0.0317**	**0.5044**	**1.4000e-003**	**0.1643**	**7.3000e-004**	**0.1650**	**0.0436**	**6.8000e-004**	**0.0443**		**145.9941**	**145.9941**	**3.5000e-003**	**3.4700e-003**	**147.1149**

3.2 Clearing and Revegitating - 2026

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.1910	10.7411	19.1928	0.0308		0.4418	0.4418		0.4226	0.4226		2,951.5189	2,951.5189	0.6020		2,966.5690
Total	**1.1910**	**10.7411**	**19.1928**	**0.0308**	**0.0000**	**0.4418**	**0.4418**	**0.0000**	**0.4226**	**0.4226**		**2,951.5189**	**2,951.5189**	**0.6020**		**2,966.5690**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2026

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0587	0.0286	0.4715	1.3600e-003	0.1643	7.0000e-004	0.1650	0.0436	6.4000e-004	0.0442		142.5347	142.5347	3.1700e-003	3.2600e-003	143.5842
Total	**0.0587**	**0.0286**	**0.4715**	**1.3600e-003**	**0.1643**	**7.0000e-004**	**0.1650**	**0.0436**	**6.4000e-004**	**0.0442**		**142.5347**	**142.5347**	**3.1700e-003**	**3.2600e-003**	**143.5842**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.1910	10.7411	19.1928	0.0308		0.4418	0.4418		0.4226	0.4226	0.0000	2,951.5188	2,951.5188	0.6020		2,966.5690
Total	**1.1910**	**10.7411**	**19.1928**	**0.0308**	**0.0000**	**0.4418**	**0.4418**	**0.0000**	**0.4226**	**0.4226**	**0.0000**	**2,951.5188**	**2,951.5188**	**0.6020**		**2,966.5690**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2026

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0587	0.0286	0.4715	1.3600e-003	0.1643	7.0000e-004	0.1650	0.0436	6.4000e-004	0.0442		142.5347	142.5347	3.1700e-003	3.2600e-003	143.5842
Total	**0.0587**	**0.0286**	**0.4715**	**1.3600e-003**	**0.1643**	**7.0000e-004**	**0.1650**	**0.0436**	**6.4000e-004**	**0.0442**		**142.5347**	**142.5347**	**3.1700e-003**	**3.2600e-003**	**143.5842**

3.2 Clearing and Revegitating - 2027

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.1910	10.7411	19.1928	0.0308		0.4418	0.4418		0.4226	0.4226		2,951.5189	2,951.5189	0.6020		2,966.5690
Total	**1.1910**	**10.7411**	**19.1928**	**0.0308**	**0.0000**	**0.4418**	**0.4418**	**0.0000**	**0.4226**	**0.4226**		**2,951.5189**	**2,951.5189**	**0.6020**		**2,966.5690**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2027

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0549	0.0260	0.4433	1.3200e-003	0.1643	6.6000e-004	0.1650	0.0436	6.0000e-004	0.0442		139.4062	139.4062	2.8900e-003	3.0800e-003	140.3956
Total	**0.0549**	**0.0260**	**0.4433**	**1.3200e-003**	**0.1643**	**6.6000e-004**	**0.1650**	**0.0436**	**6.0000e-004**	**0.0442**		**139.4062**	**139.4062**	**2.8900e-003**	**3.0800e-003**	**140.3956**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.1910	10.7411	19.1928	0.0308		0.4418	0.4418		0.4226	0.4226	0.0000	2,951.5188	2,951.5188	0.6020		2,966.5690
Total	**1.1910**	**10.7411**	**19.1928**	**0.0308**	**0.0000**	**0.4418**	**0.4418**	**0.0000**	**0.4226**	**0.4226**	**0.0000**	**2,951.5188**	**2,951.5188**	**0.6020**		**2,966.5690**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2027

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0549	0.0260	0.4433	1.3200e-003	0.1643	6.6000e-004	0.1650	0.0436	6.0000e-004	0.0442		139.4062	139.4062	2.8900e-003	3.0800e-003	140.3956
Total	**0.0549**	**0.0260**	**0.4433**	**1.3200e-003**	**0.1643**	**6.6000e-004**	**0.1650**	**0.0436**	**6.0000e-004**	**0.0442**		**139.4062**	**139.4062**	**2.8900e-003**	**3.0800e-003**	**140.3956**

3.2 Clearing and Revegitating - 2028

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.1910	10.7411	19.1928	0.0308		0.4418	0.4418		0.4226	0.4226		2,951.5189	2,951.5189	0.6020		2,966.5690
Total	**1.1910**	**10.7411**	**19.1928**	**0.0308**	**0.0000**	**0.4418**	**0.4418**	**0.0000**	**0.4226**	**0.4226**		**2,951.5189**	**2,951.5189**	**0.6020**		**2,966.5690**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2028

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0515	0.0238	0.4199	1.2800e-003	0.1643	6.1000e-004	0.1649	0.0436	5.6000e-004	0.0441		136.6488	136.6488	2.6400e-003	2.9300e-003	137.5876
Total	**0.0515**	**0.0238**	**0.4199**	**1.2800e-003**	**0.1643**	**6.1000e-004**	**0.1649**	**0.0436**	**5.6000e-004**	**0.0441**		**136.6488**	**136.6488**	**2.6400e-003**	**2.9300e-003**	**137.5876**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	1.1910	10.7411	19.1928	0.0308		0.4418	0.4418		0.4226	0.4226	0.0000	2,951.5188	2,951.5188	0.6020		2,966.5690
Total	**1.1910**	**10.7411**	**19.1928**	**0.0308**	**0.0000**	**0.4418**	**0.4418**	**0.0000**	**0.4226**	**0.4226**	**0.0000**	**2,951.5188**	**2,951.5188**	**0.6020**		**2,966.5690**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2028

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0515	0.0238	0.4199	1.2800e-003	0.1643	6.1000e-004	0.1649	0.0436	5.6000e-004	0.0441		136.6488	136.6488	2.6400e-003	2.9300e-003	137.5876
Total	**0.0515**	**0.0238**	**0.4199**	**1.2800e-003**	**0.1643**	**6.1000e-004**	**0.1649**	**0.0436**	**5.6000e-004**	**0.0441**		**136.6488**	**136.6488**	**2.6400e-003**	**2.9300e-003**	**137.5876**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Recreational	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Recreational	40.00	40.00	40.00	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
User Defined Recreational	0.535455	0.056260	0.172409	0.133149	0.028776	0.007661	0.007273	0.023440	0.000521	0.000192	0.028266	0.001153	0.005445

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Unmitigated	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**1.0000e-005**	**0.0000**	**1.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**1.0000e-005**	**0.0000**	**1.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

MOJAVE DESERT LAND TRUST

Mojave Desert Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Recreational	1.00	User Defined Unit	10.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	31
Climate Zone	10			**Operational Year**	2023
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	390.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - 10 acre ground disturbance per day

Construction Phase - 6 years of construction

Off-road Equipment - 2 loader/backhoes, 2 skid steer loaders. 2 excavators, 2 pumps

Trips and VMT - 20 worker trips per day

Vehicle Trips - 10 visitors per day, 40 mile round trip

Water And Wastewater - 66,000 gallons water per day or 24,090,000 gallons per year for 365 days

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	10.00	1,567.00
tblLandUse	LotAcreage	0.00	10.00

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	2.00
tblVehicleTrips	CC_TL	7.30	40.00
tblVehicleTrips	CNW_TL	7.30	40.00
tblVehicleTrips	CW_TL	9.50	40.00
tblVehicleTrips	ST_TR	0.00	10.00
tblVehicleTrips	SU_TR	0.00	10.00
tblVehicleTrips	WD_TR	0.00	10.00
tblWater	OutdoorWaterUseRate	0.00	24,090,000.00

2.0 Emissions Summary

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.0419	0.3748	0.5446	8.8000e-004	4.4300e-003	0.0188	0.0232	1.1800e-003	0.0179	0.0191	0.0000	77.1733	77.1733	0.0155	1.2000e-004	77.5942
2023	0.1842	1.6194	2.5651	4.1800e-003	0.0210	0.0763	0.0973	5.5700e-003	0.0730	0.0786	0.0000	364.4883	364.4883	0.0723	5.0000e-004	366.4450
2024	0.1750	1.5253	2.5806	4.2000e-003	0.0211	0.0679	0.0890	5.6100e-003	0.0649	0.0706	0.0000	366.9730	366.9730	0.0725	4.7000e-004	368.9262
2025	0.1623	1.4063	2.5615	4.1800e-003	0.0210	0.0578	0.0788	5.5900e-003	0.0552	0.0608	0.0000	365.2377	365.2377	0.0717	4.4000e-004	367.1602
2026	0.1619	1.4058	2.5578	4.1800e-003	0.0210	0.0578	0.0788	5.5900e-003	0.0552	0.0608	0.0000	364.8654	364.8654	0.0717	4.1000e-004	366.7789
2027	0.1615	1.4054	2.5547	4.1700e-003	0.0210	0.0577	0.0788	5.5900e-003	0.0552	0.0608	0.0000	364.5281	364.5281	0.0716	3.9000e-004	366.4341
2028	0.1277	1.1144	2.0241	3.3100e-003	0.0167	0.0458	0.0625	4.4300e-003	0.0438	0.0482	0.0000	288.8725	288.8725	0.0568	2.9000e-004	290.3791
Maximum	**0.1842**	**1.6194**	**2.5806**	**4.2000e-003**	**0.0211**	**0.0763**	**0.0973**	**5.6100e-003**	**0.0730**	**0.0786**	**0.0000**	**366.9730**	**366.9730**	**0.0725**	**5.0000e-004**	**368.9262**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

2.1 Overall Construction

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.0419	0.3748	0.5446	8.8000e-004	4.4300e-003	0.0188	0.0232	1.1800e-003	0.0179	0.0191	0.0000	77.1732	77.1732	0.0155	1.2000e-004	77.5941
2023	0.1842	1.6194	2.5651	4.1800e-003	0.0210	0.0763	0.0973	5.5700e-003	0.0730	0.0786	0.0000	364.4879	364.4879	0.0723	5.0000e-004	366.4445
2024	0.1750	1.5253	2.5806	4.2000e-003	0.0211	0.0679	0.0890	5.6100e-003	0.0649	0.0706	0.0000	366.9726	366.9726	0.0725	4.7000e-004	368.9258
2025	0.1623	1.4063	2.5615	4.1800e-003	0.0210	0.0578	0.0788	5.5900e-003	0.0552	0.0608	0.0000	365.2372	365.2372	0.0717	4.4000e-004	367.1598
2026	0.1619	1.4058	2.5578	4.1800e-003	0.0210	0.0578	0.0788	5.5900e-003	0.0552	0.0608	0.0000	364.8649	364.8649	0.0717	4.1000e-004	366.7785
2027	0.1615	1.4054	2.5547	4.1700e-003	0.0210	0.0577	0.0788	5.5900e-003	0.0552	0.0608	0.0000	364.5277	364.5277	0.0716	3.9000e-004	366.4337
2028	0.1277	1.1144	2.0241	3.3100e-003	0.0167	0.0458	0.0625	4.4300e-003	0.0438	0.0482	0.0000	288.8721	288.8721	0.0568	2.9000e-004	290.3787
Maximum	**0.1842**	**1.6194**	**2.5806**	**4.2000e-003**	**0.0211**	**0.0763**	**0.0973**	**5.6100e-003**	**0.0730**	**0.0786**	**0.0000**	**366.9726**	**366.9726**	**0.0725**	**5.0000e-004**	**368.9258**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	10-3-2022	1-2-2023	0.4321	0.4321
2	1-3-2023	4-2-2023	0.4460	0.4460
3	4-3-2023	7-2-2023	0.4512	0.4512
4	7-3-2023	10-2-2023	0.4561	0.4561

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

5	**10-3-2023**	**1-2-2024**	0.4553	0.4553
6	**1-3-2024**	**4-2-2024**	0.4219	0.4219
7	**4-3-2024**	**7-2-2024**	0.4221	0.4221
8	**7-3-2024**	**10-2-2024**	0.4267	0.4267
9	**10-3-2024**	**1-2-2025**	0.4258	0.4258
10	**1-3-2025**	**4-2-2025**	0.3864	0.3864
11	**4-3-2025**	**7-2-2025**	0.3909	0.3909
12	**7-3-2025**	**10-2-2025**	0.3952	0.3952
13	**10-3-2025**	**1-2-2026**	0.3950	0.3950
14	**1-3-2026**	**4-2-2026**	0.3862	0.3862
15	**4-3-2026**	**7-2-2026**	0.3906	0.3906
16	**7-3-2026**	**10-2-2026**	0.3949	0.3949
17	**10-3-2026**	**1-2-2027**	0.3948	0.3948
18	**1-3-2027**	**4-2-2027**	0.3860	0.3860
19	**4-3-2027**	**7-2-2027**	0.3904	0.3904
20	**7-3-2027**	**10-2-2027**	0.3947	0.3947
21	**10-3-2027**	**1-2-2028**	0.3946	0.3946
22	**1-3-2028**	**4-2-2028**	0.3901	0.3901
23	**4-3-2028**	**7-2-2028**	0.3902	0.3902
24	**7-3-2028**	**9-30-2028**	0.3859	0.3859
		Highest	0.4561	0.4561

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	47.4647	47.4647	4.0100e-003	4.9000e-004	47.7096
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**47.4648**	**47.4648**	**4.0100e-003**	**4.9000e-004**	**47.7096**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	47.4647	47.4647	4.0100e-003	4.9000e-004	47.7096
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**47.4648**	**47.4648**	**4.0100e-003**	**4.9000e-004**	**47.7096**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Clearing and Revegitating	Site Preparation	10/15/2022	10/17/2028	5	1567	

Acres of Grading (Site Preparation Phase): 0

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Clearing and Revegitating	Excavators	2	6.00	158	0.38
Clearing and Revegitating	Pumps	2	8.00	84	0.74
Clearing and Revegitating	Skid Steer Loaders	2	7.00	65	0.37
Clearing and Revegitating	Tractors/Loaders/Backhoes	2	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Clearing and Revegitating	8	20.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0401	0.3734	0.5294	8.5000e-004		0.0187	0.0187		0.0179	0.0179	0.0000	73.5768	73.5768	0.0153	0.0000	73.9600
Total	**0.0401**	**0.3734**	**0.5294**	**8.5000e-004**	**0.0000**	**0.0187**	**0.0187**	**0.0000**	**0.0179**	**0.0179**	**0.0000**	**73.5768**	**73.5768**	**0.0153**	**0.0000**	**73.9600**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.8300e-003	1.3700e-003	0.0152	4.0000e-005	4.4300e-003	2.0000e-005	4.4600e-003	1.1800e-003	2.0000e-005	1.2000e-003	0.0000	3.5965	3.5965	1.2000e-004	1.2000e-004	3.6342
Total	**1.8300e-003**	**1.3700e-003**	**0.0152**	**4.0000e-005**	**4.4300e-003**	**2.0000e-005**	**4.4600e-003**	**1.1800e-003**	**2.0000e-005**	**1.2000e-003**	**0.0000**	**3.5965**	**3.5965**	**1.2000e-004**	**1.2000e-004**	**3.6342**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0401	0.3734	0.5294	8.5000e-004		0.0187	0.0187		0.0179	0.0179	0.0000	73.5767	73.5767	0.0153	0.0000	73.9599
Total	**0.0401**	**0.3734**	**0.5294**	**8.5000e-004**	**0.0000**	**0.0187**	**0.0187**	**0.0000**	**0.0179**	**0.0179**	**0.0000**	**73.5767**	**73.5767**	**0.0153**	**0.0000**	**73.9599**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.8300e-003	1.3700e-003	0.0152	4.0000e-005	4.4300e-003	2.0000e-005	4.4600e-003	1.1800e-003	2.0000e-005	1.2000e-003	0.0000	3.5965	3.5965	1.2000e-004	1.2000e-004	3.6342
Total	**1.8300e-003**	**1.3700e-003**	**0.0152**	**4.0000e-005**	**4.4300e-003**	**2.0000e-005**	**4.4600e-003**	**1.1800e-003**	**2.0000e-005**	**1.2000e-003**	**0.0000**	**3.5965**	**3.5965**	**1.2000e-004**	**1.2000e-004**	**3.6342**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1762	1.6137	2.4992	4.0000e-003		0.0762	0.0762		0.0729	0.0729	0.0000	347.9327	347.9327	0.0717	0.0000	349.7257
Total	**0.1762**	**1.6137**	**2.4992**	**4.0000e-003**	**0.0000**	**0.0762**	**0.0762**	**0.0000**	**0.0729**	**0.0729**	**0.0000**	**347.9327**	**347.9327**	**0.0717**	**0.0000**	**349.7257**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.9700e-003	5.7200e-003	0.0659	1.8000e-004	0.0210	1.1000e-004	0.0211	5.5700e-003	1.0000e-004	5.6700e-003	0.0000	16.5557	16.5557	5.3000e-004	5.0000e-004	16.7192
Total	**7.9700e-003**	**5.7200e-003**	**0.0659**	**1.8000e-004**	**0.0210**	**1.1000e-004**	**0.0211**	**5.5700e-003**	**1.0000e-004**	**5.6700e-003**	**0.0000**	**16.5557**	**16.5557**	**5.3000e-004**	**5.0000e-004**	**16.7192**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1762	1.6137	2.4992	4.0000e-003		0.0762	0.0762		0.0729	0.0729	0.0000	347.9322	347.9322	0.0717	0.0000	349.7253
Total	**0.1762**	**1.6137**	**2.4992**	**4.0000e-003**	**0.0000**	**0.0762**	**0.0762**	**0.0000**	**0.0729**	**0.0729**	**0.0000**	**347.9322**	**347.9322**	**0.0717**	**0.0000**	**349.7253**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.9700e-003	5.7200e-003	0.0659	1.8000e-004	0.0210	1.1000e-004	0.0211	5.5700e-003	1.0000e-004	5.6700e-003	0.0000	16.5557	16.5557	5.3000e-004	5.0000e-004	16.7192
Total	**7.9700e-003**	**5.7200e-003**	**0.0659**	**1.8000e-004**	**0.0210**	**1.1000e-004**	**0.0211**	**5.5700e-003**	**1.0000e-004**	**5.6700e-003**	**0.0000**	**16.5557**	**16.5557**	**5.3000e-004**	**5.0000e-004**	**16.7192**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1676	1.5201	2.5193	4.0300e-003		0.0678	0.0678		0.0649	0.0649	0.0000	350.6996	350.6996	0.0720	0.0000	352.5007
Total	**0.1676**	**1.5201**	**2.5193**	**4.0300e-003**	**0.0000**	**0.0678**	**0.0678**	**0.0000**	**0.0649**	**0.0649**	**0.0000**	**350.6996**	**350.6996**	**0.0720**	**0.0000**	**352.5007**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.4400e-003	5.1100e-003	0.0614	1.7000e-004	0.0211	1.0000e-004	0.0212	5.6100e-003	9.0000e-005	5.7000e-003	0.0000	16.2734	16.2734	4.8000e-004	4.7000e-004	16.4255
Total	**7.4400e-003**	**5.1100e-003**	**0.0614**	**1.7000e-004**	**0.0211**	**1.0000e-004**	**0.0212**	**5.6100e-003**	**9.0000e-005**	**5.7000e-003**	**0.0000**	**16.2734**	**16.2734**	**4.8000e-004**	**4.7000e-004**	**16.4255**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1676	1.5201	2.5193	4.0300e-003		0.0678	0.0678		0.0649	0.0649	0.0000	350.6992	350.6992	0.0720	0.0000	352.5003
Total	**0.1676**	**1.5201**	**2.5193**	**4.0300e-003**	**0.0000**	**0.0678**	**0.0678**	**0.0000**	**0.0649**	**0.0649**	**0.0000**	**350.6992**	**350.6992**	**0.0720**	**0.0000**	**352.5003**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.4400e-003	5.1100e-003	0.0614	1.7000e-004	0.0211	1.0000e-004	0.0212	5.6100e-003	9.0000e-005	5.7000e-003	0.0000	16.2734	16.2734	4.8000e-004	4.7000e-004	16.4255
Total	**7.4400e-003**	**5.1100e-003**	**0.0614**	**1.7000e-004**	**0.0211**	**1.0000e-004**	**0.0212**	**5.6100e-003**	**9.0000e-005**	**5.7000e-003**	**0.0000**	**16.2734**	**16.2734**	**4.8000e-004**	**4.7000e-004**	**16.4255**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1554	1.4017	2.5047	4.0200e-003		0.0577	0.0577		0.0552	0.0552	0.0000	349.4233	349.4233	0.0713	0.0000	351.2050
Total	**0.1554**	**1.4017**	**2.5047**	**4.0200e-003**	**0.0000**	**0.0577**	**0.0577**	**0.0000**	**0.0552**	**0.0552**	**0.0000**	**349.4233**	**349.4233**	**0.0713**	**0.0000**	**351.2050**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.8900e-003	4.5400e-003	0.0568	1.7000e-004	0.0210	1.0000e-004	0.0211	5.5900e-003	9.0000e-005	5.6800e-003	0.0000	15.8144	15.8144	4.4000e-004	4.4000e-004	15.9552
Total	**6.8900e-003**	**4.5400e-003**	**0.0568**	**1.7000e-004**	**0.0210**	**1.0000e-004**	**0.0211**	**5.5900e-003**	**9.0000e-005**	**5.6800e-003**	**0.0000**	**15.8144**	**15.8144**	**4.4000e-004**	**4.4000e-004**	**15.9552**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2025

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1554	1.4017	2.5047	4.0200e-003		0.0577	0.0577		0.0552	0.0552	0.0000	349.4228	349.4228	0.0713	0.0000	351.2046
Total	**0.1554**	**1.4017**	**2.5047**	**4.0200e-003**	**0.0000**	**0.0577**	**0.0577**	**0.0000**	**0.0552**	**0.0552**	**0.0000**	**349.4228**	**349.4228**	**0.0713**	**0.0000**	**351.2046**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.8900e-003	4.5400e-003	0.0568	1.7000e-004	0.0210	1.0000e-004	0.0211	5.5900e-003	9.0000e-005	5.6800e-003	0.0000	15.8144	15.8144	4.4000e-004	4.4000e-004	15.9552
Total	**6.8900e-003**	**4.5400e-003**	**0.0568**	**1.7000e-004**	**0.0210**	**1.0000e-004**	**0.0211**	**5.5900e-003**	**9.0000e-005**	**5.6800e-003**	**0.0000**	**15.8144**	**15.8144**	**4.4000e-004**	**4.4000e-004**	**15.9552**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2026

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1554	1.4017	2.5047	4.0200e-003		0.0577	0.0577		0.0552	0.0552	0.0000	349.4233	349.4233	0.0713	0.0000	351.2050
Total	**0.1554**	**1.4017**	**2.5047**	**4.0200e-003**	**0.0000**	**0.0577**	**0.0577**	**0.0000**	**0.0552**	**0.0552**	**0.0000**	**349.4233**	**349.4233**	**0.0713**	**0.0000**	**351.2050**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.4400e-003	4.1000e-003	0.0532	1.6000e-004	0.0210	9.0000e-005	0.0211	5.5900e-003	8.0000e-005	5.6700e-003	0.0000	15.4421	15.4421	4.0000e-004	4.1000e-004	15.5739
Total	**6.4400e-003**	**4.1000e-003**	**0.0532**	**1.6000e-004**	**0.0210**	**9.0000e-005**	**0.0211**	**5.5900e-003**	**8.0000e-005**	**5.6700e-003**	**0.0000**	**15.4421**	**15.4421**	**4.0000e-004**	**4.1000e-004**	**15.5739**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2026

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1554	1.4017	2.5047	4.0200e-003		0.0577	0.0577		0.0552	0.0552	0.0000	349.4228	349.4228	0.0713	0.0000	351.2046
Total	**0.1554**	**1.4017**	**2.5047**	**4.0200e-003**	**0.0000**	**0.0577**	**0.0577**	**0.0000**	**0.0552**	**0.0552**	**0.0000**	**349.4228**	**349.4228**	**0.0713**	**0.0000**	**351.2046**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.4400e-003	4.1000e-003	0.0532	1.6000e-004	0.0210	9.0000e-005	0.0211	5.5900e-003	8.0000e-005	5.6700e-003	0.0000	15.4421	15.4421	4.0000e-004	4.1000e-004	15.5739
Total	**6.4400e-003**	**4.1000e-003**	**0.0532**	**1.6000e-004**	**0.0210**	**9.0000e-005**	**0.0211**	**5.5900e-003**	**8.0000e-005**	**5.6700e-003**	**0.0000**	**15.4421**	**15.4421**	**4.0000e-004**	**4.1000e-004**	**15.5739**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2027

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1554	1.4017	2.5047	4.0200e-003		0.0577	0.0577		0.0552	0.0552	0.0000	349.4233	349.4233	0.0713	0.0000	351.2050
Total	**0.1554**	**1.4017**	**2.5047**	**4.0200e-003**	**0.0000**	**0.0577**	**0.0577**	**0.0000**	**0.0552**	**0.0552**	**0.0000**	**349.4233**	**349.4233**	**0.0713**	**0.0000**	**351.2050**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.0200e-003	3.7200e-003	0.0501	1.6000e-004	0.0210	9.0000e-005	0.0211	5.5900e-003	8.0000e-005	5.6700e-003	0.0000	15.1049	15.1049	3.6000e-004	3.9000e-004	15.2291
Total	**6.0200e-003**	**3.7200e-003**	**0.0501**	**1.6000e-004**	**0.0210**	**9.0000e-005**	**0.0211**	**5.5900e-003**	**8.0000e-005**	**5.6700e-003**	**0.0000**	**15.1049**	**15.1049**	**3.6000e-004**	**3.9000e-004**	**15.2291**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2027

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1554	1.4017	2.5047	4.0200e-003		0.0577	0.0577		0.0552	0.0552	0.0000	349.4228	349.4228	0.0713	0.0000	351.2046
Total	**0.1554**	**1.4017**	**2.5047**	**4.0200e-003**	**0.0000**	**0.0577**	**0.0577**	**0.0000**	**0.0552**	**0.0552**	**0.0000**	**349.4228**	**349.4228**	**0.0713**	**0.0000**	**351.2046**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.0200e-003	3.7200e-003	0.0501	1.6000e-004	0.0210	9.0000e-005	0.0211	5.5900e-003	8.0000e-005	5.6700e-003	0.0000	15.1049	15.1049	3.6000e-004	3.9000e-004	15.2291
Total	**6.0200e-003**	**3.7200e-003**	**0.0501**	**1.6000e-004**	**0.0210**	**9.0000e-005**	**0.0211**	**5.5900e-003**	**8.0000e-005**	**5.6700e-003**	**0.0000**	**15.1049**	**15.1049**	**3.6000e-004**	**3.9000e-004**	**15.2291**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2028

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1233	1.1117	1.9865	3.1900e-003		0.0457	0.0457		0.0437	0.0437	0.0000	277.1288	277.1288	0.0565	0.0000	278.5419
Total	**0.1233**	**1.1117**	**1.9865**	**3.1900e-003**	**0.0000**	**0.0457**	**0.0457**	**0.0000**	**0.0437**	**0.0437**	**0.0000**	**277.1288**	**277.1288**	**0.0565**	**0.0000**	**278.5419**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.4800e-003	2.7000e-003	0.0377	1.2000e-004	0.0167	6.0000e-005	0.0168	4.4300e-003	6.0000e-005	4.4900e-003	0.0000	11.7437	11.7437	2.6000e-004	2.9000e-004	11.8371
Total	**4.4800e-003**	**2.7000e-003**	**0.0377**	**1.2000e-004**	**0.0167**	**6.0000e-005**	**0.0168**	**4.4300e-003**	**6.0000e-005**	**4.4900e-003**	**0.0000**	**11.7437**	**11.7437**	**2.6000e-004**	**2.9000e-004**	**11.8371**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

3.2 Clearing and Revegitating - 2028

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1233	1.1117	1.9865	3.1900e-003		0.0457	0.0457		0.0437	0.0437	0.0000	277.1285	277.1285	0.0565	0.0000	278.5416
Total	**0.1233**	**1.1117**	**1.9865**	**3.1900e-003**	**0.0000**	**0.0457**	**0.0457**	**0.0000**	**0.0437**	**0.0437**	**0.0000**	**277.1285**	**277.1285**	**0.0565**	**0.0000**	**278.5416**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.4800e-003	2.7000e-003	0.0377	1.2000e-004	0.0167	6.0000e-005	0.0168	4.4300e-003	6.0000e-005	4.4900e-003	0.0000	11.7437	11.7437	2.6000e-004	2.9000e-004	11.8371
Total	**4.4800e-003**	**2.7000e-003**	**0.0377**	**1.2000e-004**	**0.0167**	**6.0000e-005**	**0.0168**	**4.4300e-003**	**6.0000e-005**	**4.4900e-003**	**0.0000**	**11.7437**	**11.7437**	**2.6000e-004**	**2.9000e-004**	**11.8371**

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Recreational	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Recreational	40.00	40.00	40.00	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
User Defined Recreational	0.535455	0.056260	0.172409	0.133149	0.028776	0.007661	0.007273	0.023440	0.000521	0.000192	0.028266	0.001153	0.005445

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

MOJAVE DESERT LAND TRUST - Mojave Desert Air Basin, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Unmitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	47.4647	4.0100e-003	4.9000e-004	47.7096
Unmitigated	47.4647	4.0100e-003	4.9000e-004	47.7096

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Recreational	0 / 24.09	47.4647	4.0100e-003	4.9000e-004	47.7096
Total		**47.4647**	**4.0100e-003**	**4.9000e-004**	**47.7096**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Recreational	0 / 24.09	47.4647	4.0100e-003	4.9000e-004	47.7096
Total		**47.4647**	**4.0100e-003**	**4.9000e-004**	**47.7096**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

APPENDIX 3

State of California
The Resources Agency
DEPARTMENT OF FISH AND WILDLIFE

DRAFT LAND MANAGEMENT PLAN

for

PALISADES RANCH

San Bernardino County, California
Helendale Community Service District and
Western Rivers Conservancy

June 2016

PALISADES RANCH

Photograph by Chet McGaugh on 22 May 2016

Photograph by Kimberly Cox on 11 May 2016

Photograph by Ed LaRue on 17 May 2016

Draft Land Management Plan for
PALISADES RANCH
San Bernardino County, California

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TABLE OF CONTENTS

TABLE OF CONTENTS i
LIST OF TABLES ii
LIST OF FIGURES ii
LIST OF APPENDICES ii
LIST OF ACRONYMS USED IN THIS REPORT iii
ACKNOWLEDGEMENTS iv
EXECUTIVE SUMMARY v

I. INTRODUCTION 1
A. Purpose of Acquisition 1
B. Acquisition History 1
C. Purpose of Land Management Plan 4
D. About Western Rivers Conservancy and Helendale CSD 4

II. PROPERTY DESCRIPTION 5
A. Geographical Setting 5
B. Property Boundaries and Adjacent Lands 7
C. Geology, Soils, Climate, Hydrology 9
D. Cultural Features 11
1. Archaeology 11
2. Historic Land Uses and Existing Structures 11

III. HABITAT AND SPECIES DESCRIPTIONS 14
A. Vegetation Communities, Habitats, and Plant Species 14
B. Common Animal Species 15
C. Endangered, Threatened, and Special Status Species 18

IV. MANAGEMENT GOALS AND ENVIRONMENTAL IMPACTS 34
A. Definitions of Terms Used in This Plan 34
B. Biological Elements: Goals & Environmental Impacts 35
C. Cultural Elements: Goals & Environmental Impacts 46
D. Public Use Elements: Goals & Environmental Impacts 47
E. Facility Maintenance Elements: Goals and Environmental Impacts 48
F. Biological Monitoring Element 49
1. Supplement Existing Information 49
2. Monitor Efficacy of Protective Measures 50
3. Consistency with Regional Planning Efforts 50
V. OPERATIONS AND MANAGEMEN SUMMARY 50
A. Operations and Maintenance Tasks to Implement Plan 50
B. Existing Staff and Additional Personnel Needs Summary 51

VI. CLIMATE CHANGE STRATEGIES 51

VII. FUTURE REVISIONS TO LAND MANAGEMENT PLANS 52
A. Minor Revisions 52
B. Major Revisions 53
C. Plan Status Reports 53

VIII. REFERENCES 54

LIST OF TABLES

Table 1. Location Information for Palisades Ranch 7
Table 2. Special Status Plant Species and CHIPs Reported from the Region 18
Table 3. Special Status Animal Species Reported from the Region 22

LIST OF FIGURES

Figure 1. Palisades Ranch: Vicinity Map 2
Figure 2. Palisades Ranch: Site Map 3
Figure 3. USGS 7.5' Helendale Quad Map Showing May 2016 Survey Transects 6
Figure 4. Palisades Ranch: Aerial Overview of Palisades Ranch 8
Figure 5. Plant Communities Mapped in May 2016 16
Figure 6. Locations of Special Status Species Reported from the Region 19
Figure 7. Special Status Plants Observed in May 2016 21
Figure 8. Desert Tortoise Signs Observed in May 2016 25
Figure 9. Special Status Birds Observed in May 2016 29
Figure 10. Locations of Photographic Exhibits C-1

LIST OF APPENDICES

Appendix A. Plant Species Detected .....A-1 to A-4
Appendix B. Animal Species Detected .....B-1 to B-5
Appendix C. Photographic Exhibits .....C-1 to C-11

LIST OF ACRONYMS USED IN THIS LAND MANAGEMENT PLAN

ACEC – Area of Critical Environmental Concern
BLM – U.S. Bureau of Land Management
BMPs – Best management practices
CCR – Covenants, Conditions, and Restrictions
CDFW – California Department of Fish and Wildlife
CEQA – California Environmental Quality Act
CESA – California Endangered Species Act
CHIP – Communities of Highest Inventory Priority (plants)
CMBC – Circle Mountain Biological Consultants, Inc.
CNDDB – California Natural Diversity Data Base (2016)
CNPS – California Native Plant Society
CO2 – Carbon dioxide
DWMA – Desert Wildlife Management Area
E – East
°F - Fahrenheit
FESA – Federal Endangered Species Act
FY15 – Fiscal Year 2015
GPS – Global Positioning System
HCSD – Helendale Community Services District
LMP – Land Management Plan
MDRCD – Mojave Desert Resource Conservation District
MGSCA – Mohave Ground Squirrel Conservation Area
MSL – Mean sea level
N – North
NAD 83 – North American Datum 83
NRCS – Natural Resources Conservation Service
OHV – Off-highway Vehicle
ppm – Parts per million
S – South
SE – Southeast
SW – Southwest
TDS – Total dissolved solids
THC – Transitions Habitat Conservancy
TNC – The Nature Conservancy
USFWS – U.S. Fish and Wildlife Service
UTM Universal Transverse Mercator System
W – West
WCB – Wildlife Conservation Board
WRC – Western Rivers Conservancy

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Copies of this Land Management Plan are available from Helendale Community Services District and Western Rivers Conservancy.

Suggested citation:

California Department of Fish and Wildlife. 2016. Draft land management plan for Palisades Ranch, San Bernardino County, California. An unpublished report prepared by Circle Mountain Biological Consultants, Inc. on behalf of Helendale Community Services District and Western Rivers Conservancy. Sacramento, CA.

EXECUTIVE SUMMARY

Western Rivers Conservancy and Helendale Community Services District have acquired and are beginning to manage Palisades Ranch for conservation management of existing and enhanced high biodiversity values. This property, acquired in December 2015 for conservation purposes, is in a contiguous block of land with public lands managed by the U.S. Bureau of Land Management to the west and private lands to the east. Palisades Ranch is subject to focused conservation management in cooperation with the California Department of Fish and Wildlife to maintain significant, rare biological resources occurring along the Mojave River.

Located between the communities of Silver Lakes (Helendale) to the north and Oro Grande to the south, this land management plan pertains to approximately 1,647± acres, including more than 800 acres of cottonwood-willow riparian habitat and 800 acres of upland desert habitat on one contiguous parcel (plus one 4-acre parcel) located in an unincorporated portion of San Bernardino County, California. The legal description for the subject property is Township 7 North, Ranges 4 & 5 West, all of Section 13, and portions of Sections 12, 18, 23, 24, & 25.

This land management plan is necessary to govern operations and maintenance actions on lands acquired by Western Rivers Conservancy and managed by Helendale Community Services District in accordance with the latest direction from the California Department of Fish and Wildlife for proactive habitat conservation management. Biological, cultural, and geologic features of the subject property are described. Common and special status plant and animal species identified on the subject property are listed in appendices and serve as the baseline inventory described in the text. Rare and threatened species reported from the region are identified and discussed in terms of their conservation management. Habitat protection and enhancement actions for the subject property and general maintenance provisions are discussed.

Given the baseline information provided herein, the following determinations are made with regards to special status species and important plant communities documented as occurring on and adjacent to the subject property. The following resources will be:

Highly benefited: Desert tortoise, least Bell's vireo, southwestern willow flycatcher, yellow-breasted chat, Lucy's warbler, yellow warbler, summer tanager, brown-crested flycatcher, vermilion flycatcher, burrowing owl, Cooper's hawk, LeConte's thrasher, loggerhead shrike, San Emigdio blue (butterfly), cottonwood-willow riparian forest, screw bean mesquite bosque, Mojave fish-hook cactus, and larger creosote bush rings.
Moderately benefitted: Swainson's hawk, osprey, northern harrier, golden eagle, sharp-shinned hawk, ferruginous hawk, and prairie falcon.
Benefited if present: Arroyo toad, western pond turtle, western yellow-billed cuckoo, long-eared owl, Mohave ground squirrel, Mojave River vole, American badger, miscellaneous bat species, Beaver Dam breadroot, and Mojave monkeyflower.

Management goals for biological and cultural elements occurring on the subject property are outlined, along with goals for their protection, allowable public use, and property maintenance. Operations and maintenance requirements are detailed to manage these lands for the long term benefit of target species and cultural resources. An ecosystem approach and adaptive management are emphasized for protection of biological resources on acquired lands within the region.

Draft Land Management Plan for
PALISADES RANCH
San Bernardino County, California

I. INTRODUCTION

A. Purpose of Acquisition. According to a brochure produced by Western Rivers Conservancy (WRC), the 1,647-acre± Palisades Ranch has been a high conservation priority for over a decade, as referenced in approved California Department of Fish and Wildlife (CDFW) Land Acquisition Evaluation and 2004 Mojave River Habitat Water Supply Management Plan, the Mojave River Adjudication, The Nature Conservancy's Plan for the Mojave River (funded by Resources Legacy Fund), and Audubon's list of globally important bird areas. In 2015, the U.S. Fish and Wildlife Service (USFWS) considered this acquisition its highest southern California priority for FY15 Recovery Land Acquisition Funds.

The primary purposes for the acquisition of this land and subsequent development of this Land Management Plan (LMP) are, in part, to help fulfill the mission statement of WRC, which is given as to "…protect outstanding river ecosystems in the western United States. We acquire land to conserve critical habitat, provide public access for compatible use and enjoyment, and cooperate with other agencies and organizations to secure the health of whole ecosystems." Helendale Community Services District (HCSD) is a cooperative partner with WRC (herein "Managing Partners") in managing Palisades Ranch.

B. Acquisition History. According to the Phase 1 Assessment (BCA Engineering Corporation 2015), this LMP encompasses 1,646.8 acres± (herein "1,647 acres±") of riparian habitats and upland desert scrub on 25 contiguous parcels located in San Bernardino County, California (Figures 1 and 2), referred to herein as "Palisades Ranch" or "subject property." Previously, the site has also been referred to as "Safari Ranch" (BCA Engineering Corporation 2015, Wood & Associates 2014). Assessor's Parcel Numbers for these 25 parcels include 0465-151-13 and -20; 0470-011-01, 0470-021-10, 0470-011-04 and -06, -11, and -29 to -33; 0469-011-47, -48 and -63; 0460-094-05, -06, -19 to -21, -40 and -41, -44, -46, and -48 (see Table 1 for more detailed information). Owned previously by Barbara T. Older and Carl E. Ross, Palisades Ranch was purchased by WRC in December 2015.

Palisades Ranch is located mostly along the western side of the Mojave River and south of the Silver Lakes Master Planned Community in the Community of Helendale. It has no recorded Parcel or Tract Map. BCA Engineering Corporation (2015) estimated there are about 500 acres of native desert scrub, 500 acres of the Mojave River floodplain, with the remainder of the site occupied by an historic alfalfa ranch with appurtenant structures (i.e. several houses, metal equipment building, and shade structures). Wood & Associates (2014) estimated that the site is comprised of 880 acres of riparian habitats to the east within the floodplain and 880 areas of desert scrub to the west in upland areas. There is a historic Pony Express stop on the site (location mapped in Figure 10 and shown in Exhibits 10 and 11). The subject property has no other known prior historical uses or operations.

Figure 1. Palisades Ranch: Vicinity Map

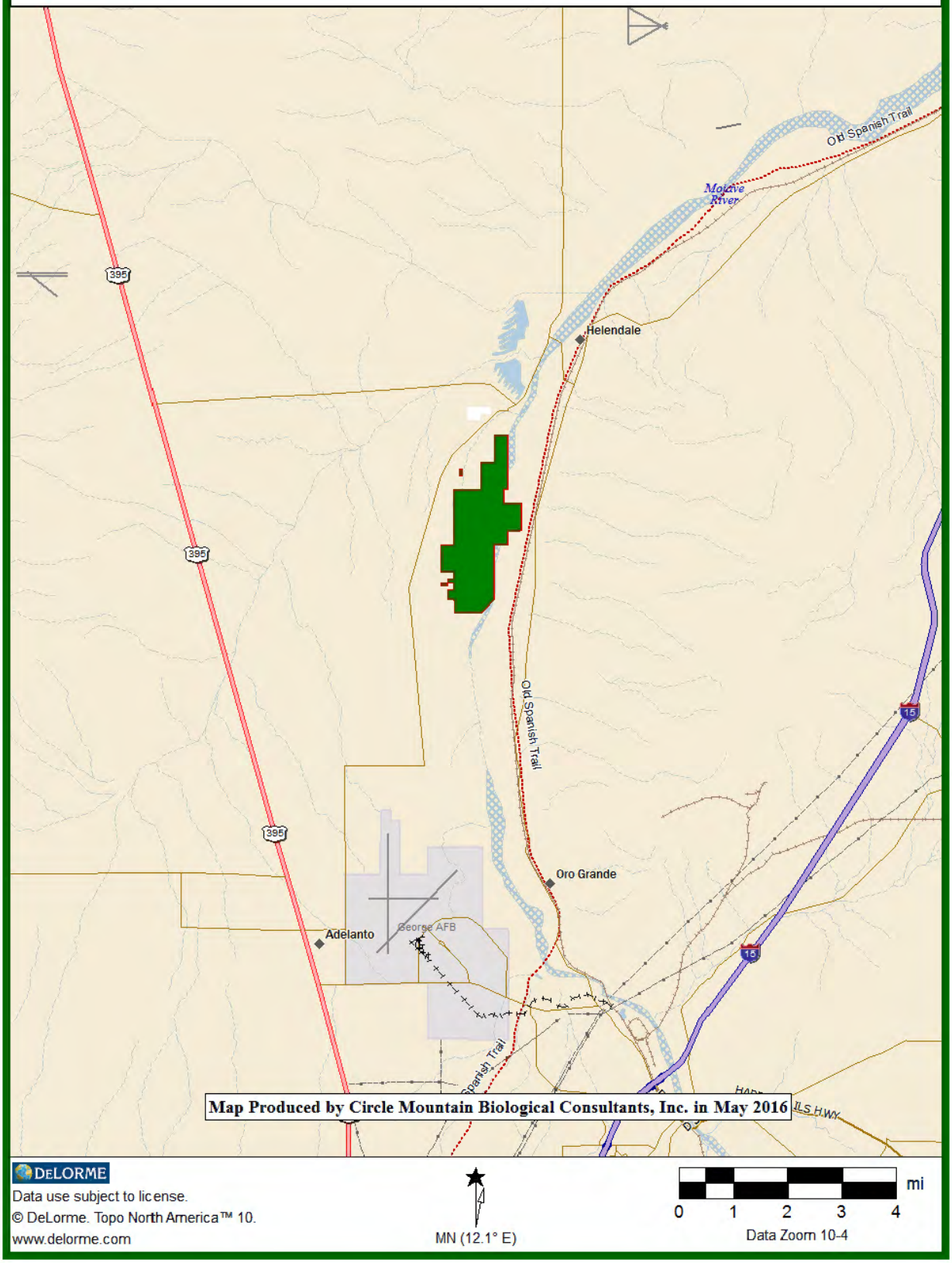
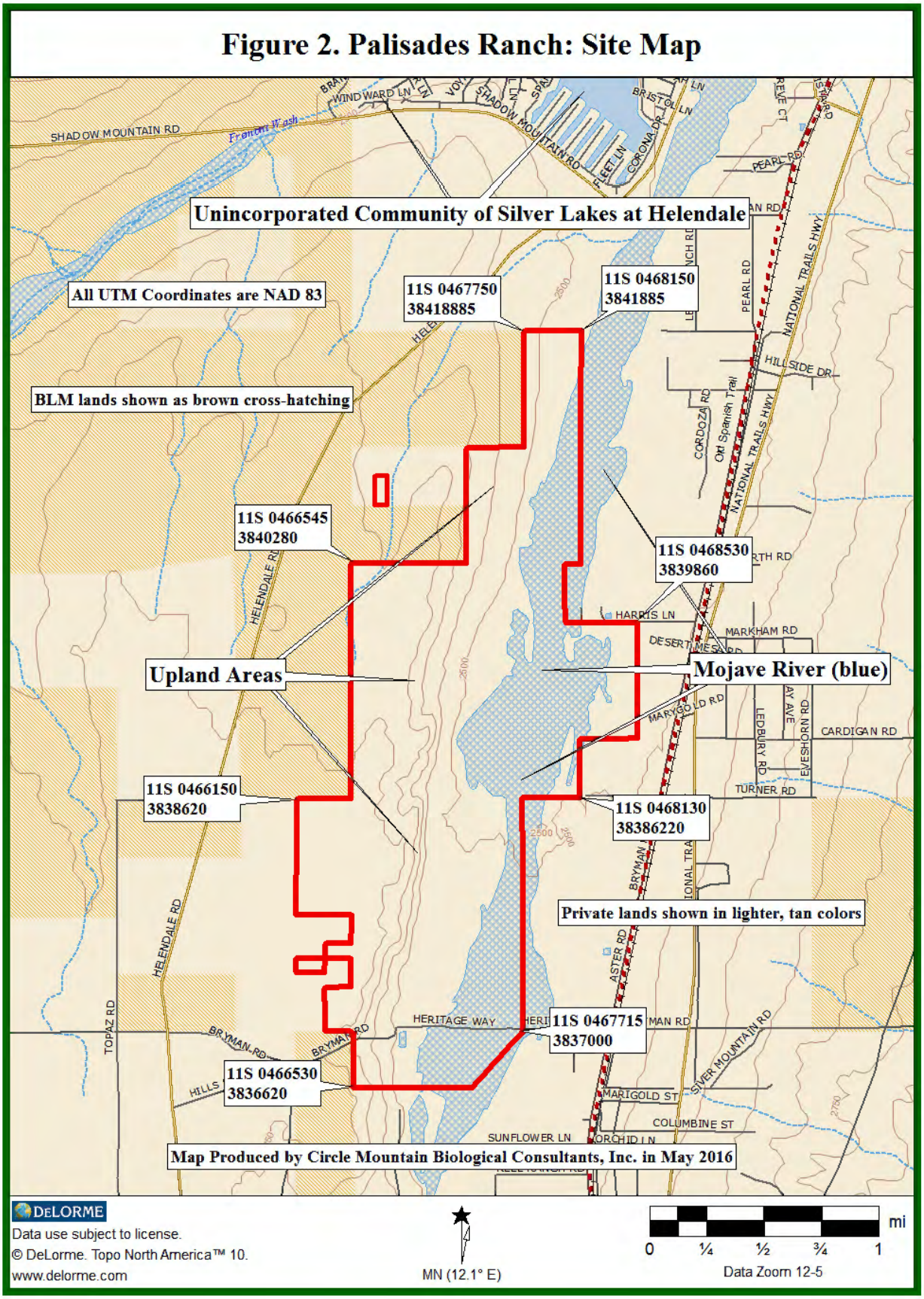


Figure 2. Palisades Ranch: Site Map



C. Purpose of Land Management Plan. The *general* purposes of LMPs are defined by the CDFW (2014) as follows, and are directly applicable to this LMP:

• The LMP guides the adaptive management of habitats, species, and programs described herein to achieve CDFW's mission to protect and enhance wildlife values.

• The LMP serves as a guide for appropriate public uses of the property.

• The LMP serves as a descriptive inventory of fish, wildlife, and native plant habitats that occur on or use the subject property.

• The LMP provides an overview of the property's operation and maintenance, and personnel requirements to implement management goals. It serves as a budget planning aid for annual regional budget preparation.

• The LMP provides a description of potential and actual environmental impacts and subsequent mitigation that may occur during management, and contains environmental documentation to comply with state and federal statutes and regulations.

The baseline inventories, management prescriptions, biological goals, etc. given herein will be programmatically applied to this and any other contiguous and nearby parcels that may eventually be acquired by the Managing Partners, as they relate to the operation and management of Palisades Ranch. The programmatic management of this subject property will be benefitted by conscientious implementation of this LMP.

At the time of this writing (June 2016), there is not an existing conservation easement associated with Palisades Ranch. It is the intent of the Managing Partners to pursue a Grant Agreement with the Wildlife Conservation Board (WCB 2016) and to establish a conservation easement with CDFW that results in enhanced protection and management of Palisades Ranch.

D. About Western Rivers Conservancy. The following information is taken from a brochure produced by WRC, and may be supplemented by information on their website, which may be accessed at www.westernrivers.org. In an effort to revitalize habitat for imperiled Mojave species, WRC has purchased the 1,647-acre± Palisades Ranch along a critical reach of the Mojave known as the "Transition Zone." Located between Apple Valley and Helendale, the Transition Zone has perennial surface flows and a lush, 15-mile-long riparian corridor of cottonwood and various willow trees. The Palisades Ranch includes 3.3 miles± and 880 acres± of riparian woodlands (Wood & Associates 2014). WRC's acquisition will effectively prevent future human development, while preserving a critical reach of this complex desert river ecosystem. Prior to the purchase by WRC, there had been a formal proposal with San Bernardino County to develop a dense residential community on the northern portions of the subject property.

Protection of Palisades Ranch's riparian habitat is vital to the recovery of two federally endangered bird species—southwestern willow flycatcher and least Bell's vireo—and possibly one federally threatened species, the western yellow-billed cuckoo. The project will benefit migratory birds and several California Species of Special Concern, including brown-crested

flycatcher, summer tanager, vermillion flycatcher, yellow-breasted chat, and yellow warbler. Potential habitat for Mojave River vole and arroyo toad (a federally endangered species and California Species of Special Concern), may exist within this stretch of riparian area. Palisades Ranch's upland habitat also supports several federally and/or state-listed species, including desert tortoise (state and federally Threatened), burrowing owl (California Species of Special Concern), and possibly Mohave ground squirrel (state Threatened). Lastly, this reach of the Mojave River once supported populations of the endangered Mojave tui chub, which could potentially be reintroduced on the property.

After six years of negotiation, WRC purchased Palisades Ranch in December 2015. Working with HCSD, CDFW, USFWS, and others, WRC secured a $1.3 million grant from the Federal Cooperative Endangered Species Conservation - Fund Recovery Land Acquisition program to conserve the property. This Section Six grant request, combined with state matching funds, will cover the expected $2.3 million appraised value of the property. Once grant funds are secured, the property will transfer to HCSD with a conservation easement held by the State of California or a 501(c) (3) designee.

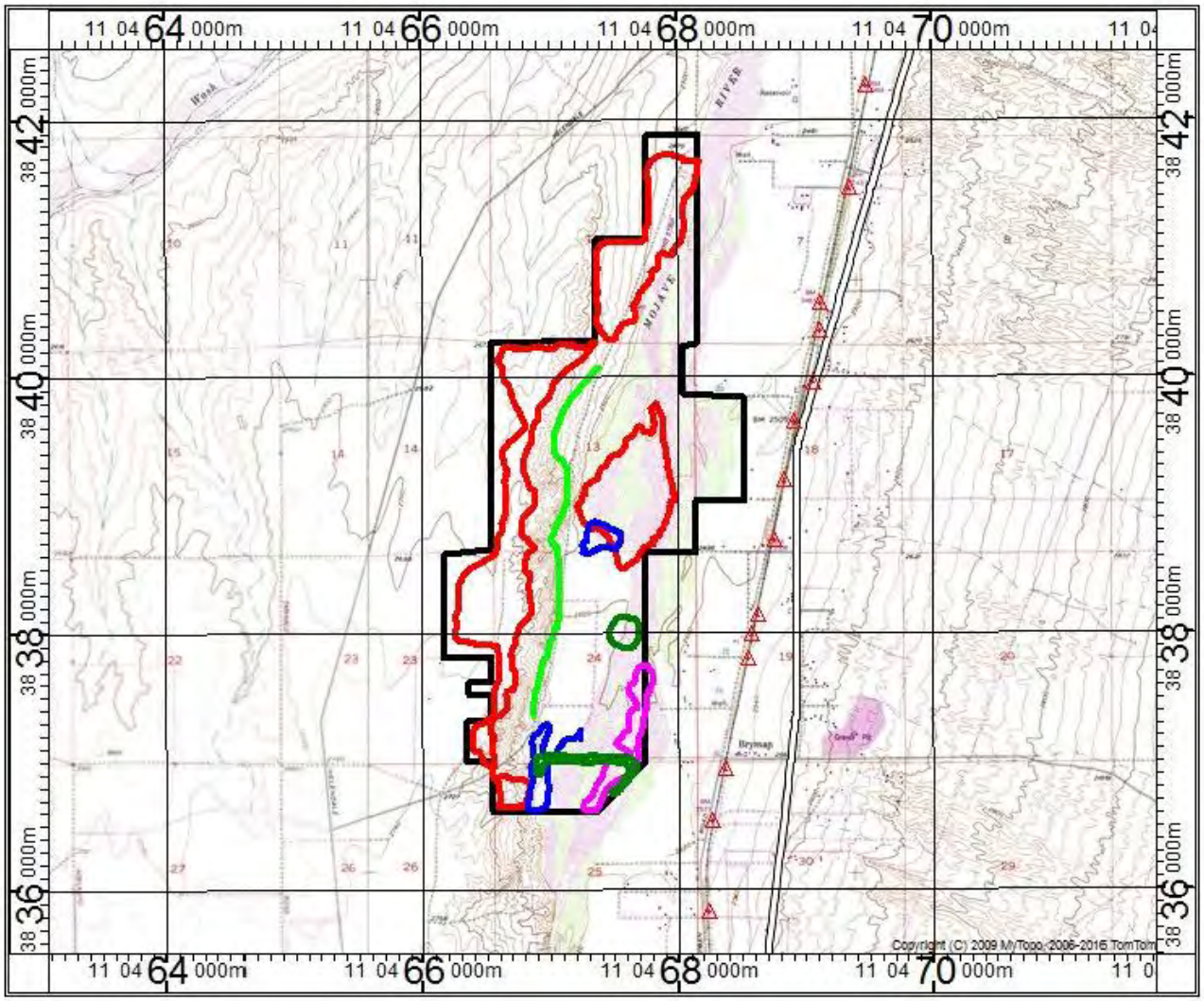
About Helendale Community Services District. HCSD's primary function is to provide water, waste water treatment, solid wastes, parks and recreation, water conservation, graffiti abatement, and street lighting for the residents of Silver Lakes and other local residents in the unincorporated community of Helendale. The reader is encouraged to visit HCSD's webpage (www.helendalecsd.org) for more information about services provided.

II. PROPERTY DESCRIPTIONS

A. Geographical Setting. The 25 parcels comprising Palisades Ranch are located in an unincorporated portion of San Bernardino County, California, south of the community of Silver Lakes and Helendale. The site is 10-15 miles± north of Apple Valley/Victorville/Adelanto and 18 miles± south-southwest of Barstow, which are the largest cities in the region, and also situated along the Mojave River. There are unnamed peaks of 4,200 feet elevation located within five miles east of the site and relatively flat alluvial areas to the west out to Shadow Mountains (4,050 feet elevation), which are approximately 10 miles west. The site is accessed from the west by Highway 395, Shadow Mountain Road, and Helendale Road and from the east by Highway 66, Vista Road, and Helendale Road.

As shown in Figure 3, the eastern half of the site (Sections 12, 13, 18, 24, and 26) is comprised of the Mojave River flood plain and the western half (Sections 13, 23, 24, and 26) is comprised of steep dissected cliffs ("palisades"), bluffs, and flat alluvial areas farther west. The 25 parcels occupy an area of 1,647 acres±, approximately 3.3 miles± along a north-south axis and 1.25 miles± wide on an east-west axis. The total length of the cottonwood forest between Oro Grande and Helendale is approximately 7.6 miles, so about 40% of this regionally significant plant community is found on the subject property. At its widest, the cottonwood-willow forest is approximately a quarter mile wide near the southern boundary of the property.

Figure 3. USGS 7.5' Helendale Quad Map Showing May 2016 Survey Transects



In this figure, red transects were surveyed by Ed LaRue, light green by Mike Radakovich, pink by Dave Goodward, dark green by Bill Deppe, and blue by Chet McGaugh (the last three biologists are expert birders).

B. Property Boundaries and Adjacent Lands. As required by CDFW (2014), legal descriptions, Assessor's Parcel Numbers (APN), and USGS 7.5' quadrangles for the 25 parcels are given as follows (all parcels are located on the USGS 7.5' Helendale quadrangle):

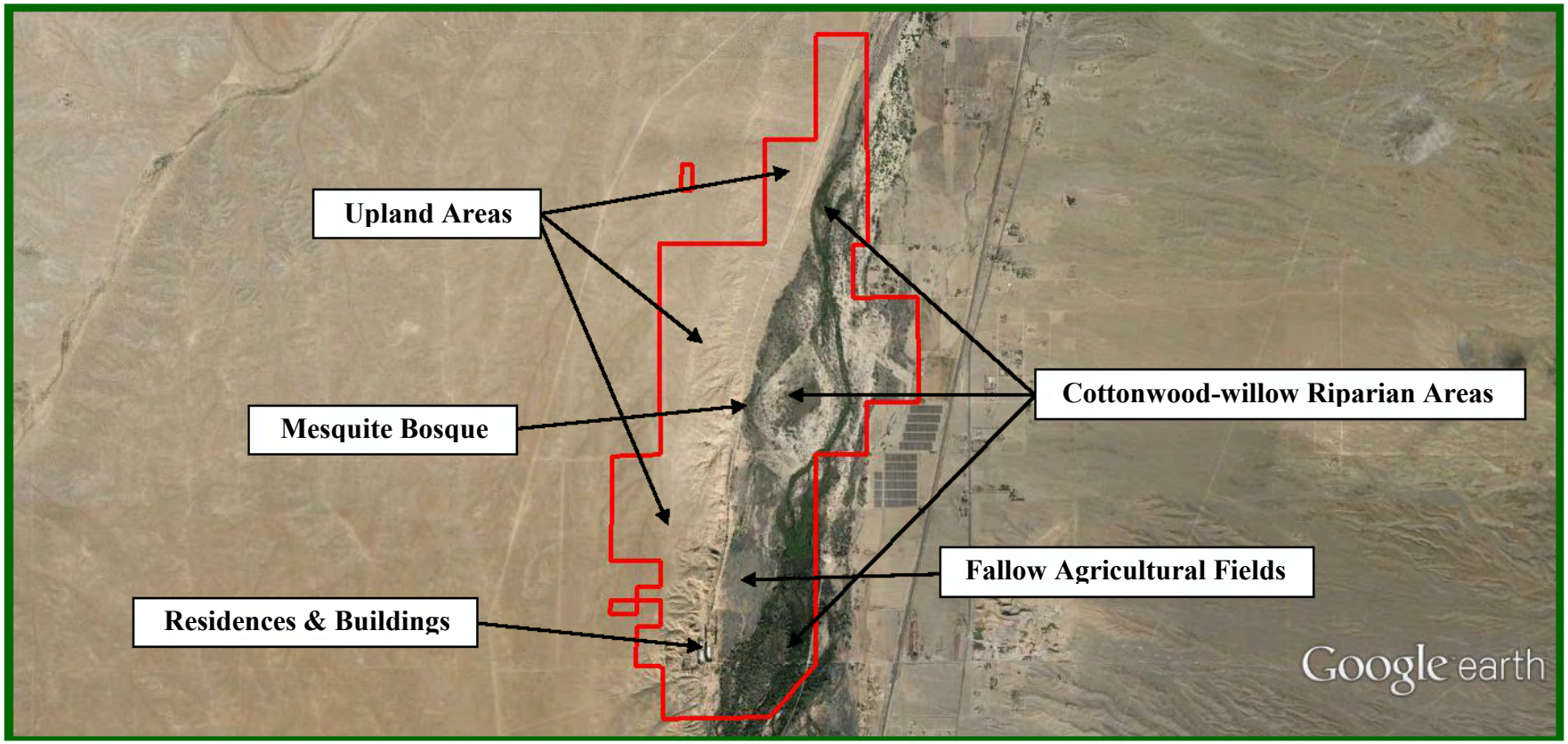
Table 1. Location Information for Palisades Ranch

APN No.	Legal Description	Section/Township/Range	Acreage
0460-094-06	NE1/4 of NE1/4	23/7N/5W	40.00
0460-094-19	W1/2 of W1/2 of SE ¼ of NE1/4	23/7N/5W	10.00
0460-094-20	E1/2 of W1/2 of SE1/4 of NE1/4	23/7N/5W	10.00
0460-094-21	E1/2 of SE1/4 of NE1/4	23/7N/5W	20.00
0460-094-40	N1/2 of SE1/4 of NE1/4 of SE1/4	23/7N/5W	5.00
0460-094-41	S1/2 of SW1/4 of NE1/4 of SE1/4	23/7N/5W	5.00
0460-094-46	S1/2 of NE1/4 of SE1/4 of SE1/4	23/7N/5W	5.00
0460-094-48	N1/2 of SE1/4 of SE1/4 of SE1/4	23/7N/5W	5.00
0460-094-50	S1/2 of SE1/4 of SE1/4 of SE1/4	23/7N/5W	5.00
0465-151-13	S1/2 of W1/3 of E3/5 of NW1/4 of SW1/4	12/7N/5W	4.00
0465-151-20	E1/2 of NE1/4 of SE1/4	12/7N/5W	240.00
0469-011-47	N1/2 of NW1/4	25/7N/5W	35.37
0469-011-48	N1/2 of NW1/4	25/7N/5W	44.63
0469-011-63	Parcel 1 of Parcel Map	7N/5W	20.30
0470-011-01	All Section 13	13/7N/5W	630.00
0470-011-04	NE1/4 of NW1/4 & NW1/4 of NE1/4	24/7N/5W	80.00
0470-011-06	SW1/4 of NE1/4	24/7N/5W	40.00
0470-011-11	W1/2 of SE1/4	24/7N/5W	80.00
0470-011-29	NE1/4 of SW1/4	24/7N/5W	8.96
0470-011-30	SE1/4 of NW1/4 & NE1/4 of SW1/4	24/7N/5W	70.90
0470-011-31	NW1/4 of SW1/4	24/7N/5W	9.10
0470-011-32	W1/2 of NW1/4 & NW1/4 ofSW1/4	24/7N/5W	110.90
0470-011-33	S1/2 of SW1/4	24/7N/5W	80.00
0470-011-33	S1/2 of SW1/4	24/7N/5W	-
0470-021-10	SW1/4 of NW1/4 & NW1/4 of SW1/4	18/7N/4W	81.50

Figure 2, above, is provided as a regional overview following CDFW's (2014) recommendation that state lands (none in the vicinity) and federal lands (BLM lands are shown as brown cross-hatched polygons in Figure 2) be identified in the region. Lands to the west from the subject property to Highway 395 and beyond are in a checkerboard pattern of public lands managed by the BLM and private lands. As shown in Figure 4, below, contiguous lands to the east are comprised mostly of active and fallow agricultural fields and recently-built solar panels, with sparse residential development farther east, beyond National Trails Highway (Highway 66).

The Fremont-Kramer Area of Critical Environmental Concern (ACEC; BLM 2005), which corresponds to the Fremont-Kramer Critical Habitat Unit for desert tortoises (USFWS 1994a) and the Fremont-Kramer Desert Wildlife Management Area (DWMA; USFWS 1994b) is contiguous to the western boundary of Section 13, the western portions of which are occupied desert tortoise habitat (Figure 8). This same area was also designated as the Mojave Ground Squirrel Conservation Area (MGSCA) by the BLM in its Record of Decision for the West Mojave Plan (BLM 2006). The 16-square-mile Mohave Monkeyflower ACEC occurs east of Highway 66, within 1.5 miles east of Palisades Ranch. The square-mile Mojave Fish-hook Cactus (a species found during the May 2016 surveys, see Figure 7) is located immediately east of Helendale, approximately 1.5 miles northeast of the subject property.

Figure 4. Palisades Ranch: Aerial Overview (©2016Google)



View from approximately 2,500 feet elevation

C. Geology, Soils, Climate, Hydrology. The following information is taken from the Phase 1 Assessment by BCA Engineering Corporation (2015), which is available upon request.

1. Geology. Palisades Ranch is located north of Victor Valley at an elevation of 2,475 to 2,740 feet±, with relatively flat desert on western portions of the site, including areas of steep slopes and cliffs (from which "Palisades Ranch" derives its name) draining into the Mojave River riparian areas from the west, at a slope of 36%±. Undeveloped areas are comprised of native riparian and desert scrub, inclusive of the Mojave River floodplain and upland areas to the west.

The site is located within the Mojave Desert Geomorphic Province, which is a large structural block of land bounded on the southwest by the San Andreas Fault; on the north and northwest by the Garlock fault, the Tehachapi Mountains and the Basin and Range Province; and on the southeast by the Colorado Desert. The Mojave Desert Province also extends eastward into Arizona and southern Nevada. Much of the topographical relief of the Mojave Desert represents remnants of mountainous topography, now partially or wholly obscured by erosion and alluvial cover.

The Transverse Mountain Ranges (east-west orientation, being transverse to the north-south orientation of California coastal mountain ranges) at Cajon Pass (Interstate 15) are divided with the San Gabriel Mountains to the west and the San Bernardino Mountains to the east. These two mountain ranges begin the basin and range system and provide the vast majority of ground water and surface flooding during storm events as numerous creeks and the Mojave River drain off the northern side of the mountains. These mountain ranges form the rain shadow effect on the Mojave Desert that reduces the amount of moisture from storms, which have formed the large alluvial fans into the Mojave Desert and the Tehachapi Mountains, which separate the Mojave Desert from the Central Valley.

The Victor Valley is at the western edge of the Basin and Range Province of the southwestern United States and ultimately is part of the Death Valley complex. In the contiguous U.S., Mount Whitney's summit is the highest at 14,505 feet and is 84.6 miles west-northwest of the lowest point at Badwater in Death Valley National Park, which is -282 feet below sea level. Along with the Great Salt Lake in Utah and Pyramid Lake in Nevada, this area spans 300,000± square miles and includes almost all of Nevada, western Utah, southeastern California, and portions of Arizona and northwestern Mexico.

Additionally, the area is comprised of transmontane ranges (i.e. Telescope Peak in the Panamint Range to the west of Death Valley, which has an elevation of 11,050 feet).

Local Faults

- San Andreas Fault is about 40 kilometers± south of Site
- Helendale Fault, 14 kilometers± to the northeast
- The majority of the site is within the 5-10 kilometers± of the Helendale Fault but not within the A or B Fault shading per Maps of Known Active Faults Near-Source Zones in California and Adjacent portions of Nevada; Page O-3; Dated - August 1997

2. Soils. The site has multiple specific soil types designated on Sheet No. 18 – Helendale Quadrangle (Soil Conservation Service 1978), as follows:

157: Mojave Riverwash
171: Villa loamy sand, floodplains of the Mojave River
169: Victorville sandy loam, 0-2% slopes
113: Cajon sand, 2-9% slopes
103: Badlands, cliffs and bluffs and intersected with many drainage ways
106: Bryman loamy fine sands, 2-5% slopes
132: Helendale loamy sand, 2-5% slopes
138: Kimberlina loamy fine sand, 2-5% slopes

Generally, all of the soils described are sands and gravelly sands formed from alluvium derived dominantly from granitic materials, and are soils unique to active drainage areas. This very deep, somewhat excessively drained soil is on alluvial fans from the nearby San Bernardino and San Gabriel mountains. Alluvial soils may be subject to erosion by wind and water when disturbed. Soils with high to moderate potential for water erosion include these soil types. Soil controls such as limited grading, creation of impermeable surfaces, establishment of windbreaks and other erosion control techniques are advisable to protect these fragile desert topsoil layers from both water and wind erosion.

3. Climate. Mojave River Ground Water Basins - Department of Water Resources (1967) reports 5 inches± of annual precipitation in the region. According to the Western Regional Climate Center, (wrcc@dri.edu) for the period between 1913 and 1980, Barstow's (located approximately 18 miles northeast) average minimum temperatures, which were recorded in December and January 2013, respectively, were 31.1°F and 31.2°F, with an average annual minimum of 47.5°F. The hottest months were July and August, where the average maximum temperatures were given as 102.4°F and 100.3°F, respectively, with an average annual maximum of 80.2°F. January has historically been the wettest month, with the 67-year average given as 0.75 inches, and May the driest month, with 0.08 inches. Though it rarely snows in the region, January is the snowiest month (average total snow fall of 0.7 inches), with trace amounts in December (0.4 inches) and March (0.1 inches) (above taken from CMBC 2014).

4. Hydrology. The community obtains its water supply from the transition zone of the Upper (Alto) Basin of the Mojave River Basin, which is an "Adjudicated Basin" with court approved and monitored water-right ownership. Water Rights are being actively purchased and leased in the area. It is estimated about 50,000 acre-feet of storm waters are generated annually (on average) to recharge the basin by runoff from the San Bernardino Mountains located to the south, however the recharge is inadequate compared to actual water pumping, therefore the Upper Basin is in an over-draught condition, and the aquifer groundwater is being mined from past glacial periods. The ground water gradient is generally from south to north and then northeast to Afton Canyon, paralleling the Mojave River. The Mojave River is at the surface at this location and there are no known springs or perched groundwater conditions at the site. Groundwater is of excellent quality with all drinking water standards met and has about 300 parts per million of total dissolved solids (TDS) consisting primarily of Calcium Bicarbonate.

Depth to groundwater is from 0 to 240± feet depending on distance from Mojave River. Ground elevation is at about 2,475± - 2,740± feet MSL, per United States Geological Survey. Water surface elevation is at about 2,460± - 2,500± feet MSL. Effective base of water is at about 2,200±, per Mojave River Ground Water Basins - Department of Water Resources, 1967. Areal Geology: Older Alluvium Deposits (Qoa) and River Deposits (Qra), per Mojave River Ground Water Basins - Department of Water Resources, 1967.

As above, the following information is taken from BCA Engineering Corporation (2015), which cites the following source: Discussion with Carl Coleman, PE and first General Manager of the Mojave Water Agency from 1964 till 1973 (Director in the 1974-76 and again elected in 2012 representing Apple Valley) and a Town council member of the Town of Apple Valley on its inaugural Town Council in 1988 and providing consulting engineer services continuously since 1973 - present:

- There are no known specific issues of environmental concern at this site.
- The site is characterized as a typical alfalfa ranch with equipment, building, and historical single wall steel fuel tanks which have been systematically removed and replaced with updated fuel systems including double wall and above-surface fuel tanks and dispenser systems.
- The depth of functioning water wells along most portions of the Mojave River riparian corridor have very little relative fluctuation due to seasonal storm run-off conditions, while many other distant areas from the Mojave River routinely fluctuate 50± seasonally.
- Geologically, separate areas like Lucerne Valley have even larger localized water table fluctuations, mostly due to historical high-volume agricultural pumping.
- Additionally, the water quality in this area is generally very good, with a minimum of total dissolved solids.
- TDS range of a maximum of 300 ppm Sodium Bicarbonate, per Mojave River Ground Water Basins - Department of Water Resources, 1967.
- Testing of potable water by the Mojave Water Agency and local water retailers are completed regularly with no known issues of concern.

D. Cultural Features.

1. Archaeology. At this time, there have been no archaeological surveys of the subject property. During the reconnaissance surveys on 22 May 2016, Radakovich found two archaeological items, including a "scraper tool" (Figure 22) and "flake" (Figure 23). These two artifacts were found along the base of the cliffs, along the green line shown in Figure 3, and are mapped in Figure 10. Archaeological surveys, including database queries, are considered to be a First Tier, Cultural Goal 1 action item in this LMP.

2. Historic Land Uses and Existing Structures. According to BCA Engineering Corporation (2015) the site has no recorded Parcel or Tract Maps, has about 500 acres of native desert, about 500 acres of the Mojave River floodplain, with the remainder of the site comprised of a historic alfalfa ranch with appurtenant structures including several houses, metal equipment buildings, and alfalfa bales storage structure. An historic Pony Express stop has been documented on the site (see Exhibits 10 and 11). There is also an abandoned runway, shown as "Palisades Ranch Airport" on various maps, which is becoming partially revegetated by saltbush scrub. The site has no other known prior historical uses or operations. The native desert areas are crossed by natural drainage channels, historical fencing, and dirt trails and roads. The nearest existing significant industrial or commercial corridor location is north of the site in the community of Silver Lakes and immediately adjacent areas along paved roads (Vista Road and Highway 66).

Wood & Associates (2014), which is available upon request, depicts many photographs of existing structures and other features at Palisades Ranch. Some of these photographs follow (see the aerial on the following page for locations):

"Rock House"

"Caretaker's Residence"

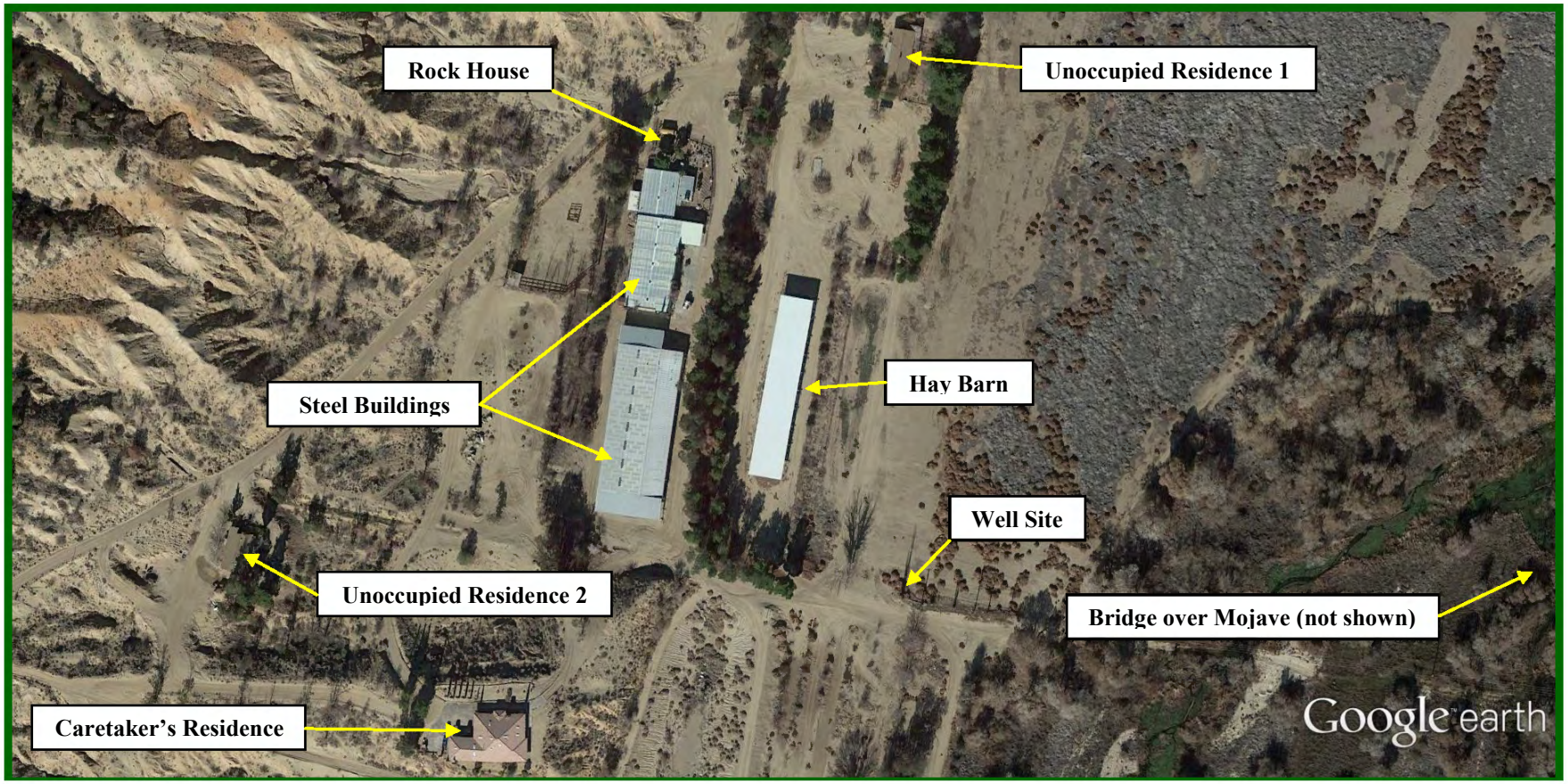
"Unoccupied Residence 1"

"Unoccupied Residence 2"

"Steel Buildings"

"Well Site"

"Bridge over Mojave River (location not shown on next page)"


Rock House
Unoccupied Residence 1
Steel Buildings
Hay Barn
Well Site
Unoccupied Residence 2
Bridge over Mojave (not shown)
Caretaker's Residence
Google earth

III. HABITAT AND SPECIES DESCRIPTIONS

A. Vegetation Communities, Habitats, and Plant Species. As mentioned elsewhere and mapped below in Figure 5, the site is comprised of creosote bush scrub in upland areas, saltbush scrub interspersed throughout the river floodplain, a ruderal field resulting from past farming activities, and Fremont cottonwood forest mixed with screw bean mesquite and various willow species throughout most of the Mojave River floodplain (Sawyer et al. 2009).

Upland Areas. Although various sources have estimated that the upland creosote bush areas on the western half of the site range from as few as 500 acres (BCA Engineering Corporation 2015) to as many as 880 acres (Wood & Associates), CMBC's calculations using Google Earth 2016 aerial imagery and ground-truthing reveals there are about 825 acres± of creosote bush scrub on the subject property. Surveys were performed late enough in May 2016 that many of the annual plants were unidentifiable. Of the 110 plant species identified, 59 annual and perennial species were found in upland areas, from the base of the bluffs to the western boundary of the site (see Appendix A).

Dominant perennial plant species in upland areas include creosote bush (*Larrea tridentata*), burrobush (*Ambrosia dumosa*), peach thorn (*Lycium cooperi*), Anderson's box-thorn (*Lycium andersonii*), Nevada joint-fir (*Ephedra nevadensis*), and several species of indigo bush (*Psorothamnus arborescens*, *Psorothamnus schottii*). Less abundant species included California buckwheat (*Eriogonum fasciculatum*), cheesebush (*Ambrosia salsola*), groundsel (*Senecio flaccidus*), desert goldenhead (*Acamptopappus sphaerocephalus*), bush peppergrass (*Lepidium fremontii*), winter fat (*Krascheninnikovia lanata*), and several species of cactus (*Cylindropuntia echinocarpa*, *Cylindropuntia ramosissima*). Rubber rabbitbrush (*Chrysothamnus nauseosus*) is most common alongside roads and in disturbance areas. Sandier substrates support Indian ricegrass (*Achnatherum hymenoides*), desert sand verbena (*Abronia villosa*), sandpaper plant (*Petalonyx thurberi*), and desert primrose (*Oenothera* sp.). Where the creosote intergrades with saltbush scrub, four-winged saltbush (*Atriplex canescens*), big saltbush (*Atriplex lentiformis*), and allscale (*Atriplex polycarpa*) are common.

Although annual species are under-represented in the late-spring survey, 32 of the 59 species identified in upland areas were annual plants. These include natives such as chia (*Salvia columbariae*), two species of poppy (*Eschscholzia glyptosperma*, *Eschscholzia minutiflora*), Bigelow coreopsis (*Coreopsis bigelovii*), red primrose (*Camissonia boothii*), brittle spineflower (*Chorizanthe brevicornu*), rigid spineflower (*Chorizanthe rigida*), desert trumpet (*Eriogonum inflatum*), desert wishbone plant (*Mirabilis bigelovii*), desert milk-aster (*Stephanomeria exigua*), syntrichopappus (*Syntrichopappus fremontii*), woolly-star (*Eriastrum* sp.), dicoria (*Dicoria canescens*), brown-eyed primrose (*Camissonia claviformis*), and Wallace's daisy (*Eriophyllum wallacii*).

Given the historic human use of the site for farming and limited residential development, there are also many non-native plants throughout the site, perhaps fewer in upland areas. These include rubber rabbitbrush, Russian thistle (*Salsola tragus*), London rocket (*Sisymbrium irio*), tansy mustard (*Descurainia pinnata*), flixweed (*Descurainia sophia*), short-pod mustard (*Hirschfeldia incana*), red-stemmed filaree (*Erodium cicutarium*), Mediterranean split-grass (*Schismus* sp.), and red brome (*Bromus madritensis* ssp. *rubens*). Several native species typically associated with

disturbed areas also occur, including rancher's fiddleneck (*Amsinckia tessellata*), milk-vetch (*Astragalus lentiginosus*), and annual bur-sage (*Ambrosia acanthicarpa*). Based on aerial photographs, ground-truthing, and mapping using DeLorme Topo North America™ 10, CMBC estimates that approximately 150 acres (shown in gray in Figure 5) is the main impact area associated with historic alfalfa and hay farming. Though mostly barren in 2016, there are extensive piles of Russian thistle throughout and east of these denuded areas.

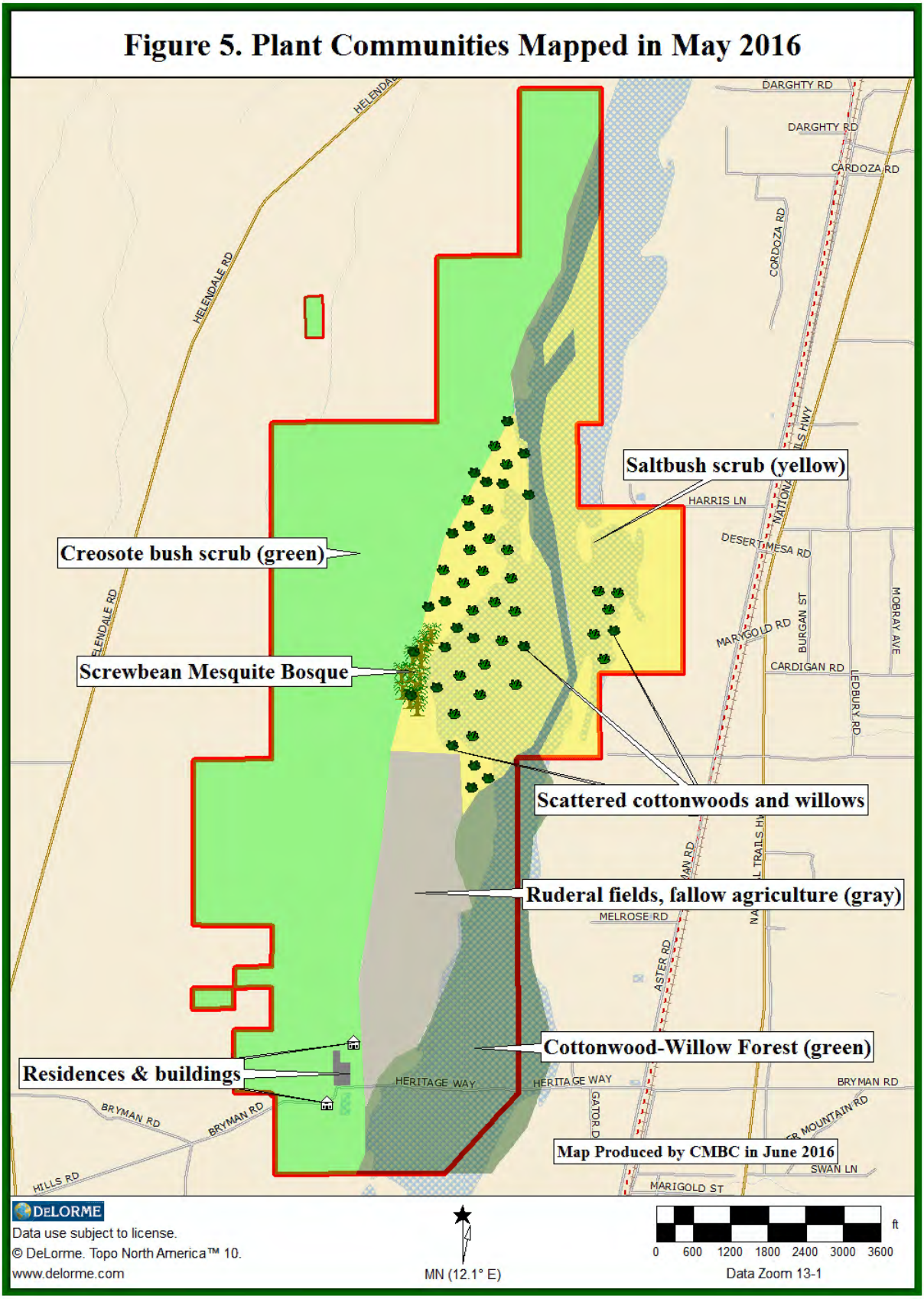
Riparian Areas. The cottonwood-willow forest that dominates the central and eastern parts of the site along channels of perennially-standing and flowing water is a valuable, indispensible resource that is limited to only a few places in the Mojave Desert, such as nearby Mojave Narrows to the south, Big Rock Creek to the west, Morongo Canyon to the southeast, and Amargosa River to the northeast. Along the main river channel, there are both stretches of flowing water (Exhibits 12 and 13) and standing water (Exhibits 14 and 15) resulting from blockage due to beaver dams. In these areas, narrow-leafed willow (*Salix exigua*), arroyo willow (*Salix lasiolepis*), and red willow (*Salix laevigata*) are common, along with various species of rush (*Juncus* ssp.), sedge (*Carex* ssp.), cat-tail (*Typha latifolia*), and mulefat (*Baccharis glutinosa*). Black willow (*Salix gooddingii*) has also been reported but was not observed.

Fremont's cottonwood (*Populus fremontii*) is present and is more common adjacent to surface water where stands of mature cottonwoods are interspersed over an understory of saltbush scrub, including four-winged saltbush, all-scale, and big saltbush. In addition to the impenetrable growths of narrow-leafed willow, rushes, sedges, and cat-tails, there is a dense streamside growth of seep-spring monkeyflower (*Mimulus guttatus*) (yellow flowers in Exhibits 12 and 13), desert heliotrope (*Heliotropium curvassivicum*), rabbitfoot grass (*Polypogon monspeliensis*), and salt grass (*Distichlis spicata*), among others. There is an isolated stand of mature screw bean mesquite (*Prosopis pubescens*) trees (Exhibits 20 and 21) on the western parts of the floodplain, where Emory baccharis (*Baccharis emoryi*), goldenbush (*Isocoma acradenia*), yerba mansa (*Anemopsis californica*), big saltbush, and four-winged saltbush form a dense understory. This community, denoted as "Mesquite Bosque" in Figure 5, may be more extensive than mapped.

Three highly-invasive plants are present and restricted to the Mojave River floodplain, including giant reed (*Arundo donax*; Exhibits 16 and 17), salt cedar (*Tamarix ramosissima*; Exhibit 18), and broad-leaf peppergrass (*Lepidium latifolium*; Exhibit 16), which is particularly abundant to the north. Other non-native species observed within the floodplain included rabbitfoot grass, wild lettuce (*Lactuca serriola*), common dandelion (*Taraxacum officinale*), and cocklebur (*Xanthium strumarium*).

B. Common Animal Species. During the 17 and 22 May 2016 surveys of upland areas to the west, Ed LaRue of CMBC and volunteer, Michael Radakovich, identified 9 reptile, 17 bird, and 7 mammal species. Common reptile species included side-blotched lizard (*Uta stansburiana*), western whiptail (*Cnemidophorus tigris*), desert horned lizard (*Phrynosoma platyrhinos*), desert iguana (*Dipsosaurus dorsalis*), desert spiny lizard (*Sceloporus magister*), and zebra-tailed lizard (*Callisaurus draconoides*). Both gopher snake (*Pituophis melanoleucus*) and red racer (*Masticophis flagellum*) were also observed. During surveys of riparian areas on 22 May 2016, western fence lizard (*Sceloporus occidentalis*), Pacific tree frog (*Hyla regilla*), western toad (*Anaxyrus boreas*), and bullfrog (*Rana catesbeiana*) were observed in or adjacent to standing water. Other locally common reptile species that likely occur include long-nosed leopard lizard (*Gambelia wislizenii*), desert night lizard (*Xantusia vigilis*), glossy snake (*Arizona elegans*), long-nosed snake (*Rhinocheilus lecontei*), and various rattlesnake species (*Crotalus* ssp.).

Figure 5. Plant Communities Mapped in May 2016



Although the riparian thickets host many more bird species than are found in upland areas, there were still 17 species of birds identified on western portions of the site. These include resident or seasonal species that may breed onsite, such as mourning dove (*Zenaida macroura*), red-tailed hawk (*Buteo jamaicensis*), Say's phoebe (*Sayornis saya*), ash-throated flycatcher (*Myiarchus cinerascens*), horned lark (*Eremophila alpestris*), black-throated sparrow (*Amphispiza bilineata*), sage sparrow (*Amphispiza belli*), western kingbird (*Tyrannus verticalis*), rock wren (*Salpinctes obsoletus*), and lesser nighthawk (*Chordeiles acutipennis*).

Some of the observed species are more often associated with urbanizing areas, including common raven (*Corvus corax*), European starling (*Sturnus vulgaris*), and American kestrel (*Falco sparverius*). The surveys were performed during the peak of migration, so species like yellow-rumped warbler (*Dendroica coronata*), western tanager (*Piranga ludoviciana*), Brewer's sparrows (*Spizella breweri*), and northern rough-winged swallows (*Stelgidopteryx serripennis*) were also observed.

CMBC was able to enlist three of the top ornithologists currently working in southern California, including Chet McGaugh, Bill Deppe, and Dave Goodward. These birders performed focused surveys of the riparian areas on 22 May 2016. Thanks to their input, the species list increased from 17 species on 17 May 2016 to the 76 species listed in Appendix B. Seven of the birds detected on 22 May 2016 were special status species, which are discussed below, in Section III.C.

The focused bird surveys were performed during the ideal spring migration period, and therefore included many migrants such as lazuli bunting (*Passerina amoena*), olive-sided flycatcher (*Contopus borealis*), western wood-pewee (*Contopus sordidulus*), western tanager, western kingbird (*Tyrannus verticalis*), cliff swallow (*Hirundo pyrrhonota*), pacific slope flycatcher (*Empidonax difficilis*), Hammond's flycatcher (*Empidonax hammondii*), MacGillivray's warbler (*Oporornis tolmiei*), Wilson's warbler (*Wilsonia pusilla*), common yellowthroat (*Geothlypis trichas*), and blue grosbeak (*Guiraca caerulea*), among others. The association of cottonwoods and willows and perennial water is ideal for spring and fall migrant bird species, nesting summer residents, and year-round residents.

Still other bird species are present only because of the perennial, standing water that occurs onsite. These species included pied-billed grebe (*Podilymbus podiceps*), green heron (*Butorides virescens*), black-crowned night heron (*Nycticorax nycticorax*), Virginia rail (*Rallus limicola*), common gallinule (*Gallinula galeata*), and mallard (*Anas platyrhynchos*). Red-shouldered hawk (*Buteo lineatus*) is another species rarely observed in desert habitats and is present due to larger trees and availability of abundant prey species.

The 12 mammal species identified during the two surveys are also listed in Appendix B. Common upland species include antelope ground squirrel (*Ammospermophilus leucurus*), kangaroo rat (*Dipodomys* sp.), Botta pocket gopher (*Thomomys bottae*), Audubon cottontail (*Sylvilagus audubonii*), and black-tailed hare (*Lepus californicus*). Predators include bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), kit fox (*Vulpes macrotis*), and coyote (*Canis latrans*). Beaver (*Castor canadensis*) and raccoon (*Procyon lotor*) were detected only in riparian areas, and desert woodrat (*Neotoma lepida*) middens were most common in woodland areas.

C. Endangered, Threatened, and Special Status Species. USFWS (2008), CDFW (2016a, 2016b, 2016c), and California Native Plant Society (CNPS 2016) maintain lists of animals and/or plants considered rare, threatened, or endangered, which are collectively referred to as "special status species." Additionally, CDFW (2010) maintains a list of plant "Communities of Highest Inventory Priority," which are referred to as "CHIPs." Special status species identified during the surveys described in this LMP appear in Appendix A and B in red font. Unless otherwise noted, the bird species discussed below are considered Birds of Conservation Concern by the USFWS (2008) and/or Bird Species of Special Concern by CDFW (2016b). As described below in Section IV, each of these species is considered a "Biological Element" under this LMP.

Prior to performing field surveys, CMBC performed a literature review of the latest version of the California Natural Diversity Data Base (CNDDB; CDFW 2016a). That search revealed locations of 2 plant, 1 reptile, 2 bird, and 2 mammal species that are designated as special status species by one or more of the agencies listed above. The locations of these special status species are shown in Figure 6. To supplement this information, CMBC and its subcontractors then performed reconnaissance-level field surveys on 17 and 22 May 2016, results of which are discussed below.

PLANTS. Table 2 includes the plant species and communities that have been identified on the subject property during 2016 reconnaissance surveys or reported to the CNDDB (CDFW 2016a) as occurring in the region.

Table 2. Special Status Plant Species and CHIPs* Reported from the Region

Common Name	Scientific Name	Status Designation**
Creosote bush rings	*Larrea tridentata*	Regulated Desert Native Plant
Beaver Dam breadroot	*Pediomelum castoreum*	List 1B.2, BLM Sensitive
Mojave monkeyflower	*Mimulus mohavensis*	List 1B.2, BLM Sensitive
Mojave fish-hook cactus	*Sclerocactus polyancistrus*	List 4.2
Fremont cottonwood forest	*Populus fremontii*	CHIP
Arroyo willow thickets	*Salix lasiolepis*	CHIP
Screw bean mesquite bosque	*Prosopis pubescens*	CHIP

*CHIP – Is a plant Community of Highest Inventory Priority as identified by CDFG (2010).

The status designations in the third column are as follows (CNPS) 2016:

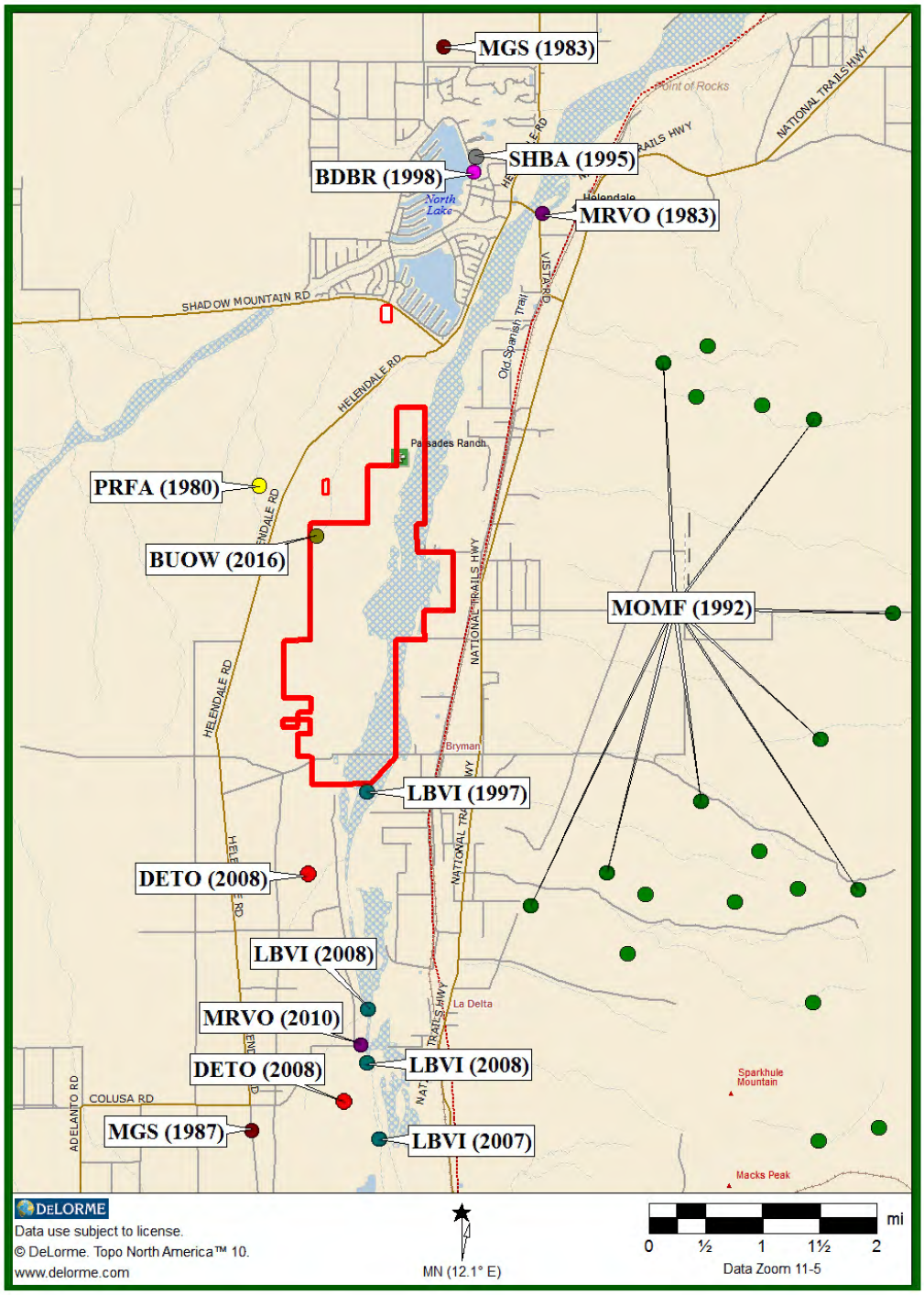
List 1B.2 plants are rare, threatened, or endangered in California and elsewhere; and, specifically, fairly threatened in California (moderate degree/immediacy of threat).

List 4.2 plants are of limited distribution - A watch list; and, specifically, fairly threatened in California (moderate degree/immediacy of threat).

At the County level, the San Bernardino County Development Code was revised and adopted on 12 April 2007. Chapter 88.01 Plant Protection and Management, Section 88.01.020 states, "The provisions of this Chapter apply to the removal and relocation of regulated trees or plants and to any encroachment (for example, grading) within the protected zone of a regulated tree or plant on all private land within the unincorporated areas of the County and on public lands owned by the County, unless otherwise specified..."

Section 88.01.060(c) Regulated Desert Native Plants states, "The following desert native plants or any part of them, except the fruit, shall not be removed except under a Tree or Plant Removal Permit in compliance within Section 88.01.050 (Tree or Plant Removal Permits)," which includes creosote rings larger than 10 feet in diameter.

Figure 6. Locations of Special Status Species Reported from the Region



- Beaver Dam Breadroot (BDBR) - Mohave Monkeyflower (MOMF) - Burrowing owl (BUOW)

- Desert tortoise (DETO) - Least Bell's vireo (LBVI) - Prairie falcon (PRFA)

- Mohave ground squirrel (MGS) - Mohave River vole (MRVO) - Silver-haired bat (SHBA)

Descriptions of Special Status Plants and Communities

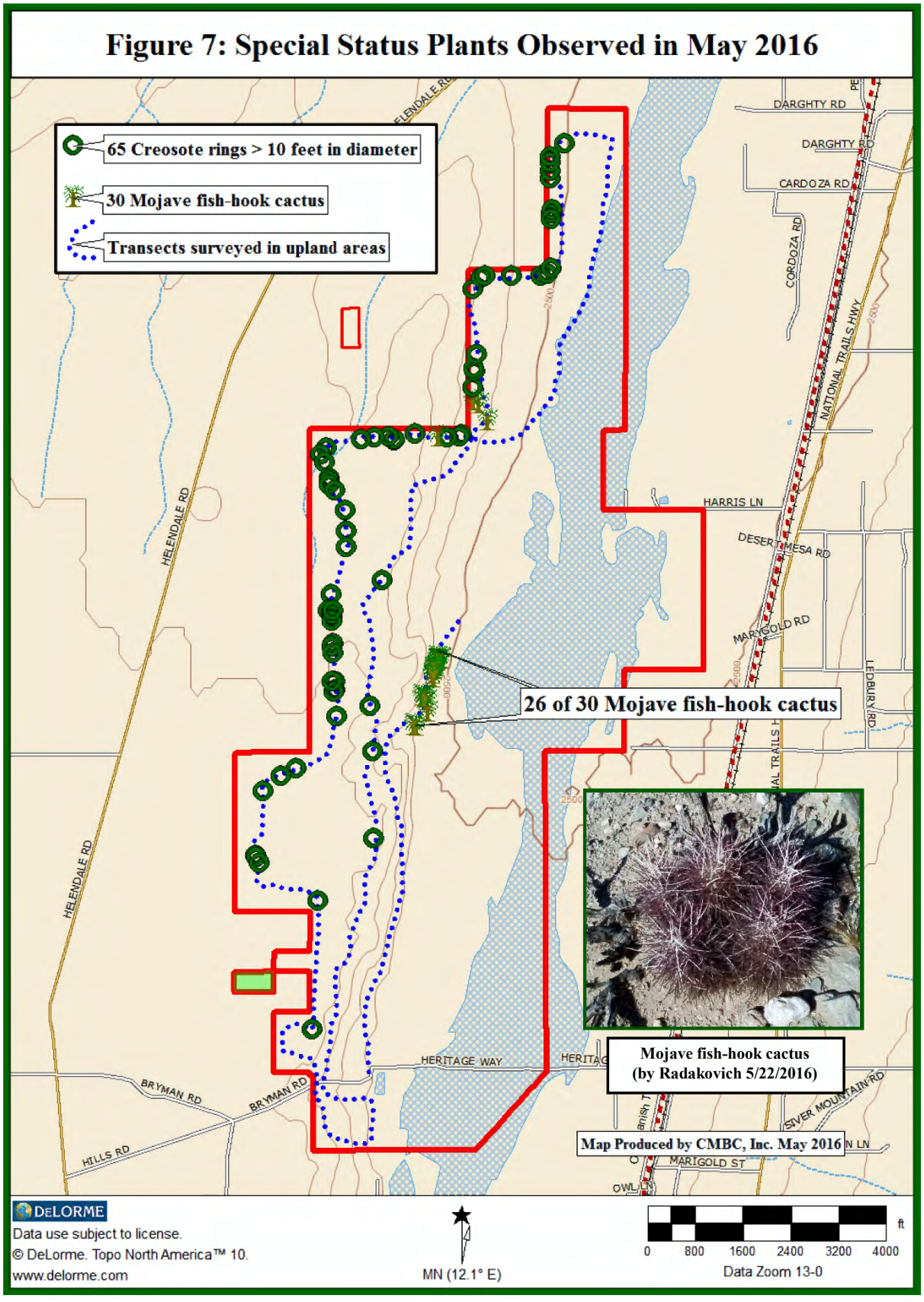
Creosote Rings. Creosote rings that are larger than 10-feet in diameter are considered to be a Regulated Desert Native Plant. Creosote rings are often very old, clonal creosote bushes where over time the original bush has died away, root sprouted, and left a ring of genetically identical bushes that are all roughly the same height. One such ring, known as "King Clone" occurs in nearby Johnson Valley and is estimated to be about 11,700 years old. LaRue observed 65 creosote bush rings along the reconnaissance transects depicted in Figure 3 (see Exhibit 2 for one of the rings photographed on 17 May 2016), although there are obviously numerous other rings in adjacent areas not surveyed. (Photo of "King Clone" by mojaveproject.org, no date given).

Beaver Dam Breadroot. This species is listed by CNPS (2016) as a List 1B.2 plant, meaning that it is rare, threatened, or endangered in California and elsewhere; and, specifically, fairly threatened in California (moderate degree/immediacy of threat). It is a perennial herb, blooming from April to May, found in sandy washes including road cuts, in Joshua tree woodland and Mojavean desert scrub. Although CDFW (2016a) shows the location at Silver Lakes, it is based on a 1998 observation by Ed LaRue, and was actually located along the western shoulder of Highway 395, some seven miles west of Silver Lakes. Even so, it has been reported from the region and could be found onsite when ideal conditions persist. (Photo by Teague Embry 2011).

Mojave Monkeyflower. Also listed as a List 1B.2 plant, this small annual herb, blooming from April through June, on sandy or gravelly substrates, often in washes, occurs in Joshua tree woodland and Mojavean desert scrub. In 1992, a biologist with the Barstow office of the BLM performed extensive surveys for this plant east of Highway 66, where all local records have been reported. That it has not been found west of Highway 66 may be more a matter of survey effort than actual distribution. (Photo by James Andre 2006).

Mojave Fish-hook Cactus. As a List 4.2 plant, this cactus species is of limited distribution - A watch list; and, specifically, fairly threatened in California (moderate degree/immediacy of threat). Found from Victorville to north of Death Valley, this perennial stem succulent, which blooms from April to July, and is found in Joshua tree woodland, Great Basin scrub, and Mojavean desert scrub is relatively widespread but nevertheless restricted to western parts of the Mojave Desert. LaRue and Radakovich observed 30 plants in two concentrations, although they are likely to be common elsewhere onsite in upland areas. There is an ACEC located about 1.5 miles northeast of the subject property that is dedicated to this species. (Photo by Cindy Hopkins 2012).

Figure 7: Special Status Plants Observed in May 2016



Fremont Cottonwood Forest/Arroyo Willow Thickets. Each of these communities is considered a CHIP, or Community of Highest Inventory Priority (CDFG 2010). Although not otherwise designated by either CDFW or USFWS, they are sufficiently rare that they are generally reported to CDFW (2016a) when encountered. CMBC's reconnaissance surveys were not rigorous enough to determine the full extent and/or separateness of these two communities. The general locations of the two communities are situated within the Mojave River floodplain and are roughly mapped in Figure 5 as both "Scattered Cottonwoods and Willows" and "Cottonwood-Willow Forest." It is advisable that a botanist or specialist using aerials and ground-truthing determine the exact extent of these two communities, both where they overlap and are separate. Taken together, they represent a rare, important resource in the region, particularly to amphibians and birds.

Screw Bean Mesquite Bosque. Also considered a CHIP, is mapped alongside the cottonwood-willow areas shown in Figure 5. The community may extend farther north than mapped, which should be determined by more surveys and mapping exercises. Whereas mesquite bosque communities comprised of honey mesquite (*Prosopis glandulosa*) are relatively common in the region, stands of screw bean mesquite such as occurs at Palisades Ranch are less common in the Mojave Desert of California. These trees are often planted to provide shade for cattle, but the trees on the subject property appear to be growing naturally.

ANIMALS. Special status animal species detected during one or both of the reconnaissance surveys are listed in Appendix B in red font; these and other species reported from the region are included in Table 3, below. Status designations are taken from CDFW (2016b) and are described therein. Rather than provide several dozen pages of life history information in this LMP, the reader is referred to the BLM's electronic species accounts, which provide detailed species information for all special status animals occurring in the region (BLM 2005), including all of the species considered in this LMP (http://www.blm.gov/ca/st/en/fo/cdd/wemo_species). Some of the species may also be described in the website for the Desert Renewable Energy Conservation Plan (Dudek 2012) at http://www.drecp.org/whatisdrecp/species.html. Pertinent information is given below relative to the importance of the subject property to a particular species. Unless otherwise noted (San Emigdio blue, Mohave ground squirrel) most of photographs were provided by Cal Photos, University of California, Berkley (http://calphotos.berkeley.edu/fauna/), with the photographers credited in associated paragraphs.

Table 3. Special Status Animal Species Reported from the Region

Common Name	Scientific Name	Status
Invertebrates		
San Emigdio blue	*Plebejulina emigdionis*	Global Ranking = G1G2, S1S2, USFS Sensitive
Amphibians		
Arroyo toad	*Anaxyrus californicus*	California Species of Special Concern Federally Endangered
Reptiles		
Desert tortoise	*Gopherus agassizii*	State Threatened Federally Threatened
Western pond turtle	*Emys marmorata*	California Species of Special Concern No federal status

Table 3. (cont.) Special Status Animal Species Reported from the Region		
Birds		
Osprey	*Pandion haliaetus*	CDFW Watch List No federal status
Northern harrier	*Circus cyaneus*	California Species of Special Concern No federal status
Sharp-shinned hawk	*Accipiter striatus*	CDFW Watch List No federal status
Cooper's hawk	*Accipiter cooperi*	CDFW Watch List No federal status
Swainson's hawk	*Buteo swainsoni*	State Threatened USFWS Bird of Conservation Concern
Ferruginous hawk	*Buteo regalis*	CDFW Watch List USFWS Bird of Conservation Concern
Golden eagle	*Aquila chrysaetos*	CDFW Fully Protected, Watch List USFWS Bird of Conservation Concern
Prairie falcon	*Falco mexicanus*	CDFW Watch List USFWS Bird of Conservation Concern
Burrowing owl	*Athene cunicularia*	California Species of Special Concern USFWS Bird of Conservation Concern
Long-eared owl	*Asio otus*	California Species of Special Concern No federal status
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	State Endangered Federally Threatened
Southwestern willow flycatcher	*Empidonax trailii extimus*	State Endangered USFWS Bird of Conservation Concern
Vermilion flycatcher	*Pyrocephalus rubinus*	California Species of Special Concern No federal status
Brown-crested flycatcher	*Myiarchus tyrannulus*	CDFW Watch List No federal status
LeConte's thrasher	*Toxostoma lecontei*	California Species of Special Concern USFWS Bird of Conservation Concern
Loggerhead shrike	*Lanius ludovicianus*	California Species of Special Concern USFWS Bird of Conservation Concern
Least Bell's vireo	*Vireo bellii*	State Endangered Federally Endangered
Yellow warbler	*Dendroica petechia*	California Species of Special Concern USFWS Bird of Conservation Concern
Lucy's warbler	*Oreothlypis luciae*	California Species of Special Concern No federal status
Yellow-breasted chat	*Icteria virens*	California Species of Special Concern No federal status
Summer tanager	*Piranga rubra*	California Species of Special Concern No federal status
Mammals		
Mohave ground squirrel	*Xerospermophilus mohavensis*	State Threatened No federal status
Mojave River vole	*Microtus californicus mohavensis*	California Species of Special Concern No federal status
American badger	*Taxidea taxus*	California Species of Special Concern No federal status
Silver-haired bat Spotted bat Pallid bat Townsend's big-eared bat	*Lasionycteris noctivagans* *Euderma maculatum* *Antrozous pallidus* *Plecotus townsendii*	All are California Species of Special Concern BLM Sensitive Species except Townsend's big-eared bat, which is a State Candidate for Threatened species

SPECIAL STATUS INVERTEBRATES

San Emigdio Blue Butterfly. Although not ranked by either USFWS of CDFG as rare, San Emigdio blue is globally ranked (G1) and state ranked (S1) as "critically imperiled," which means it is "at very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors" globally, and "critically imperiled in the state because of extreme rarity (often 5 or fewer populations) or because of factor(s) such as very steep declines making it especially vulnerable to extirpation from the state" (CDFW 2016a). It is also considered to be a Sensitive species by the U.S. Forest Service. (Photo by Chet McGaugh at Palisades Ranch on 22 May 2016).

Lepidopterist, Gordon Pratt, provided the following information in an email to LaRue on 5 June 2016. "This butterfly is named the San Emigdio Blue Butterfly (*Plebejulina emigdionis*) because of its type locality, the San Emigdio Canyon in Kern County. Because of cattle ranching that occurred over many decades the butterfly is no longer present there. The San Emigdio Blue Butterfly has been recommended for the endangered species list several times and each time USFWS has come to the conclusion not enough is known. Since its original recommendation for listing it has dwindled to probably less than 20% of its original range. There are approximately only about a dozen known sites that still have this butterfly and because of the recent long term drought additional sites may follow shortly. Most sites cover limited areas of 1 to maybe 5 acres. So this butterfly is actually likely to go extinct in the near future and will probably be placed on the list when there is an emergency listing.

"The caterpillar food plants for this butterfly are the four winged saltbush (*Atriplex canescens*) and to a lesser degree the desert saltbush (*Atriplex polycarpa*), which are largely desert plants. In turn the caterpillars depend on an ant, *Formica francoueri* that does not normally occur in the desert. These ants protect the larvae from parasitoids and predators, which kill San Emigdio Blue Butterfly caterpillars. The caterpillars are not protected by any other ant species. This explains why the butterfly is so rare since the conditions which the butterfly requires are not common even along the desert edge. The reason this butterfly is becoming even rarer is the ants require a high water table and water usage by humans in the desert is reducing the number of areas suitable for the ant and butterfly.

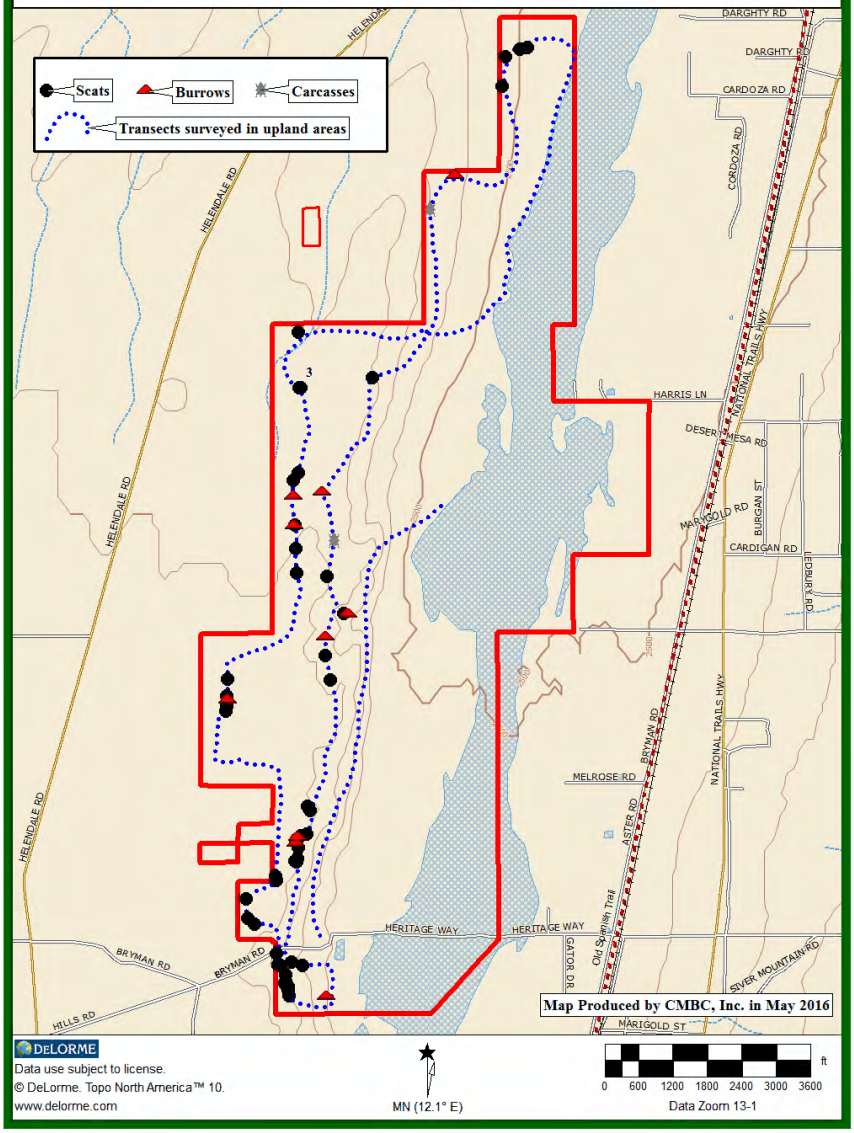
"This strong ant/caterpillar association is important because in order for the ants to be effective protectors of the caterpillars they need to have their ant tunnels run into the root systems of the caterpillar's food plant saltbush. The caterpillars of the San Emigdio Blue Butterfly hide in large numbers along the trails and tunnels used by these ants. Once the ant disappears from the site, the butterfly disappears soon after. Unfortunately creating the conditions that will induce the ants to recolonize an area at the base of saltbush food plants is quite complicated and may be near impossible."

Goodward indicated that he and others observed San Emigdio blues during a birding trip in the area on 23 July 2000, so this indicates the species has persisted there over the last 15 years-or-so. It is suspected that the species will be studied by appropriate scientists and its status confirmed now that it has been rediscovered at Palisades Ranch.

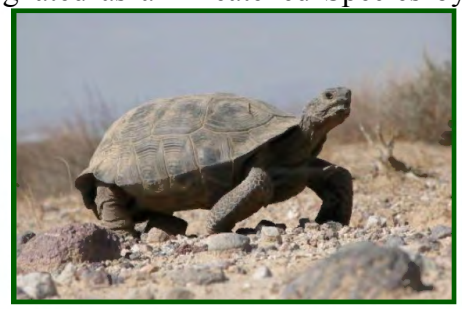
SPECIAL STATUS AMPHIBIANS AND REPTILES

Arroyo Toad. Arroyo toad is designated as a California Species of Special Concern and is listed as Federally Endangered by the USFWS. The last known observation in the region was in 1949 about six miles southwest of Barstow in the Mojave River (CMBC 2014). They were last observed in the Victorville area in 1954, still occur at the headwaters of the Mojave River at Deep Creek, West Fork of Mojave River, and Little Horse Thief Creek, but are currently judged to be extirpated from the Mojave River north of these locations, which are all in the foothills of the San Bernardino Mountains (USFWS 2014). Although CMBC strongly encourages qualified personnel to be enlisted to search for this species, based on existing information, they are presumed to be absent from the site. (Photo by Chris Brown 2009).

Figure 8. Desert Tortoise Signs Observed in May 2016



Agassiz's Desert Tortoise. Agassiz's desert tortoise is designated as a Threatened Species by both the USFWS and California Fish and Game Commission, and is one of the high priority species to be protected by conservation of Palisades Ranch. Focused surveys for desert tortoises and their diagnostic signs (scats, burrows, carcasses) were completed on 17 and 22 May 2016. Tortoise sign that was found is mapped above in Figure 8, and included numerous scats, 10 burrows, and 2 carcasses. Kimberly Cox of HCSD also reported seeing one at its burrow west of the access road near the north end of the property in mid-May 2016. The tortoise sign found by LaRue and Radakovich was in upland areas, although there could be transient animals in riparian areas. (Photo by Mark Bratton 2003).



Western Pond Turtle. Western pond turtle is designated as a California Species of Special Concern and has no federal status. Although Lovich and Meyer (2002) studied western pond turtles at Afton Canyon and Camp Cady, their conclusions did not address occurrence of this species elsewhere in the river, particularly to the south. Lovich (in BLM 2005) reports observing a western pond turtle in a beaver (*Castor canadensis*) pond along the Mojave River below the Victorville sewage treatment plant in 1998, and indicates there are "previous records" at Mojave Narrows. There are quiet ponds at Palisades Ranch that could not be clearly viewed during our recon surveys. It is suggested that surveys be performed by qualified biologists to see if there are suitable and occupied habitats. (Photo by Pierre Fidenci 2003)

SPECIAL STATUS RAPTOR SPECIES. The following raptors are discussed relative to those that may nest onsite or would be incidental, as follows. Of the raptors listed, only Cooper's hawk and burrowing owl may nest onsite.

Cooper's hawk. Cooper's hawk is considered a "Watch List" bird by the CDFW and has no federal designation. Cooper's hawks are known to nest in large trees, and the cottonwoods found onsite are ideal nesting substrates for this species. Though not reported to the CNDDB (CDFW 2016a), a single bird was observed during the focused bird surveys on 22 May 2016, as mapped in Figure 9. There are both suitable nesting and foraging substrates throughout riparian areas (nesting) and upland areas (foraging) for Cooper's hawks. (Photo by Larry Blakely 2000).

Burrowing Owl. Burrowing owl, which is designated as California Species of Special Concern and a USFWS Bird of Conservation Concern, is the only other raptor likely to nest onsite, and more likely to nest in upland areas than in riparian areas. This is a high profile species that, given its tendency to inhabit landscapes that are vulnerable to human disruption (e.g., agricultural fields, manmade berms, vacant lots, and pristine desert), has been proactively protected by CDFW. Although none has been reported to the CNDDB (CDFW 2016a), evidence of burrowing owl (i.e., white wash and diagnostic regurgitated pellets) were found on 17 May 2016 at an abandoned kit fox den in upland areas as mapped in Figure 6. (Photo by Christopher Christie 2015).

The remaining raptor species may either forage onsite or would be incidental. Those that may forage or roost thereon include northern harrier, sharp-shinned hawk, Swainson's hawk, ferruginous hawk, golden eagle, prairie falcon, and long-eared owl, which are discussed below.

Northern Harrier. Northern harrier is designated as a California Species of Special Concern and has no federal status. It is fairly common through the winter in the Mojave Narrows/Victorville/Hesperia area, with recent records for this area falling between 19 September and 17 February (BLM 2005). It may rarely forage onsite and would not nest there. (Photo by Ron Wolf 2007).

Sharp-shinned Hawk. Sharp-shinned hawk is designated as a CDFW "Watch List" species and has no federal status. As a winter visitor to the area, there is some potential for this small accipiter to depredate passerine birds on the subject property but it would not nest there. (Photo by Tom Greer 2009).

Swainson's Hawk. Of the raptors described in this section, Swainson's hawk is the only one designated as a Threatened species by the California Fish and Game Commission and is considered a USFWS Bird of Conservation Concern. Like many of the other raptors, Swainson's hawk is an incidental migrant through the area, although there is some potential for the species to both forage and roost onsite as it passes through the area. (Photo by Christopher Christie 2009).

Ferruginous Hawk. Ferruginous hawk is designated as a CDFW "Watch List" species and a USFWS Bird of Conservation Concern. CMBC (2014) reports two locations from the Barstow area. Known particularly to forage over fallow agricultural lands, there is some potential for the 150-acre± fallow lands on the subject property to provide foraging opportunities for this species. (Photo by Ron Wolf 2011).

Golden Eagle. Golden eagle is designated by the CDFW as a "Fully Protected" and "Watch List" species and by the USFWS as a Bird of Conservation Concern. Golden eagles prefer to locate their nests on cliffs or trees near forest edges or in small stands near open fields (Dudek 2012), so there may be some limited potential to nest onsite, but not likely. There is potential for golden eagles to forage onsite, particularly on black-tailed hares in upland areas. (Photo by Monty Rickard 2003).

Prairie Falcon. Prairie falcon is a CDFW "Watch List" species and a USFWS Bird of Conservation Concern. Prairie falcon is a year round resident of the region, reported from one location to the CNDDB (CDFW 2016a), although locations are not revealed to protect (particularly nesting) birds. The species is found in annual grasslands, some agricultural fields, and desert scrub (Zeiner et al. 1990). There is suitable foraging habitat onsite but not likely any nesting substrates, as the "palisades" may not be sufficiently inaccessible to favor nesting prairie falcons. (Photo by R.L Sivaprasad).

Long-eared Owl. Long-eared owl is a California Species of Special Concern and has no federal status. Except for a few mountainous areas where it is a year round resident, it is a winter visitor to the region including the subject property. Athel stands and native woodlands, such as the cottonwood-willow forest onsite, are ideal roosting sites for this species, which would not nest in the region. (Photo by Ron Wolf 2007).

Osprey. Osprey is a CDFW "Watch List" species and has no federal status. Among all the raptors listed, it is the least likely one to forage onsite and would not nest there. LaRue has observed them flying over Silver Lakes, where they may depredate fish, but the bodies of water on Palisades Ranch are too small to support fish that osprey hunt. There is some marginal chance that one may roost or otherwise visit the site as they are passing through the area but the species would be incidental at best. (Photo by Jim Maloney 2009).

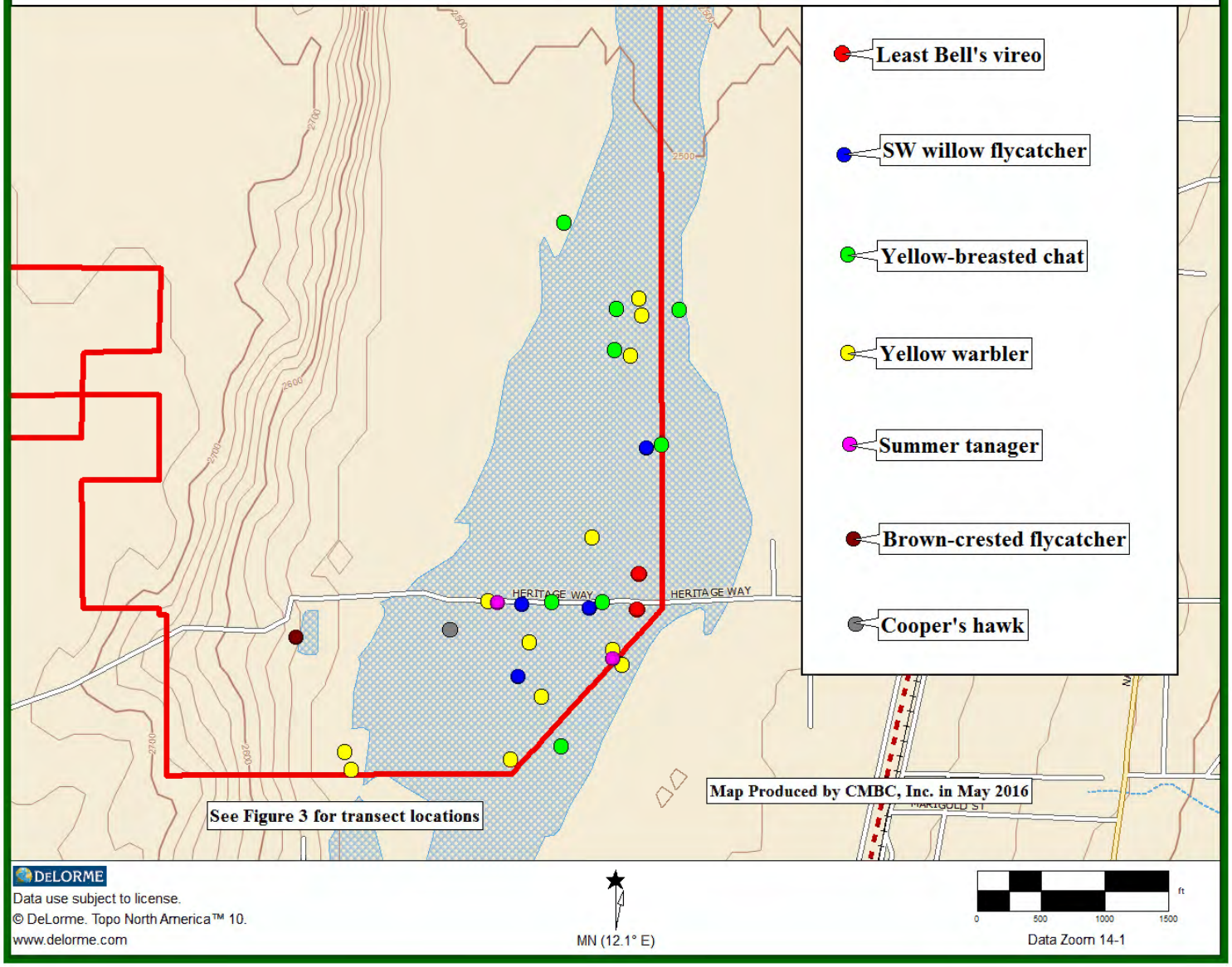
OTHER SPECIAL STATUS BIRD SPECIES

Whereas the subsection above focuses on raptor species including hawks, falcons, and owls, this subsection focuses on passerines and other non-raptors.

Western Yellow-Billed Cuckoo. The western yellow-billed cuckoo is listed as State Endangered and Federally Threatened. In August 2014 the USFWS proposed critical habitat for this species in nine western states, including California. The nearest critical habitat proposals were in the south fork of the Kern River to the northwest, along the Owens River to the north, and Santa Ana River to the south. In an email to LaRue on 5 June 2016, Deppe reported hearing them in August-September (no date) and in the early 2000's in June at Mojave Narrows. Steve Myers (email to LaRue on 4 June 2016) has also heard them singing at Mojave Narrows in early 2000's but no confirmed nesting. The May 2016 surveys were too early to detect this species, which is more likely to be found during nesting in July and August (Zeiner et al. 1990a). (Photo by John Pelafigue 2006)

Southwestern willow Flycatcher. Southwestern willow flycatcher is listed as State Endangered and Federally Endangered (USFWS 1995). Critical habitat for the species was first designated by the USFWS in 2005 and revised in 2013, and is comprised of two main components, including riparian vegetation and insect prey populations (USFWS 2013). Riparian vegetation in critical habitat is described, in part, as "… habitat along a dynamic river or lakeside, in a natural or manmade successional environment (for nesting, foraging, migration, dispersal, and shelter) that is comprised of trees and shrubs…dense riparian vegetation with thickets of trees and shrubs that can range in height from about 2 meters (m) to 30 m (about 6 feet (ft) to 98 ft). Lower stature thickets (2 to 4 m or 6 to 13 ft tall) are found at higher elevation riparian forests, and tall-stature thickets are found at middle- and lower elevation riparian forests…dense patches of riparian forests that are interspersed with small openings of open water or marsh or areas with shorter and sparser vegetation that creates a variety of habitat that is not uniformly dense. Patch size may be as small as 0.1 hectare (ha) [0.25 acre (ac)] or as large as 70 ha (175 ac)" (USFWS 2013).

Figure 9. Special Status Birds Observed in May 2016



Importantly, Palisades Ranch is located within and near the center of the stretch of the Mojave River that is designated as critical habitat (see map on page 510 of the Federal Register notice, USFWS 2013). The Recovery Plan for the species (USFWS 2002) also identifies the stretch of the Mojave River from Spring Valley Lake to Bryman (where Palisades Ranch occurs) where "Specific river reaches, within [Mojave] Management Units, where recovery efforts should be focused." As shown by the blue dots in Figure 9, southwestern willow flycatchers were detected in four places on 22 May 2016, although it is impossible to know how many birds were responsible for these detections, although at least two are suspected. Goodward also notes in an email to LaRue on 3 June 2016 "Two other subspecies migrate through southern CA. So the ones at Palisades Ranch could have been any of the three [subspecies of willow flycatcher]." The surveys were early enough that these birds were not necessarily nesting, and may have been migrating through the area. Breeding birds would be more detectable in mid-June through mid-July. (Photo by Stephen Dowlan 2015).

Vermilion Flycatcher. Vermilion flycatcher is listed as a California Species of Special Concern and has no federal status. It is a common summer resident in a wide variety of scrub and woodland habitats below about 1,400 m (4500 ft) throughout California (Zeiner et al. 1990a). They require holes or cavities in low trees or shrubs and occasionally in human structures. Though not observed during the 22 May 2016 surveys, Goodward, one of the three ornithologists on the survey indicated that he and others detected six vermilion flycatchers in the area during a birding trip on 23 July 2000. (Photo by Christopher Christie 2014), so they are known to occur in the area.

Brown-Crested Flycatcher. Brown-crested flycatcher is designated as a CDFW "Watch List" species and has no federal status. It is a fairly common summer resident (May through July) in desert riparian habitats, reportedly nesting in riparian habitats along the Mojave River near Victorville. They require riparian thickets, trees, snags, and shrubs for foraging and nesting, and are dependent on woodpecker-excavated cavities for nesting (Zeiner et al. 1990a). A single bird was detected by McGaugh on 22 May 2016 (see Figure 9), and Goodward reported a pair of brown-crested flycatchers in the area on 23 July 2000. (Photo by Carlos Henrique Luz Nunes de Almeida 2011).

LeConte's Thrasher. LeConte's thrasher is designated as a California Species of Special Concern and a Bird of Conservation Concern by the USFWS. Although not detected during the May 2016 surveys, there are both nesting and foraging habitats for LeConte's thrashers in both upland and particularly riparian areas throughout the subject property. (Photo by Christopher Christie 2016).

Loggerhead Shrike. Loggerhead shrike is designated as a California Species of Special Concern and a Bird of Conservation Concern by the USFWS. Although not detected during the May 2016 surveys, there are both nesting and foraging habitats for loggerhead shrikes in both upland and particularly riparian areas throughout the subject property. (Photo by Stephen Dowlan 2004).

Least Bell's Vireo. Least Bell's vireo was listed as a State Endangered species in 1980 and as a Federally Endangered species in 1986 (USFWS 1986). The nearest critical habitats for this species, which was designated in 1994 (USFWS 1994c), is the Prado Basin area south of Chino and the Santa Clara River south of Casitas Lake (Map provided at website: databasin.org). The draft recovery plan for the species was completed in 1998 (USFWS 1998). Michael Patten (in BLM 2005) reported that there were several pairs along the Mojave River when that document was published 11 years ago. Habitats are suitable for nesting particularly on the southern portions of Palisades Ranch where a singing male was detected by two of the three birders on 22 May 2016 (e.g., although two red dots are shown in Figure 9, Goodward and Deppe believe this was the same bird). (Photo by Ron Wolf 2010).

Yellow Warbler. Yellow warbler is designated as a California Species of Special Concern and a Bird of Conservation Concern by the USFWS. The species is a locally common summer resident that breeds in riparian woodlands from mid-April through early August (Zeiner et al. 1009a). Among the seven special status bird species identified on 22 May 2016, yellow warbler was the most common, with 12 locations depicted in Figure 9, although they are likely even more common than the detections would suggest. (Photo by Christopher Christie 2008).

Lucy's Warbler. Lucy's warbler is designated as a California Species of Special Concern and has no federal status. A fairly common summer resident of a few desert areas, occupying desert wash and riparian habitats, and breeding from April through July (Zeiner et al. 1990a), habitats at Palisades Ranch are ideally suitable for this species, although it was not detected onsite. Cover is provided mostly by mesquite and other riparian trees and shrubs, so the mesquite bosque found on the western parts of the site may also serve as suitable habitat. (Photo by Christopher Christie 2009).

Yellow-Breasted Chat. Yellow-breasted chat is designated as a California Species of Special Concern and has no federal status. An uncommon summer resident and migrant, requiring riparian thickets of willow and other brushy tangles near watercourses for cover (Zeiner et al. 1990a), habitats at Palisades Ranch are ideal for this species. Although eight locations are given in Figure 9 during the 22 May 2016 survey, the birders indicated that this likely underestimates the number of chats occurring at that time. (Photo by Christopher Christie 2014).

Summer Tanager. Summer tanager is designated as a California Species of Special Concern and has no federal status. An uncommon summer resident and breeder in desert riparian habitats, occupying habitats with cottonwoods and willows, especially older dense stands along rivers and streams, habitats onsite are ideal for the species. A single bird was detected by Deppe on 22 May 2016, as mapped in Figure 9.

SPECIAL STATUS MAMMAL SPECIES

Mohave Ground Squirrel. Mohave ground squirrel is listed as a Threatened species by the California Fish and Game Commission and is not designated by the USFWS, which has denied 1993 and 2005 petitions to federally list it as endangered. Based on declining trapping success, the species appears to be declining throughout its range, which is restricted to lands north and west of the Mojave River. There are no records of the species occurring in riparian habitats but they are known to occur in saltbush habitats as occur within the river floodplain and in creosote bush scrub as occurs throughout upland portions of the site to the west (BLM 2005). As depicted in Figure 6, Mohave ground squirrel was found north of Silver Lakes in 1983 and in north Adelanto in 1986 (CDFW 2016a). (Photo by Phil Leitner date unknown).

Mojave River Vole. Mojave River vole is designated as a California Species of Special Concern and has no federal status. According to David Laabs (in BLM 2005), the species is restricted to the stretch of the Mojave River between Victorville and Helendale, which situates Palisades Ranch near the center of its known range. The Mojave River vole is found in moist habitats including meadows, freshwater marshes and irrigated pastures in the vicinity of the Mojave River. Suitable habitat is associated with ponds and irrigation canals along with the Mojave River proper (BLM 2005). BLM (2005) reported that the "…current population status of the Mojave River vole is unknown … The Mojave Narrows Regional Park is the only protected land in this core area." If it occurs at Palisades Ranch, there would be two protected areas, which would be vital to the continued existence of this rare rodent. One location is shown in Figure 6, 2 to 3 miles south of Palisades Ranch in 2010 (CDFW 2016a). It is vitally important that surveys be performed onsite to determine the status of this species. (Photo of a *Microtus californicus* credited to Ron Wolf in 2009 is depicted in the absence of any photographs of subspecies *mohavensis*.)

American Badger. American badger is designated as a California Species of Special Concern and has no federal status. Found throughout California except for the extreme northwest, badgers are carnivorous, feeding primarily on fossorial rodents such as rats, mice, and especially ground squirrels and pocket gophers (Zeiner et al. 1990b). An average litter of two to three young are born in March and April. Several potential badger digs were observed in upland areas by LaRue on 17 May 2016, although additional surveys are needed to confirm their occurrence at Palisades Ranch. (Photo by California Academy of Sciences 2001).

Miscellaneous Bat Species. Special status bat species reported from the region include silver-haired bat, spotted bat, pallid bat, and Townsend's big-eared bat, among others. However, the potential occurrence of a given species on the site is uncertain. For example, Zeiner et al. (1990b) indicate that silver-haired bats have not been observed in San Bernardino County, yet CDFW (2016a) lists occurrences in Lucerne Valley in 1983 and, in particular, an occurrence at Silver Lakes in 1995, which is shown above in Figure 6, although the exact location is unknown. Except for Townsend's big-eared bat, which CDFW (2016b) lists as a State Candidate for Threatened species, each of these species is considered Sensitive by the BLM and a California Species of Special Concern by CDFW. There may be other special status bat species occurring in southern California that are not listed in this section, so this is considered to be a place holder until which time appropriate bat specialists can visit the site to ascertain the bat species that do occur, particularly those foraging in riparian areas or perhaps roosting on the cliff faces.

Townsend's big-eared bat
(Photo by Rob Schell 2009)

Pallid bat
(Photo by Rob Schell 2014)

Spotted bat
(Photo by Merlin Tuttle, no date)

Silver-haired bat
(Photo by Dietmar Nill, no date)

IV. MANAGEMENT GOALS AND ENVIRONMENTAL IMPACTS

A. Definitions of Terms Used in This LMP. Definitions of technical terms used in this LMP are taken, verbatim, from CDFW (2014), as follows:

1. Element: An element refers to any biological unit, public use activity, or facility maintenance program as defined below for which goals have been prepared and presented within this LMP.

2. Biological Element: These elements consist of species, habitats, or communities for which specific management goals have been developed within the LMP.

Within each defined biological element using the CNDDB classification based on Sawyer et al. (2009) habitats, biological and public use management goals are specified and described. Criteria used to identify biological elements have been determined by CDFW and include but are not limited to the following:

a. Protection of the element is authorized or mandated by legislation or official policy. Each parcel (or region) should be assessed to see if any Communities of Highest Inventory Priority (CHIP) occur (see Department September 2010, electronic list at September 2010 http://www.dfg.ca.gov/biogeodata/vegcamp/natural_communities.asp).

b. Any listed, candidate, or sensitive species, or species of special concern known or suspected to occur on or to use the property must be specified within another element or as a separate biological element.

c. Essential habitat (e.g., desert tortoise critical habitat) for one or more listed species must be specified as a biological element.

d. Manipulated habitats that are intensively managed for fish and wildlife values (e.g., Areas of Critical Environmental Concern) must be specified as biological elements.

e. Restoration efforts that may restore an extirpated species or habitat, or maintenance efforts that may avoid the threat of extirpation.

3. Public Use Elements. Public use elements are any recreational, scientific, or other use activity appropriate to and compatible with the purposes for which this property was acquired.

It is important to coordinate with any existing CCR Title 14, Sections 550-552 or Section 630 regulations.

Criteria used to characterize such public use elements include but are not limited to:

a. Use is authorized or mandated by legislation of official policy (e.g., uses such as hunting, fishing, and interpretative programs).

b. Use is compatible with fish and wildlife requirements in the area if properly conducted (e.g., hunting or scientific research programs).

c. Historical uses that may be restricted seasonally or year-round under this LMP due to incompatibility with biological element needs (e.g., fishing or interpretative programs).

4. Facility Maintenance Element. This is a general purpose element describing the maintenance and administrative program that helps maintain orderly and beneficial management of the area.

5. Biological Goal. A biological goal is the statement of intended long-range results of management based upon the feasibility of maintaining, enhancing, or restoring species populations and/or habitat.

6. Public Use Goal. A public use goal is the statement of the desired type and level of public use compatible with the biological element goals previously specified within the LMP.

7. Tasks. Tasks are the individual projects or work elements that implement the goal and are useful in planning operation and maintenance budgets.

B. Biological Elements: Goals & Environmental Impacts. There are ongoing programs described in the following subsections, the statuses of which are reported relative to June 2016, at the time of this writing. Although CDFW (2014) does not specifically identify cultural resources as a formal "element," archaeological and other special cultural resources protected by pertinent regulations are briefly described in Section IV.C. and would benefit from conservation management given in the following biological elements.

Biological Element 1. Desert Tortoise.

Threats. Anthropomorphic threats that are known to affect tortoise conservation have been outlined in CMBC (2012). Such impacts may include (1) Fragmentation of habitat; (2) edge effects, or disturbance of natural ecosystems along transition lines between urban disturbed lands and wild protected spaces; (3) water pollution; (4) water quality; (5) air pollution; (6) waste disposal impacts of many sorts; (7) human-wildlife conflicts; (8) invasive species; (9) increased fire regimes from natural, accidental, and intentional causes; (10) criminal activity; and (11) human predation on animal and plant life. Boarman (2002) lists 22 threats that may affect tortoise, including those pertinent to Palisades Ranch: Agriculture, collecting by humans, construction activities, disease, drought, energy and mineral development, fire, garbage and litter, handling and manipulation, invasive plants, raven and coyote predation, roads, motorized recreational activities, and vandalism.

Based on surveys performed in May 2016, illegal off-road vehicle (OHV) activities observed at the top of the bluffs, on the western part of the site (see Exhibits 7, 8, and 9), may be the most prevalent and threatening impact to resident tortoises at Palisades Ranch. Tortoises are absent from the steepest parts of the bluffs and the terrain is as such that vehicles cannot access those areas. Although there is a relative lack of tortoises in riparian areas and areas offsite to the east are impacted by active and fallow agriculture, residences, and solar development, there is still the potential for tortoises to travel east-west through the subject property.

The private property is posted with no trespassing signs and has thus been ostensibly unavailable to the general public, although vehicle recreationists, target shooters, and hunters still occasionally enter the area and are asked to leave by the current caretaker (Alex Aviles, personal communication to LaRue on 17 May 2016). There has also been historic (Exhibit 4) and recent dumping (Exhibits 5 and 6) on the subject property. Given the proximity of the residential community to the site, it is suspected that much of the cross-country vehicle use may originate with residents from Silver Lakes and Helendale, located to the north. Tortoises and tortoise burrows may be crushed by cross-country vehicle traffic, there is an increased potential for dumping, and tortoises may be collected or intentionally harmed by vehicle users.

First Tier, Biological Goal 1. Protect individual desert tortoises on Palisades Ranch and manage all lands in such a way as to promote the health of individual animals and the recovery of the species in the region.

Task 1. In order to curtail illegal, cross-country vehicle use on western portions of the site, the Managing Partners should (1) place signs along the western boundaries indicating that this is a wildlife management area and that all vehicles must remain on designated routes; (2) initiate a community outreach and awareness program with local residents, particularly in Silver Lakes, to inform them of the importance of the area and that recreational vehicles must remain on designated routes; (3) delineate all vehicle roads and trails occurring in the low hills and alluvial areas on the western portions of the site on recent aerial photographs; (4) designate a subset of these routes for official vehicle use and sign them as "open" and designate/maintain other routes for foot travel and mountain bike uses; and (5) using vertical mulching and other remedial methods, camouflage and otherwise eliminate closed routes throughout western portions of the site. Route closure and rehabilitation are activities consistent with one of the goals of the Desert Tortoise Recovery Plan (USFWS 2011), which is to close or rehabilitate routes to pre-road conditions within DWMAs.

Operations/Maintenance Summary and Environmental Impacts. Given the recent acquisition of the subject property only seven months ago, there has been no active attempt to curtail illegal recreational vehicle activity on western portions of the site; in fact, it has only now, with completion of May 2016 reconnaissance surveys, been identified as a problem. The five subtasks identified in Task 1, above, are given in a suggested sequential order of implementation, which is judged to be a logical progression to begin to curtail this ongoing, deleterious impact. Designated vehicle routes, while being eliminated from future motorized vehicle travel, could still be used for foot travel and mountain bike use, which are compatible with reserve-level management of the subject property. Implementation of each of these actions will result in beneficial environmental impacts by minimizing impacts to desert tortoises and creating favorable conditions for protection of occupied habitats. However, trespassers are likely to travel cross-country even more when they find their favorite routes have recently been closed to vehicle use.

Task 2. There are two types of refuse that currently occur on the subject property: (1) refuse and miscellaneous debris that resulted from previous residents and use of the site for farming (Exhibit 4) and (2) recent, ongoing dumping by local residents living in the Helendale area (Exhibits 5 and 6). The Managing Partners should remove both forms of refuse, which for the second type, would reduce the attractiveness of the area to persons engaging in activities likely to threaten tortoises and occupied habitats. If existing dumps are removed, incidental

visitors may be less likely to dump more. This measure is consistent with the Desert Tortoise Recovery Plan (USFWS 2011), which indicates that illegal dumps, trash, and miscellaneous debris should be removed from DWMAs, which would be applicable for this site that is to be proactively managed for tortoise conservation and recovery.

Operations/Maintenance Summary and Environmental Impacts. Of the two types of dumps described above, eliminating existing dumps from peripheral areas, first, is considered to be the highest priority. The dump sites on the interior of the subject property are not likely to induce local residents to dump more materials, as the site is relatively inaccessible to vehicles due to locked gates to the north and south and the presence of a resident caretaker who actively patrols the site and prohibits dumping. It is suggested that gates to the site continue to be locked to minimize dumping and other illegal uses. Some of the historic materials on the subject property may be recycled and result in a source of income for ongoing management of the site. Removal of dumps will have the favorable impacts of eliminating an existing problem and reducing the likelihood of continued dumping.

Task 3. Implement Best Management Practices (BMPs) identified in Appendix I of the West Mojave Plan (BLM 2005). Derived from biological opinions issued by the USFWS and land-use decisions made by the BLM, BMPs are considered state of the art measures intended to minimize impacts of otherwise authorized, legal activities. Whereas the reader is directed to Appendix I of the West Mojave Plan for complete descriptions, the BMPs are summarized as follows: designate qualified biologists to oversee projects where tortoises may be affected; train workers (in particular, caretakers and visitors) in tortoise awareness; perform clean-up activities when tortoises are mostly inactive (generally from November through January and less so during summer months, July and August); perform preconstruction clearance surveys; fence sites that may serve to entrap tortoises; minimize surface disturbance; provide for biological monitoring; properly dispose of refuse; prohibit dogs at restoration sites; minimize resources to ravens and other tortoise predators, including water and food; remain on existing routes and barren areas except where restoration requires otherwise; maintain slower speed limits; check under parked vehicles for tortoises; inform heavy equipment operators of tortoise occurrence in the area and monitor their activities; report any tortoises injured by restoration activities to the USFWS and CDFW; and inspect trenches and avoid creating pits that may entrap tortoises.

Operations/Maintenance Summary and Environmental Impacts. It is important that caretakers and authorized visitors are instructed in meaningful ways to avoid impacts, such as checking beneath parked vehicles for tortoises. It is equally important that incoming heavy equipment operators be briefed on applicable BMPs, such as driving on designated routes, staying in designated areas, properly disposing of refuse, and being aware that tortoises are in the area. The measures delineated herein, and others like the BMPs given in Appendix I of the West Mojave Plan, should be implemented by any new crews that perform clean-up work as subcontractors to the Managing Partners. Implementing BMPs will have beneficial environmental impacts for both tortoises and occupied habitats.

Task 4. Develop and implement a monitoring plan to determine the effectiveness of management actions, status of habitat, status of the desert tortoise populations, and other species of concern.

Operations/Maintenance Summary and Environmental Impacts. The initial biological inventories performed in May 2016 were intended to provide baseline biological and human-use information on the subject property. Pertinent data included general plant and animal species lists; specific inventories for special status species, focused on desert tortoises and special status birds; and descriptions of observable human disturbances. As time and resources allow, probably with extensive use of volunteer labor, the Managing Partners should attempt to supplement these baseline inventories, particularly with regards to the occurrence of tortoises.

Several targeted activities include: (1) Perform baseline protocol surveys (USFWS 2010) during the months of April-May and/or September/October to determine the relative densities of desert tortoises on western portions of the site. (2) Implement photo-documentation stations at strategic locations where vertical mulching and other camouflaging techniques are used to close routes. (3) Take detailed, baseline inventory of cross-country vehicle tracks and trails to see if signing, route designation, and closure are having the desired effect of minimizing impacts and encouraging visitors to remain on designated trails. If conscientiously implemented, this monitoring program will be able to track beneficial and deleterious environmental impacts associated with implementing the tasks identified above.

Second Tier, Biological Goal 1. Establish a conservation easement for existing lands and continue to acquire appropriate habitats and manage them in accordance with the easement and this LMP.

Task 1. When conditions are favorable, establish a conservation easement for the protection of all special status species and resources occurring on Palisades Ranch as outlined by the Wildlife Conservation Board (2016) template for grant agreement for acquisition of fee interest. Protection of riparian areas through a conservation easement along this stretch of river is vital to the recovery of southwestern willow flycatcher, least Bell's vireo, and desert tortoise, which are known to occur. Other species that may occur including western yellow-billed cuckoo, Mohave ground squirrel, and Mojave River vole would also benefit.

Operations/Maintenance Summary and Environmental Impacts. The establishment of conservation easements on acquired parcels will provide for a means to protect valuable biological and cultural resources located on Palisades Ranch. This designation should effectively eliminate the likelihood that these parcels will be developed for renewable energy or other human development, which is not judged to be compatible with land management envisioned by the conservation easements and implemented by this LMP. Similarly, the easements and this LMP help to facilitate one of the goals of the Desert Tortoise Recovery Plan (USFWS 2011), which is to prohibit clearing for agriculture, landfills, and any other surface disturbance that diminishes the capacity of the land to support desert tortoises, other wildlife, and native vegetation. Establishing a conservation easement will result in the prohibition of deleterious activities, particularly incompatible development, which is a beneficial environmental impact.

Task 2. As monetary resources become available and their expenditure does not significantly detract from management of lands already acquired, it will be consistent with the purposes, goals, and implementation of this LMP to continue to acquire lands and protect them to the benefit of the elements identified herein.

Operations/Maintenance Summary and Environmental Impacts. All pertinent prescriptions identified herein should be applied to conservation management of newly acquired lands. This task is consistent with one of the goals of the Desert Tortoise Recovery Plan (USFWS 2011), which is to proactively secure lands within DWMAs, or in this case, parcels subject to reserve-level management. Expanding the existing base property through acquisition of additional contiguous lands that would be managed consistently with this LMP is considered a beneficial environmental impact.

Biological Element 2. Special Status Plant Species.

Special status plant species known to occur on the subject property include Mojave fish-hook cactus and larger creosote bush rings. Beaver Dam breadroot and Mojave monkeyflower are two other special status plant species reported from the region. Additionally, the following species that occur (see red-font plant species in Appendix A) are protected at the State level by the 1998 Food and Agricultural Code, Division 23: California Desert Native Plants, Chapter 3: Regulated Native Plants, Section 80073: Desert willow, silver cholla, pencil cholla, Mojave fish-hook cactus, and screw bean mesquite.

Threats. No significant threats are known to affect any one of these special status plant species, all of which occur in upland areas that are less vulnerable to wildfire than riparian areas. Wildfires or those set by human visitors may affect some of these plant species, though the extent of this threat is not known. There is some potential for illegal collection of fish-hook cacti to be used in residential landscaping, particularly if people discover the cacti are rare.

First Tier, Biological Goal 1. Protect special status plant species on parcels already acquired, and manage those lands in such a way as to promote the health of individual plants and populations in the region.

Task 1. All of the tasks identified above for desert tortoises are also likely to benefit conservation management of special status plants.

Task 2. The Managing Partners have a unique opportunity to add to the regional knowledge of special status plant species reported from the region. All encounters with plant species designated by the USFWS, CDFW, and/or CNPS should be reported to the California Natural Diversity Data Base and CNPS Rare Plants Inventory using standard forms provided by both agencies. Based on current information, Mojave fish-hook cactus is the only species designated by one or more of these agencies known to occur on the subject property.

Operations/Maintenance Summary and Environmental Impacts. May 2016 reconnaissance surveys identified the locations of 30 Mohave fish-hook cacti. Additional surveys will undoubtedly identify more individuals, which should be mapped and the information maintained by the Managing Partners. Maintaining a caretaker onsite may prevent or discourage illegal collection of fish-hook cacti. Springtime surveys following periods of winter rainfall would promote the growth of Mojave monkeyflower and Beaver Dam breadroot, which along with any other agency-designated plant species, should be sought, mapped, and the information maintained by the Managing Partners. Only beneficial environmental impacts will result from additional surveys and resource protection.

Biological Element 3. Communities of Highest Inventory Priority (CHIPs).

CHIPs known to occur on the subject property include Fremont cottonwood forest, arroyo willow thickets, and screw bean mesquite bosque. Although these plant communities have been tentatively identified, the extent of their occurrence and formal identification need to be completed.

Threats. All three of the CHIPs occur within the Mojave River floodplain, and serve as vital habitat for special status bird species and perhaps others (e.g., Mojave River vole, western pond turtle, etc. if they occur). Both wildfires and human-caused fires represent a threat, particularly in mature cottonwood and mesquite stands somewhat removed from flowing and standing water. Depending on the amount and extent of groundwater extraction, the riparian habitats could be deleteriously affected if overdraft conditions exceed current levels or prolonged drought affects the Mojave River aquifer.

There are three invasive plant species, in particular, that may threaten components of these riparian communities, including broad-leaf peppergrass, giant reed, and salt cedar, which are listed in order of their relative prevalence. Peppergrass has been listed as a noxious weed of great ecological concern by both the California Department of Food and Agriculture (CDFA) and California Invasive Plant Council (Cal-IPC) (University of California, Davis 2015). As with giant reed, the plant displaces more desirable, native plants and may serve as fuel for fires. Even during the brief reconnaissance surveys, on 22 May 2016, LaRue observed trespass by several motorcyclists who likely crossed the bridge over the Mojave River to the east and exited the site via Hills Road to the west. This sort of illegal use represents a potential cause of fire.

First Tier, Biological Goal 1. Protect special status plant communities on parcels already acquired, and manage those lands in such a way as to promote the health of these woodland communities in the region.

Task 1. Continue to restrict recreational vehicle use from the site by maintaining a caretaker and locked gates. The purpose of Biological Goal 1 and implementation of Task 1 are intended to reduce the risk of trespassers inadvertently or intentionally setting fire to natural fuels occurring in riparian areas where these CHIPs occur.

Operations/Maintenance Summary and Environmental Impacts. The density of vegetation and occurrence of flowing and standing water significantly restrict cross-country vehicle travel; users are likely to get bogged down in wet areas and have recently been extracted by the current caretaker (Alex Aviles, personal communication to LaRue on 17 May 2016). Even so, if the gates are not locked, particularly at the north end of the property, trespassers may drive up to the edge of the communities where dead plants such as Russian thistle could be ignited and burn sensitive riparian habitats. HCSD is fortunate to currently have a caretaker onsite, which is judged to be the most effective means of curtailing trespass use of riparian areas by recreational vehicles, particularly motorcycles. Those measures identified above for desert tortoise intended to designate and control recreational vehicle use will also help to realize this goal and implement this task. Continued protection of CHIPs by the current and future caretakers is considered a beneficial environmental impact.

Task 2. Enlist qualified biologists, particularly botanists, to identify plants and map the full extent and distribution of CHIPs.

Operations/Maintenance Summary and Environmental Impacts. The reconnaissance surveys completed to provide a baseline inventory of CHIPs for this LMP should be validated and augmented. Qualified individuals should be enlisted to use aerial photographs and ground truthing to (1) complete a comprehensive species list of all plants comprising the CHIPs; (2) use these plant lists to ascertain that the three CHIPs identified herein accurately represent the plant communities occurring; and (3) produce accurate maps of these and other CHIPs that may occur on the subject property. It is also advisable that a comprehensive inventory of larger creosote bush rings be completed in upland areas. Additional inventories will not result in adverse environmental impacts and may facilitate better protection of these resources by accurately mapping their locations.

Second Tier, Biological Goal 1. Protect CHIPs on the subject property by minimizing the prevalence and spread of exotic plants, particularly broad-leaf peppergrass, salt cedar, and giant reed.

Task 1. Continue to remove or otherwise control salt cedar and giant reed in the floodplain and initiate a program to eradicate broad-leaf peppergrass from Palisades Ranch.

Operations/Maintenance Summary and Environmental Impacts. CDFG (2008) reports that Natural Resources Conservation Service (NRCS) and the Mojave Desert Resource Conservation District (MDRCD) expressed interest in partnering on the project to achieve site restoration by removing salt cedar and other invasive species of plants from the property. Since then, NRCS has spent some time removing salt cedar from the floodplain, although it is not clear to what extent or if they have also removed any giant reed or peppergrass plants. University of California, Davis (2015) recommends mowing/burning and the use of herbicides, but indicates there are limited results, and it is questionable if herbicides should be added into the floodplain. The eradication of salt cedar may also be problematic, as its removal is situationally discouraged in the recovery plan for southwestern willow flycatcher (USFWS 2002).

The Managing Partners must exercise caution in using herbicides to remove invasive plant species. Although the amount of salt cedar onsite compared to the native overstory of cottonwoods, willows, and other riparian trees and shrubs is considered to be minimal, the southwestern willow flycatcher recovery Plan (USFWS 2002) still advises against the removal of all salt cedars from occupied habitats. It is advisable that Managing Partners consult with agency biologists to ensure that eradication of salt cedar or mechanical removal of peppergrass plants would not be considered an adverse impact to southwestern willow flycatchers and other special status species. At the least, any such removal should not occur during the breeding bird season, which is conservatively between March and September.

Third Tier, Biological Goal 1. Re-establish riparian habitats in areas there they have been removed.

Task 1. CDFW (2015) identified the following task to accomplish this goal: "Active riparian restoration through planting of cottonwood, willow, mesquite, and other riparian species if needed."

Operations/Maintenance Summary and Environmental Impacts. No efforts have been initiated to date to re-establish riparian habitats at Palisades Ranch or to remove the extensive piles of dead Russian thistle from fallow agricultural fields. Review of aerial photographs (Figure 4) suggests that the 150-acre± fallow agricultural fields (shown as gray in Figure 5) were once likely vegetated by cottonwoods, willows, and other riparian vegetation. Protection of existing riparian habitats is the primary goal of this LMP, but if funding becomes available that would not otherwise detract from management actions given herein, re-establishing native vegetation in fallow agricultural lands is recommended. Saltbushes are often used as a readily available and efficacious plant in revegetation activities, and may be an early successional species to be used on these fallow agricultural lands, which are bordered by remnant stands of saltbush scrub. In this case, saltbush could be the primary species to revegetate the area with strategic placement of riparian shrubs and trees that would facilitate natural revegetation of the area. Re-establishment of native saltbush and riparian habitats in fallow agricultural areas would be considered a beneficial environmental impact so long as the cost to restore these lands does not detract from other management actions identified herein.

Task 2. Engage in discussions with the Mojave Water Agency and participate in the Southern California Water Dialogue regarding reservation of water for conservation purposes, status of the Mojave aquifer, and transfers of water rights (TNC 2004).

Operations/Maintenance Summary and Environmental Impacts. The re-establishment of riparian plant communities will likely rely on the availability of near-surface water in reclaimed areas. In May 2004, The Nature Conservancy (TNC 2004) identified Task 2 as one of its "key strategies" for acquiring and managing Palisades Ranch. At this time, it is unclear if such communications have occurred and, if so, what the outcome may be. Overdraft conditions, which are outside the control of the Managing Partners, are considered a deleterious and harmful environmental impact that could undermine management of Palisades Ranch. The Managing Partners should, if not already, cooperate with local water agencies and others to ensure that conditions are maintained that promote the continued health of riparian habitats found on the subject property.

Biological Element 4. Special Status Bird Species.

Special status bird species that have thus far been identified onsite include southwestern willow flycatcher, least Bell's vireo, yellow-breasted chat, yellow warbler, summer tanager, brown-crested flycatcher, vermilion flycatcher, Cooper's hawk, and burrowing owl (except for vermilion flycatcher, which was identified in July 2000, see locations for other species in Figure 9). Other species that are likely to occur include Lucy's warbler, LeConte's thrasher, loggerhead shrike, and eight raptor species listed in Table 3. Burrowing owl, LeConte's thrasher, loggerhead shrike, and most of the raptors are likely to occur, some as nesters others as foragers, in upland communities, and most of these species are likely to rely on or visit riparian areas.

Threats. The threats identified above, including recreational vehicle impacts to upland areas and fire to riparian areas, are the same as those that would affect special status bird species. The prevalence of non-native plant species that may outcompete native plant species or facilitate spread of fire are also a threat.

First Tier, Biological Goal 1. Protect foraging and nesting habitats for special status bird species on parcels already acquired, and manage those lands in such a way as to promote the health of native habitats thereon.

Task 1. Tasks identified above for desert tortoises and CHIPs will also predictably benefit conservation management of special status bird species. Management of legal and illegal OHV activities, removal of non-native weed species, implementation of fire-preventative measures, and other protection of riparian vegetation (e.g., prevent harvest of standing trees for wood) will all benefit special status bird species. Additional focused breeding bird surveys are encouraged to determine species that occur and to establish a baseline to see if management actions are facilitating the persistence of targeted species at Palisades Ranch.

Operations/Maintenance Summary and Environmental Impacts. Some of protective activities are ongoing. NRCS has been in the process of eliminating non-native plant species and the current caretaker regularly patrols the property and evicts trespassers. It is strongly recommended that the Managing Partners develop relationships with local conservation organizations, such as Audubon Society and local colleges, and encourage visits and fieldtrips that would augment the baseline inventory of birds occurring onsite. There should be specific breeding bird inventories for western yellow-billed cuckoo, southwestern willow flycatcher, and least Bell's vireo, which will predictably result in comprehensive species lists of other special status birds occurring on the subject property. If possible, the Managing Partners could promote nonintrusive ecotourism of the site with groups that would be willing to pay to stay there, collect data, and share those data as a supplemental income that could be used to manage the site.

During baseline inventories, Deppe indicated that it would be advisable to create narrow footpaths through the dense riparian understory to facilitate future bird inventories. It is advisable that regulatory agency biologists be contacted beforehand to ensure that creating such access would not result in adverse environmental impacts. Certainly, such trails should not be established during the breeding season, from March through September. Nor should the trails provide new access to motorcycles and other trespass recreational vehicles; if constructed, they should provide for foot traffic, only.

Task 2. Ascertain if brown-headed cowbird parasitism is a significant impact to breeding special status bird species, and if so, implement a trapping program to control the impact.

Operations/Maintenance Summary and Environmental Impacts. There have been no focused studies to determine the extent of special status bird nesting, nesting by brown-headed cowbirds, which were identified but not counted on the 22 May 2016 survey, or the prevalence of parasitism by cowbirds on sensitive bird species. Baseline inventories would need to be performed for both cowbirds and numerous sensitive bird species, and focused parasitism studies would need to be completed over multiple seasons. Depending on the results of these inventories

and with appropriate input from agency biologists, there may or may not need to be cowbird trapping at Palisades Ranch. There may be both beneficial and adverse environmental impacts associated with this proposal, which could result in manipulation of both cowbirds and special status birds to implement the task.

Biological Element 5. Special Status Mammal Species.

None of the mammal species identified herein, including Mojave River vole, Mohave ground squirrel, American badger, and pertinent bat species is known to occur on the subject property.

Threats. The types and extent of threats affecting any of the special status mammal species depends on their occurrence and prevalence on the subject property. If they occur, threats affecting desert tortoises would also affect Mohave ground squirrel and American badger. Threats affecting CHIPs would be the same as those affecting Mojave River vole and any sensitive bat species that may occur.

First Tier, Biological Goal 1. Ascertain presence and status of special status mammal species on the subject property, and if present, manage the site for sustained populations.

Task 1. Perform species-specific inventories to determine the occurrence of Mojave River vole and Mohave ground squirrel on the subject property.

Operations/Maintenance Summary and Environmental Impacts. To date, no focused surveys have been performed for Mojave River vole or Mohave ground squirrel. Qualified biologists, capable of identifying Mojave River voles onsite should be employed. If present, adverse environmental impacts could occur if voles are collected and removed from the site, particularly if they are not abundant. Perform exploratory trapping and/or camera surveys of upland portions of the property for Mohave ground squirrel (CDFG 2003 revised 2010). Since there would be no need to collect specimens and these methods are consistently used with minimal impact to the species, no adverse environmental impacts would be associated with studies of Mohave ground squirrels. Surveys suggested above for special status plants and desert tortoise would enable those biologists to determine if American badger occurs onsite.

Biological Element 6. Western Pond Turtle and Arroyo Toad.

These two species are combined in this element as they share the common characteristic of improbable occurrence on the subject property. Finding either one of them onsite would be a significant discovery.

Threats. The threats identified herein for CHIPs and special status bird species would also apply to western pond turtle and arroyo toad, as these resources are restricted to the Mojave River floodplain.

First Tier, Biological Goal 1. Ascertain presence and status of special status reptile and amphibian species on the subject property, and if present, manage the site for sustained populations.

Task 1. Perform comprehensive focused surveys for western pond turtle and arroyo toad in appropriate habitats.

Operations/Maintenance Summary and Environmental Impacts. There have been no focused surveys for these species to date. Focused surveys by qualified biologists should be performed in appropriate habitats. For western pond turtle, the many beaver ponds occurring along the main channel comprise the most likely habitat and should be the focus of the surveys. If turtles are found in standing water, it would then be appropriate to expand surveys into adjacent, upland areas where they would overwinter. Habitats for arroyo toad encompass both inundation areas for eggs, tadpoles, and adults as well as contiguous areas for active and aestivating adults. For both species, it is important that the surveys be extensive enough and performed over multiple seasons to ensure that they are either present or absent from the subject property. There would be no adverse environmental impacts associated with these surveys so long as the biologists do not collect any specimens (i.e., only qualified individuals that do not require third party identifications should be used for these surveys) or otherwise use invasive methods to perform surveys (i.e., removing or significantly damaging vegetation).

Biological Element 7. Mojave Tui Chub.

Mojave Tui chubs historically occurred in this stretch of the Mojave River but have since been extirpated.

Threats. Given that the species does not presently occur onsite, there are no threats at this time. However, care must be exercised that the source population(s) is not adversely affected by removal of individuals to establish a refugium at Palisades Ranch.

Second Tier, Biological Goal 1. Consider the feasibility to establish, operate, and manage a Mojave Tui chub refugium at Palisades Ranch.

Task 1. Establish, operate, and manage a Mojave Tui chub refugium at Palisades Ranch if conditions are favorable.

Operations/Maintenance Summary and Environmental Impacts. Although CDFG (2008) citing the Mohave Tui chub recovery plan (USFWS 1984), CDFW (2015), and TNC (2004) all suggest that a refugium could be established at Palisades Ranch, it is still considered a second tier biological goal given the likely exorbitant costs involved to establish and maintain the refugium. None of these documents or any others reviewed for this LMP describes any specific parameters to establish the refugium. It is assumed that Tui chubs would not be placed in the natural stream, as they would be vulnerable to flooding and interbreeding with arroyo chubs, which is the primary reason they were extirpated in the first place. So, the refugium would be placed onsite but not in the stream, must be protected from flood events and various predators (e.g., raccoons), and would rely on host populations at Zzyzx, China Lake, and/or the Lewis Center in Apple Valley to populate the refugium. It is beyond the scope of this LMP to fully describe how such a refugium would be established, except to say that the Managing Partners must work closely with agency biologists and others to establish, operate, and manage it.

C. Cultural Elements: Goals & Environmental Impacts. As mentioned above, there have been no focused archaeological studies of the subject property. The Pony Express building mapped in Figure 10 and shown in Exhibits 10 and 11 is considered a significant cultural resource. Several common artifacts were found on 22 May 2016 but the full extent of any additional resources remains unstudied and unknown.

Threats. The extent of threats to archaeological resources is dependent on the amount, location, and sensitivity of those resources, all of which remain unknown at this time. Ms. Cox indicated that when she first saw the Pony Express building about 12 years ago, there were still wooden rafters and other components that have since been removed from the structure. There has also been vandalism of the building in the form of graffiti (see Exhibit 10), illegal shooting, and there is currently refuse and a sofa-couch inside the building.

First Tier, Biological Goal 1. Ascertain the incidence and prevalence of archaeological resources on the subject property and protect those resources *in situ*.

Task 1. Formal archaeological surveys should be performed by certified individuals in upland and riparian areas throughout Palisades Ranch. If significant archaeological resources are identified, they should be reported to the proper entities, registered, and be protected in place.

Task 2. If not already, the Pony Express building and any other qualifying structures on Palisades Ranch should be assessed for inclusion in the National Register of Historic places. Depending on input from pertinent experts, damage to the building should be repaired and evidence of graffiti removed in such a way as to avoid further damage. It may be appropriate to provide an educational kiosk, vehicle barriers, and other related structures to inform the public of the significance of the resource in an effort to prevent further damage.

Operations/Maintenance Summary and Environmental Impacts. Although several artifacts were discovered at the base of the cliffs on 22 May 2016 (mapped in Figure 10 and shown in Exhibits 22 and 23), no formal archaeological surveys have been performed. If experts from local colleges, universities, or pertinent organizations can be enlisted as volunteers, inventory costs may be avoided or reduced. In any case, certified archaeologists should be enlisted to perform pertinent literature searches, data base requests, and field surveys to determine if any significant cultural resources are present. If so, the Managing Partners should determine the best way to protect these resources in place, and to ensure that they are registered with the appropriate entities.

Although the Pony Express building is recognized as a significant cultural resource, current management and protection by the resident caretaker is insufficient to protect the structure. Vandalism is occurring, in part, because the facility is north of the locked gate that prohibits the general public from entering the main residential area at Palisades Ranch. Since there may be no practical way of prohibiting vehicle trespass in this area, identifying the site as a significant resource and developing it as such, may result in more appreciation and less vandalism of the structure. If existing vandalism can be remedied (e.g., remove graffiti) without further damaging the structure, that is advisable.

D. Public Use Element: Goals & Environmental Impacts. It is the intent of the Managing Partners and the policy of CDFW to administer lands available to the public for wildlife-dependent recreational use when such uses do not unduly interfere with the primary conservation purpose for which such lands were acquired. Compatible human uses occurring within the region including the subject parcels include hiking, nature study (particularly bird watching), and photography. Camping, hunting, and/or shooting would require oversight administration, maintenance, and in the case of firearms, may pose a threat to other visitors, nesting birds, and vulnerable species including the desert tortoise. So hunting and shooting should be prohibited but camping in designated areas may be appropriate. As depicted on pages 7 and 8, there are existing residential facilities that may be refurbished and used by authorized groups and individuals who are invited by the Managing Partners to perform inventories and other scientific studies.

Threats. So long as they are implemented in a conscientious manner, allowable recreation activities such as hiking, nature study, bird watching, and photography (and excluding hunting and shooting) pose minimal threats to public use, recreation, and nonintrusive enjoyment of Palisades Ranch. However, given the concentration of human activities in adjacent rural areas particularly to the east, OHV impacts on lands to the west, and the lack of dedicated law enforcement onsite, any one of these and other activities could occur in such a way that natural and/or cultural resources are damaged. If access paths are created, as discussed above under the special status bird biological element, there could be adverse impacts to both habitats and breeding birds, if establishment and future uses do not occur in a conscientious manner.

First Tier, Public Use Goal 1. Provide for low-impact, authorized recreational uses of Palisades Ranch that do not detract from the stated goals and objectives for conserving biological and cultural elements identified herein or by statute.

Task 1. Provide for and publicize availability of Palisades Ranch for compatible recreational uses. Refurbish existing residences for occupation by invited visitors to the site with limited construction of new facilities and none that would impact special status resources, particularly riparian habitats designated as CHIPs.

Task 2. Develop camping areas in or adjacent to existing residential areas that may be used by invited visitors without impacting special status resources (particularly CHIPs and breeding birds) in adjacent areas. Construct foot bridges at strategic points across streams.

Operations/Maintenance Summary and Environmental Impacts. Thus far, Palisades Ranch has been unavailable to the general public, with the exception of the current caretaker, a few residents, and trespass users. As envisioned in Tasks 1 and 2, the Managing Partners may begin to develop and provide for recreational activities that (1) provide nonintrusive recreational opportunities, (2) stimulate scientific research and conduct inventories of special status resources occurring onsite, and (3) generate income to manage the site. Given the availability of existing structures and associated costs, it would be better to repair and refurbish existing facilities than to build new ones. If new facilities are needed, they should be situated adjacent to existing ones with no impacts or threats to riparian habitats. Similarly, if camping facilities are developed, such as picnic tables, tent sites, and campfire rings (which would need to be strictly managed and seasonally restricted) they should be situated in disturbed areas that pose no increased threats to riparian communities. Firewood collecting would be prohibited. Foot paths and bridges over streams would provide for better access to visitors (particularly birders and hikers) with limited risks (i.e., drowning).

At the time of this writing, the caretaker inhabits one of the four residential buildings occurring at Palisades Ranch. The two apartments located in the steel buildings (see photographs on pages 7 and 8) could be occupied with minimal preparation, although more work would be required on the "rock house" and other two residences before they could be inhabited. If these residences are remodeled or otherwise refurbished, they could serve as habitations for additional caretakers, employees, or authorized visitors conducting biological, cultural, or other such studies consistent with this LMP. There are likely dump piles, the old hay barn, well sites, and other facilities that could present health and safety hazards to invited visitors if not specifically treated to minimize the threat.

E. Facility Maintenance Element: Goals and Environmental Impacts. At the time of this writing (June 2016), some facilities maintenance is ongoing. The following goals and objectives are intended to govern clean-up activities on parcels already purchased and those to be acquired at later dates.

Threats. As identified above for both biological and public use elements, the presence of human debris, typically associated with abandoned residential and recreational facilities, may attract members of the public engaging in both legal and illegal activities.

First Tier, Facilities Maintenance Goal 1. Complete facilities maintenance activities in a timely, cost-efficient manner that is complimentary to the goals and objectives given in this LMP for the protection and conservation of both cultural and biological elements.

Task 1. As with previous tasks, it is a priority to remove nonhazardous solid waste materials from those areas where the presence of such debris is attracting legal and illegal activities, with stated benefits for conservation of both cultural and biological resources.

Operations/Maintenance Summary and Environmental Impacts. Those sites requiring heavy equipment for debris removal would need to be surveyed for archaeological and biological resources (particularly tortoises) to ensure no significant resources are adversely affected. Clean-up crews would need to be trained in the recognition of tortoise sign, and would serve as environmental monitors when untrained crews enter the parcels, particularly those engaged in using heavy equipment. BMPs identified above for tortoises would be implemented on parcels already acquired, and will continue to be implemented for future acquisitions.

Task 2. Following refurbishment of existing structures and residences, maintain them and the grounds in such a way as there are no health and safety threats to invited guests.

Operations/Maintenance Summary and Environmental Impacts. If the Managing Partners do decide to operate Palisades Ranch as an ecotourism/research facility, it would result in an increase of human visitors to the site. This would require that any unsafe facilities be modified or removed so they no longer pose a threat, and that the entire site be maintained with health and safety of invited visitors in mind. This may require a signing program showing visitors where they may and may not go. If foot paths are developed, clear signs showing the way would minimize the potential of getting lost or damaging areas adjacent to the trails.

Second Tier, Facilities Maintenance Goal 1. Close redundant routes and those that facilitate illegal uses, while maintaining access for acceptable levels of public use.

Task 1. The closure and rehabilitation of all unnecessary vehicle routes is recommended above. The technique of "vertical mulching," involving the horizontal and vertical placement of rocks and dead vegetative material within the barren portions of a closed roadway to eliminate the appearance of an open road and facilitate native plant growth, is well suited for application on the subject parcels and has been successively implemented elsewhere in the desert. This technique employs minimal surface disturbance and may prevent excessive OHV use. Route closure and rehabilitation would require constant monitoring and maintenance until which time local vehicle users learn to respect conservation management and recreate appropriately.

Operations/Maintenance Summary and Environmental Impacts. The main north-south road has already been effectively closed by locked gates at either end. However, there are other existing roads and trails created by persisting use, mostly by motorcycles, that should be closed or designated for foot traffic, only. If these roads are designated and effectively closed, and subsequent monitoring reveals that cross-country vehicle travel is increasing and impacting cultural or biological resources, vertical mulching and other techniques should be employed to curtail those activities. It may also be necessary to provide more signs and have the caretaker regularly patrol those areas.

F. Biological Monitoring Element. Biological monitoring would include two types of activities; (1) those that provide for additional information to supplement baseline inventories and (2) those that determine the efficacy of protective measures implemented to reverse or curtail existing, deleterious human activities. It is also important that the LMP be consistent with other regional planning efforts.

1. Supplement Existing Information. The biological goals and tasks given above identify numerous opportunities and inventories to identify special status plant communities, plants, amphibians, reptiles, birds, and mammals known and suspected to occur at Palisades Ranch. Although it is known that CHIPs occur, future studies are needed to ascertain their exact nature and distribution. Similarly, threatened and endangered species, including desert tortoise, southwestern willow flycatcher, and least Bell's vireo are now documented but the full extent of their occurrence requires additional inventories and monitoring over multiple years. There are suitable habitats for numerous other species such as western yellow-billed cuckoo, arroyo toad, western pond turtle, Mohave ground squirrel, and Mojave River vole but no focused surveys have been performed to determine if they actually occur.

There are many local and regional experts – mammalogists, ornithologists, herpetologists, botanists – that would readily volunteer their services to study resources at Palisades Ranch in the interest of scientific discovery. Groups such as the U.S. Geological Survey, Victor Valley College Natural Resources Department, Lewis Center, Audubon Society, Mojave Group of the Sierra Club, Mojave Chapter of the California Native Plant Society, to name a few, are local conservation organizations that would likely be interested in leading tours and providing expertise to inventory pertinent resources. Managing Partners are encouraged to stimulate interest through word of mouth and publicized invitations to develop relationships with these groups and facilitate volunteer efforts consistent with this LMP.

2. Monitor Efficacy of Protective Measures. Some of the goals and tasks identify route closures to curtail illegal activities such as cross-country vehicle travel and dumping. Once these protective measures are implemented, it will be necessary to establish baseline data so that future monitoring, both along transects and at standardized camera stations, can determine if the desired effects are occurring, and if not, identify remedial activities to accomplish the goals. Assuming non-native plants continue to be removed, and a new program of eradicating broad-leaf peppergrass is initiated, monitoring will be required to determine if the plants are being reduced, and if not, to target areas for future eradication. If cooperative relationships are established with local science-based groups, it will be important to monitor their use of native habitats to ensure no deleterious impacts are occurring, to nesting birds, for example. In other cases, hired consultants may be required to initiate monitoring studies that may later be perpetuated by volunteers.

3. Consistency with Regional Planning Efforts. Pertinent parts of this LMP are designed to be consistent with existing, regional management plans. As discussed, this LMP is consistent with and supportive of specific recovery plans for the desert tortoise (USFWS 1994b), Mojave Tui chub (USFWS 1984), least Bell's vireo (USFWS 1998), and southwestern willow flycatcher (USFWS 2002). Preserve-level management is also consistent with protective management actions identified in the West Mojave Plan (BLM 2006) for desert tortoise, Mohave ground squirrel, and other covered species, particularly birds. Managing Partners also intend to continue a working relationship with Natural Resources Conservation Service, Mojave Desert Resource Conservation District (MDRCD), and Mohave Water Agency where their complimentary missions overlap.

CDFG (2008) refers to the 1996 Judgment After Trial requiring CDFG (currently, "CDFW") to prepare a Habitat Water Supply Management Plan for the benefit of the riparian habitat areas and species identified in the Judgment. In the Plan, CDFG then recognized acquisition of water rights, fee ownership and conservation easements along the river as vital to the protection and conservation of remaining riparian habitat (CDFG 2008). The California Riparian Habitat Conservation Plan recommends protection and restoration of riparian areas with intact adjacent upland habitats as a conservation measure developed to guide policy and action on behalf of riparian habitats and California's land birds. Many of the riparian bird species found on the subject property are focal species discussed in the Riparian Bird Conservation Plan (CDFG 2008).

V. OPERATIONS AND MAINTENANCE SUMMARY

A. Operations and Maintenance Tasks to Implement Plan. Each of the biological elements, associated goals, and tasks given above has a section entitled "Operations/Maintenance Summary and Environmental Impacts." The function of these sections among the many elements, goals, and tasks is to describe current management, if any, and identify additional management activities to ensure appropriate protection. The sections also identify both adverse and beneficial impacts that may be associated with each of the protective management prescriptions intended to protect each element.

B. Existing Staff and Additional Personnel Needs Summary. The Managing Partners, in association with CDFW, USFWS, and other organizations described herein, comprise existing staff to manage Palisades Ranch as outlined in this LMP. At some point, the management of the lands will be transferred from WRC to HCSD, which will then be responsible for implementing this LMP. Although personnel may change, for the foreseeable future, the pertinent staff of HCSD implementing the plan will include its General Manager and onsite Caretaker. The LMP envisions that many skilled, expert volunteers will take advantage of the authorized, limited access to continue inventories and monitoring identified herein.

VI. CLIMATE CHANGE STRATEGIES

The following discussion is taken from the Fremont-Kramer Desert Wildlife Management Area LMP provided by Tom Egan with permission from Transitions Habitat Conservancy (THC; January 2012). Warmer temperatures, changes in precipitation regimes, and nitrogen deposition are all factors associated with climate change resulting from elevated greenhouse gases (primarily carbon dioxide or CO2), which are altering the structure and function of ecosystems in the western United States (Smith 2010). The greatest effect of this change, particularly relative to the California deserts, will probably be impacts upon ecosystems via changing precipitation regimes. Climate change models predict lengthier and more frequent droughts and greater variability in rainfall.

Elevated CO2 is known to stimulate plant production in desert systems and together with rainfall changes, may result in plant community structural shifts that favor some invasive exotic plants over certain native species (Bradley 2010). These changes may have direct implications for invasive weed control and/or fire management (Brooks 2010) within dedicated wildlife management areas. Addressing invasive plant species in the context of climate change (Bradley 2010) may be facilitated by:

- Use species and landscape invasion risk assessments;
- Target corridors of invasive species movement and restrict uses that facilitate invasion;
- Expand monitoring activities and information sharing to identify upcoming problems;
- Develop flexible management protocols to respond quickly to new invasive species; and
- Prepare for possible native plant community restoration opportunities.

In addition to certain native plant species in the California deserts, the desert tortoise may be vulnerable to a warming climate (Lovich 2010). Adaptive responses may include individual tortoises altering their home range size, shifting distributions to higher elevations, changes to the nesting season, and/or a modification of egg-laying behavior/nest location affecting sex ratios.

Refuges and wildlife areas are not fixed islands of safe haven for species and the previous goal of preserving dynamic equilibrium must be abandoned (Scott 2010). Management of reserve areas must focus on a system "state" that provides representative, redundant and resilient populations of species to maintain the integrity, diversity, and health of conservation targets.

In consideration of the above, LMP actions among the subject parcels should be tailored in a manner that is flexible in responding to changes in the plant and animal community anticipated to occur over time as the result of climate change. Long-term protection of the three CHIPs (cottonwood forest, arroyo willow thickets, and mesquite bosque) should be emphasized.

On-the-ground actions to minimize non-native plant wildfire fuel load, such as additional manual weed removal to reduce wildfire risk and native plant revegetation, may need to be considered in the future. This LMP should be revised accordingly as needed to address changing wildfire fuel loads, plant community shifts, and/or other potential influences of climate change among the subject parcels.

VII. FUTURE REVISIONS TO LAND MANAGEMENT PLANS

This LMP reflects the best available information during the planning process of 2016, and it is understood that new information or circumstances will arise over time and adjustments will be required to keep the LMP current. Such new information may include:

- Feedback generated by adaptive management of the site;
- Scientific research that directs improved techniques of habitat management;
- Research that directs improved management of agricultural resources;
- Documented threats to wildlife species and their habitats;
- New legislative or policy direction; and,
- New acquisitions.

Public outreach and public input will be necessary in proportion to the proposed policy change established by the LMP. If the appropriate procedure for a particular proposed revision is not apparent, the determination of which of the following procedures to use shall be made by the regional manager in consultation with the Lands Program/Wildlife Branch.

A. Minor Revisions. Minor revisions may include the addition of new property(s) to an existing ecological reserve or wildlife area or the adoption of limited changes to the goals and tasks through adaptive management, based on other scientific information or policy direction. This procedure will be applicable to revisions that meet the following criteria:

- No change is proposed to the overall purposes of this LMP;
- California Environmental Quality Act (CEQA) documentation (if required) is completed and approved;
- Appropriate consultation occurs within the region and with other appropriate branches in CDFW;
- Appropriate consultation with other agencies occurs;
- Adjoining neighbors are consulted regarding the revision, if the revision is related to a specific location of the acquisition of additional area.

Minor revisions may be prepared by the staff members or with other CDFW resources, and require approval by the regional manager. If additional acquisitions require no changes in existing management, the parcels may be integrated within the current LMP via a memo from the regional manager to the Director. The documentation is attached to the LMP and provided to the Lands Program/Wildlife Branch for their files.

B. Major Revisions. Major revisions or a new LMP, require a procedure comparable to the initial LMP planning process, but also proportionate to the level of policy change that is proposed. This procedure is applicable to revisions that meet the following criteria:

- Substantial revision and/or a new policy direction are proposed to the LMP, or the adoption of a completely new LMP is proposed;
- Appropriate CEQA documentation is completed and approved;
- Appropriate consultation occurs throughout CDFW;
- Appropriate coordination and consultation with other agencies occurs; and,
- A public outreach program is conducted that is proportional to the level of the proposed revision.

Major revisions or a new LMP may be prepared using available CDFW resources. Any major revisions or new LMP development require prior approval by the regional manager. If the appropriate procedure for a particular, proposed revision is not apparent, the determination of which of these procedures to use shall be made by the region in consultation with the Lands Program. The revised LMP may need additional CEQA analysis if the revisions present substantive changes. A new LMP and or new CEQA analysis for a revised LMP would require the review and approval of the Deputy Director.

C. Plan Status Reports. Periodic evaluation is important to help ensure that the purposes and goals of the LMP are being met. The chapter or section that includes, "Management Goals," may contain many specific tasks that involve monitoring of the sites and evaluation of the adequacy of management activities. Cumulatively, these efforts will provide feedback regarding the success of the overall management effort. Periodic and detailed analysis of this feedback data will be necessary to assess the status of this LMP.

A review of the achievement of the goals of the LMP should be prepared every 5-10 years following the date of adoption of the LMP or subsequent revisions.

A status report documenting this review should, at minimum, include:

- An evaluation of the achievement of the purposes and goals of the LMP;
- An evaluation of the completion or annual completion, as appropriate, of each task contained in this LMP;
- Monitoring required as a result of a mitigated negative declaration;
- A fiscal evaluation of the program;
- An evaluation of the effectiveness of CDFW's coordination efforts with local governments, and other property management and regulatory agencies involved with the sites;
- A notation of important new scientific information that has bearing on management; and,
- A recommendation and schedule for revisions to the LMP to incorporate new information and improve its effectiveness.

The status report should be prepared or coordinated by the site manager or other regional representative. It should be reviewed by appropriate Regional functions, then submitted to the Regional Manager and forwarded to the Lands Program, Wildlife Branch to be submitted to the Deputy Director. This report should serve as a basis for revision of the LMP and appropriate adjustment to ongoing management practices. Approved copies of the report are included in the management plan files in the region and Lands Program.

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Appendix A. Plant Species Detected

The following plant species were identified on-site during the general biological inventory described in this report. Those plant species that are protected by pertinent State ordinances are highlighted in red and signified by "(SC)" following the common name.

GNETAE	GNETAE
Ephedraceae	**Joint-fir family**
Ephedra nevadensis	Nevada joint-fir
ANGIOSPERMAE: DICOTYLEDONES	DICOT FLOWERING PLANTS
Asteraceae	**Sunflower family**
Acamptopappus sphaerocephalus	Desert goldenhead
Ambrosia acanthicarpa	Annual bur-sage
Ambrosia psilostachya	Western ragweed
Ambrosia dumosa	Burrobush
Ambrosia salsola	Cheesebush
Artemesia douglasiana	Mugwort
Artemesia dracunculus	Tarragon
Baccharis emoryi	Emory baccharis
Baccharis glutinosa	Mulefat
Baileya multiradiata	Marigold
Chaenactis fremontii	Desert pincushion
Chrysothamnus nauseosus	Rubber rabbitbrush
Coreopsis bigelovii	Bigelow coreopsis
Dicoria canescens	Dicoria
Eriophyllum wallacii	Wallace's woolly daisy
Isocoma acradenia	Goldenbush
**Lactuca serriola*	Wild lettuce
Nicolettia occidentalis	Nicolettia
Senecio flaccidus	Groundsel
Stephanomeria exigua	Milk aster
Stephanomeria parryi	Parry rock-pink
Stephanomeria pauciflora	Desert milk aster
Syntrichopappus fremontii	Syntrichopappus
**Taraxacum officinale*	Common dandelion
Tetradymia sp.	Cottonthorn
**Xanthium strumarium*	Cocklebur
Bignoniaceae	**Bigonia family**
Chilopsis linearis ssp. *arcuata*	Desert willow (SC)
Boraginaceae	**Borage family**
Amsinckia tessellata	Fiddleneck
Cryptantha angustifolia	Narrow-leaved forget-me-not
Cryptantha micrantha	Forget-me-not
Heliotropium curvassivicum	Desert heliotrope
Tiquilia nuttallii	Nuttall coldenia

Brassicaceae	**Mustard family**
**Descurainia pinnata*	Tansy
**Descurainia sophia*	Flixweed
Guillenia lasiophylla	California mustard
**Hirschfeldia incana*	Short-pod mustard
Lepidium fremontii	Bush peppergrass
Lepidium latifolium	Broad-leaf peppergrass
Lepidium lasiocarpum	Sand peppergrass
**Sisymbrium irio*	London rocket
Streptanthella longirostris	Streptanthella
Cactaceae	**Cactus family**
Cylindropuntia echinocarpa	Silver cholla (SC)
Cylindropuntia ramosissima	Pencil cholla (SC)
Sclerocactus polyancistrus	Mojave fish-hook cactus (SC)
Chenopodiaceae	**Goosefoot family**
Atriplex canescens	Four-winged saltbush
Atriplex confertifolia	Spiny saltbush
Atriplex lentiformis	Big saltbush
Atriplex polycarpa	Allscale
Atriplex spinifera	Spiny saltbush
Krascheninnikovia lanata	Winter fat
**Salsola tragus*	Russian thistle
Euphorbiaceae	**Spurge family**
Croton californicus	Croton
Stillingia linearifolia	Stillingia
Fabaceae	**Pea family**
Astragalus lentiginosus	Milk-vetch
Glycyrrhiza lepidota	Wild liquorice
Prosopis pubescens	Screw bean mesquite (SC)
Psorothamnus arborescens	Indigo bush
Psorothamnus schottii	Indigo bush
Geraneaceae	**Geranium family**
**Erodium cicutarium*	Red-stemmed filaree
Hydrophyllaceae	**Water-leaf family**
Phacelia tanacetifolia	Phacelia
Lamiaceae	**Mint family**
Salazaria mexicana	Paper-bag bush
Salvia columbariae	Chia
Loasaceae	**Stick-leaf family**
Mentzelia albicaulis	Little blazing star
Petalonyx thurberi	Sandpaper plant

Nyctaginaceae	**Four o'clock family**
Abronia villosa	Desert sand verbena
Mirabilis bigelovii	Desert wishbone plant
Onagraceae	**Evening-primrose family**
Camissonia boothii	Red primrose
Camissonia claviformis	Brown-eyed primrose
Oenothera deltoides	Devil's lantern
Papaveraceae	**Poppy family**
Argemone munita	Prickly poppy
Eschscholzia glyptosperma	Desert gold-poppy
Eschscholzia minutiflora	Little gold-poppy
Plantaginaceae	**Plantain family**
Plantago ovata	Plantain
Platanaceae	**Sycamore family**
Platanus racemosa	Sycamore tree
Polemoniaceae	**Phlox family**
Eriastrum sp.	Woolly star
Eriastrum densifolium	Woolly star
Loeseliastrum c.f. *matthewsii*	Sunbonnets
Polygonaceae	**Buckwheat family**
Chorizanthe brevicornu	Brittle spineflower
Chorizanthe rigida	Rigid spineflower
Eriogonum fasciculatum	California buckwheat
Eriogonum inflatum	Desert trumpet
Eriogonum nidularium	Whiskbroom
Eriogonum pusillum	Buckwheat
Eriogonum viridescens	Buckwheat
**Rumex crispus*	Curly dock
Salicaceae	**Willow family**
Populus fremontii	Fremont's cottonwood
Salix exigua	Narrow-leaf willow
Salix laevigata	Red willow
Salix lasiolepis	Arroyo willow
Saururaceae	**Lizard-tail family**
Anemopsis californica	Yerba mansa
Scrophulariaceae	**Figwort family**
Mimulus guttatus	Seep-spring monkey-flower

Solanaceae	**Nightshade family**
Datura wrightii	Jimsonweed
Lycium andersonii	Anderson's box-thorn
Lycium cooperi	Peach thorn
Tamaricaceae	**Tamarisk family**
**Tamarix ramosissima*	Tamarisk
Urticaceae	**Nettle family**
Urtica holosericea	Stinging nettle
Viscaceae	**Mistletoe family**
Phorodendron sp.	Mistletoe in cottonwood
Zygophyllaceae	**Caltrop family**
Larrea tridentata	Creosote bush
ANGIOSPERMAE: MONOCOTYLEDONES	MONOCOT FLOWERING PLANTS
Cyperaceae	**Sedge family**
Carex sp.	Sedge
Scirpus sp.	Bulrush
Juncaceae	**Rush family**
Juncus sp.	Rush
Poaceae	**Grass family**
Achnatherum hymenoides	Indian ricegrass
**Arundo donax*	Giant reed
**Bromus madritensis* ssp. *rubens*	Red brome
**Bromus tectorum*	Cheat grass
Distichlis spicata	Salt grass
**Hordeum murinum*	Hare barley
**Polypogon monspeliensis*	Rabbitfoot grass
**Schismus* sp.	Split-grass
Typhaceae	**Cat-tail family**
Typha latifolia	Cat-tail

* - indicates a non-native (introduced) species.
c.f. - compares favorably to a given species when the actual species is unknown.

Some species may not have been detected because of the seasonal nature of their occurrence. Common names are taken from Beauchamp (1986), Hickman (1993), Jaeger (1969), and Munz (1974).

Appendix B. Animal Species Detected

The following animal species were detected during the general biological inventory described in this report. Special status animal species are highlighted in red and signified by "(SC)" following the common names. Those only found in adjacent areas are signified by "+."

AMPHIBIA	AMPHIBIANS
Bufonidae	**True toads**
Anaxyrus boreas	Western toad
Hylidae	**Treefrogs**
Hyla regilla	Pacific treefrog
Ranidae	**True frogs**
Rana catesbeiana	Bullfrog
REPTILIA	REPTILES
Testudinidae	**Land tortoises**
Gopherus agassizii	Agassiz's desert tortoise (SC)
Iguanidae	**Iguanids**
Dipsosaurus dorsalis	Desert iguana
Callisaurus draconoides	Zebra-tailed lizard
Sceloporus magister	Desert spiny lizard
Sceloporus occidentalis	Western fence lizard
Uta stansburiana	Common side-blotched lizard
Phrynosoma platyrhinos	Desert horned lizard
Teiidae	**Whiptails**
Cnemidophorus tigris	Western whiptail
Colubridae	**Colubrids**
Masticophis flagellum piceus	Red racer
Pituophis melanoleucus	Gopher snake
AVES	BIRDS
Podicipedidae	**Grebes**
Podilymbus podiceps	Pied-billed grebe
Rallidae	**Rails**
Gallinula galeata	Common gallinule
Rallus limicola	Virginia rail

Ardeidae	**Herons**
Nycticorax nycticorax	Black-crowned night-heron
Butorides virescens	Green heron
Anatidae	**Ducks, geese and swans**
Anas platyrhynchos	Mallard
Cathartidae	**Vultures**
Cathartes aura	Turkey vulture
Accipitridae	**Hawks, eagles, harriers**
Accipiter cooperii	Cooper's hawk (SC)
Buteo lineatus	Red-shouldered hawk
Buteo jamaicensis	Red-tailed hawk
Falconidae	**Falcons**
Falco sparverius	American kestrel
Phasianidae	**Grouse and quail**
Callipepla californica	California quail
Charadriidae	**Plovers**
Charadrius vociferus	Killdeer
Columbidae	**Pigeons and doves**
Streptopelia decaocto	Eurasian collared-dove
Zenaida macroura	Mourning dove
Cuculidae	**Cuckoos**
Geococcyx californianus	Greater roadrunner
Tytonidae	**Barn Owls**
Tyto alba	Common barn owl
Strigidae	**Typical owls**
Bubo virginianus	Great horned owl
Athene cunicularia	Burrowing owl (SC)
Camprimulgidae	**Nightjars**
Chordeiles acutipennis	Lesser nighthawk
Apodidae	**Swifts**
Aeronautes saxatalis	White-throated swift
Trochilidae	**Hummingbirds**
Archilochus alexandri	Black-chinned hummingbird
Calypte anna	Anna's hummingbird
Calypte costae	Costa's hummingbird

Picidae	**Woodpeckers**
Picoides nuttallii	Nuttall's woodpecker
Colaptes auratus	Northern flicker
Tyrannidae	**Tyrant flycatchers**
Contopus borealis	Olive-sided flycatcher
Contopus sordidulus	Western wood-pewee
Empidonax difficilis	Pacific slope flycatcher
Empidonax trailii	Willow flycatcher (SC)
Empidonax hammondii	Hammond's flycatcher
Myiarchus tyrannulus	Brown-crested flycatcher (SC)
Sayornis nigricans	Black phoebe
Sayornis saya	Say's phoebe
Myiarchus cinerascens	Ash-throated flycatcher
Tyrannus verticalis	Western kingbird
Alaudidae	**Larks**
Eremophila alpestris	Horned lark
Hirundinidae	**Swallows**
Stelgidopteryx serripennis	Northern rough-winged swallow
Hirundo pyrrhonota	Cliff swallow
Corvidae	**Crows and jays**
Corvus corax	Common raven
Remizidae	**Verdins**
Auriparus flavipes	Verdin
Aegithalidae	**Bushtits**
Psaltriparus minimus	Bushtit
Troglodytidae	**Wrens**
Salpinctes obsoletus	Rock wren
Thryomanes bewickii	Bewick's wren
Troglodytes aedon	House wren
Cistothorus palustris	Marsh wren
Muscicapidae	**Thrushes and allies**
Polioptila caerula	Blue-gray gnatcatcher
Sialia mexicana	Western bluebird
Catharus ustulatus	Swainson's thrush
Mimidae	**Mockingbirds and thrashers**
Toxostoma redivivum	California thrasher

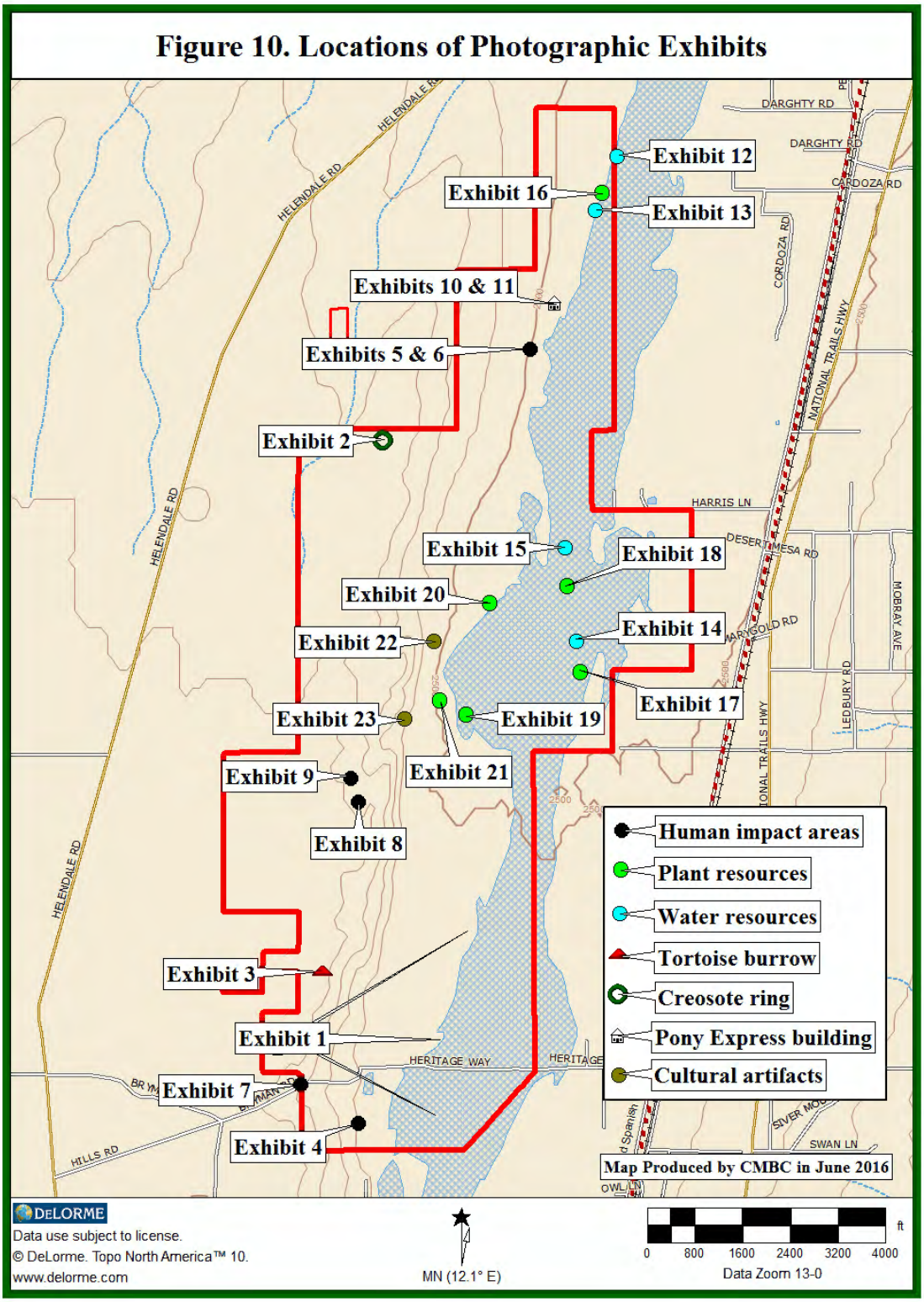
Ptilogonatidae	**Silky flycatchers**
Phainopepla nitens	Phainopepla
Sturnidae	**Starlings**
Sturnus vulgaris	European starling
Vireonidae	**Vireos**
Vireo bellii	Least Bell's vireo (SC)
Emberizidae	**Sparrows, warblers, tanagers**
Dendroica petechia	Yellow warbler (SC)
Oporornis tolmiei	MacGillivray's warbler
Geothlypis trichas	Common yellowthroat
Wilsonia pusilla	Wilson's warbler
Icteria virens	Yellow-breasted chat (SC)
Piranga rubra	Summer tanager (SC)
Piranga ludoviciana	Western tanager
Pheucticus melanocephalus	Black-headed grosbeak
Guiraca caerulea	Blue grosbeak
Passerina amoena	Lazuli bunting
Pipilo erythrophthalmus	Spotted towhee
Spizella breweri	Brewer's sparrow
Amphispiza bilineata	Black-throated sparrow
Amphispiza belli	Sage sparrow
Melospiza melodia	Song sparrow
Agelaius phoeniceus	Red-winged blackbird
Euphagus cyanocephalus	Brewer's blackbird
Quiscalus mexicanus	Great-tailed grackle
Molothrus ater	Brown-headed cowbird
Icterus galbula	Bullock’s oriole
Fringillidae	**Finches**
Carpodacus mexicanus	House finch
Carduelis psaltria	Lesser goldfinch
Carduelis lawrencei	Lawrence's goldfinch

MAMMALIA	MAMMALS
Leporidae	**Hares and rabbits**
Lepus californicus	Black-tailed hare
Sylvilagus audubonii	Audubon cottontail
Sciuridae	**Squirrels**
Ammospermophilus leucurus	Antelope ground squirrel
Geomyidae	**Pocket gophers**
Thomomys bottae	Botta pocket gopher
Heteromyidae	**Pocket mice**
Dipodomys sp.	Kangaroo rat
Castoridae	**Beavers**
Castor canadensis	Beaver
Cricetidae	**Rats and mice**
Neotoma lepida	Desert wood rat
Canidae	**Foxes, wolves and coyotes**
Canis latrans	Coyote
Vulpes macrotis	Kit fox
Urocyon cinereoargenteus	Gray fox
Procyonidae	**Raccoons**
Procyon lotor	Raccoon
Felidae	**Cats**
Lynx rufus	Bobcat

Nomenclature follows Stebbins, *A Field Guide to Western Reptiles and Amphibians* (2003), third edition; Sibley, National Audubon Society, the Sibley Guide to Birds (2000), first edition; and Ingles, Mammals of the Pacific States (1965), second edition.

Appendix C. Photographic Exhibits

Figure 10. Locations of Photographic Exhibits



Locations of the 23 photographic exhibits on the next 10 pages are depicted in Figure 10.

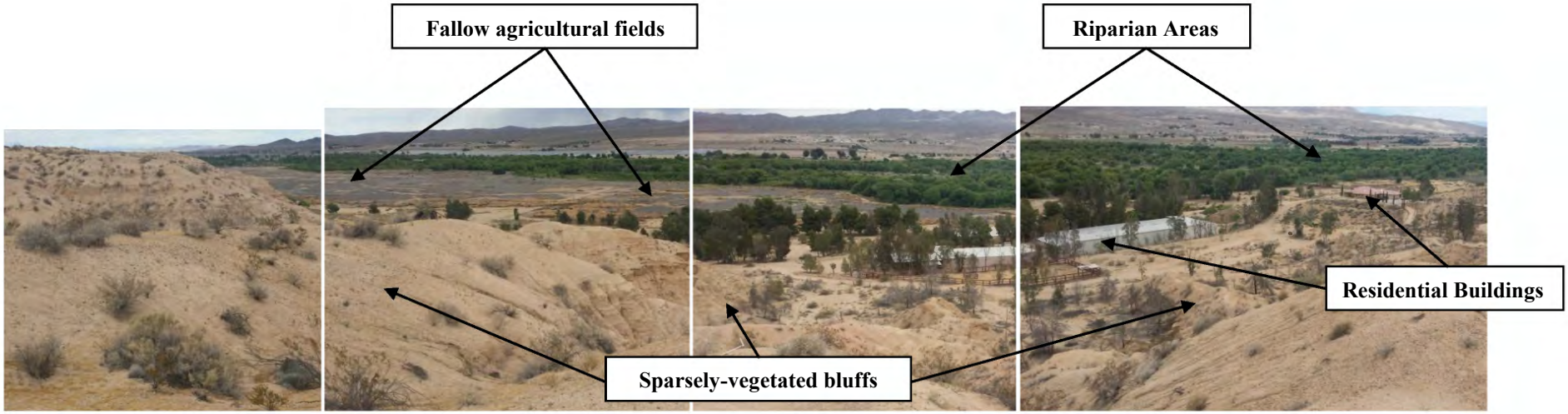


Exhibit 1. Palisades Ranch: Overview from west of River, facing east (see Figure 10 for locations and directions of photographs).

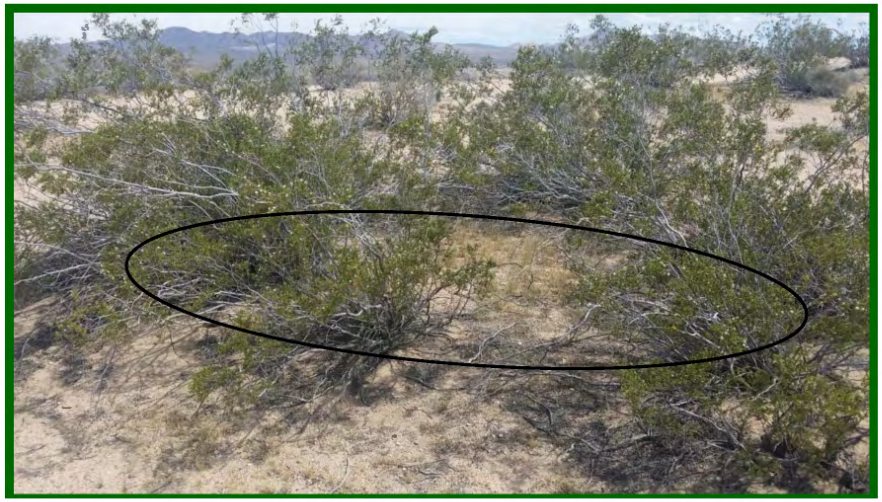


Exhibit 2. One of many larger creosote rings on west bluff.

Exhibit 3. Tortoise burrow at top of bluff.

Exhibit 4. Tire dump on southern part of site.

Exhibit 5. Recent dumping east of abandoned runway.

Exhibit 6. Recent dumping east of abandoned runway.

Exhibit 7. OHV problem area at base of bluffs, west of residences, along Hills Road.

Exhibit 8. OHV impacts in wash.

Exhibit 9. Cross-country, OHV impacts in the bluffs.

Exhibits 10 & 11. Several views of the Pony Express building.

Exhibit 12. Open, running water and streamside growth near north boundary.

Exhibit 13. Another view of flowing water, just south of Exhibit 12.

Exhibit 14. One of the beaver ponds along Mojave River.

Exhibit 15. Another of the beaver ponds along Mojave River.

Exhibit 16. Broad-leafed peppergrass (*Lepidium latifolium*) and giant reed (*Arundo donax*).

Exhibit 17. Dense stands of giant reed on dry, fine sand near center of site.

Exhibit 18. Salt cedar (*Tamarix ramosissima*) near center of site.

Exhibit 19. Mature stands of Fremont's cottonwood (*Populus fremontii*) near center of site.

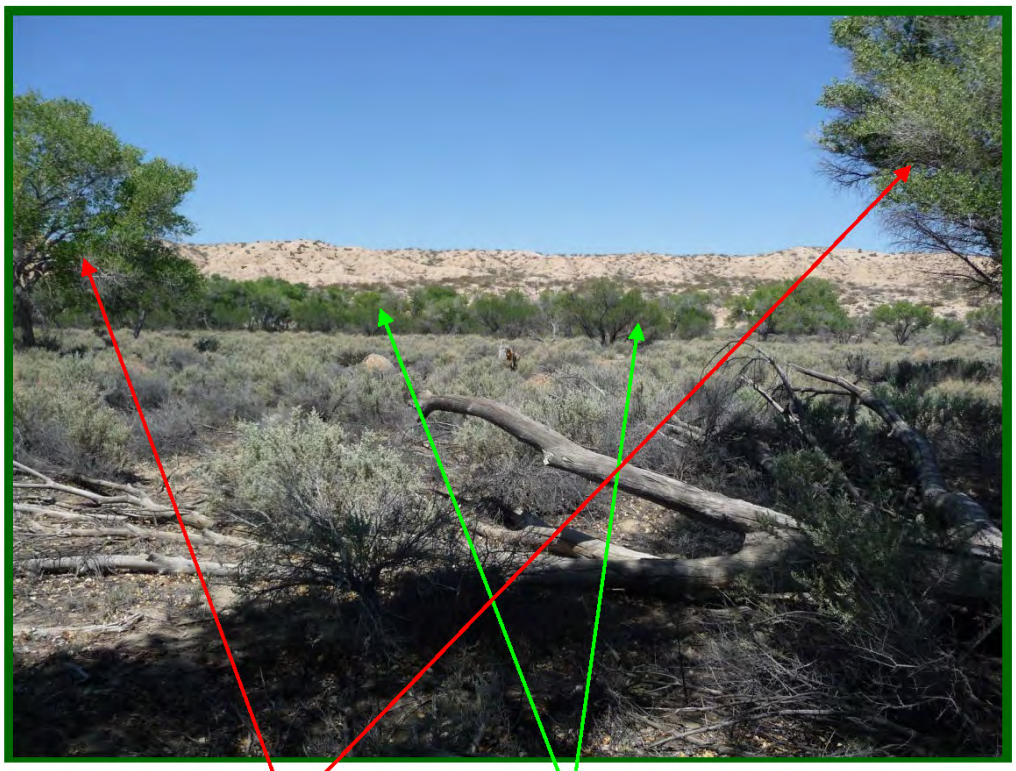


Exhibit 20. Fremont's cottonwood, screw bean mesquite (*Prosopis pubescens*), with understory of saltbush (*Atriplex* ssp.) scrub.

Exhibit 21. Mature stands of screw bean mesquite with understory of saltbush scrub.

Exhibit 22. "Scraper tool" found by Radakovich at base of bluffs on 22 May 2016.

Exhibit 23. Second artifact found by Radakovich at base of bluffs on 22 May 2016.

APPENDIX 4

Botanical Surveys on the Palisades Ranch Property along the Mojave River in San Bernardino County, California

Mojave River at the Palisades Ranch Property. Photo by Naomi Fraga

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Updated Report submitted: February 8, 2022

Introduction **3**

Methods **3**

Table 1. Dates of the botanical surveys and the survey team for each day. 4

Results **5**

Table 2. Descriptions of wetland indicator status ratings (Lichvar 2013) and a summary of the status of plant species documented on the Palisades Property. 5

Non-Native Species 6

Table 2. Cal-IPC rated non-native species observed on the Palisades Property. 6

Plant Species of Conservation Concern 7

Table 3. Rare plants that occur or occur near the Palisades property. 7

Discussion **7**

Literature Cited **8**

List of Appendices **9**

Appendix A. GIS Shapefiles (emailed as attachment) 9

Appendix B. Photographs (emailed as attachment) 9

Appendix C. Complete checklist of the vascular flora 10

Appendix D: CNDDB form for Mojave fishhook cactus 17

Introduction

The Mojave River is over 100 miles long, and stretches across San Bernardino County, California from its headwaters in the San Bernardino Mountains to its terminus at Soda Lake in the Mojave National Preserve. It's an intermittent river that flows primarily underground but flows perennially at several key locations including Mojave Narrows in Victorville, the Palisades Ranch Property, owned and managed by the Mojave Desert Land Trust (MDLT) near Helendale, and Afton Canyon. These zones of perennial flow provide essential riparian habitat for wildlife in an area threatened by urbanization and groundwater overdraft (Parker et al. 2021). In 2020 and 2021, staff from California Botanic Garden (CalBG) surveyed the 1,647 acre Palisades Ranch property to document the botanical diversity, with special emphasis on rare and invasive plant taxa. We hope the data will provide baseline information on botanical diversity that will support ongoing conservation and restoration efforts. The Palisades property not only hosts 3.5 miles of critical river corridor, but also has a variety of habitat types that support rare plant species such as Mojave fishhook cactus (*Sclerocactus poyancistrus*) and desert tortoise (*Gopherus agassizii*). The results of our botanical survey are summarized below.

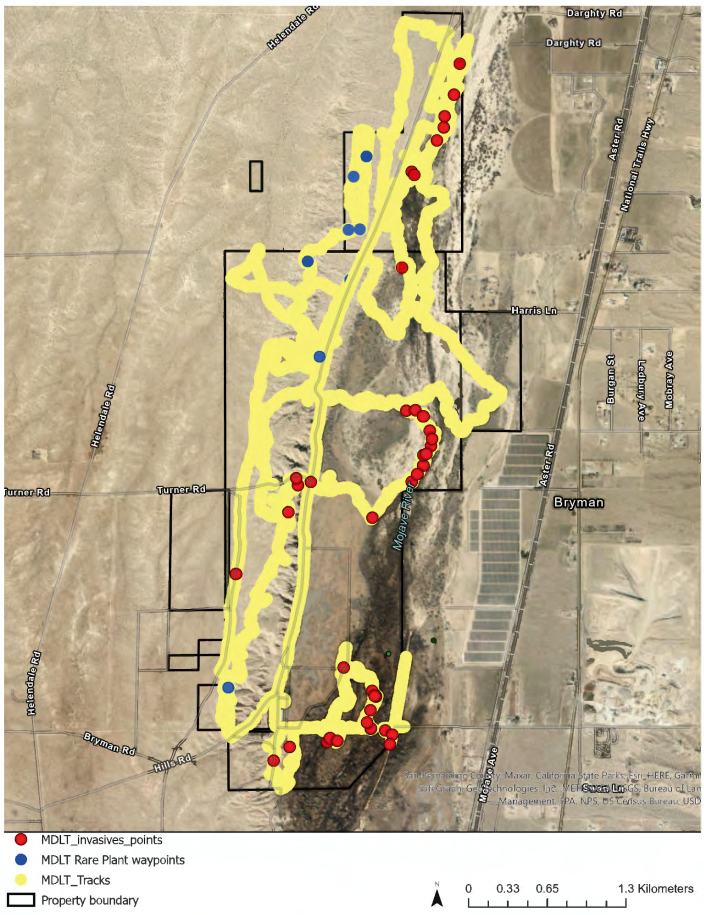

Figure 1. A map of the Palisades property showing survey tracks, invasive plant points, and Mojave fishhook cactus points.

Methods

Botanical surveys were conducted by staff at CalBG on the Palisades Ranch Property owned and managed by the MDLT in the Mojave River watershed in San Bernardino County, California. Several sources of data were reviewed in advance of surveys including: occurrence data provided by the California Department of Fish and Wildlife in the California Natural Diversity Database (CNDDB 2020), records downloaded from the Consortium of California Herbaria (CCH 2020), and GIS shapefiles provided by MDLT of invasive plant point data and a vegetation map (Fig. 1). In the field, a GPS-enabled tablet and smart-phone device assisted with

data collection and map visualization. Applications such as Avenza Maps, ArcGIS Collector, and Gaia GPS were used for data collection. The property was surveyed in 2020 and 2021 on the following dates: May 6 & 12, June 19, Sep 10, 17 & 24 in 2020 and March 21, 2021 (Table 1). We conducted a survey on September 21, 2021 after the initial report was submitted in an effort to increase the survey coverage within the dense riparian areas along the river in the southern portion of the property .

Table 1. Dates of the botanical surveys and the survey team for each day.

Survey Date	**Survey Team**	Survey Location
6-May-2020	Naomi Fraga (Director of Conservation) and Joy England (Rare Plant Botanist)	The bluffs and north side of the river
12-May-2020	Naomi Fraga and Joy England	The bluffs and south side of the river
19-Jun-2020	Naomi Fraga and Carolyn Mills (Research Assistant)	Center portion of the river
10-Sep-2020	Joy England and LeRoy Gross (Field Botanist)	Center portion of the river
17-Sep-2020	Joy England and LeRoy Gross	Center portion of the river
24-Sep-2020	Joy England and LeRoy Gross	Southern part of the river
24-Mar-2021	Naomi Fraga and Carson Barry (Conservation Intern)	The bluffs (focus on Mojave fishhook cactus)
24-Sep-2021	Naomi Fraga and Joy England	The bluffs and south side of the river

Plant specimens were collected when plants could not be identified on site, and if plants had suitable material available (flowers and fruits) to produce a high quality herbarium specimens. Plant identifications were verified using taxonomic keys and descriptions from several references including Baldwin et al. (eds., 2012), and Jepson Flora Project (2021) and expert identification on site. Identifications were also verified through comparison with annotated specimens at the California Botanic Garden herbarium. Wetland plants were categorized according to the National Wetland Plant List maintained by the Army Corps of Engineers. The reference list used was the Arid West (AW) from California plant downloaded online at (https://wetland-plants.sec.usace.army.mil/nwpl_static/v34/home/home.html).
Herbarium specimens collected during the project will be deposited at California Botanic Garden (formerly Rancho Santa Ana Botanic Garden [acronym RSA])] with duplicates distributed to University of California at Riverside (UCR) Herbarium. Spatial data collected during the project were converted into shapefiles using ArcGIS online. The following layers have been submitted as an appendix to this report: Survey Tracks, Rare Plant Points, Invasive Plant Points (Appendix A). Photographs of plants and landscapes were taken during surveys and have also been submitted as Appendix B.

Results

Over the course of our surveys we documented 201 plant taxa on the Palisades Ranch Property, including 173 native taxa (86.1%) and 28 non-native taxa (13.9%). Eighty-two taxa or 40.8% of the total species diversity are considered wetland plants (Lichvar 2013; Table 2). Nearly half of the species documented are annual plants (49.8%) which is typical of habitats in the Mojave Desert, followed by perennial herbs (25.4%), shrubs (19.4%), and trees (5.5%) (Fig. 2). A full checklist of plant species recorded during our surveys is provided in Appendix C.

Table 2. Descriptions of wetland indicator status ratings (Lichvar 2013) and a summary of the status of plant species documented on the Palisades Property.

Status	**Qualitative Description (Lichvar et al. 2012)**	**# of Taxa**
Obligate (OBL)	Almost always occur in wetlands	16
Facultative Wetland (FACW)	Usually occur in wetland, but may occur in nonwetland.	23
Facultative (FAC)	Occur in wetland and non-wetland	17
Facultative Upland (FACU)	Usually occur in non-wetland, but may occur in wetland	26
Upland (UPL)	Almost never occur in wetland	119
	Total wetland	82
	Total upland	119
	Total	**201**
	Percent wetland	*40.80%*

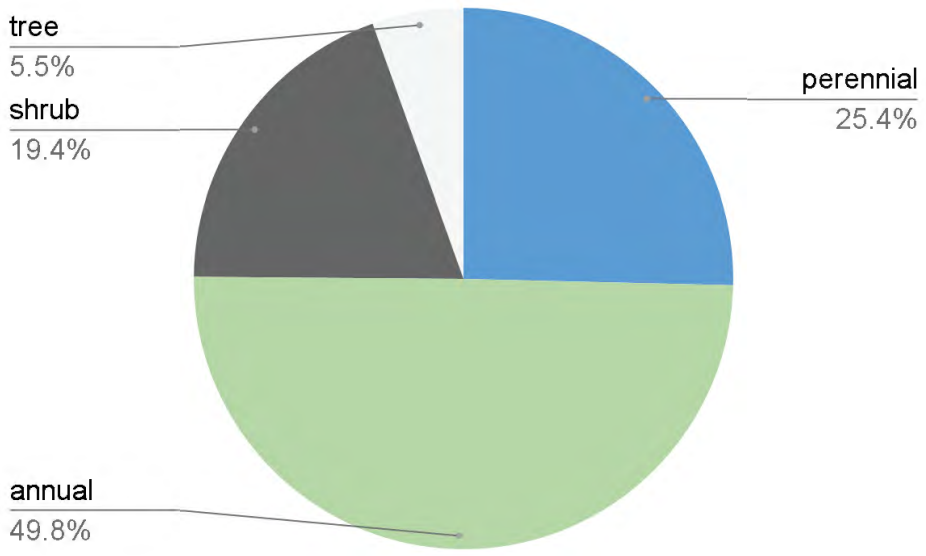

Figure 2. Lifeform diversity of the plant species documented on the Palisades Property.

Non-Native Species

Three of the 28 non-native taxa were planted and are persisting from cultivation (*Ulmus pumila*, Siberian elm; *Pinus halepensis*, Aleppo pine; and *Robinia psuedoacacia*, black locust). Fourteen of the 28 non-native plant species (or 50%) are listed by the California Invasive Plant Council as High, Moderate, or Limited in their inventory (Table 2; Cal-IPC 2021). The Cal-IPC assignment of species to each category is based on an assessment of ecological impacts, and expert review (Cal-IPC 2021). The high priority invasive species we mapped included *Arundo donax* (giant reed grass) and *Tamarix ramosissima* (salt cedar; Appendix A).

Table 2. Cal-IPC rated non-native species observed on the Palisades Property.

Family	**Taxon**	**Cal-IPC Rating**
Asteraceae	*Cirsium* cf. *vulgare*	Moderate
Brassicaceae	*Brassica tournefortii*	High
Brassicaceae	*Lepidium latifolium*	High
Poaceae	*Arundo donax*	High
Poaceae	*Bromus madritensis* subsp. *rubens*	High
Poaceae	*Bromus tectorum*	High
Tamaricaceae	*Tamarix ramosissima*	High
Chenopodiaceae	*Atriplex semibaccata*	Moderate
Chenopodiaceae	*Bassia hyssopifolia*	Limited
Chenopodiaceae	*Salsola tragus*	Limited
Fabaceae	*Robinia pseudoacacia*	Limited
Geraniaceae	*Erodium cicutarium*	Limited
Poaceae	*Schismus barbatus*	Limited
Zygophyllaceae	*Tribulus terrestris*	Limited

[1]California Invasive Plant Council Ratings:
High – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.

Moderate – These species have substantial and apparent-but generally not severe-ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

Limited – These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

Plant Species of Conservation Concern

We documented one plant species of conservation concern. *Sclerocactus polyancistrus* (Mojave fishhook cactus) is a rare succulent in the cactus family (Cactaceae) that occurs in the Mojave Desert and White and Inyo Mountains in California and Nevada (Fig. 3; Table 3; Jepson eflora 2021). We mapped nine living individuals primarily occurring at the base of the bluffs on the west side of the property. We observed several dead individuals that appeared to be dead for some time. We did not observe any recently damaged plants and we did not observe any smaller or younger individuals. Based on our preliminary observations it appears that recruitment within the population is limited. A field form was submitted to CNDDB with population information (Appendix D). We did not find suitable habitat for *Diplacus mohavensis* (Mojave monkeyflower), a species that occurs nearby, but typically occurs in gravelly washes. We also did not locate *Pediomelum castoreum* (beaver indian breadroot) which was observed by another party as a single individual in the project area in 2020. There is potential habitat for this species in the creosote bush scrub on the west side of the property near the bluffs and it should be surveyed for in future years.

Figure 3. *Sclerocactus polyancistrus* (Mojave fishhook cactus)

Table 3. Rare plants that occur or occur near the Palisades property.

Family	Taxon	CNPS Rank	Presence
Cactaceae	*Sclerocactus polyancistrus*	4.2	Present
Phrymaceae	*Diplacus mohavensis*	1B.2	Absent, no potential habitat identified
Fabaceae	*Pediomelum castoreum*	1B.2	Observed by another party, potential habitat present

Discussion

Surveys began later than anticipated in 2020 due to the ongoing global COVID-19 pandemic, however we were still able to document a high diversity of annuals due to the late rains that occurred. We likely captured the majority of the ephemeral flora (annuals and short-lived perennial herbs) that are associated with winter rains, as evidenced by the relatively high species diversity of annual plants that we documented (50.3%). The relative diversity of non-native species is high (13.6%) when compared to the Mojave Desert as a whole (8%; André 2014), but it is less than what is found in the state of California (17%; Jepson eflora 2021). This relatively high diversity of non-native species is likely attributed to past land use such as

agriculture. A follow up survey in the dense riparian corridor at the south end of the property yielded 10 additional plant taxa to the checklist of vascular plants documented on the site. All of the newly documented taxa are wetland taxa, five are obligate, two are facultative wetland, two are facultative, and one is facultative upland. This increased the percentage of wetland taxa documented within the property from 37.7% to 40.2%.We also documented two new non-native species that are rated as Moderate by the California Invasive Plant Council (Cal-IPC 2021). *Cirsium vulgare* (bull thistle) is a perennial herb that was observed as a rosette. A tentative identification was made from a photograph (Appendix B), but additional surveys should confirm its identification. *Atriplex semibaccata* (Australian saltbush) is a spreading shrub that has the ability to form dense stands and can outcompete native vegetation (al-IPC 2021). This area is difficult to access and survey due to the high density of vegetation, but it would be beneficial to conduct future surveys in this area to increase documentation of flora in the riparian corridor. . Additional surveys in the riparian corridor would provide valuable information on the composition of species in the riparian wetland, including the presence of floating or emergent aquatic species.

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List of Appendices

Appendix A. GIS Shapefiles (emailed as attachment)

Appendix B. Photographs (emailed as attachment)

Appendix C. Complete checklist of the vascular flora

*Asterisks indicate non-native species.

	Family	Taxon	Common Name	**Habit**	**Voucher**	**Wetland**
	Azollaceae	*Azolla filiculoides*	mosquito fern	aquatic perennial	LG 7872, 7909	OBL
*	Amaranthaceae	*Amaranthus albus*	pigweed amaranth	annual	LG 7904	FACU
	Amaranthaceae	*Amaranthus blitoides*	prostrate pigweed	annual		FACU
	Apiaceae	*Berula erecta*	cutleaf waterparsnip	perennial	Photo	OBL
	Apiaceae	*Lomatium mohavense*	Mohave wild parsely	perennial		UPL
	Apocynaceae	*Asclepias fascicularis*	narrow-leaf milkweed	perennial	LG 7877	FAC
	Araceae	*Lemna minuta*	smaller duckweed	annual	JE 2846	OBL
	Asteraceae	*Acamptopappus sphaerocephalus*	goldenhead	shrub		UPL
	Asteraceae	*Ambrosia acanthicarpa*	annual burrweed	annual		UPL
	Asteraceae	*Ambrosia dumosa*	burro weed	shrub		UPL
	Asteraceae	*Ambrosia psilostachya*	western ragweed	shrub	LG 7883	FACU
	Asteraceae	*Ambrosia salsola*	burrobrush	shrub		UPL
	Asteraceae	*Anisocoma acaulis*	scale bud	annual		UPL
	Asteraceae	*Artemisia douglasiana*	mugwort	shrub	LG 7881	FAC
	Asteraceae	*Artemisia dracunculus*	tarragon	shrub	LG 7880, 7901	FACU
	Asteraceae	*Artemisia tridentata* subsp. *tridentata*	big sagebrush	shrub	LG 7900	UPL
	Asteraceae	*Baccharis salicifolia*	mule fat	shrub	LG 7888	FAC
	Asteraceae	*Baccharis salicina*	willow baccharis	shrub	LG 7892	FACW
	Asteraceae	*Bidens laevis*	bur marigold	perennial	JE 2847	OBL
	Asteraceae	*Brickellia desertorum*	desert brickellbush	shrub	LG 7917	UPL
	Asteraceae	*Calycoseris parryi*	yellow tackstem	annual		UPL
	Asteraceae	*Chaenactis carphoclinia*	pebble pincushion	annual		UPL
	Asteraceae	*Chaenactis fremontii*	fremont pincushion	annual	JE 2501	UPL
*	Asteraceae	*Cirsium cf. vulgare*	thistle	perennial	Photo	FACU
	Asteraceae	*Dicoria canescens*	desert twinbugs	annual	LG 7889	UPL
	Asteraceae	*Ericameria nauseosa* var. *hololeuca*	white rabbitbrush	shrub	LG 7890, 7913	UPL
*	Asteraceae	*Erigeron bonariensis*	flax-leaved horseweed	annual		FACU
	Asteraceae	*Erigeron canadensis*	horseweed	annual	LG 7886	FACU
	Asteraceae	*Eriophyllum wallacei*	Wallace eriophyllum	annual		UPL
	Asteraceae	*Euthamia occidentalis*	Western goldenrod	shrub	LG 7871	FACW
	Asteraceae	*Helianthus annuus*	sunflower	annual	LG 7891	FACU

	Asteraceae	*Isocoma acradenia*	alkali goldenbush	shrub	LG 7915	FACU
	Asteraceae	*Iva axillaris*	poverty weed	shrub	LG 7878	FACU
*	Asteraceae	*Lactuca serriola*	prickly lettuce	annual	JE 2841	FACU
	Asteraceae	*Laennecia coulteri*	Coulter's horseweed	annual	LG 7896	FAC
	Asteraceae	*Lasthenia gracilis*	needle goldfields	annual		UPL
	Asteraceae	*Lepidospartum squamatum*	scale-broom	shrub	LG 7887	FACU
	Asteraceae	*Leptosyne bigelovii*	Bigelow coreopsis	annual		UPL
	Asteraceae	*Lessingia glandulifera* var. *glandulifera*	sticky lessingia	annual	LG 7916	UPL
	Asteraceae	*Logfia depressa*	dwarf cottonrose	annual	JE 2500	UPL
	Asteraceae	*Malacothrix coulteri*	snake's head	annual		UPL
	Asteraceae	*Malacothrix glabrata*	desert dandelion	annual		UPL
	Asteraceae	*Nicolletia occidentalis*	western nicolletia	perennial		UPL
	Asteraceae	*Rafinesquia neomexicana*	desert chicory	annual		UPL
	Asteraceae	*Senecio flaccidus var. monoensis*	smooth threadleaf ragwort	shrub	LG 7906	UPL
*	Asteraceae	*Sonchus asper subsp. asper*	spiny sowthistle	annual	NF 6339	FAC
	Asteraceae	*Stephanomeria exigua* var. *exigua*	small wirelettuce	annual	NF 6360, 6363	UPL
	Asteraceae	*Stephanomeria parryi*	Parry's wire lettuce	annual	JE 2510	UPL
	Asteraceae	*Stephanomeria pauciflora*	wire lettuce	perennial		UPL
	Asteraceae	*Tetradymia stenolepis*	narrow scaled felt thorn	shrub		UPL
	Asteraceae	*Xanthium strumarium*	cocklebur	annual	LG 7903	FACU
	Asteraceae	*Xylorhiza tortifolia*	Mojave woodyaster	perennial		UPL
	Boraginaceae	*Amsinckia tessellata* var. *tessellata*	devil's lettuce	annual	JE 2508	UPL
	Boraginaceae	*Cryptantha angustifolia*	narrow leaved forget me not	annual	JE 2497	UPL
	Boraginaceae	*Cryptantha circumscissa*	western forget me not	annual		UPL
	Boraginaceae	*Cryptantha micrantha*	purple root cryptantha	annual		UPL
	Boraginaceae	*Cryptantha nevadensis*	Nevada forget me not	annual		UPL
	Boraginaceae	*Cryptantha pterocarya*	winged nut forget me not	annual		UPL
	Boraginaceae	*Eriodictyon trichocalyx* var. *trichocalyx*	hairy yerba santa	shrub	LG 7893	UPL
	Boraginaceae	*Heliotropium curassavicum* var. *oculatum*	seaside heliotrope	perennial		FACU
	Boraginaceae	*Nama demissa*	purplemat	annual		UPL
	Boraginaceae	*Pectocarya heterocarpa*	mixed-nut pectocarya	annual	JE 2492	UPL
	Boraginaceae	*Pectocarya penicillata*	winged pectocarya	annual		UPL

	Boraginaceae	*Pectocarya platycarpa*	wide-toothed pectocarya	annual	JE 2496	UPL
	Boraginaceae	*Phacelia crenulata*	notch leaved phacelia	annual		UPL
	Boraginaceae	*Phacelia distans*	common phacelia	annual		UPL
	Boraginaceae	*Tiquilia nuttallii*	annual tiquilia	annual	NF 6368	UPL
*	Brassicaceae	*Brassica tournefortii*	Saharah mustard	annual	JE 2513	UPL
	Brassicaceae	*Caulanthus cooperi*	Cooper caulanthus	annual		UPL
	Brassicaceae	*Caulanthus lasiophyllus*	California mustard	annual		UPL
	Brassicaceae	*Descurainia pinnata*	yellow tansy mustard	annual		UPL
	Brassicaceae	*Lepidium flavum*	yellow pepper grass	annual		UPL
	Brassicaceae	*Lepidium fremontii*	desert pepper grass	perennial		UPL
	Brassicaceae	*Lepidium lasiocarpum*	shaggyfruit pepperweed	annual		UPL
*	Brassicaceae	*Lepidium latifolium*	perennial pepperweed	perennial		FAC
*	Brassicaceae	*Sisymbrium altissimum*	tumble mustard	annual		FACU
*	Brassicaceae	*Sisymbrium orientale*	indian hedge mustard	annual		UPL
	Cactaceae	*Cylindropuntia echinocarpa*	dilver cholla	shrub		UPL
	Cactaceae	*Cylindropuntia ramosissima*	branched pencil cholla	shrub		UPL
	Cactaceae	*Sclerocactus polyancistrus*	Mojave fish hook cactus	shrub		UPL
	Campanulaceae	*Nemacladus sigmoideus*	small flowered nemacladus	annual	JE 2512	UPL
	Chenopodiaceae	*Atriplex canescens*	hoary saltbush	shrub		UPL
	Chenopodiaceae	*Atriplex confertifolia*	spiny saltbush	shrub		UPL
	Chenopodiaceae	*Atriplex lentiformis*	big saltbush	shrub		FAC
	Chenopodiaceae	*Atriplex polycarpa*	cattle spinach	shrub		FACU
	Chenopodiaceae	*Atriplex spinifera*	spinescale saltbush	shrub	JE 2517	FAC
*	Chenopodiaceae	*Atriplex semibaccata*	Australian saltbush	perennial	JE 2852	FAC
	Chenopodiaceae	*Atriplex torreyi* var. *torreyi*	Torrey's saltbush	annual	JE 2844	FAC
*	Chenopodiaceae	*Bassia hyssopifolia*	fivehorn smotherweed	annual		FACU
	Chenopodiaceae	*Chenopodium berlandieri* var. *sinuatum*	pitseed goosefoot	annual	NF 6351	UPL
	Chenopodiaceae	*Grayia spinosa*	hop sage	shrub		UPL
	Chenopodiaceae	*Kraschennikovia lanata*	winter fat	shrub	LG 7914	UPL

*	Chenopodiaceae	*Salsola tragus*	Russian thistle	annual	NF 6352	FACU
	Chenopodiaceae	*Stutzia covillei*	Coville's orach	annual		FACW
	Chenopodiaceae	*Suaeda nigra*	bush seepweed	shurb	LG 7879	OBL
	Convolvulaceae	*Cuscuta indecora*	bigseed alfalfa dodder	parasitic vine	NF 6364, LG 7908	UPL
	Cyperaceae	*Cyperus odoratus*	flatsedge	annual	LG 7870	FACW
	Cyperaceae	*Eleocharis parishii*	spikerush	perennial	LG 7869	FACW
	Cyperaceae	*Eleocharis montevidensis*	sand spikerush	perennial	JE 2843	FACW
	Cyperaceae	*Schoenoplectus americanus*	chairmaker's bullrush	perennial	JE 2849	OBL
	Cyperaceae	*Schoenoplectus acutus* var. *occidentalis*	tule	perennial	NF6340, LG 7874	OBL
	Cyperaceae	*Schoenoplectus pungens* var. *longispicatus*	common threesquare	perennial	NF 6357, LG 7899, JE 2850	OBL
	Datiscaceae	*Datisca glomerata*	Durango root	perennial		FACW
	Ephedraceae	*Ephedra nevadensis*	Nevada ephedra	shrub		UPL
	Equisitaceae	*Equisetum hyemale subsp. affine*	giant scouring rush	perennial	JE 2853	FACW
	Euphorbiaceae	*Croton californicus*	desert croton	perennial		UPL
	Euphorbiaceae	*Euphorbia ocellata* subsp. *arenicola*	prostrate spurge	annual	LG 7876	UPL
	Euphorbiaceae	*Stillingia linearifolia*	narrow leaved stillingia	perennial		UPL
	Fabaceae	*Astragalus lentiginosus* var. *variabilis*	freckled milk vetch	annual		UPL
	Fabaceae	*Glycyrrhiza lepidota*	wild licorice	perennial	NF 6353	FAC
	Fabaceae	*Lupinus shockleyi*	desert lupine	annual	JE 2504	UPL
*	Fabaceae	*Melilotus albus*	white sweetclover	annual	NF 6341	UPL
*	Fabaceae	*Melilotus indicus*	sourclover	annual	NF 6355	FACU
	Fabaceae	*Prosopis pubescens*	screw bean	tree	LG 7898	FAC
	Fabaceae	*Psorothamnus arborescens*	Mojave indigo bush	shrub	JE 2499	UPL
*	Fabaceae	*Robinia pseudoacacia*	black locust	tree	LG 7897	FACU
	Gentianaceae	*Zeltnera exaltata*	desert centaury	annual	NF 6358	FACW
*	Geraniaceae	*Erodium cicutarium*	coastal heron's bill	annual		UPL
	Geraniaceae	*Erodium texanum*	desert heron's bill	annual		UPL
	Juncaceae	*Juncus balticus*	wire rush	perennial		FACW
	Juncaceae	*Juncus bufonius* var. *bufonius*	toad rush	annual		FACW
	Juncaceae	*Juncus mexicanus*	Mexican rush	perennial	JE 2509	FACW

	Juncaceae	*Juncus torreyi*	Torrey's rush	perennial	NF 6357, 6343, JE2842	FACW
	Lamiaceae	*Salvia columbariae*	chia sage	annual		UPL
	Lamiaceae	*Salvia carduacea*	thistle sage	annual		UPL
	Lamiaceae	*Scutellaria mexicana*	Mexican bladder sage	shrub		UPL
	Loasaceae	*Mentzelia albicaulis*	white stemmed blazing star	annual	JE 2498	UPL
	Loasaceae	*Petalonyx thurberi*	sandpaper plant	perennial	NF 6367	UPL
*	Lythraceae	*Lythrum salicaria*	purple loosestrife	perennial	LG 7894	OBL
	Malvaceae	*Eremalche exilis*	white mallow	annual		UPL
	Nyctaginaceae	*Abronia villosa* var. *villosa*	hairy sand verbena	annual	JE 2515	UPL
	Nyctaginaceae	*Mirabilis laevis*	desert wishbone bush	perennial		UPL
	Oleaceae	*Forestiera pubescens*	desert olive	shrub	LG 7918	FACU
	Oleaceae	*Fraxinus* cf. *velutina*	ash	tree		FAC
	Onagraceae	*Camissonia campestris*	field primrose	annual		UPL
	Onagraceae	*Chylismia claviformis*	clavate fruited primrose	annual		UPL
	Onagraceae	*Epilobium ciliatum* var. *ciliatum*	fringed willowherb	perennial	NF6342, LG 7873	FACW
	Onagraceae	*Eremothera boothii*	Booth's sun cup	annual		UPL
	Onagraceae	*Oenothera californica*	California evening primrose	perennial	NF 6365	UPL
	Onagraceae	*Oenothera deltoides* subsp. *deltoides*	desert lantern	annual		UPL
	Orobanchaceae	*Castilleja linariifolia*	paintbrush	perennial	LG 7884	UPL
	Orobanchaceae	*Castilleja minor* subsp. *spiralis*	little paintbrush	annual	NF 6362	OBL
	Papaveraceae	*Argemone munita*	prickly poppy	annual or perrenial	NF 6349	UPL
	Papaveraceae	*Eschscholzia glyptosperma*	desert gold poppy	annual	JE 2511	UPL
	Papaveraceae	*Eschscholzia minutiflora*	Coville s poppy	annual		UPL
*	Pinaceae	*Pinus halepensis*	Aleppo pine	tree	Planted	UPL
	Phrymaceae	*Erythranthe microphylla*	small leaved monkeyflower	annual		OBL
	Plantaginaceae	*Plantago ovata*	desert plantain	annual		UPL
*	Plantaginaceae	*Veronica anagallis-aquatica*	water speedwell	perennial		OBL
*	Poaceae	*Arundo donax*	giant reed	perennial	JE 2845	FACW
*	Poaceae	*Bromus madritensis* subsp. *rubens*	foxtail brome	annual		UPL
*	Poaceae	*Bromus tectorum*	downy chess	annual		UPL
*	Poaceae	*Crypsis schoenoides*	swamp prickle grass	annual	LG 7905	FACW
*	Poaceae	*Cynodon dactylon*	Bermuda grass	perennial	NF 6350	FACU

	Poaceae	*Distichlis spicata*	salt grass	perennial	JE 2506	OBL
	Poaceae	*Elymus trachycaulus* subsp. *trachycaulus*	slender wheatgrass	perennial		FAC
	Poaceae	*Elymus triticoides*	beardless wild rye	perennial	NF 6337	UPL
	Poaceae	*Hordeum murinum* subsp. *glaucum*	foxtail barley	annual	JE 2503	FACU
	Poaceae	*Leptochloa fusca* subsp. *fascicularis*	bearded Sprangletop	annual	NF 6345, LG 7907	UPL
	Poaceae	*Panicum capillare*	witch grass	annual	LG 7910	FACU
	Poaceae	*Phragmites australis*	common reed	perennial	LG 7885	FACW
	Poaceae	*Poa secunda*	pine bluegrass	perennial		FACU
*	Poaceae	*Polypogon monspeliensis*	annual beard grass	annual		FACW
*	Poaceae	*Schismus barbatus*	old han schismus	annual	JE 2494	UPL
	Poaceae	*Stipa hymenoides*	Indian rice grass	perennial		UPL
	Polemoniaceae	*Eriastrum eremicum* subsp. *eremicum*	desert woollystar	annual	NF 6338	UPL
	Polemoniaceae	*Eriastrum densiflorum* subsp. *mohavense*	Mojave eriastrum	perennial	NF6356	UPL
	Polemoniaceae	*Gilia latiflora*	broad-Flowered Gilia	annual	NF 6361,6359	UPL
	Polemoniaceae	*Linanthus bigelovii*	Bigelow's linanthus	annual	JE 2514	UPL
	Polemoniaceae	*Loeseliastrum matthewsii*	desert calico	annual	NF 6346	UPL
	Polygonaceae	*Chorizanthe brevicornu*	brittle spine flower	annual		UPL
	Polygonaceae	*Chorizanthe rigida*	rigid spiny herb	annual		UPL
	Polygonaceae	*Eriogonum baileyi var. baileyi*	Bailey's buckwheat	annual	NF 6444	UPL
	Polygonaceae	*Eriogonum brachyanthum*	short-flower wild buckwheat	annual	NF 6347, 6369	UPL
	Polygonaceae	*Eriogonum fasciculatum* var. *polifolium*	California buckwheat	shrub		UPL
	Polygonaceae	*Eriogonum gracillimum*	rose and white buckwheat	annual	LG 7912	UPL
	Polygonaceae	*Eriogonum inflatum*	desert trumpet	perennial		UPL
	Polygonaceae	*Eriogonum maculatum*	angle stermed buckwheat	annual		UPL
	Polygonaceae	*Eriogonum nidularium*	whisk broom	annual		UPL
	Polygonaceae	*Eriogonum pusillum*	yellow turban	annual		UPL
	Polygonaceae	*Eriogonum reniforme*	kidney-Leaf wild buckwheat	annual	LG 7875	UPL
	Polygonaceae	*Persicaria punctata*	dotted smartweed	perennial	JE 2854	OBL
*	Polygonaceae	*Rumex pulcher*	fiddle dock	perennial	NF 6348	FAC

	Ranunculaceae	*Delphinium parishii*	Parish's larkspur	perennial		UPL
	Salicaceae	*Populus fremontii*	Fremont cottonwood	tree		FACW
	Salicaceae	*Salix exigua*	narrowleaf willow	tree	JE 2848	FACW
	Salicaceae	*Salix gooddingii*	Gooding's willow	tree	NF 6354, LG 7911b	FACW
	Salicaceae	*Salix lasiolepis*	arroyo willow	tree		FACW
	Salicaceae	*Salix laevigata*	red willow	tree		FACW
	Saururaceae	*Anemposis californica*	yerba mansa	perennial	NF 6366	OBL
	Solanaceae	*Datura wrightii*	jimsonweed	perennial		UPL
	Solanaceae	*Nicotiana quadrivalvis*	tobacco	annual	LG 7902	FACU
	Solanaceae	*Lycium andersonii*	Anderson thornbush	shrub		UPL
	Solanaceae	*Lycium cooperi*	Cooper's box thorn	shrub		UPL
	Tamaricaceae	*Tamarix ramosissima*	saltcedar	shrub	LG 7895	FAC
	Typhaceae	*Typha latifolia*	Broad-Leaved cattail	perennial	LG 7868	OBL
	Ulmaceae	*Ulmus pumila*	Siberian elm	tree	Planted	UPL
	Urticaceae	*Urtica dioica*	stinging nettle	perennial	JE 2851	FAC
	Viscaceae	*Phoradendron macrophyllum*	big leaf mistletoe	shrub	LG 7911a	UPL
	Zygophyllaceae	*Larrea tridentata*	creosote bush	shrub		UPL
*	Zygophyllaceae	*Tribulus terrestris*	puncture vine	annual		UPL

Appendix D: CNDDB form for Mojave fishhook cactus

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code FRA20F0004
Quad code 3411763
Occ. no. _____
EO index no. _____
Map index no. _____

Scientific name: *Sclerocactus polyancistrus*

Common name: Mojave fish-hook cactus

Date of field work (mm-dd-yyyy): 05-06-2020

Comment about field work date(s): Surveys for Mojave Desert Land Trust

OBSERVER INFORMATION

Observer: Naomi S. Fraga

Affiliation:

Address: 1500 North College Avenue , Claremont, CA 91711

Email: nfraga@rsabg.org

Phone: (626) 674-6746

Other observers:

DETERMINATION

Keyed in: Jepson eflora

Compared w/ specimen at: RSA

Compared w/ image in:

By another person:

Other:

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: We covered a large area noting all species we encountered, but were not able to focus specifically on trying to find more locations of this species.

Total number of individuals: 9

Collection? No **Collection number:**

Museum/Herbarium:

PLANT INFORMATION

Phenology:

vegetative	flowering	fruiting
0 %	100 %	0 %

SITE INFORMATION

Habitat description: Area dominated by Larrea tridentata, Ambrosia dumosa, Lycium andersonii, Psorothamnus, Xylorhiza tortifoliaChaenactis fremontii, Erodium cicutarium

Slope:

Land owner/manager: Mojave Desert Land Trust (private)

Aspect: N facing

Site condition + population viability: Fair

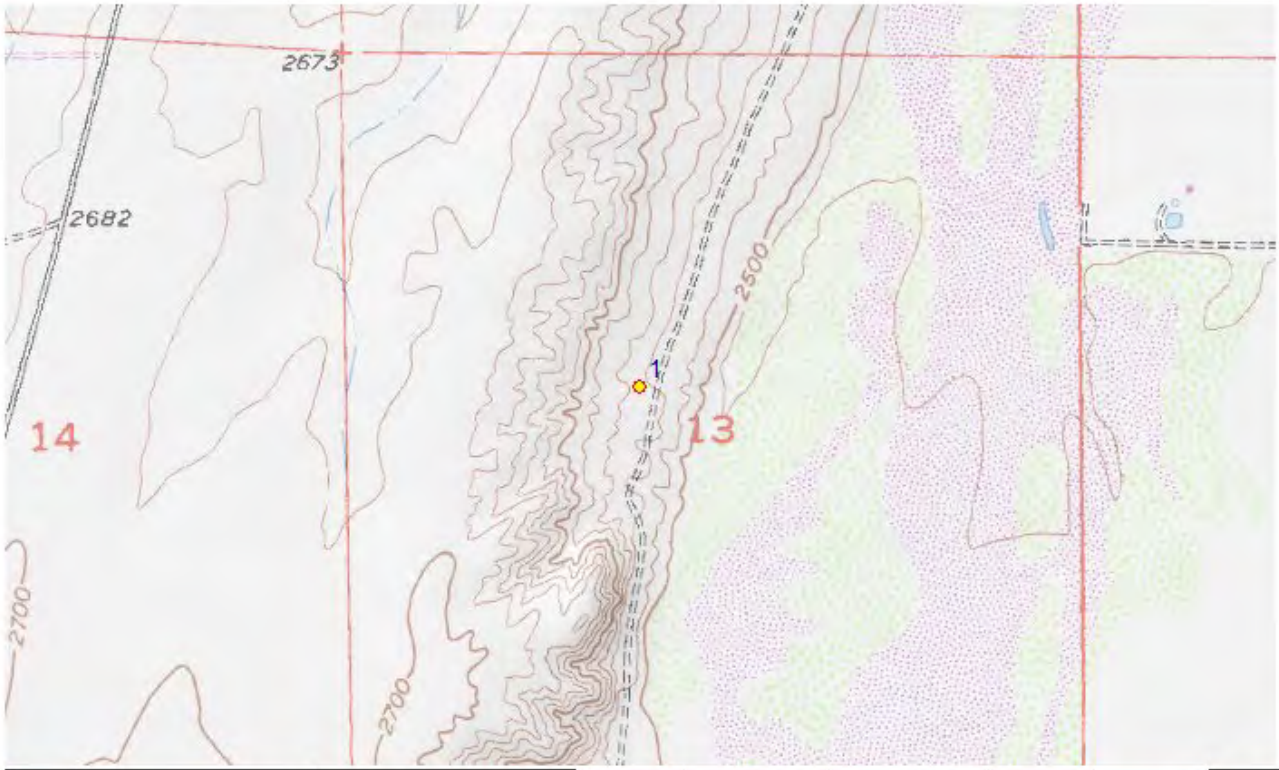
Immediate & surrounding land use:

Visible disturbances: invasive species, road nearby, historical agriculture to the east.

Threats: No immediate threats observed

General comments: More plants could occur in the area, more surveys needed.

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	San Bernardino	Helendale	2553	34.69743	-117.35844	467172	3839548	11
1	**Public Land Survey**	**Feature Comment**						
	S T07N R05W 13	1 plant found						

The mapped feature is accurate within: 10 m

Source of mapped feature: GPS

Mapping notes:

Location/directions comments: Plants at the base of bluffs, west of the road.

Attachment(s): IMG_1607.jpg; IMG_1606.jpg

APPENDIX 5

United States Department of the Interior
U.S. GEOLOGICAL SURVEY
SOUTHWEST BIOLOGICAL SCIENCE CENTER
2255 NORTH GEMINI DRIVE, MS-9394
FLAGSTAFF, ARIZONA 86001
928 556-7094 Telephone
928 556-7092 Fax

In Reply Refer To:
Mail Stop 9394

December 7, 2020

Alisa Ellsworth, Senior Environmental Scientist
Lands North Program
787 North Main Street, Suite 220
Bishop, CA 93514

Subject: Transmittal of "Surveys for Special Status Turtles and Amphibians at Mojave Narrows" associated with CDFW funding for research at Palisades Ranch and Mojave Narrows Regional Park

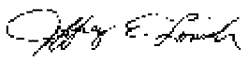
Dear Ms. Ellsworth:

Attached is our final report associated with Technical Assistance Agreement 20ZDTAA01115 for funds provided by the California Department of Fish and Wildlife via funds managed by the Mojave Desert Resource Conservation District. The report summarizes our efforts to survey Palisades Ranch for arroyo toads, California red-legged frogs, and southwestern pond turtles. Additional surveys were conducted at Mojave Narrows Regional Park for southwestern pond turtles and to determine the species composition of introduced turtle species.

Survey efforts were scaled-back from restrictions imposed by the COVID-19 pandemic that limited our ability to travel and work in California. Nevertheless field work was conducted, including the use of automated sound detection equipment to monitor frog and toad calls as summarized in this report.

Please contact me for questions or additional information. I may be reached at (928) 556-7358 or email: jeffrey_lovich@usgs.gov.

Sincerely,



Jeffrey Lovich, PhD
Research Ecologist
Principle Investigator

1 Attachment
Cooperator Report

Copy to: Allyson Lavender, Mojave Desert Land Trust, Joshua Tree, CA
Dana Raponi, Mojave Desert Resource Conservation District, Victorville, CA
Peter Satin, Coachella Valley Association of Governments, Palm Desert, CA
Chris Schill, Administrative Officer, Southwest Biological Science Center
Project File

Surveys for special status turtles and amphibians at Mojave Narrows Regional Park and Palisades Ranch

Final report to the California Department of Fish and Wildlife, Mojave Desert Land Trust, and the Mojave Desert Resource Conservation District under Technical Assistance Agreement #20ZDTAA01115

JEFFREY E. LOVICH, SHELLIE R. PUFFER AND KRISTY L. CUMMINGS

U.S. Geological Survey, Southwest Biological Science Center,
2255 North Gemini Drive, MS-9394, Flagstaff, Arizona 86001
jeffrey_lovich@usgs.gov

December 7, 2020

TABLE OF CONTENTS

INTRODUCTION 3

MATERIALS AND METHODS 3

Study site descriptions 3
- Mojave Narrows Regional Park 3
- Palisades Ranch 4

Southwestern pond turtle (*Actinemys pallida*) surveys 4
- General field methods 4
- Mojave Narrows Regional Park turtle trapping 4
- Palisades Ranch turtle trapping 5
- Camera trapping at Palisades Ranch 5

California red-legged frog (*Rana draytonii*) and arroyo toad (*Anaxyrus californicus*) surveys 6
- Survey protocols 6
- Palisades Ranch survey sites 6
- Field survey transects 7
- Passive acoustic surveys for amphibians 7

RESULTS 8

Summary of previous records for species of interest on the upper Mojave River 8
- Southwestern pond turtle 8
- California red-legged frog 8
- Arroyo toad 8

Summary of field surveys for species of interest on the upper Mojave River 8
- Southwestern pond turtle 8
- California red-legged frog and arroyo toad 9

Other amphibians and animals detected 9

CONCLUSIONS 9

ACKNOWLEDGEMENTS 11

LITERATURE CITED 11

TABLES 15

Table 1 15

Table 2 17

Table 3 **18**

Table 4 **19**

Table 5 **21**

Table 6 **22**

Table 7 **28**

FIGURES **29**

Figure 1 **29**

Figure 2 **30**

Figure 3 **31**

Figure 4 **32**

Figure 5 **33**

Figure 6 **34**

Figure 7 **35**

Figure 8 **36**

Figure 9 **37**

Figure 10 **38**

APPENDICES **39**

Appendix A **39**

Appendix B **43**

Appendix C **56**

Appendix D **75**

INTRODUCTION

Desert riparian areas are critical oases that support a high biodiversity of plant and animal species (Hultine et al. 2015) that could not otherwise survive in such arid environments. The Mojave Desert of the southwestern United States is one of the most arid ecosystems in North America, a distinction challenged only by portions of the western Sonoran Desert in California (Lovich et al. 2020). The largest river in the Mojave Desert is its namesake, the Mojave River. The river initially flows northward from its headwaters in the San Bernardino Mountains, then eastward after passing Helendale, California, to its usual terminus in Soda Dry Lake about 200 river km away from the source. In extremely wet years the river can spill over into Silver, East Cronese, and West Cronese (aka Cronise) dry lakes. With no outlet to the ocean, the river lies within the hydrographic boundary of the Great Basin (Grayson 1993) even though from a biogeographic standpoint the river is entirely within the Mojave Desert ecosystem after leaving the San Bernardino Mountains.

Vegetation along much of the desert course of the river, long dominated by native riparian species like cottonwoods (*Populus fremontii*), willows (*Salix* spp.), and mesquites (*Prosopis* spp.), has changed considerably since the 1800s due to overdraft of the river for municipal and agricultural uses (Lines 1999, Webb et al. 2001). Large areas of the riparian zone have been replaced with the exotic pest plant saltcedar (*Tamarix ramosissima*) (Lines and Bilhorn 1996, Lovich et al. 1998). Despite reduced flows from overdraft, perennial water occurs naturally or through supplementation of surface water by groundwater pumping in several areas along the river including Mojave Narrows Regional Park, locations downstream of Victorville, Palisades Ranch, Camp Cady Wildlife Area (Cummings et al. 2018), Afton Canyon (Lovich and Meyer 2002), and several other sites.

Several special status species have been reported in the Mojave River and its associated riparian corridor over time, including the southwestern pond turtle (*Actinemys pallida*; listed as a species of special concern in California), California red-legged frog (*Rana draytonii*; federally listed as threatened), and the arroyo toad (*Anaxyrus californicus*; federally listed as endangered). The status and distribution of these species in the Mojave River is poorly known, since all are more widely distributed in coastal areas of California and beyond. The California Department of Fish and Wildlife and the Mojave Desert Land Trust have an interest in knowing the status of these species at two locations on the upper Mojave River: Mojave Narrows Regional Park and Palisades Ranch. The objective of this study was to determine the past and potential occurrence of the species of interest at those sites as well as document the presence and abundance of introduced species of amphibians and turtles.

MATERIALS AND METHODS

Study site descriptions

Mojave Narrows Regional Park—This site is a large public park managed by San Bernardino County in the southern Mojave Desert of California. It is situated adjacent to the Mojave River in the town of Victorville, California (Fig. 1). The park includes two perennial lakes (Horseshoe and Pelican lakes) stocked weekly for public fishing, overnight camping areas, hiking and horseback riding trails, day use picnic areas, a disk golf course, and children's play areas. The park has areas of open grassy fields, marshes, and the riparian corridor of the Mojave River which runs along the northeast side of the property where recreational trails follow the intermittent streambed. Horseshoe Lake is the larger of the two lakes at 16 ha, and is located in the southwest end of the park. It supports a wide variety of waterfowl including, but not limited to, pelicans (*Pelecanus sp*.), great blue herons (*Ardea herodias*), and Canada geese (*Branta canadensis*). Horseshoe Lake also has a small dam on its northern perimeter and a large, heavily vegetated island in its center (Fig. 2A). Large cottonwood trees, willows, and sedges (*Carex* spp.) grow

around the lake's perimeter and on its island. A relatively protected 7 ha ephemeral marsh exists in the area just north of Horseshoe Lake (Fig. 2B), providing additional surface water seasonally. Both the marsh and the riparian corridor contain suitable habitat for pond turtles, but are dry for a large portion of the year. The perimeter of Horseshoe Lake is open for public use, however, access to the island is restricted as water sports other than fishing are not allowed in the lake.

Palisades Ranch—Located near Helendale, California, this 670 ha desert river ecosystem is protected and managed by the Mojave Desert Land Trust (Fig. 1). An approximately 6.5 km stretch of the Mojave River runs through the property in a hydrological transition zone where permanent surface water occurs on the southern portion of the property. This riparian zone supports about 40 species of concern according to the Mojave Desert Land Trust (https://www.mdlt.org/a-protected-mojave-ranch-is-attracting-rare-species/). Surface water occurs where underlying bedrock forces the river to the surface, and it is also fed by treated wastewater outflow from nearby Oro Grande where the Victor Valley Wastewater Reclamation Authority has a treatment plant collecting wastewater from Victorville, Apple Valley, Hesperia, and surrounding municipalities. Multiple ponded areas exist near a defunct bridge on the east side of the property, as well as along the unmaintained road that runs east-west through the property from this bridge. The ponded areas are created by extensive beaver (*Castor canadensis*) activity, and can be > 2 m deep in some places. The ponded waters along the road are greatly reduced during the summer months, but the pond just south of the defunct bridge maintains its water levels perennially. The riparian corridor throughout Palisades Ranch includes sedges, cattails (*Typha* sp.), and arrowweed (*Pluchea sericea*) as well as an abundance of willows and cottonwoods. Surrounding the corridor are thickets of invasive Russian thistle (*Salsola tragus*) in abandoned pastures and old fields, making many areas along the river difficult to access, though the Ranch is not currently open to the public.

Southwestern pond turtle (*Actinemys pallida*) surveys

General field methods—All turtle trapping surveys were conducted using 2.5 ft diameter hoop traps baited with sardines in oil (Gibbons 1988, 1990). Traps were tied to rebar or streamside vegetation and set with a single pool noodle float inside to ensure the ability of captured animals to breathe and prevent sinking in case of detachment or collapse. Hoop traps were typically set in shallower waters allowing the traps to be grounded, but were sometimes also set floating in deeper waters. Basking traps were also utilized during one survey at Mojave Narrows Regional Park. Traps were checked daily for turtles or incidental captures of other animals. Data on air and water temperature (Kestrel weather meter, model 3500; digital pocket thermometer) and general weather conditions were recorded while traps were set. All turtles captured were processed at the site of capture and then released or removed (in the case of some non-native species). GPS locations were taken where hoop traps (point of capture) were set. Data were recorded on sex, weight, and size (carapace length, plastron length, carapace width, carapace height), and any additional pertinent comments were recorded (see Appendix A for completed datasheets). Red-eared slider turtles (*Trachemys scripta elegans*) that were captured and released at Mojave Narrows Regional Park were marked with cohort notches on the plastron using a triangular file (Cagle 1939).

Mojave Narrows Regional Park turtle trapping—A total of five turtle trapping sessions were conducted at Mojave Narrows Regional Park (all in Horseshoe Lake) with the objectives of determining: 1) what species of non-native turtles inhabit the area, and 2) if *Actinemys pallida* are present in the park. Kayaks and a tow-behind raft were used to transport turtle traps to and from the island for trapping sessions. Hoop traps were set in areas deep enough for the mouth to be submerged (generally in water depth of 0.5 m or deeper) and near shore where the traps could be tied off to either a 1 m length of rebar hammered into the ground or to vegetation on the shoreline (see Fig. 2). Basking traps were set in deeper water away from the shoreline and anchored with a brick tied to a length of rope. All hoop traps that were

set on the perimeter of the lake (in areas of public access) were accompanied by a sign alerting the public that research was being conducted, and included research permit numbers, a statement about animal welfare during the study, and a warning against tampering with the traps (Fig. 2C). Traps remained in place for up to 24 hours.

On 3 May 2017, an initial reconnaissance visit to the park was conducted to perform visual surveys of Horseshoe Lake. We used binoculars and a spotting scope to search for basking turtles and turtles swimming in the water. Two hoop traps baited with sardines were set on the shore of the south side of the lake while we performed our visual surveys (Table 1). A site visit on 27 July 2017 included a tour of the riparian areas throughout the park, led by park rangers, to identify where turtles were present and assess potential trapping sites. At this time, we also gained permission to view a large pond on the private property just north of the Mojave Narrows Regional Park at the Kemper-Campbell Ranch. This pond provided promising turtle habitat, and although we did not see any basking turtles or trap at this location on that short visit, it may warrant investigation in the future due to its proximity to the Mojave River corridor. After reviewing the factors of accessibility, personal safety, turtle observations, and suitable perennial water depths for trapping, it was determined that Horseshoe Lake was most likely to contain the largest population of turtles and provided the best environment for turtle trapping.

Comprehensive turtle trapping at the park was initiated on 19 September 2019 (Table 1). Two hoop traps were set off the southern portion of the island, and six hoop traps were set around the perimeter of the lake (with accessibility to the public) on the eastern, southern, and western sides of the lake. When we returned to check traps, two that were set from the mainland had been visibly moved or tampered with and were partially collapsed, leading to the decision to only trap in areas inaccessible to the public (i.e., only set traps from the lake's island) in the future. The next trapping session was performed on 2 June 2020 (Table 1). A total of 10 baited hoop traps were spread around the perimeter of the island in the center of the lake as well as a secondary small islet (colloquially "Duck Island", see Fig. 2D) on the northwest side of Horseshoe Lake. Two additional trapping sessions were conducted on 16 June 2020 and 16 August 2020 (Table 1) for a total of 11 and 9 traps set, respectively, on the central island and on "Duck Island". One basking trap was set during the 16 June 2020 trap session, but was not used again thereafter.

Palisades Ranch turtle trapping—Turtle trapping sessions were performed at Palisades Ranch in ponded areas created by beaver dams in the riparian corridor on the property. These ponded areas were located near and around the defunct bridge on the east side of the property, as well as along the unmaintained, flooded road running east-west through the property from the bridge (Fig. 3). Hoop traps set in pools of water where the depth exceeded 1 m were set afloat with two pool noodles. Traps remained in place for a minimum of 18 hours. Over the course of all the trapping sessions, we rotated traps among different sites in the riparian area to cover as much of the habitat as possible and identify areas where turtles were located. A preliminary trapping session (using only two traps) was performed on 3 October 2017 to evaluate for trapping potential and trap locations (Table 1). More extensive trapping was then initiated on 18 June 2019 and continued through 16 June 2020 (Table 1). All of these additional trap sessions were performed during the turtle activity season of May – September and utilized up to 3 traps during each session (Table 1).

Camera trapping at Palisades Ranch—Up to two game cameras (Wildgame Innovations™ Micro 6 Red) were periodically set at turtle trap locations during trapping sessions to capture videos of any turtles swimming in the trap area or to capture terrestrial movements over land (see Fig. 3). Cameras were attached to a 1.5 m length of U-post hammered into the ground. The cameras were set approximately 0.3-0.6 m above the waterline pointed towards the hoop trap, or on terrestrial ground pointed towards either a hoop trap in the water or a terrestrial trail through the brush. Camera trapping was conducted on 9-11 July 2019, 31 July – 01 August 2019, 1-2 June 2020, and 15-16 June 2020. Camera traps remained in place for the entire hoop trapping session and recorded footage during both the daytime and nighttime hours;

however, the cameras would periodically turn off or lose battery life, resulting in only partial recordings of some trapping sessions.

California red-legged frog (*Rana draytonii*) and arroyo toad (*Anaxyrus californicus*) surveys

Survey protocols—Protocols for determining the presence/absence of both target amphibian species were adopted from guidelines set forth by the U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife (https://wildlife.ca.gov/conservation/survey-protocols). Prior to performing surveys, the protocols require a thorough review of previous observations of the target species in the vicinity of the study location to determine whether they had ever been recorded on or near (within 1.6 km) the Palisades Ranch property. We searched for records using the scientific literature, technical reports, VertNet (vertnet.org), and the California Natural Diversity Database (CNDDB). The agency protocols also dictate the number of surveys that should be undertaken during both daytime and nighttime, the time of year the surveys should be performed (according to breeding season), and the appropriate weather and lunar phase conditions that allow for greatest detectability (Table 2; Fig. 4). We created a schedule to perform the appropriate number of surveys for each species at the correct time of year and lunar phase (see Table 3). However, the emergence of COVID-19 as a global pandemic, and the self-quarantine and travel restrictions imposed by the state of California and the U.S. Geological Survey, severely impacted our field schedule as indicated in the "Work performed" column of Table 3. We discussed the situation with our clients and adjusted our work accordingly. Habitat site assessments (see Appendix B) were performed each day surveys were undertaken in order to assess current habitat quality and changes from previous survey sessions, especially related to water levels.

Palisades Ranch survey sites—Surveys for the target amphibian species were performed at two main sites on the Palisades Ranch property. Site 1, the main survey site, was an out-and-back transect (approximately 1 km round trip) along the unmaintained, flooded road between the defunct bridge (UTM 11S, NAD 83, 467539 E, 3837017 N) on the east side of the property, and the end of the riparian area on the west side of the property where the surface water dries up completely, the riparian foliage ends, and the vegetation changes to abandoned pasture land (Fig. 5A, B). Both daytime and nighttime surveys for *R. draytonii* and *A. californicus* were performed at this site. High water levels along the east-west road transect at the end of the winter wet season began to slowly recede throughout the summer. As a result, the out-and-back transect start/end point on the west side of the property was adjusted accordingly due to the extent of the aquatic habitat available. Surveys were performed walking slowly, directly along the flooded road cutting across the river corridor, and additionally searching further into vegetated areas edging the road. We searched for signs of the target species including egg masses, tadpoles, metamorphs, or adult animals. During the nighttime surveys, battery operated flashlights (utilizing either AA or AAA batteries) were used at eye height to sight species and search for eyeshine on the surface of the water and at the edges of the streambed. Surveyors would pause every 10-15 minutes along the survey transect and turn off all lights to listen for frog calls in the area for approximately 3-5 minutes. Surveys were not conducted during fog, heavy rain, or any other conditions that would limit visibility or calls of the survey animals or their sign.

A second survey site (Site 2) on Palisades Ranch property located adjacent to the airstrip and Mojave River course (UTM 11S, NAD 83, 468030 E, 3841130 N) was also utilized during a nighttime survey. This site is located on the northern side of the Palisades Ranch property. We performed one survey at this site (10 March 2020) as the Mojave River was still flowing through this portion of the property following the winter wet season (Fig. 5C). The area presented good potential habitat for arroyo toads. Surveyors listened quietly in the dark for amphibian calls in the area for approximately 8 minutes. At the time of the later surveys in June, the surface flow in this area had dried, and it was therefore deemed to be unsuitable habitat for the target species.

A third site was also briefly utilized for acoustic surveys during the nighttime only. This site located on the east side of the bridge spanning the Mojave River is approximately 0.3 km east of the intersection of Helendale and Vista roads in the town of Helendale, and approximately 6 km north of the Palisades Ranch property. Surveyors pulled over in their vehicle onto a dirt pull-off on the side of the road and listened for frog calls from inside the vehicle for approximately five minutes. This was not a formal study site and no data sheets were created for this site as it was a brief, impromptu stop on every night survey.

Field survey transects—We conducted four survey transects (two daytime, two nighttime) for *Rana draytonii* during the breeding season (25 February – 30 April) on 9 March 2020 and 10 March 2020 at Site 1 along the flooded road crossing Palisades Ranch (Table 3; Fig. 4). Three biologists slowly walked the transect according to methods described above during the times of 1525 and 1925 hours on 9 March 2020, and 1016 and 1930 hours on 10 March 2020 looking for signs or listening for calls of *R. draytonii* (see Appendix C for original datasheets). Additionally, one survey was performed at Site 2 near the airstrip at the time of 2127 hours on 10 March 2020 (Table 3; Appendix C). We also looked and listened for evidence of *R. draytonii* during all transects performed for *A. californicus,* although the timing of those later transects in June did not meet criteria set out in protocols for *R. draytonii* since they were performed outside of the breeding season for the species.

We conducted four survey transects for *Anaxyrus californicus* (two daytime, two nighttime) during the breeding season (15 March – 1 July; Table 3; Fig. 4). During each survey session, two biologists walked out-and-back transects at Site 1 along the flooded road crossing the property. These surveys were performed at 2045 hours on 1 June 2020, 1430 hours on 2 June 2020, 2030 hours on 15 June 2020, and 1330 hours on 16 June 2020 to search for sign of *A. californicus* (see Appendix C for original data sheets). We also looked and listened for evidence of *A. californicus* during the *R. draytonii* surveys on 9 March 2020 and 10 March 2020, although the timing of these earlier transects in March did not meet criteria set out in protocols for *A. californicus* since they were performed just before the beginning of breeding season for the species.

Passive acoustic surveys for amphibians—In response to the negative impact of COVID-19 on our planned in-person surveys, we decided to use acoustic monitoring to supplement our field work by collecting data on amphibian calls when we were not present. A Wildlife Acoustics Song Meter SM4 was deployed from 3 June 2020 until 21 July 2020 near the main flooded road channel (Fig. 4). The camera was secured in a cottonwood tree (UTM 11S, NAD 83, 467183 E, 3837011 N) roughly 2 m above ground in the riparian area approximately 345 m west of the defunct bridge (Fig. 5D). The Song Meter recorded the biophony of the area, including all sounds and calls made in the vicinity of the Song Meter (amphibians, birds, insects, mammals). Any sound audible to a human ear, including geophony (e.g., wind, foliage rustlings) or anthropophony (e.g., trains, barking dogs) from the nearby exurban areas were also recorded. The song meter was set to record for five minutes at the top of each hour during the time frames outlined below. Acoustic distances varied depending on call frequency, intensity, loudness, direction, environmental temperature and humidity, and other weather conditions. The Song Meter was set to record from 1300 – 2100 hours from 3 June 2020 until 15 June 2020, then from 2005 – 0005 hours from 17 June 2020 to 21 July 2020. The Song Meter also recorded from 2005 – 2305 hours on 16 June 2020 and 0005 – 0405 hours on 17 June 2020 during a short period of re-configuration in which the SD cards were replaced, and the recording times were adjusted to record later into the night. The program Kaleidoscope (version 5.2.1) was downloaded from www.wildlifeacoustics.com and used to analyze the sound data recorded from the Song Meter, including waveform and sonogram images of all call data during the recording periods. Data were converted into an Excel spreadsheet (see Appendix D). Anuran calls were compared to recordings of the target species at http://www.californiaherps.com.

RESULTS

Summary of previous records for species of interest on the upper Mojave River

Southwestern pond turtle—The occurrence of pond turtles in the Mojave River is well-documented based on fossil records, archaeological records, and observations of living specimens into recent times (e.g., Cummings et al. 2018, Jefferson 1987, Lovich and Meyer 2002, Lovich et al. 2018a, Lovich *in prep.*). CNDDB lists an observation of basking individuals in Mojave Narrows Regional Park in the marsh below the dam at Horseshoe Lake in 1989 (Table 4). Although there are no records from Palisades Ranch (or within 1.6 km), the species is expected there due to the multitude of records from the river above the ranch, including a record of an adult observed in waste-water treatment ponds only 6 km upstream from Palisades Ranch. The lead author is currently studying a population of pond turtles on the upper river about 48 km upstream from Palisades Ranch, and preparing a paper for submission to a scientific journal (Lovich et al. *in prep.*) that contains a more complete history (including paleontological, archaeological and historical data) of pond turtle records throughout the Mojave Desert.

California red-legged frog—As currently recognized taxonomically, this frog is native to California and Baja California Norte, Mexico. In California, their past range included the foothills of the Coast Ranges to the top of the Sacramento Valley, and southward along the western side of the Sierra Nevada foothills. Records exist for the Transverse Range, but very few populations remain in southern California. Declines have been widespread (Thomson et al. 2016). We found only three records for the Mojave River, two in the upper portion of the river at Victorville, about 18 river km upstream from Palisades Ranch. Both of those specimens were collected in June 1917 and are vouchered in the California Academy of Sciences collections. A third observation is listed in CNDDB from the headwaters of the river near Silverwood Lake, but the date of the observation is unknown (Table 5).

Arroyo toad—Like the red-legged frog, this species is native only to California and Baja California Norte, Mexico. In California, their range included the Pacific side of the Coast Ranges south of Monterey, into portions of the Transverse Range, then into the Peninsular Range. Several localities are known from the desert side of the Transverse Range, including the upper Mojave River. Range wide, populations have decreased an estimated 65-76% due mainly to habitat destruction (Thomson et al. 2016). Arroyo toads are habitat specialists that require shallow, slow moving water for a minimum of 4-5 months per year, flowing over sandy, gravelly stream bottoms. Numerous museum specimens (Table 6) document the persistence of this species in the upper Mojave River system from the 1930s through at least 2006 (Ramirez 2002, 2003, 2007). Since conditions on the upper river have not changed considerably since 2006, the populations are presumed extant. Historical records are within 18-48 river km upstream from Palisades Ranch.

Summary of field surveys for species of interest on the upper Mojave River

Southwestern pond turtle—No pond turtles were captured or observed at either study site since trapping efforts and observations were initiated in 2017. After a total effort of 839.2 trap hours (679.8 trap hours in 2020) at Mojave Narrows Regional Park and 479.9 trap hours (116.5 trap hours in 2020) at Palisades Ranch since 2017, only three individual non-native red-eared slider turtles (*T. s. elegans*) were captured (one at Palisades Ranch, two at Mojave Narrows Regional Park; Tables 1, 7; Appendix A). Trapping efforts were conducted within the active season for pond turtles, and water temperatures recorded during every trap session were always above the feeding activity threshold of about 15°C for most semi-aquatic turtles in North America (Ernst and Lovich 2009) (Table 1). A single male *T. s. elegans* captured in 2019 in a hoop trap set in the large pond adjacent and just upstream of the defunct bridge at Palisades Ranch is the only aquatic turtle observation our team made at the site since we initiated trapping efforts in 2017 (Tables 1, 7; Fig. 6). This turtle was removed at the request of the

California Department of Fish and Wildlife and placed in the care of a herpetological sanctuary. The two *T. s. elegans* individuals (both males) captured at Mojave Narrows Regional Park (one each in 2019 and 2020) were the only turtles our team captured in our hoop traps since we first initiated trapping efforts in 2017 (Tables 1, 7; Fig. 7). Additional *T. s. elegans* as well as spiny softshell turtles (*Apalone spinifera*) were observed basking or swimming at Mojave Narrows Regional Park in Horseshoe Lake in 2017. Surprisingly, only three *T. s. elegagns* and no *A. spinifera* were observed with binoculars in 2020, despite their conspicuous nature in 2017.

California red-legged frog and arroyo toad—Due to travel restrictions imposed as a result of the ongoing pandemic, we were unable to maintain our original schedule of presence/absence surveys that followed the recommended protocols set forth by the U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife (Table 3). We were able to complete three trips for amphibian surveys and site assessments (Table 3; Fig. 4; Appendices B, C). A total of two day surveys and three night surveys for California red-legged frogs were completed in March during the breeding season (an additional night survey from 25 February – April 30, as well as one day survey and one night survey outside of the breeding season from 1 July – 30 September were not performed but are recommended by the U.S. Fish and Wildlife Service). A total of two day surveys and two night surveys were also completed for arroyo toads in June (an additional 4 night surveys and 4 day surveys were not performed but are recommended by the U.S. Fish and Wildlife Service). We didn't observe California red-legged frogs or arroyo toads in any life stage during our field surveys (Table 3; Appendix C). Additionally, the Wildlife Acoustics Song Meter was deployed from 3 June to 21 July to take daily recordings and increase our opportunities to detect anuran calls and strengthen our effort in determining presence/absence while travel was restricted. Of the 295 recordings made on the song meter, no evidence of either target species was heard (see Appendix D).

Other amphibians and animals detected

We observed other amphibians frequently, including American bullfrogs (*Lithobates catesbeianus*) and Baja California tree frogs (*Pseudacris hypochondriaca*) in most life stages (tadpoles, metamorphs, juveniles, and adults) with the exception of egg masses. Baja California tree frogs in a variety of colorations were by far the most common amphibian seen and heard (including at our third site near the Helendale bridge) during our field surveys as well as on the song meter recordings (Fig. 8). American bullfrogs were seen in smaller numbers but heard frequently (Fig. 9). Both of these species were detected auditorily for the entire duration of the study. We observed no African clawed frogs (*Xenopus laevis*), but cannot rule out their presence due to their ubiquity elsewhere in Mojave Desert and coastal southern California wetlands. Acoustic detection suggested the occurrence of the western toad (*Anaxyrus boreas*) on three separate occasions in June 2020 (see Appendix D), and one metamorph was observed during our field surveys on 16 June 2020 (Fig. 10). Other animals heard via sound recordings included a variety of unidentified birds and mammals. Additionally, substantial anthropophony was recorded, including trains, vehicles, footfalls, music, and explosive acoustic staccato (e.g. fireworks or gunshots). For an entire descriptive list of animals and sounds recorded on the song meter, refer to Appendix D. Other animals observed during field surveys included beavers (*Castor canadensis*), raccoons (*Procyon lotor*), mosquitofish (*Gambusia* sp.), snails (*Catinella* spp.), and one dead Mojave River Vole (*Microtus californicus mohavensis*). Camera trapping also detected the presence of beavers, bullfrogs, fish, and a racoon, but none of our target species.

CONCLUSIONS

The absence of a significant number of observable turtles at Mojave Narrows Regional Park is puzzling. Introduced turtles (spiny soft shells and red-eared sliders) were numerous and conspicuous when we conducted a preliminary visual survey in 2017. Based on the lead author's previous experience with turtles, our expectation was that a large population of introduced turtles inhabited Horseshoe Lake. Trapping results in addition to a notable reduction in visual observations of turtles over time suggest that the numbers had declined significantly by 2020. The reason for such a decline is unknown, but there are several possibilities.

There is significant commercial exploitation of turtles in the United States (Brown et al. 2011, 2012; Mali et al. 2014), both permitted and illegal (e.g., Grandmaison and Frary 2012). Turtles collected are then sold into the food (Clark 1920, Colteaux and Johnson 2017, Sloan and Lovich 1995) or pet trade (e.g., Levell 2000) industries. No evidence of commercial exploitation is known at the park that would substantiate this hypothesis.

Since the lake is a popular place for fishing it is also possible that fishing contributed to the perceived decline. Turtles will swallow baited hooks (Steen et al. 2014), including *A. pallida* (Lovich et al. 2017) and that contributes to mortality in their populations (Nemoz et al. 2004, Steen and Robinso. 2017). A similar effect is possible at Mojave Narrows due to the amount of fishing activity at Horseshoe Lake, but we observed no direct evidence of mortality due to fishing.

It is also possible that disease reduced the population of turtles at the lake. Disease can have rapid, extensive, and significantly negative effects to a diversity of turtle populations (Agha et al. 2017, Chessman et al. 2020, Seigel et al. 2003). We observed no physical evidence of shell disease in slider turtles (Lovich et al. 1996), a malady that also affects western pond turtles (Haman et al. 2019). However, that does not rule out the possibility that other pathogens such as viruses were involved (e.g., Chessman et al. 2020).

Another possibility is that the turtles moved to another water body like Pelican Lake. However aquatic turtles are most likely to move to other water bodies during drought conditions (Gibbons et al. 1983). Horseshoe Lake water levels did not change appreciably during our observations there starting in 2017.

We have no data to confirm any of the hypotheses above for the perceived decline of turtles, Since we observed only non-native turtle species in the lake, the decline may be inconsequential from a conservation perspective, although turtles do provide important ecological services including keeping water bodies clean (Lindsay et al. 2013, Lovich et al. 2018b).

Failure to detect western pond turtles at Mojave Narrows Regional Park is also puzzling as there is a CNDDB record there in 1989 (Table 4), and they still occur upstream in the West Fork Mojave River (Lovich pers. obs.). Turtles at the latter location would only be able to access Mojave Narrows Regional Park during floods when the river flows aboveground between the sites. The failure to detect pond turtles at Palisades Ranch is unexpected because of the presence of what looks like excellent habitat. Given the dense riparian vegetation at Palisades Ranch, it is more likely that pond turtles exist in places we were unable to trap than it is for them to be absent from the area. Nevertheless, we could find no previous records of pond turtles at Palisades Ranch. Bullfrogs and human modification of the environment have also been implicated in the decline of western pond turtles (Nicholson et al. 2020). A future detection of pond turtles would not be unexpected.

During our surveys we detected only three species of amphibians (Baja California tree frogs, American bullfrogs, and a western toad), all at Palisades Ranch. The American bullfrog is an introduced non-native to California. We expected to see and hear more western toads due to the fact that they are not uncommon along the Mojave River (e.g., Camp Cady 86 river km downstream; Cummings et al. 2018). The abundance of Baja California tree frogs at Palisades Ranch is not surprising given their wide distribution in wetlands of the Mojave Desert (Bradford et al. 2005).

The fact that we did not observe any red-legged frogs or arroyo toads, coupled with the fact that there are no historical records of either within the survey protocol-mandated 1.6 km of Palisades Ranch, argues strongly against their current presence. In addition, available habitat is suboptimal for either species. The best arroyo toad habitat was observed in March when water was flowing over the sandy, braided channel of the river near the disused airstrip on the ranch (Site 2). However, successful reproduction and recruitment is not possible in ephemeral streams unless water is available for a minimum of 4-5 months of the year (Thomson et al. 2016), and that does not normally occur in this reach of the Mojave River. Perennial water bodies at the site are not only unsuitable habitat for arroyo toads but facilitate the co-occurrence of predators like bullfrogs (Miller et al. 2012).

Habitat at the ranch may appear to be suitable for red-legged frogs from a purely abiotic perspective. They use a wide variety of wetland types (Thomson et al. 2016) as found at the ranch but the presence of the introduced bullfrogs compromises habitat quality. The presence of bullfrogs and some invasive fish species (e.g., *Gambusia* and *Lepomis*) has been demonstrated to have negative effects on the survival and condition of red-legged frogs due to predation and more complex interactions (Doubledee et al. 2003, Lawler et al. 1999). Recent modelling research suggests that the distribution of both pond turtles and arroyo toads exhibit a negative relationship with increased stream temperatures (Rogers 2020). Thus, the effects of global warming may need consideration in their future conservation.

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TABLES

Table 1. Data on trap locations and trap hour efforts for southwestern pond turtles. Locality abbreviations are as follows: MNRP = Mojave Narrows Regional Park; PR = Palisades Ranch. GPS coordinates are given in UTM (NAD 83, Zone 11S). Temperature data were acquired for the Victorville area (central to both study sites) using National Weather Service/ National Oceanic and Atmospheric Administration and https://www.wunderground.com.

Locality	Trap types	Total number of traps	Dates set	GPS locations of traps (UTM, NAD 83, Zone 11S)	General weather conditions	Water temperature range recorded (°C)	Minimum Air Temperature (°F)/(°C)	Maximum Air Temperature (°F)/(°C)	Number turtles captured	Total trap hours
MNRP	Hoop	2	05/03/17	474783 E, 3818800 N 474834 E, 3818841 N	Sunny	20.8	55.4/ 13.0	92.8/ 33.7	0	4.0
PR	Hoop	2	10/03/17 – 10/04/17	467543 E, 3837005 N 467562 E, 3837019 N	Sunny, windy	15.0 – 17.9	38.1/ 3.4	77.4/ 25.2	0	40.5
PR	Hoop	3	06/18/19 – 06/20/19	467543 E, 3837005 N 467546 E, 3837006 N 467518 E, 3837021 N	Sunny	18.3 – 20.4	56.6/ 13.7	101.4/ 38.6	1 (*T. s. elegans*)	135.5
PR	Hoop	3	07/09/19 – 07/11/19	467543 E, 3837005 N 467546 E, 3837006 N 467518 E, 3837021 N	Sunny, light breezes	18.6 – 24.2	54.1/ 12.3	101.1/ 38.4	0	127.4
PR	Hoop	3	07/31/19 – 08/01/19	467543 E, 3837005 N 467518 E, 3837021 N 467459 E, 3837007 N	Sunny	19.8 – 24.0	61.1/ 16.2	98.6/ 37.0	0	60.0
MNRP	Hoop	8	09/17/19 – 09/18/19	474747 E, 3818845 N 474759 E, 3818848 N 474388 E, 3819238 N 474398 E, 3819195 N 474403 E, 3819182 N 474747 E, 3818789 N 474828 E, 3818833 N 474779 E, 3819002 N	Sunny, windy	20.7	48.5/ 9.2	85.4/ 29.7	1 (*T. s. elegans*)	155.4
PR	Hoop	3	06/01/20 – 06/02/20	467518 E, 3837021 N 467338 E, 3837018 N 467571 E, 3837020 N	Overcast	18.1 – 18.5	51.8/ 11.0	94.8/ 34.9	0	56.5

Locality	Trap types	Total number of traps	Dates set	GPS locations of traps (UTM, NAD 83, Zone 11S)	General weather conditions	Water temperature range recorded (°C)	Minimum Air Temperature (°F)/(°C)	Maximum Air Temperature (°F)/(°C)	Number turtles captured	Total trap hours
MNRP	Hoop	10	06/02/20 – 06/03/20	474794 E, 3818902 N 474692 E, 3819022 N 474548 E, 3819267 N 474381 E, 3819297 N 474379 E, 3819298 N 474380 E, 3819284 N 474382 E, 3819284 N 474527 E, 3819112 N 474542 E, 3819067 N 474567 E, 3819008 N	Partly sunny to sunny	22.7 – 22.8	57.1/ 13.9	100.3/ 37.9	0	226.7
PR	Hoop	3	06/15/20 – 06/16/20	467100 E, 3837023 N 467173 E, 3837020 N 467289 E, 3837019 N	Sunny, windy	18.2 – 19.2	52.3/ 11.3	92.4/ 33.6	0	60.0
MNRP	Hoop, basking	11	06/16/20 – 06/17/20	474794 E, 3818902 N 474692 E, 3819022 N 474548 E, 3819267 N 474519 E, 3819321 N 474381 E, 3819297 N 474379 E, 3819298 N 474380 E, 3819284 N 474527 E, 3819112 N 474542 E, 3819067 N 474567 E, 3819008 N 474738 E, 3818842 N	Sunny, light breezes	21.0 – 21.6	56.7/ 13.7	91.5/ 33.1	1 (*T. s. elegans*)	253.0
MNRP	Hoop	9	08/16/20 – 08/17/20	474794 E, 3818902 N 474555 E, 3819242 N 474548 E, 3819267 N 474519 E, 3819321 N 474381 E, 3819297 N 474382 E, 3819284 N 474542 E, 3819067 N 474694 E, 3818849 N 474738 E, 3818842 N	Sunny	26.1 – 26.4	68.9/ 20.5	110.1/ 43.4	0	200.1

Table 2. Condensed summary of presence/absence survey protocols for target amphibian species at Palisades Ranch. Survey protocols for California red-legged frogs (RLF; *Rana draytonii*) and arroyo toads (AT; *Anaxyrus californicus*) were adopted from protocols set forth by the U.S. Fish and Wildlife Service.

RLF Survey Protocol Bullet List	AT Survey Protocol Bullet List

• Adopted from https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83914&inline
• Search for records of observations with 1.6 km of the site
• Perform two day surveys and four night surveys during breeding season (25 February – 30 April); look for egg masses
• Perform one day survey and one night survey during non-breeding season (1 July – 30 September)
• Total survey window is 1 January – 30 September
• Perform up to eight surveys total, with seven days in between survey sessions
• Nighttime surveys should commence at least 1 hr after sunset
• Weather conditions:
  ○ Air temperature should be > 50°F
  ○ Wind speeds should be < 5 mph
  ○ Skies should be clear to partly cloudy
	• Adopted from https://www.fws.gov/pacific/ecoservices/endangered/recovery/documents/AroyoToad.1999.protocol.pdf
	• Search for records of observations within 1.6 km of the site
	• Perform six surveys during the breeding season (15 March – 1 July), with seven days between survey sessions
	• One survey each in April, May, and June
	• Daytime and nighttime surveys should be performed during the same 24-hour period
	• Nighttime surveys should occur between 1 hr after dusk and midnight
	• Weather conditions:
	  ○ Air temperature should be > 55°F
	  ○ Do not conduct surveys during inclement weather or flows
	  ○ Do not conduct surveys during full moons

Table 3. Planned and performed surveys for California red-legged frogs (RLF; *Rana draytonii*) and arroyo toads (AT; *Anaxyrus californicus*) at Palisades Ranch. Under "Target species", trip number refers to the sequential number of planned trips for each species in order to perform the correct number of surveys at the appropriate intervals laid out by the U.S. Fish and Wildlife presence/absence survey protocols for each species. Trips labeled as "backup" were planned in case weather conditions were adverse enough to cancel a prior planned trip in the season. See Appendices B and C, respectively, for all data recorded on Habitat Site Assessments and Survey data sheets for both RLF and AT.

Planned Dates (2020)	Target species	Number day surveys	Number night surveys	Work performed (Y/N)	Weather	Moon phase(s)	Amphibian species observed	Water temperature range recorded (°C)
03/09-03/11	RLF (Trip 1)	2	3	Y	Partly cloudy to intermittent drizzle	Full to waning gibbous	American bullfrogs (*Lithobates catesbeianus*); Baja California tree frogs (*Pseudacris hypochondriaca*)	11.6 – 14.4
03/24-03/26	RLF (Trip 2); AT (Trip 1)	2	2	N	-	New to waxing crescent	-	-
04/02-04/03	AT (Trip 2)	1	1	N	-	First quarter to waxing gibbous	-	-
04/15-04/17	AT (Trip 3)	1	1	N	-	Waning crescent	-	-
05/18-05/20	AT (Trip 4)	1	1	N	-	Waning crescent	-	-
06/01-06/03	AT (Trip 5)	1	1	Y	Overcast, light breezes	Waxing gibbous	American bullfrogs (*Lithobates catesbeianus*); Baja California tree frogs (*Pseudacris hypochondriaca*)	18.1 – 18.5
06/15-06/17	AT (Trip 6)	1	1	Y	Clear to mostly cloudy with breeze	Waning crescent	American bullfrogs (*Lithobates catesbeianus*); Baja California tree frogs (*Pseudacris hypochondriaca*)	18.2 – 19.2
06/29-07/01	Backup AT Trip	1	1	N	-	Waxing gibbous	-	-
7/20-7/22	RLF (Trip 3)	1	1	N	-	New moon to waxing crescent	-	-
7/27-7/29	Backup RLF Trip	1	1	N	-	First quarter to waxing gibbous	-	-

Table 4. Summary of records for southwestern pond turtles (*Actinemys pallida*) in the Mojave River and its drainages. Records were acquired from the scientific literature, technical reports, VertNet (vertnet.org), and/or the California Natural Diversity Database (CNDDB). Observation dates are original dates of field observation or collection. CNDDB occurrence numbers are given to facilitate record location. Latitude, longitude, and elevations were acquired via CNDDB and GPS locations. Source indicates the original source of the data, and information source indicates where we pulled the summarized records. Museum abbreviations are as follows: LACM = Natural History Museum of Los Angeles County; MVZ = Museum of Vertebrate Zoology; SDNHM = San Diego Natural History Museum.

Observation date	CNDDB occurrence #	Key quad	Location	Latitude	Longitude	Elev-ation (m)	Source	Comments	Information source
Unknown	811	Yermo (3411687)	Yermo	34.90579	-116.82149	585	Museum records from LACM, field note records, and reports.	LACM #7997. B. Brattstrom considers this population extirpated (1990).	CNDDB
1987-XX-XX	848	Cave Mountain (3511613)	Afton Canyon, Cady Mountains	35.02765	-116.34584	408	Museum records, reports	Observed by T. Papenfuss and R. Rado (1987). Observed by Brattstrom (unknown date).	CNDDB
Multiple	903	Manix (3411685)	Camp Cady Wildlife Area	34.93646	-116.61109	524	Email communication, field survey forms, phone conversation, museum records, field note records, reports	Observed in 1980, 1987, 1998-1999 (K. Meyer USGS report form), 2012	CNDDB, Lovich and Meyer (2002)
1987-XX-XX	916	Harvard Hill (3411686); Yermo (3411687)	Mojave River, 5 mi. E of Yermo	34.90636	-116.74642	561	Reports, letters, museum records from SDNHM	SDNHM #17135-17136 (unknown date). Brattstrom considers this population extirpated (1990).	CNDDB

Observation date	CNDDB occurrence #	Key quad	Location	Latitude	Longitude	Elev-ation (m)	Source	Comments	Information source
1989-09-09	968	Victorville (3411753)	North end of narrow pool of water in lower slough, approx. 0.15 mi. N of Middle Lake and 0.5 mi. W of Mojave River.	34.51868	-117.27821	841	S. Myer field survey form	Adults observed basking. Location in Mojave Narrows Regional Park.	CNDDB
2004-07-15	1144	Victorville (3411753)	0.7 mi west of Hwy 18, 6 mi. NNW of Victorville	34.61896	-117.35562	238	Field survey form (wastewater treatment plant area)	One adult observed over 8 surveys conducted. Closest location to Palisades Ranch.	CNDDB
2006-04-30	1173	Silverwood Lake (3411733)	Summit Valley, 1.17 mi N of Silverwood Lake Dam	34.32212	-117.31284	956	Field survey form	Two adult turtles observed	CNDDB
Multiple	1175	Dunn (3511614)	Mojave River in Afton Canyon, from railroad bridge just S of campground to approx. 0.4 mi further west	35.03722	-116.38422	434	Manuscript (Lovich and Meyer 2002), field survey forms (Lovich, unpublished), museum records from MVZ	Specimen collected 1987 (MVZ #227728). Adults observed 1998-1999. 1 adult female observed 2017.	CNDDB, Lovich and Meyer (2002)
2016-06-14	1495	Dunn (3511614)	Mojave River in Afton Canyon, approx. 0.4 mi E of the railroad bridge south of the campground	35.03639	-116.37611	423	Report (Lovich et al. 2018)	Hatchling photograph (2016)	CNDDB, Lovich and Meyer (2002)
Multiple	1496	Silverwood Lake (3411733)	Las Flores Ranch, West Fork Mojave River, 1.0 mi. NNE of Cedar Springs Dam	34.31935	-117.30621	952	Survey reports (Lovich, unpublished)	Adults captured 2017-2019	CNDDB/ Lovich data

Table 5. Summary of records for California reg-legged frogs (*Rana draytonii*) in the Mojave River and its drainages. Records were acquired from the scientific literature, technical reports, VertNet (vertnet.org), and/or the California Natural Diversity Database (CNDDB). Observation dates are original dates of field observation or collection. CNDDB occurrence numbers are given to facilitate record location. Latitude, longitude, and elevations were acquired via VertNet and CNDDB. Source indicates the original source of the data, and information source indicates from where we pulled the summarized records. Museum abbreviations are as follows: CAS = California Academy of Sciences.

Observation date	CNDDB occurrence #	Key quad	Location	Latitude	Longitude	Elev-ation (m)	Source	Comments	Information source
1917-06-18	13	Victorville (3411753)	Victorville	34.53464	-117.28755	838	Museum record from CAS. Collected by J.R. Slevin and I. McGuire	CAS #42848	CNDDB
1917-06-21	-	Victorville (3411753)	Victorville	34.53464	-117.28755	838	Museum record from CAS. Collected by J.R. Slevin and I. McGuire	CAS #42849	VertNet
Unknown	14	Silverwood Lake (3411733)	Mojave River Public Camp; 3 miles NE of Silverwood Lake	34.33111	-117.2657	951	Bureau of Land Management compilation of historic museum specimen information for *Rana aurora (draytonii*)	Information collected during the preparation of "The California Desert Plan". 1980.	CNDDB

Table 6. Summary of records for arroyo toads (*Anaxyrus californicus*) in the Mojave River and its drainages. Records were acquired from the scientific literature, technical reports, VertNet (vertnet.org), and the California Natural Diversity Database (CNDDB). Observation dates are original dates of field observation or collection. CNDDB occurrence numbers are given to facilitate record location. Latitude, longitude, and elevations were either given by VertNet and CNDDB or were acquired Google Earth. Source indicates the original source of the data, and information source indicates from where we pulled the summarized records. Museum abbreviations are as follows: LACM = Natural History Museum of Los Angeles County; LMNH-LSU/ LSU = Louisiana Museum of Natural History at Louisiana State University; MVZ = Museum of Vertebrate Zoology; SDNHM = San Diego Natural History Museum.

Observation date	CNDDB occurrence #	Key quad	Location	Latitude	Longitude	Elev-ation (m)	Source	Comments	Information source
Multiple	28	Lake Arrowhead (34117 32), Silverwood Lake (34117 33)	West Fork of Mojave River and Deep Creek, 0.2 to 1.6 mi west of spillway, Mojave River Forks RP, and San Bernardino NF	34.34182	-117.2343	920	Multiple permit reports, field survey forms, data summaries, memos, species accounts, survey results	Surveys spanned from 0.6 mi SE of spillway to Arrowhead Lake Rd. Observations in 1995, 1999, 2001, 2003, 2004, 2005, 2006, 2008. Observations of adults, tadpoles, and juveniles.	CNDDB
Multiple	92	Silverwood Lake (34117 33)	Along Grass Valley Creek in the vicinity of Hwy 173, west of County Regional Park campground, and 2.8 mi NE of Cedar Springs Dam	34.32686	-117.27083	975	Multiple survey reports, letters, field survey forms, telemetry studies	R. Ramirez locations included in this record. Observations in 2001, 2005, 2006. Observations of adults, larvae, egg masses, and vocalizations. Includes radio tracking of toads.	CNDDB

Observation date	CNDDB occurrence #	Key quad	Location	Latitude	Longitude	Elev-ation (m)	Source	Comments	Information source
Multiple	94	Silverwood Lake (34117 33)	Horsethief Canyon and West Fork of Mojave River, Summit Valley, North of Silverwood Lake, Rancho Las Flores	34.32531	-117.30352	963	Multiple field surveys, radio telemetry studies, and museum records for SDNHM. Includes studies by R. Ramirez.	Includes field surveys (1998), radio tracking individuals (1999, 2000, 2001, 2005, 2006), and museum records 1966-1967 (SDNHM #47464, 47792, 65648-65658). Includes adult, larvae, and juvenile observations.	CNDDB
Multiple	95	Cajon (34117 34)	Little Horsethief Canyon west of the dam, approx. 1 mi west of Little Horsethief Ranch	34.31338	-117.40522	1082	Multiple permit reports, letters, monitoring reports, data summaries, species accounts, and survey results	Observations from 1995, 1996, 1998, 1999. Includes observations of adults, tadpoles, and metamorphs.	CNDDB
Multiple	96	Lake Arrowhead (34117 32)	Deep Creek between hot spring and warm spring, about 1-2 creek miles east of Kinley Creek, San Bernardino National Forest	34.34317	-117.17481	1097	Multiple survey reports, data summaries, museum records (LMNH-LSU, LACM), and species accounts	Museum specimens from 1963 (LSU #11995-97) and 1967 (LACM #88013). Observations from 1995, 1997, 1998, 1999, 2001, 2003, 2004, 2006. Observations of adults, juveniles, metamorphs, tadpoles	CNDDB
2009-05-28	107	Silverwood Lake (34117 33)	Vicinity of SR138, immediately east of Oak Springs Road, Horsethief Canyon	34.31552	-117.3581	1006	M. Glenn field survey form	5 adults observed	CNDDB

Observation date	CNDDB occurrence #	Key quad	Location	Latitude	Longitude	Elev-ation (m)	Source	Comments	Information source
2001-05-17	113	Cajon (34117 34)	SE of Hwy 138 at Little Horsethief Canyon Road, approx. 1.1 mi east of Cajon Pass, West Summit Valley	34.32394	-117.40901	1094	Multiple sources including a letter and survey results	Gravid toad observation freshly killed on highway	CNDDB
Multiple	114	Silverwood Lake (34117 33)	West Fork of Mojave River at SW Silverwood Lake, approx. 0.3 mi ESE of Hwy 138 at Cleghorn Road, Silverwood Lake State Recreation Area	34.28668	-117.34971	1030	Multiple sources including an annual permit report and monitoring report	Multiple adults observed in 2003 and 2004	CNDDB
1995-05-25	120	Lake Arrowhead (34117 32)	East of Arrowhead Lake Road at Welsh Lane, 0.7 mi NW of Mojave Dam spillway, 0.7 mi SSE of BM2981, Hesperia	34.35097	-117.2412	901	K. Beaman et al. unpublished surveys for arroyo toads	Adults detected during field surveys	CNDDB
1991-08-01	121	Lake Arrowhead (34117 32)	Deep Creek, just north of Bacon Flats, 1 mi. WNW of Devils Hole, 1 mi. E of Lake Arrowhead airport	34.30618	-117.13242	1262	Multiple survey reports, data summaries, and species accounts	Observations of adults only in 1991, though surveys were also performed in 1995, 1997, 1999, 2002, 2003, and 2005.	CNDDB

Observation date	CNDDB occurrence #	Key quad	Location	Latitude	Longitude	Elev-ation (m)	Source	Comments	Information source
2003-XX-XX	124	Lake Arrowhead (3411732)	Kinley Creek just E of Burnt Flat, 0.4 mi NNE of BM4388 on Hwy 173, 2.5 mi NNE of Toll Road Campground	34.32606	-117.19193	1282	Species account and letter	Tadpoles observed in 2003. No observations during surveys in 2004 and 2005.	CNDDB
1949-04-16	130	Hinkley (3411782)	Along Mojave river, approx. 4 mi. SE of Hinkley PO and 6.4 mi. W of Barstow PO	34.8897	-117.1378	671	LMNH-LSU Museum Record	LSU #14674	CNDDB
Multiple	132	Victorville (3411753)	Mojave River near lower narrows and Mojave Heights, approx. 3 mi. NNW of Victorville and 4.5 mi. E of Adelanto PO	34.5755	-117.32511	811	MVZ Museum Records	1949, 1953, 1954, 1955, 1956 records. MVZ #62816, 63885-63888, 49244-49247, 49540, 58461, 61033-61037	CNDDB
Multiple	133	Victorville (3411753)	Along the Mojave River from Hwy 18 (Happy Trails Hwy) north to Hwy 15 (Barstow Fwy), Victorville	34.53441	-117.28837	823	Museum Records from SDNHM and MVZ	Museum specimens from 1930 (SDNHM #2481, 2482, 2542, 2543), 1932 (SDNHM #7038-7040), and 1979 (MVZ #171393-171397)	CNDDB
1967-06-19	136	Silverwood Lake (3411733)	Vicinity of Miller Canyon, between the SE tip of Silverwood Lake and Pilot Rock Conservation Camp	34.2729	-117.2965	1091	Museum Records from SDNHM	Museum specimens from 1967 (SDNHM #65659-65661, 65641-65645)	CNDDB

Observation date	CNDDB occurrence #	Key quad	Location	Latitude	Longitude	Elev-ation (m)	Source	Comments	Information source
2017-04-20	153	Silverwood Lake (3411733)	Horsethief Canyon, approx. 0.1 mi. WSW of Hwy 138 at Hwy 173, and 2.0 mi. WNW of Cedar Springs Dam, NW of Silverwood Lake	34.31175	-117.34782	991	Field survey form	Observations of adults and tadpoles	CNDDB
1934-06-21	-	Lake Arrowhead (3411732)	Near junction of Deep Creek and "Little" Mojave River	34.34218	-117.21614	961	LACM record. Collected by Bogert.	LACM #11368. Voucher specimen is lost. LACM notes that a reservoir now exists in the collection location.	VertNet/ LACM
1934-06-21	-	Lake Arrowhead (3411732)	Near junction of Deep Creek and "Little" Mojave River	34.34218	-117.21614	961	LACM record. Collected by Bogert.	LACM #11369. Voucher specimen is lost. LACM notes that a reservoir now exists in the collection location.	VertNet/ LACM
1955-07-19	-	Lake Arrowhead (3411732)	1 mi West of Mojave River Public Camp	34.34437	-117.24501	967	LACM record. Collected by Cunningham.	LACM #11656. Voucher specimen is lost. LACM notes the collection location coordinates are derived from www.calsign.com/mining/countydata/sanbernardino5.htm	VertNet/ LACM

Observation date	CNDDB occurrence #	Key quad	Location	Latitude	Longitude	Elev-ation (m)	Source	Comments	Information source
1955-07-19	-	Lake Arrowhead (34117 32)	1 mi West of Mojave River Public Camp	34.34437	-117.24501	967	LACM record. Collected by Cunningham.	LACM #11659. Voucher specimen is lost. LACM notes the collection location coordinates are derived from www.calsign.com/mining/countydata/sanbernardino5.htm	VertNet/ LACM
Unknown	-	Lake Arrowhead (34117 32)	Deep Creek Canyon, 3 mi. south of confluence with Mojave River	34.34360	-117.19989	1004	LACM record.	LACM #178110. Voucher specimen is cleared and stained. Latitude and longitude were approximated by calculating 3 river miles upstream from the Deep Creek confluence with the Mojave River.	VertNet/ LACM

Table 7. Incidental turtle captures at Mojave Narrows Regional Park and Palisades Ranch over the entire course of trapping efforts. Locality abbreviations are as follows: MNRP = Mojave Narrows Regional Park; PR = Palisades Ranch. GPS coordinates are given in UTM (NAD 83, Zone 11S). Column abbreviations for measurements are as follows: CL = carapace length, PL = plastron length, CW = carapace width, CH = carapace height.

Locality	Species	Sex	Capture method	Date of first capture	GPS location	Weight (g)	CL (cm)	PL (cm)	CW (cm)	CH (cm)	Comments
PR	*Trachemys scripta elegans*	M	Hoop	06/19/2019	467543 E, 3837005 N	1700	22.0	19.5	15.9	8.5	Removed and placed at a herpetological sanctuary
MNRP	*Trachemys scripta elegans*	M	Hoop	09/18/2019	474759 E, 3818848 N	610	16.3	-	-	-	Melanistic male. Marked with cohort notch (single notch, left femoral scute of plastron).
MNRP	*Trachemys scripta elegans*	M	Hoop	06/17/2020	474692 E, 3819022 N	375	13.6	12.4	10.9	5.0	Marked with cohort notch (double notch, left femoral scute of plastron).

FIGURES

Figure 1. Map showing the study site locations at Palisades Ranch and Mojave Narrows Regional Park (starred red location markers) along the Mojave River (blue line) in San Bernardino County, California. Map created using Google Earth.

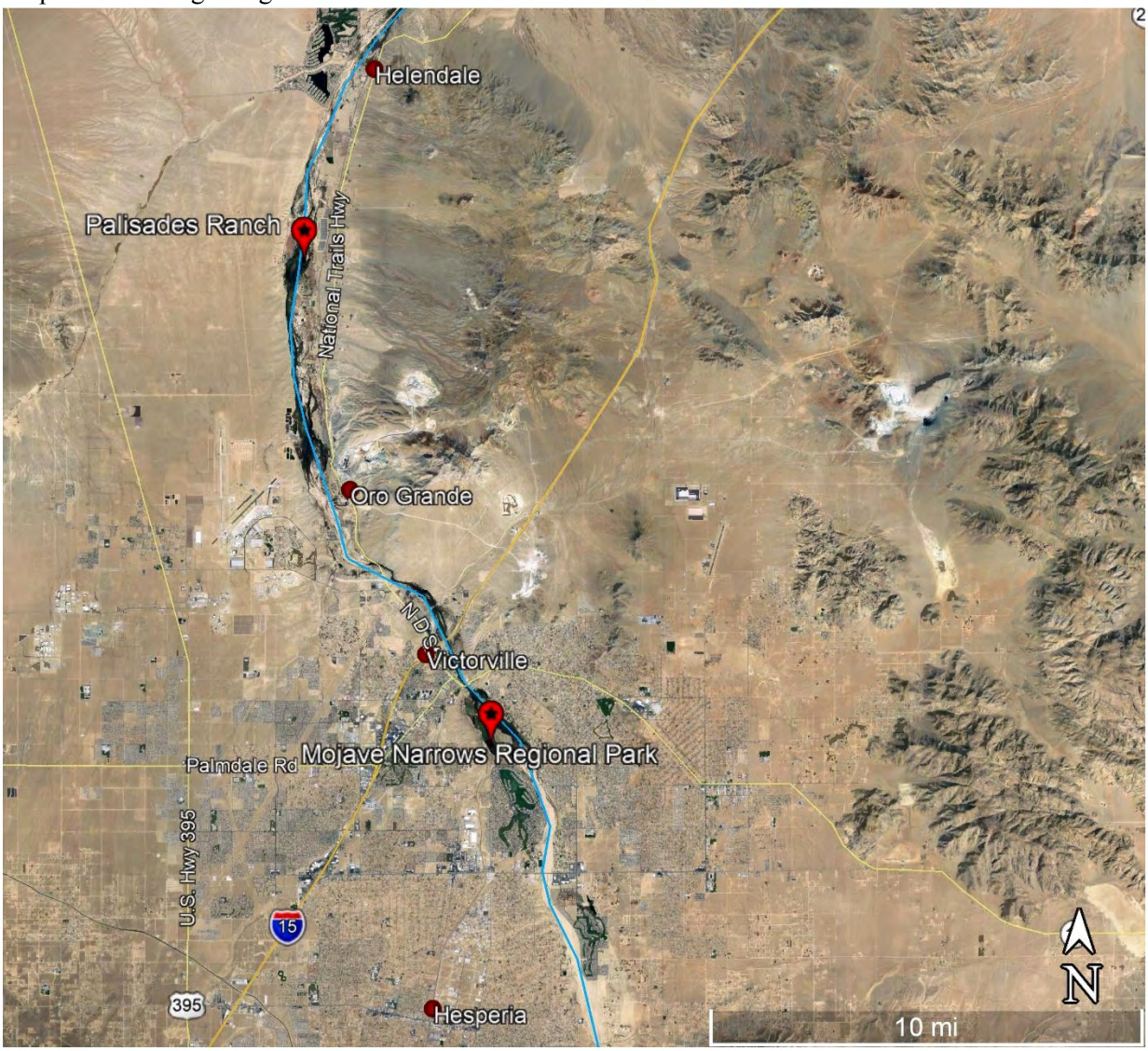


Figure 2. Mojave Narrows Regional Park in Victorville, California. Photo panels show A) a view of the southern end of Horseshoe Lake looking towards the heavily vegetated island in its center (hoop trap in foreground); B) the protected marsh area just north of Horseshoe Lake; C) a sign accompanying a hoop trap set on the mainland area that is accessible to the public; and D) a view of the north side of Horseshoe Lake, with a portion of the small islet nicknamed "Duck Island" to the right side of the photo. Photos by U.S. Geological Survey.

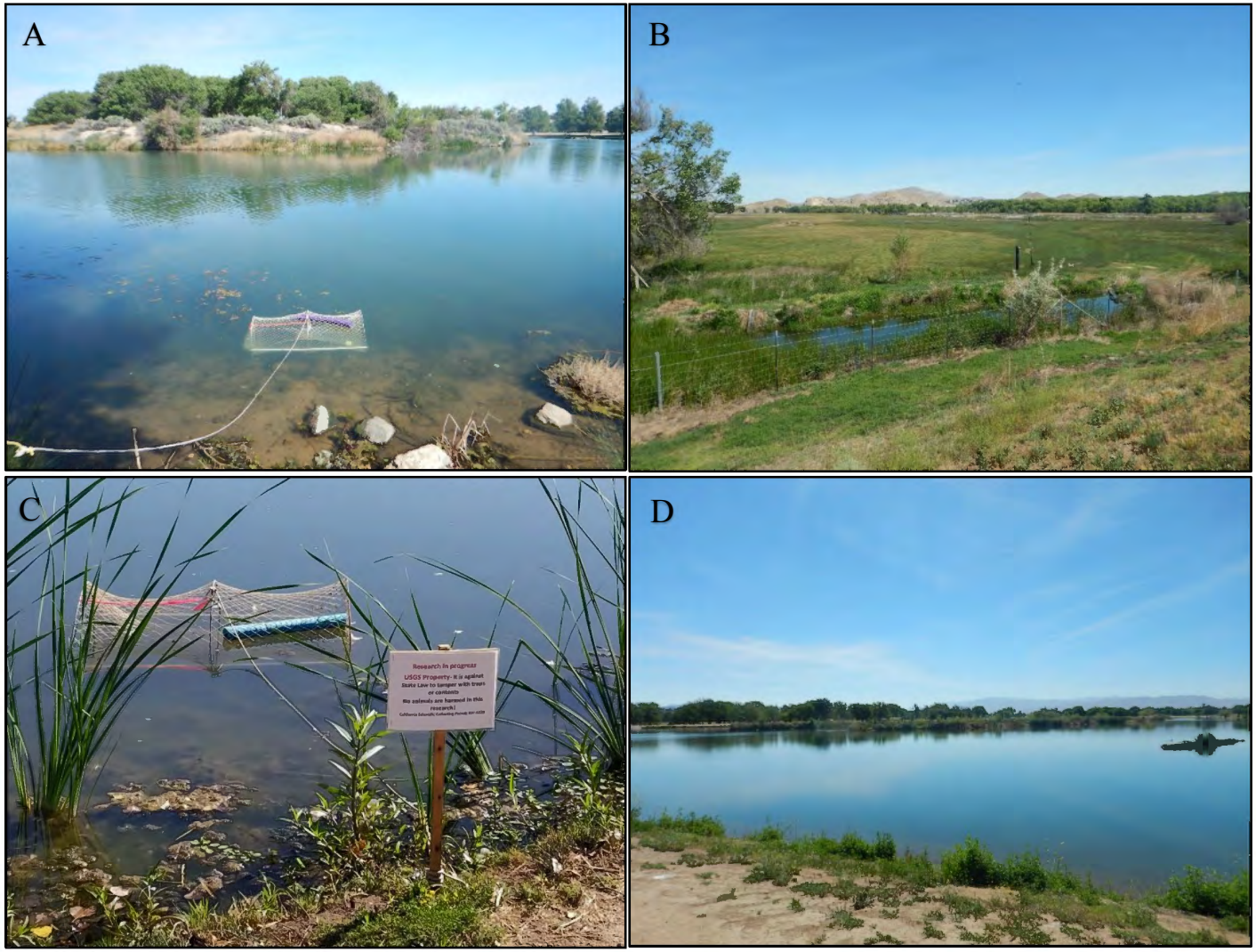


Figure 3. Areas of concentrated turtle trapping at Palisades Ranch near Helendale, California. Photo panels show A) the large, main beaver pond adjacent to the defunct bridge on the east side of the property (hoop trap in background, camera trap in foreground); B) the unmaintained, flooded road running east-west through the property (hoop trap on left, camera trap on right); C) a hoop trap being set on the north side of the defunct bridge; and D) a hoop trap set in a heavily vegetated and shaded area just east of the defunct bridge (camera trap in foreground). Photos by U.S. Geological Survey.

Figure 4. Survey windows, surveys performed, and dates song meter was set to record audio for red-legged frogs (RLF) and arroyo toads (AT) at Palisades Ranch.

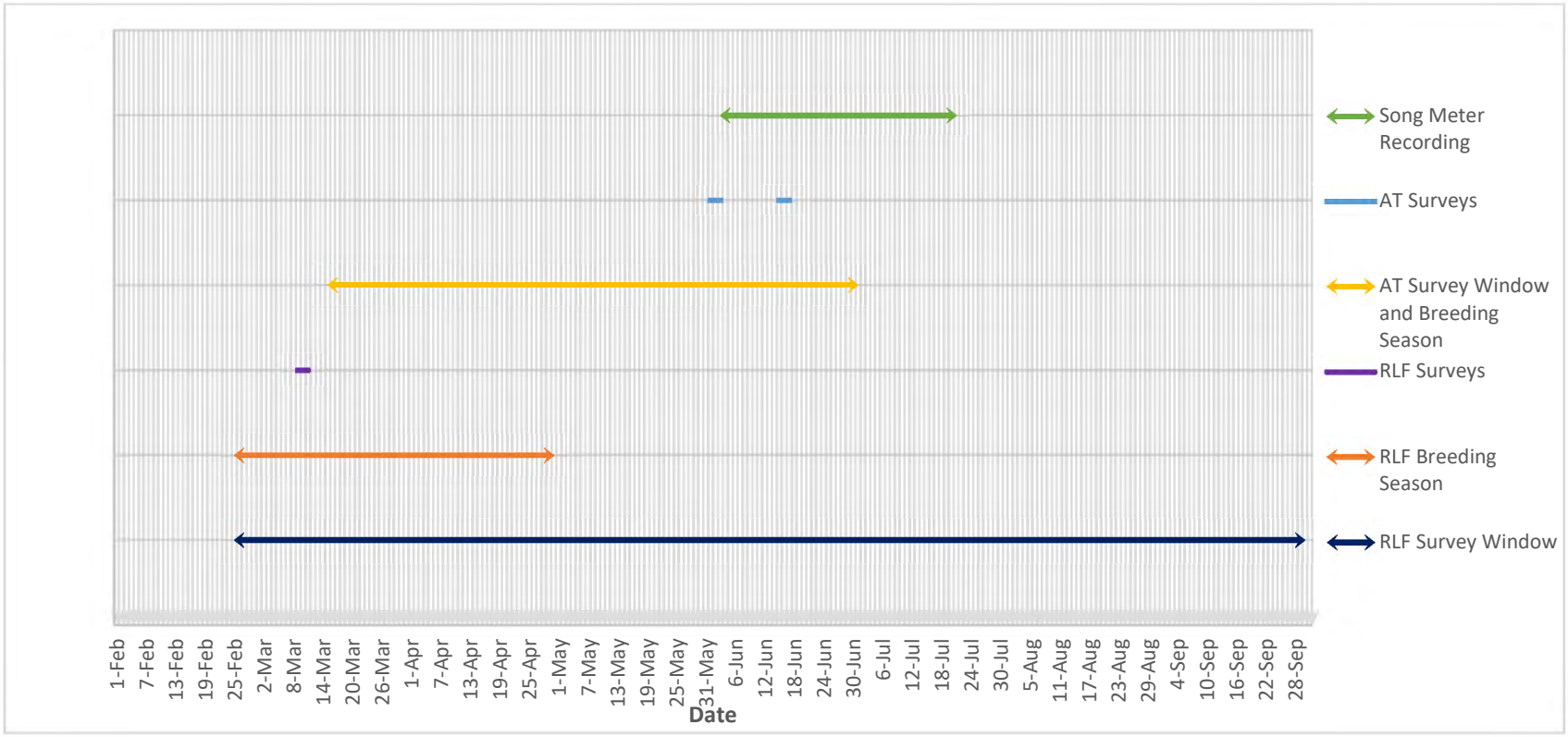


Figure 5. Red-legged frog and arroyo toad survey sites at Palisades Ranch near Helendale, California. Photo panels show A) the unmaintained, flooded road transect at survey Site 1; B) beaver damming along the flooded road transect at survey Site 1; C) flowing water at survey Site 2 located adjacent to the airstrip on the north side of the property; and D) Wildlife Acoustics Song Meter SM4 secured in a cottonwood tree in the riparian area along the flooded road. Photos by U.S. Geological Survey.

Figure 6. Anterior view of a non-native, adult male red-eared slider turtle (*Trachemys scripta elegans*) captured in a hoop trap at Palisades Ranch on 19 June 2019. Photo by U.S. Geological Survey.

Figure 7. Non-native, adult male red-eared sliders (*Trachemys scripta elegans*) captured in hoop traps at Mojave Narrows Regional Park. Photo panels A and B show dorsal and ventral views, respectively, of the male *T. s. elegans* captured on 18 September 2019. Photo panels C and D show dorsal and ventral views, respectively, of the male *T. s. elegans* captured on 17 June 2020. Photos by U.S. Geological Survey.

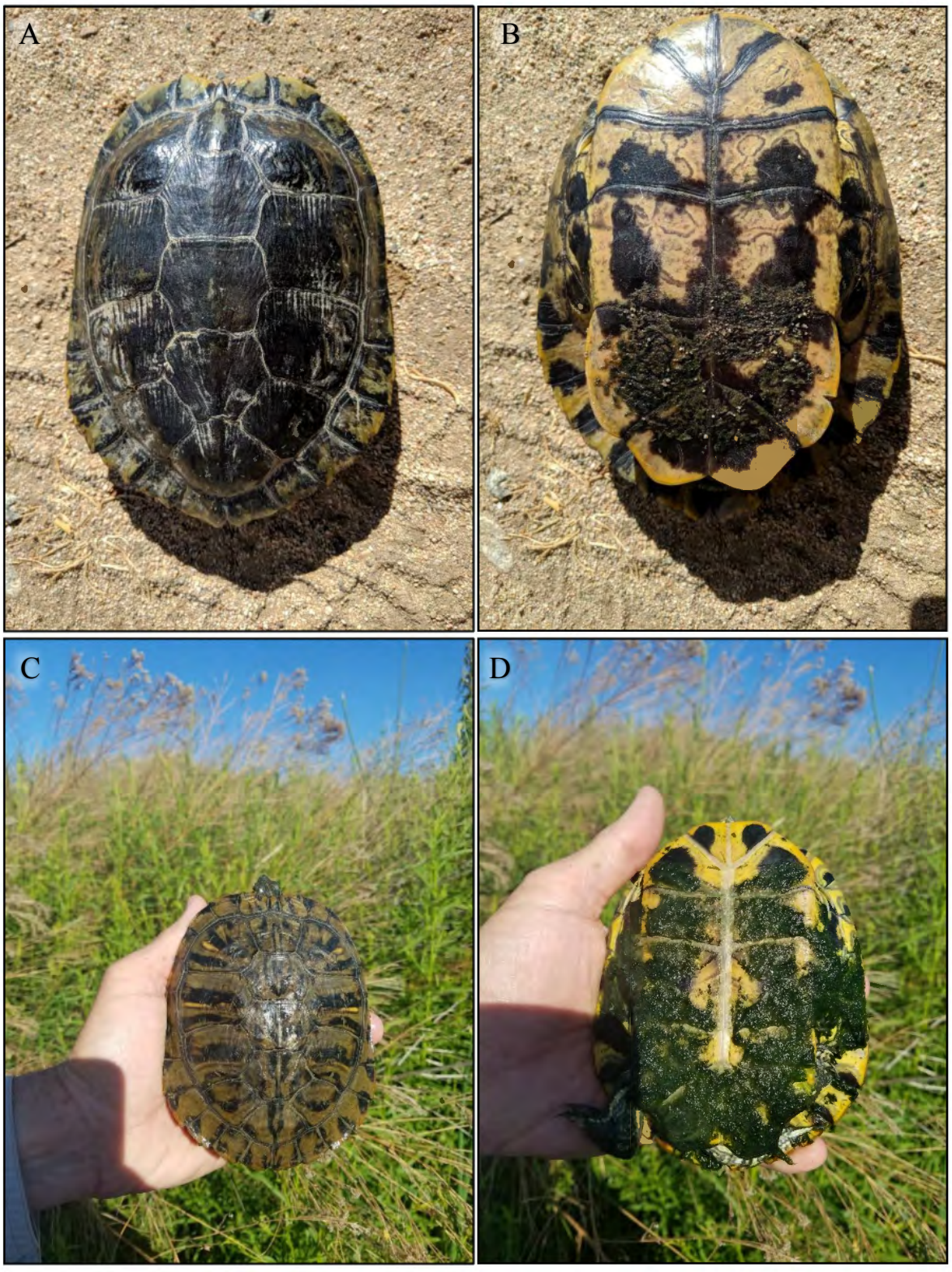


Figure 8. Baja California tree frogs (*Pseudacris hypochondriaca*) observed during field survey transects for other targeted species of amphibians at Palisades Ranch. Photo panels A, B, and C show different colorations (green, orange, and brown, respectively) of adult *P. hypochondriaca* observed. Photo panels D and E show juvenile and tadpole *P. hypochondriaca*, respectively. Photos by U.S. Geological Survey.

Figure 9. Photo of one adult American bullfrog (*Lithobates catesbeianus*) hand-captured during field survey transects for other targeted species of amphibians at Palisades Ranch. Photo by U.S. Geological Survey.

Figure 10. Photo of a hand-captured western toad (*Anaxyrus boreas*) metamorph observed during field survey transects for other targeted species of amphibians at Palisades Ranch. Species identification was confirmed by Ed Ervin (Associate Biologist, Merkel & Associates Inc., southern California amphibian expert). Photo by U.S. Geological Survey.

APPENDICES

Appendix A.

Datasheets for all turtles captured during trapping sessions at Palisades Ranch and Mojave Narrows Regional park from 2017-2020. Abbreviations on datasheets are as follows: Wt = weight, CL = carapace length, PL = plastron length, CW = carapace width, CH = carapace height. Recorder indicates the biologist recording the data: SRP = Shellie Puffer, KC = Kristy Cummings.

ent 6/25/19 T. scripta QAQC 06/27/19 SRP

ACTINEMYS DATA SHEET

Site: Afton Cady Palisades **Recorder:** JEL (SRP) _____

Date: 06/19/19 **Time:** 0911

Turtle ID: — **Capture Occasion:** 1

Turtle Characteristics

Sex: ~~Female~~ (Male) Immature Hatchling Dead

Weight: (g+/-1) 1700

Carapace Length (+/-0.1) 22.0 cm
Plastron Length (+/-0.1) 19.15 cm
} straightline, midline

Carapace Width (+/-0.1) 15.9 cm
Carapace Height (+/-0.1) 8.5 cm
} between 2nd & 3rd vertebrals

Shell Damage: None - good condition, bright patterning & dark melanin on plastron; claws on R front foot - several missing

X-ray

X-ray Settings: 60kv, 0.08 sec, 27" **Other** —

Clutch Size: —

GPS Unit

GPS Unit: (Garmin Oregon 550T) Garmin GPS 3 Other _____

Projection (UTM) Other _____ **Zone** (11) Other _____

Datum (NAD 83) Other _____

GPS

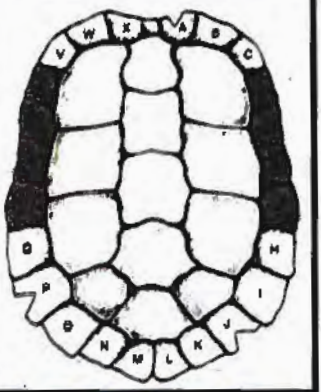
GPS (Trap): E 467543 N 3837005

Accuracy +/- 9 m **Elevation** 7167 m

Trap Info

Describe Location: Hoop 1 - big beaver pond, upstream side of bridge; Deep pond, many sedges
GPS location Waypoint #059

Comments:
- Removed ~~female~~ male red-eared slider from pond & ~~she~~ HE will either go in tank @ USGS or go to PTX Herp Society
- Decided turtle was male in office as per C. Drost & W. Gibbons



Created: 3/15/16 – took down to PTX Herp Soc on 06/26/19

Ent 09/20/19 KC

Mojave Narrows Regional Park turtle inventory	Date: 09/18/19	Recorder: SRP

	Species	Sex	Wt(g)	CL(cm)	PL(cm)	CW(cm)	CH(cm)	Shell Disease?	Comments (cohort notch; [redacted] notch on left femoral scute of plastron)
1	T. scripta	M	[redacted]	16.3	–	–	–	N	small melanistic male, very long claws
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

Mojave Narrows Regional Park turtle inventory Date: 17 June 2020 Recorder: KC

	Species	Sex	Wt(g)	CL(cm)	PL(cm)	CW(cm)	CH(cm)	Sh # Disease?	Comments (cohort notch applied to all turtles unless noted otherwise ~~single~~ Double notch on left femoral scute of plastron)
1	Pseudemys scripta elegans	M	375	13.6	12.4	10.9	5.0	N	~~A~~ 1 gone on plastron, ~~1~~ 2 toes pictured
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

Appendix B.

Datasheets for all habitat site assessments performed each day during California red-legged frog (*Rana draytonii*) and arroyo toad (*Anaxyrus californicus*) surveys at Palisades Ranch. These habitat site assessment sheets were modeled from U.S. Fish and Wildlife Service guidelines created for both species. Each habitat site assessment datasheet has two pages of data.

California Red-legged Frog Habitat Site Assessment Data Sheet

Date of Site Assessment: 03/09/2020 (mm/dd/yyyy)

Site Assessment Biologists: Lovich, Jeffrey (Last name, first name); Cummings, Kristy (Last name, first name); Puffer, Shellie (Last name, first name); _____ (Last name, first name)

Site Location: Pallisades Ranch, San Bernardino County - flooded road by old bridge (County, General location name)

N 3837017 E 467539 Acc(m) Elev(m) 761 (UTM Coordinates, NAD 83, Zone 11)

1) Is this site within the current or historic range of the CRF (circle one)? YES (NO)

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one)? YES (NO)

GENERAL AQUATIC HABITAT CHARACTERIZATION

POND: frequent & vary in size - created from beaver dams
Size: varies Maximum depth: ? 2m in some places

Vegetation: emergent, overhanging, dominant species: Typha, willows, cottonwoods, tumbleweed at edges of corridor
Typha is dominant

Substrate: sandy bottom, muddy & organic

Perennial or Ephemeral *(circle one)*. If ephemeral, date it goes dry: _____
pools behind largest beaver dams are perennial

~~**STREAM**~~: Flooded road
Bank full width: 1-1.5 cars (5m)
Depth at bank full: N/A
Stream gradient: N/A

The road crosses the property E → W & is flooded by the Mojave River which flows S → N - water is ephemeral
Are there pools (circle one)? (YES) NO
If yes,
Size of stream pools: - many ponded backwaters good for amphibians come off the road
Maximum depth of stream pools: 0.7m

California Red-legged Frog Habitat Site Assessment Data Sheet

Characterize non-pool habitat: run, riffle, glide, other: _____

Vegetation: emergent, overhanging, dominant species: Typha dominant, cottonwoods, willows

Substrate: sandy, muddy/organic

Bank description: "banks" are often formed by beaver dams & have small flowing outlets

Perennial or Ephemeral *(circle one)*. If ephemeral, date it goes dry: _____

Other aquatic habitat characteristics, species observations, drawings, or comments:

- Beaver stumps (including from very large cottonwoods) & beaver dams abundant & create many beaver ponds

- Many mosquitofish & Baja California tree frogs

- transects were run between the Old Bridge, ~~the~~ east/west to the parking point at the end of the water-filled roadway ~~to~~ the west of the bridge. Each transect included an out/back on the same track of road, also including any flooded areas off ~~the~~ the road

California Red-legged Frog Habitat Site Assessment Data Sheet

Date of Site Assessment: 03/10/2020 (mm/dd/yyyy)

Site Assessment Biologists: Puffer (Last name) Shellie (first name); Cummings (Last name) Kristy (first name); Lovich (Last name) Jeffrey (first name); _____ (Last name) _____ (first name)

Site Location: Palisades Ranch, near airport strip; San Bernardino County, CA (County, General location name)

N 3841130 E 468030 Acc(m) _____ Elev(m) 758 (UTM Coordinates, NAD 83, Zone 11)

1) Is this site within the current or historic range of the CRF (circle one)? YES (NO)

2) Are there known records of CRF within 1.6 km (1 mi) of the site (circle one)? YES (NO)

GENERAL AQUATIC HABITAT CHARACTERIZATION

POND: N/A

Size: — Maximum depth: —

Vegetation: emergent, overhanging, dominant species: —

Substrate: —

Perennial or Ephemeral *(circle one)*. If ephemeral, date it goes dry: —

STREAM:

Bank full width: est 15-20 m

Depth at ~~bank full~~: depth of water currently up to ~25-30 cm

Stream gradient: almost none

Are there pools (circle one)? YES (NO)

If yes,

Size of stream pools: —

Maximum depth of stream pools: —

California Red-legged Frog Habitat Site Assessment Data Sheet

Characterize non-pool habitat: run, riffle, glide, other: like sheet flow - very shallow, gently moving waters

Vegetation: emergent, overhanging, dominant species: sparse near water & widely scattered cottonwoods & willows at edges with tumbleweeds in the uplands

Substrate: sandy

Bank description: shallow & sandy, moving up to taller sandy banks step-wise

Perennial or Ephemeral *(circle one).* If ephemeral, date it goes dry: unsure

Other aquatic habitat characteristics, species observations, drawings, or comments:

- Heard calls of P. hypochondriaca during daytime
- This stretch of the river is ephemeral according to Tony Winkel (MWD) & is dry during summer
- Adjacent to airstrip

Arroyo Toad Habitat Site Assessment Data Sheet

Date of Site Assessment: 6/1/2020 (mm/dd/yyyy)

Site Assessment Biologists: Cummings (Last name) Kristy (first name); Louth (Last name) Jeff (first name); _____ (Last name) _____ (first name); _____ (Last name) _____ (first name)

Site Location: San Bernardino County, Palisades Ranch – flooded road by old bridge
(County, General location name)

N 3837017 E 467539 Acc(m) Elev(m) 761
(UTM Coordinates, NAD 83, Zone 11)

1) Is this site within the current or historic range of the AT (circle one)? YES (NO)

2) Are there known records of AT within 1 km of the site (circle one)? YES (NO)

GENERAL AQUATIC HABITAT CHARACTERIZATION

POND:

Size: _____ Maximum depth: _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or Ephemeral *(circle one)*. If ephemeral, date it goes dry: unsure

STREAM:

Bank full width: ~6m

Depth at bank full: 2m

Stream gradient: Barely flowing

Are there pools (circle one)? YES (NO)

If yes,

Size of stream pools: ~~N/A - Beaver dammed stream~~

Maximum depth of stream pools: ~~~1-2m~~

Arroyo Toad Habitat Site Assessment Data Sheet

Characterize non-pool habitat: run, riffle, glide, other: run from beaver dam in old grown over road

Vegetation: emergent, overhanging, dominant species: overhanging, evergreen riparian vegetation

Substrate: Sandy w/ algae

Bank description: N/A - flat

Perennial or Ephemeral *(circle one)*. If ephemeral, date it goes dry: unknown

Other aquatic habitat characteristics, species observations, drawings, or comments:

Beaver dams, ~~Bull~~ Bullfrogs present

3- 2yr old Bullfrog tadpoles

1- 1yr. old Bullfrog tadpole

many minnows in water

Arroyo Toad Habitat Site Assessment Data Sheet

Date of Site Assessment: 6/2/2020 (mm/dd/yyyy)

Site Assessment Biologists: Lovich (Last name) Jeff (first name) ____ (Last name) ____ (first name)

Cummings (Last name) Kristy (first name) ____ (Last name) ____ (first name)

Site Location: San Bernardino County, ~~Los~~ Palisades Ranch - flooded Road by old bridge
(County, General location name)

N 3837017 E 467539 Acc(m) ____ Elev(m) 761
(UTM Coordinates, NAD 83, Zone 11)

1) Is this site within the current or historic range of the AT (circle one)? YES (NO)

2) Are there known records of AT within 1 km of the site (circle one)? YES (NO)

GENERAL AQUATIC HABITAT CHARACTERIZATION

POND:

Size: ____ Maximum depth: ____

Vegetation: emergent, overhanging, dominant species: ____

Substrate: ____

Perennial or Ephemeral *(circle one)*. If ephemeral, date it goes dry: unsure

STREAM:

Bank full width: 2-6m

Depth at bank full: 2-6m

Stream gradient: Fairly flowing

Are there pools (circle one)? YES (NO)

If yes,

Size of stream pools: ____

Maximum depth of stream pools: ____

Arroyo Toad Habitat Site Assessment Data Sheet

Characterize non-pool habitat: run, riffle, glide, other: run from beaver dam to old overgrown road

Vegetation: emergent, overhanging, dominant species: overhanging, overgrown riparian vegetation

Substrate: Sandy w/ algae

Bank description: N/A - flat

Perennial or Ephemeral *(circle one)*. If ephemeral, date it goes dry: unknown

Other aquatic habitat characteristics, species observations, drawings, or comments:

Beaver dams, bull frog's present

4 - 2 yr old Bull frog tadpoles

1 - 1 yr old Bull frog tadpoles

lots of minnows swimming in wake

- walked from old bridge ~~North~~ west to parking spot then walked ~~South~~ ~~west~~ east back to bridge on old road

Arroyo Toad Habitat Site Assessment Data Sheet

Date of Site Assessment: 06/15/2020 (mm/dd/yyyy)

Site Assessment Biologists: Lovith (Last name) Jeff (first name); Cummings (Last name) Kristy (first name)

_____ (Last name) _____ (first name); _____ (Last name) _____ (first name)

Site Location: San Bernardino County, Palisades Ranch - Old Road East to west by old bridge
(County, General location name)

N 3837017 E 467539 Acc(m) _____ Elev(m) 761
(UTM Coordinates, NAD 83, Zone 11)

1) Is this site within the current or historic range of the AT (circle one)? YES (NO)

2) Are there known records of AT within 1 km of the site (circle one)? YES (NO)

GENERAL AQUATIC HABITAT CHARACTERIZATION

POND:

Size: _____ Maximum depth: _____

Vegetation: emergent, ~~overhanging~~, dominant species: _____

_____

_____

Substrate: _____

_____

Perennial or Ephemeral *(circle one)*. If ephemeral, date it goes dry: unknown

STREAM:

Bank full width: 1-5m

Depth at bank full: 1-2m

Stream gradient: intermittent

Are there pools (circle one)? YES (NO)

If yes,

Size of stream pools: _____

Maximum depth of stream pools: _____

Arroyo Toad Habitat Site Assessment Data Sheet

Characterize non-pool habitat: run, riffle, glide, other: Beaver dammed area run in old overgrown road

Vegetation: emergent, overhanging, dominant species: overhanging, overgrown riperian vegetation

Substrate: Soft mud, Sand

Bank description: N/A - flat

Perennial or Ephemeral *(circle one)*. If ephemeral, date it goes dry: unknown

Other aquatic habitat characteristics, species observations, drawings, or comments:

- Lots of evidence of beavers
- heard Bullfrog calls (Several)
- Saw Knight hawks flying overhead - mostly by old bridge
- minnows in water
- performed transect from East side of property (by old bridge) & walked west down old flooded road to vehicle by housing
- Road had less flooded areas than previous - shallower pooled areas w/ more dry areas in between - only 2 deep pools (2-3m) on Route - the rest were fairly shallow (1-2m)

Arroyo Toad Habitat Site Assessment Data Sheet

Date of Site Assessment: 06/16/2020 (mm/dd/yyyy)

Site Assessment Biologists: Cummings (Last name) Kristy (first name); _____ (Last name) _____ (first name)

Lovich (Last name) Jeff (first name); _____ (Last name) _____ (first name)

Site Location: San Bernardino county, Palisades Ranch - old flooded Road by old bridge
(County, General location name)

N 3832017 E 467539 Acc(m) _____ Elev(m) 761
(UTM Coordinates, NAD 83, Zone 11)

1) Is this site within the current or historic range of the AT (circle one)? YES (NO)

2) Are there known records of AT within 1 km of the site (circle one)? YES (NO)

GENERAL AQUATIC HABITAT CHARACTERIZATION

POND:

Size: _____ Maximum depth: _____

Vegetation: emergent, overhanging, dominant species: _____

Substrate: _____

Perennial or **Ephemeral** *(circle one)*. If ephemeral, date it goes dry: unknown

STREAM:

Bank full width: 1-5m

Depth at bank full: 1-2m

Stream gradient: Intermittent

Are there pools (circle one)? YES (NO)

If yes,

Size of stream pools: _____

Maximum depth of stream pools: _____

Arroyo Toad Habitat Site Assessment Data Sheet

Characterize non-pool habitat: run, riffle, glide, other: beaver dam area run in overgrown road

Vegetation: emergent, overhanging, dominant species: overhanging, overgrown riparian vegetation

Substrate: Sandy, muddy

Bank description: N/A - flat

Perennial or ~~Ephemeral~~ *(circle one)*. If ephemeral, date it goes dry: unknown

Other aquatic habitat characteristics, species observations, drawings, or comments:

- Performed transect ~~for~~ walking up old flooded road from west side of property (by houses) to old Bridge on east side of property and back to starting point

- lots of beaver dammed flooded areas
- flooded areas are intermittent w/ dry areas walking ~~off~~ along road

Appendix C.

Survey datasheets for California red-legged frogs (*Rana draytonii*) and arroyo toads (*Anaxyrus californicus*) for survey transects performed at Palisades Ranch. These survey datasheets were modeled from U.S. Fish and Wildlife Service guidelines created for both species. Each survey datasheet has two pages of data, with all amphibian and other animal observations listed on the second page. Time of day, season (breeding or non-breeding), weather conditions, moon phase, water temperature, and survey times are all listed in accordance with U.S. Fish and Wildlife Survey guidelines.

ent. 3/12/20 RE QAQC 03/13/20 SEP

California Red-legged Frog Survey Data Sheet

Date of Survey: 03/09/2020 (mm/dd/yyyy)

Survey Biologist: Lovich (Last name) Jeff (first name)

Survey Biologist: Puffer (Last name) Shellie (first name)

Survey Biologist: Cummings (Last name) Kristy (first name)

Survey Biologist: _____ (Last name) _____ (first name)

Site Location: Palisades Ranch, San Bernardino County - flooded road by old bridge
(County, General location name)

N 3837017 E 467539 Acc(m) Elev(m) 761
(UTM Coordinates, NAD 83, Zone 11)

Type of Survey* (circle one of each for time of day and season):

(DAY (1 hr post-sunrise to 1 hr pre-sunset)) **NIGHT (no earlier than 1 hr post-sunset)**

(BREEDING (1 Jan - 30 June)) **NON-BREEDING (1 Jul - 30 Sept)**

*Breeding season, daytime: search for larvae, metamorphs, and egg masses.
Non-breeding season , daytime: search for metamorphosing sub-adults and non-breeding adults.
All seasons, nighttime: search for adult and metamorphosed frogs.

Survey number (circle one): (1) 2 3 4 5 6 7 8

Sunrise: [redacted] 07:05 **Begin Time:** 15:25

Sunset: [redacted] 18:53 **End Time:** [redacted] 16:55

Cloud cover: partly to mostly cloudy **Precipitation:** no

Air Temperature (>10C/50F): 67.9°F **Water Temperature:** 14.4°C

Wind Speed (<8 kph/5 mph): 2.7 mph **Visibility Conditions:** perfect; clear

Moon phase: Full **Humidity:** RH 30.5 %

Description of weather conditions: cool, slight breeze with sun popping in & out of clouds

Brand name and model of light used to conduct surveys: N/A

Were binoculars used for the surveys (circle one)? YES (NO)
Brand, model, and power of binoculars: _____

California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Pseudachris hypochondriaca	23+	observed	metamorphs, adults	juvenile, adult	100% positive (see photos)
↳ saw 3 colors: gray-brown, orange-red, & bright green					

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: None observed

Other notes, observations, comments, *etc.*

- Many mosquitofish observed
- Beavers obviously present from number of beaver dams & freshly cut trees & limbs
- Walked transect from ~~west~~ east side of property (from bridge) to ~~east~~ west along flooded road, and back, explored few backwaters along road
- Transect count was performed on return transect to get 23 observations – recorded 23+ because we also saw P. hypochondriaca on first transect across but didn't get exact counts on that transect

ent 3/13/20 KC QAQC 03/13/20 SKT

California Red-legged Frog Survey Data Sheet

Date of Survey: 03/09/2020 (mm/dd/yyyy)

Survey Biologist: Lovich (Last name) Jeff (first name)

Survey Biologist: Cummings (Last name) Kristy (first name)

Survey Biologist: Rutter (Last name) Shellie (first name)

Survey Biologist: _____ (Last name) _____ (first name)

Site Location: San Bernardino, Palisades Ranch - flooded road by old bridge
(County, General location name)

N 3837017 E 467539 Acc(m) Elev(m) 761
(UTM Coordinates, NAD 83, Zone 11)

Type of Survey* (circle one of each for time of day and season):

DAY (1 hr post-sunrise to 1 hr pre-sunset) **BREEDING (1 Jan - 30 June)**

NIGHT (no earlier than 1 hr post-sunset) **NON-BREEDING (1 Jul - 30 Sept)**

*Breeding season, daytime: search for larvae, metamorphs, and egg masses.
Non-breeding season , daytime: search for metamorphosing sub-adults and non-breeding adults.
All seasons, nighttime: search for adult and metamorphosed frogs.

Survey number (circle one): 1 (2) 3 4 5 6 7 8

Sunrise: [redacted] 07:05

Sunset: [redacted] 18:53

Cloud cover: Partly cloudy

Air Temperature (>10C/50F): 63.4°F

Wind Speed (<8 kph/5 mph): 0

Moon phase: full

Begin Time: ~~7:25pm~~ 7:25pm - 1925

End Time: 8:40pm - 2040

Precipitation: 0

Water Temperature: ~~Same~~ 14.4°C

Visibility Conditions: clear

Humidity: 40.5

Description of weather conditions: partly cloudy; moon behind clouds

Brand name and model of light used to conduct surveys: headlamps

Were binoculars used for the surveys (circle one)? YES (NO)

Brand, model, and power of binoculars: _____

California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
P. hypochondriaca	1	O	Adult	Adult	100% positive
P. hypochondriaca	tads! ?	H	unk.	unk	100% positive

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: none

Other notes, observations, comments, *etc.*

- Walked transects from west side of property to old bridge & back along flooded road
- Moon full, popping in & out of clouds
- Calls were loudest near downed cottonwoods (large cottonwoods cut down by beavers) are located
- calls came in waves
- we periodically paused to turn off headlamps, stop and listen for calls

ent 3/13/2020 KL CAUC 03/13/20 SBT

California Red-legged Frog Survey Data Sheet

Date of Survey: 3/10/20 (mm/dd/yyyy)

Survey Biologist: Lovich (Last name) Jeff (first name)

Survey Biologist: Cummings (Last name) Kristy (first name)

Survey Biologist: Rudder (Last name) Shellie (first name)

Survey Biologist: _____ (Last name) _____ (first name)

Site Location: San Bernardino, Palisades Ranch - flooded road by old bridge
(County, General location name)

N 3837017 E 467539 Acc(m) _____ Elev(m) 761
(UTM Coordinates, NAD 83, Zone 11)

Type of Survey* (circle one of each for time of day and season):

(DAY) (1 hr post-sunrise to 1 hr pre-sunset) — (BREEDING) (1 Jan - 30 June)

NIGHT (no earlier than 1 hr post-sunset) — NON-BREEDING (1 Jul - 30 Sept)

*Breeding season, daytime: search for larvae, metamorphs, and egg masses.
Non-breeding season , daytime: search for metamorphosing sub-adults and non-breeding adults.
All seasons, nighttime: search for adult and metamorphosed frogs.

Survey number (circle one): 1 2 (3) 4 5 6 7 8

Sunrise: 07:05 **Begin Time:** 10:16am

Sunset: 18:53 **End Time:** 11:54am

Cloud cover: Mostly cloudy w/ very interspersed sunshine **Precipitation:** intermittent very light drizzle

Air Temperature (>10C/50F): 57.4°F **Water Temperature:** 11.6 °C

Wind Speed (<8 kph/5 mph): 0.7 **Visibility Conditions:** clear

Moon phase: Full - waning gibbous **Humidity:** 80 %

Description of weather conditions: mostly cloudy ; very interspersed sunshine
Drizzled very lightly for a few minutes total

Brand name and model of light used to conduct surveys: N/A

Were binoculars used for the surveys (circle one)? YES (NO)

Brand, model, and power of binoculars: _____

California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Pseudachris hypochondriaca	8	O	mature adult	~~adult~~	positive
Pseudachris hypochondriaca	-	H	unk	~~unk.~~	positive

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: N/A

Other notes, observations, comments, *etc.*

- Also observed one dead Pseudachris hypochondriaca in flooded road. Most Pseudachris observations occurred off the flooded road & in ponded backwaters. Three observations were terrestrial near a sandbar area.
- Walked transect along flooded road from ~~West~~ side of property to bridge & back
- Checked as many backwaters off the road as possible
- Small snails found along edge of road on debris

ent. 3/13/2020 KC QAQC 03/13/20 SRP

California Red-legged Frog Survey Data Sheet

Date of Survey: 03/10/2020 (mm/dd/yyyy)

Survey Biologist: Puffer (Last name) Shellie (first name)

Survey Biologist: Cummings (Last name) Kristy (first name)

Survey Biologist: Lovich (Last name) Jeffrey (first name)

Survey Biologist: _____ (Last name) _____ (first name)

Site Location: San Bernardino; Palisades Ranch - flooded road by bridge
(County, General location name)

N 3837017 E 467539 Acc(m) Elev(m) 761
(UTM Coordinates, NAD 83, Zone 11)

Type of Survey* (circle one of each for time of day and season):

DAY (1 hr post-sunrise to 1 hr pre-sunset) **BREEDING (1 Jan - 30 June)**

NIGHT (no earlier than 1 hr post-sunset) **NON-BREEDING (1 Jul - 30 Sept)**

*Breeding season, daytime: search for larvae, metamorphs, and egg masses.
Non-breeding season , daytime: search for metamorphosing sub-adults and non-breeding adults.
All seasons, nighttime: search for adult and metamorphosed frogs.

Survey number (circle one): 1 2 3 (4) 5 6 7 8

Sunrise: 07:05 **Begin Time:** 19:30

Sunset: 18:53 **End Time:** 21:00

Cloud cover: mostly clear, scattered clouds **Precipitation:** none

Air Temperature (>10C/50F): 56.3°F **Water Temperature:** 11.6°C

Wind Speed (<8 kph/5 mph): 0.9 mph **Visibility Conditions:** clear

Moon phase: Full - waning gibbous **Humidity:** RH 68.9%

Description of weather conditions: Rained intermittently during the day, but skies are now clear with few scattered clouds - warm moon rising - some heat lightning

Brand name and model of light used to conduct surveys: headlamps

Were binoculars used for the surveys (circle one)? YES (NO)

Brand, model, and power of binoculars: _____

California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Pseudachris hypochondriaca	10	observed	adults	mature adults	positive
"	–	H	unk.	unk.	positive
~~Rana~~ Lithobates catesbeianus	1	O	adult	mature adult	positive
unknown – increasing short trill	–	H	unk.	unk.	–
unknown – croak	–	H	unk.	unk.	–

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: beavers spotted moving around via eyeshine, bullfrog spotted (1)(adult)

Other notes, observations, comments, *etc.*

- TWO unknown calls (1) type of croak heard many times in one area (2) unknown increasing short trill heard near west side of road
- Transect out & back on flooded road from west side parking spot to bridge
- Loudest area of calls by P. hypochondriaca still by downed cottonwoods
- Observed bullfrog via eyeshine & captured to verify
- Worm moon rose, heat lightning occurred
- wind was a little breezier than wind speed represented at start but died down to no wind by end of transects

Ent. 3/13/2020 KC

California Red-legged Frog Survey Data Sheet

Date of Survey: 03/10/2020 (mm/dd/yyyy)

Survey Biologist: Puffer (Last name) Shellie (first name)

Survey Biologist: Cummings (Last name) Kristy (first name)

Survey Biologist: Lovich (Last name) Jeffrey (first name)

Survey Biologist: _____ (Last name) _____ (first name)

Site Location: San Bernardino; Palisades Ranch next to airstrip
(County, General location name)

N 3841130 E 408030 Acc(m) Elev(m) 758
(UTM Coordinates, NAD 83, Zone 11) → used Gaia app

Type of Survey* (circle one of each for time of day and season):

DAY (1 hr post-sunrise to 1 hr pre-sunset) **(BREEDING (1 Jan - 30 June)**

(NIGHT (no earlier than 1 hr post-sunset) **NON-BREEDING (1 Jul - 30 Sept)**

*Breeding season, daytime: search for larvae, metamorphs, and egg masses.
Non-breeding season , daytime: search for metamorphosing sub-adults and non-breeding adults.
All seasons, nighttime: search for adult and metamorphosed frogs.

Survey number (circle one): 1 2 3 4 (5) 6 7 8

Sunrise: 07:05 **Begin Time:** 21:27

Sunset: 18:53 **End Time:** 21:35

Cloud cover: Mostly clear, few clouds **Precipitation:** none

Air Temperature (>10C/50F): 55° F **Water Temperature:** –

Wind Speed (<8 kph/5 mph): 3.3 mph **Visibility Conditions:** clear

Moon phase: Full - waning gibbous **Humidity:** RH 70%

Description of weather conditions: Breezy, clear, rained on & off earlier in the day

Brand name and model of light used to conduct surveys: headlamps

Were binoculars used for the surveys (circle one)? YES (NO)

Brand, model, and power of binoculars: _____

California Red-legged Frog Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Size Class	Certainty of Identification
Pseudacris hypochondriaca	–	H	unk.	unk.	positive
↳ also heard short, low trills that may be second call of this species					

Describe potential threats to California red-legged frogs observed, including non-native and native predators such as fish, bullfrogs, and raccoons: –

Other notes, observations, comments, *etc.*

- Stood on airstrip with clear view of stream & listened for calls
- Heard P hypochondriaca call as well as the same short, low trill that we heard on the transect - possible second call of the species?
- Lots of noise pollution, esp trains

Ent. 06/03/20 SRP QAQC 6/8/20 KC

Arroyo Toad Survey Data Sheet

Date of Survey: 6/1/2020 (mm/dd/yyyy)

Survey Biologist: Lovich (Last name) Jeff (first name)

Survey Biologist: Cummings (Last name) Kristy (first name)

Survey Biologist: _____ (Last name) _____ (first name)

Survey Biologist: _____ (Last name) _____ (first name)

Site Location: San Bernardino County, Palisades Ranch (County, General location name) - flooded road by old bridge

N 3837017 E 467539 Acc(m) Elev(m) 761

(UTM Coordinates, NAD 83, Zone 11)

Type of Survey* (circle one of each for time of day and season):

DAY (1 hr post-sunrise to 1 hr pre-sunset) — (BREEDING (15 Mar-1 July))

(NIGHT (1 hr post-sunset to midnight)) — NON-BREEDING

Daytime: search mainly for eggs, larvae, and juveniles.
Nighttime: search mainly for adults.

Survey number: 1

Sunrise: 5:38am **Begin Time:** 8:45pm

Sunset: 7:58pm **End Time:** 9:25pm

Cloud cover: 80% **Precipitation:** 44.5 dew pt.

Air Temperature (>13C/55F): 80.9°F **Water Temperature:** 18.5°C ridge on road

Wind Speed: 0.95 mph **Visibility Conditions:** mostly cloudy but clear to see

Moon phase: 1/2 moon **Humidity:** 28.38

Description of weather conditions: overcast + breezy

Were binoculars used for the surveys (circle one)? YES (NO)

Brand, model, and power of binoculars: —

Arroyo Toad Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Certainty of Identification
Bullfrog Lithobates Catesbeiana	3	O	2yr. old tadpole	100%
Bullfrog Lithobates Catesbeiana	1	O	1yr. old tadpole	100%
Baja cal. treefrogs Pseudacris hypochondriaca	lots	H	adult	100%
Lithobates Catesbeiana Bullfrogs	3-4	H	adult	100%

Describe potential threats to Arroyo Toads observed, including non-native and native predators such as fish, bullfrogs, and raccoons: Bullfrogs, beavers

Other notes, observations, comments, *etc.*

- Performed 1/2 transect distance compared to previous transect lengths.
- many minnows in water
- water was clear
- walked transect ~~on from~~ ~~South~~ west side of bridge ~~to Northside~~ approximately 4 telephone poles from Road intersection beyond houses – Started from west side of property moving ~~west~~ east
- walked transect up flooded old Road – ~~North~~ towards bridge
- less water on road than last time – more dry spots
- heard less tree frogs than last time

Ent. 06/03/20 SRP QAQC 6/8/20 KC

Arroyo Toad Survey Data Sheet

Date of Survey: 6/2/2020 (mm/dd/yyyy)

Survey Biologist: Lovich (Last name) Jeff (first name)

Survey Biologist: Cummings (Last name) Kristy (first name)

Survey Biologist: _____ (Last name) _____ (first name)

Survey Biologist: _____ (Last name) _____ (first name)

Site Location: San Bernardino County, Palisades Ranch (County, General location name) - flooded Road by old bridge

N 3837017 E 467539 Acc(m) Elev(m) 761

(UTM Coordinates, NAD 83, Zone 11)

Type of Survey* (circle one of each for time of day and season):

(DAY) (1 hr post-sunrise to 1 hr pre-sunset) (BREEDING) (15 Mar-1 July)

NIGHT (1 hr post-sunset to midnight) NON-BREEDING

Daytime: search mainly for eggs, larvae, and juveniles.
Nighttime: search mainly for adults.

Survey number: 2

Sunrise: 5:38am **Begin Time:** 2:30pm

Sunset: 7:57pm **End Time:** 3:15pm

Cloud cover: 90% - overcast **Precipitation:** Ø

Air Temperature (>13C/55F): 86°F **Water Temperature:** 18.1°C

Wind Speed: Ø **Visibility Conditions:** Clear

Moon phase: ½ moon **Humidity:** 41.4

Description of weather conditions: Overcast, warm

Were binoculars used for the surveys (circle one)? YES (NO)

Brand, model, and power of binoculars: —

Arroyo Toad Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Certainty of Identification
Bullfrog Lithobates Catesbeiana	4	O	2 yr old tadpoles	100%
Bullfrog Lithobates Catesbeiana	1	O	1 yr old tadpole	100%
Baja California treefrog Pseudacris hypochondriaca	1	O	adult - brown	100%

Describe potential threats to Arroyo Toads observed, including non-native and native predators such as fish, bullfrogs, and raccoons: Beavers, bullfrogs

Other notes, observations, comments, *etc.*

- many minnows in water swimming!
- road has many deep ruts - almost thigh deep but mostly 1-2 m deep
- walked from old bridge - ~~South~~ west to parking spot ~~[redacted]~~ and back to old bridge on old road (on East side of property)

Ent. 06/18/20 SRP QAQC 06/22/2020 KC

Arroyo Toad Survey Data Sheet

Date of Survey: 06/15/2020 (mm/dd/yyyy)

Survey Biologist: Lovich (Last name) Jeff (First name)

Survey Biologist: Cummings (Last name) Kristy (First name)

Survey Biologist: _____ (Last name) _____ (first name)

Survey Biologist: _____ (Last name) _____ (first name)

Site Location: San Bernardino County, Palisades Ranch, on old flooded road by old bridge
(County, General location name)

N 3837017 E 467539 Acc(m) Elev(m) 761
(UTM Coordinates, NAD 83, Zone 11)

Type of Survey* (circle one of each for time of day and season):

DAY (1 hr post-sunrise to 1 hr pre-sunset) **BREEDING (15 Mar-1 July)**

NIGHT (1 hr post-sunset to midnight) **NON-BREEDING**

Daytime: search mainly for eggs, larvae, and juveniles.
Nighttime: search mainly for adults.

Survey number: X 3 KC

Sunrise: 5:37am **Begin Time:** 8:30pm

Sunset: 8:03pm **End Time:** 8:55pm

Cloud cover: mostly **Precipitation:** none

Air Temperature (>13C/55F): 78.2°F **Water Temperature:** 18.2°C

Wind Speed: 2.3 mph **Visibility Conditions:** clear

Moon phase: waning crescent **Humidity:** 27.8%

Description of weather conditions: windy, mostly cloudy, warm

Were binoculars used for the surveys (circle one)? **YES** (NO)

Brand, model, and power of binoculars: _____

Arroyo Toad Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Certainty of Identification
Bullfrogs Lithobates Catesbeianus	unknown	H	Adult	100%
Bullfrogs Lithobates Catesbeianus	1	O	1yr old	100%
Bull frogs Lithobate Catesbeianus	3-4	O	2yr olds	100%

Describe potential threats to Arroyo Toads observed, including non-native and native predators such as fish, bullfrogs, and raccoons: Beavers, raccoons, bullfrogs

Other notes, observations, comments, *etc.*

- Ran transect from Old bridge on east side of property (walked west to vehicle parked by houses
- heard no frogs except bullfrogs!
- water was clear

Ent. 06/18/20 SRP QAQC 06/22/2020 KC

Arroyo Toad Survey Data Sheet

Date of Survey: 06/16/2020 (mm/dd/yyyy)

Survey Biologist: Lovich (Last name) Jeff (first name)

Survey Biologist: Cummings (Last name) Kristy (first name)

Survey Biologist: _____ (Last name) _____ (first name)

Survey Biologist: _____ (Last name) _____ (first name)

Site Location: San Bernardino County, Palisades Ranch, old flooded road by old bridge
(County, General location name)

N 3837017 E 467539 Acc(m) Elev(m) 761
(UTM Coordinates, NAD 83, Zone 11)

Type of Survey* (circle one of each for time of day and season):

(DAY (1 hr post-sunrise to 1 hr pre-sunset) (BREEDING) (15 Mar-1 July)

NIGHT (1 hr post-sunset to midnight) NON-BREEDING

Daytime: search mainly for eggs, larvae, and juveniles.
Nighttime: search mainly for adults.

Survey number: ~~X~~ 4 KC

Sunrise: 5:37am **Begin Time:** 1:30pm

Sunset: 8:04pm **End Time:** 2:35pm

Cloud cover: 0 **Precipitation:** 0

Air Temperature (>13C/55F): 86.2°F **Water Temperature:** 19.2°C

Wind Speed: 5.2 mph **Visibility Conditions:** clear

Moon phase: waning crescent **Humidity:** 22.9 %

Description of weather conditions: windy, warm

Were binoculars used for the surveys (circle one)? YES (NO)

Brand, model, and power of binoculars: _____

Arroyo Toad Survey Data Sheet

AMPHIBIAN OBSERVATIONS

Species	# of indiv.	Observed (O) Heard (H)	Life Stages	Certainty of Identification
Bullfrog Lithobates Catesbeianus	5	O	2-yr old.	100%
Baja california treefrog Pseudacris hypochondriaca	5	O	juvenile 1 green 4 brown	100%
mosquitofish & minnows Cyprinid	100's	O	all	100%
Tadpoles Pseudacris hypochondriaca	40-50	O	tadpole - some developing hind limbs	unknown (TOD) 100%
Bullfrog Lithobates Catesbeianus	2-3	H	adult	100%

Describe potential threats to Arroyo Toads observed, including non-native and native predators such as fish, bullfrogs, and raccoons: Bullfrogs, raccoons

Other notes, observations, comments, *etc.*

- took pictures of tadpoles for later identification ~~identified~~
- walked transect from west to east on old flooded road (to bridge & back) and back to starting point
- water was clear
- Identified the tadpoles as pseudacris hypochondriaca by Charles Drost (CWCS)

Appendix D.

Acoustic results collected from a Wildlife Acoustics Song Meter SM4 (SN:S4A05213, Firmware:1.2.2) deployed from 3 June 2020 until 21 July 2020. The camera was secured in a cottonwood tree (UTM 11S, NAD 83, 467183 E, 3837011 N) roughly 2 m above ground in the riparian area approximately 345 m west of the defunct bridge near the main flooded road channel and set to record for five minute periods during each hour of the programmed time frame. "Output file name" is the individual recording name for each acoustic session that correlates each row in the table to the wave sound output file in the database. Sound identification is a combination of the interpretation of the sounds heard during each acoustic session and the use of the waveform and sonogram provided by Kaleidoscope (version 5.2.1).

OUTPUT FILE NAME	DATE	START TIME	SOUND IDENTIFICATION
S4A05213_20200603_220000.wav	6/3/2020	14:54:00	*P. hypochondriaca* calls and trill; *L. catesbeianus*
P.hypochondriaca. Jun. 3 2020_3_05pm.wav	6/3/2020	15:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200604_010000.wav	6/3/2020	18:00:00	*P. hypochondriaca* calls and trill; *L. catesbeianus*; birds
S4A05213_20200603_210000.wav	6/3/2020	14:00:00	*P. hypochondriaca* calls and trill; *L. catesbeianus*; birds
S4A05213_20200604_000000.wav	6/3/2020	17:00:00	*P. hypochondriaca*; *L. catesbeianus*; birds; possible mouse
S4A05213_20200604_020000.wav	6/3/2020	19:00:00	Train; *P. hypochondriaca*; *L. catesbeianus*; birds
S4A05213_20200604_030000.wav	6/3/2020	20:00:00	*P. hypochondriaca*; *L. catesbeianus*; birds
S4A05213_20200604_040000.wav	6/3/2020	21:00:00	Train; *P. hypochondriaca*; *L. catesbeianus*; birds
S4A05213_20200604_200000.wav	6/4/2020	13:00:00	*L. catesbeianus*; birds
S4A05213_20200604_210000.wav	6/4/2020	14:00:00	*P. hypochondriaca*; *L. catesbeianus*; two "er" sounds?
S4A05213_20200604_220000.wav	6/4/2020	15:00:00	*P. hypochondriaca*; *L. catesbeianus*; birds; possible dirt bike or other motorized vehicle
S4A05213_20200604_230000.wav	6/4/2020	16:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200605_000000.wav	6/4/2020	17:00:00	*P. hypochondriaca*; *L. catesbeianus*; birds; train
S4A05213_20200605_010000.wav	6/4/2020	18:00:00	*P. hypochondriaca*; *L. catesbeianus*; birds; train
S4A05213_20200605_020000.wav	6/4/2020	19:00:00	*P. hypochondriaca*; *L. catesbeianus*; birds; train
S4A05213_20200605_030000.wav	6/4/2020	20:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200605_040000.wav	6/4/2020	21:00:00	*L. catesbeianus*; birds
S4A05213_20200605_200000.wav	6/5/2020	13:00:00	Birds
S4A05213_20200605_210000.wav	6/5/2020	14:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200605_220000.wav	6/5/2020	15:00:00	*P. hypochondriaca*; train
S4A05213_20200605_230000.wav	6/5/2020	16:00:00	*P. hypochondriaca*
S4A05213_20200606_000000.wav	6/5/2020	17:00:00	*P. hypochondriaca*
S4A05213_20200606_010000.wav	6/5/2020	18:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200606_020000.wav	6/5/2020	19:00:00	*P. hypochondriaca*; *L. catesbeianus*; birds
S4A05213_20200606_030000.wav	6/5/2020	20:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200606_040000.wav	6/5/2020	21:00:00	*P. hypochondriaca*
S4A05213_20200606_200000.wav	6/6/2020	13:00:00	*L. catesbeianus*; many birds
S4A05213_20200606_210000.wav	6/6/2020	14:00:00	*P. hypochondriaca* calls and trills
S4A05213_20200606_220000.wav	6/6/2020	15:00:00	*P. hypochondriaca* calls and trills

S4A05213_20200606_230000.wav	6/6/2020	16:00:00	*P. hypochondriaca*
S4A05213_20200607_000000.wav	6/6/2020	17:00:00	*P. hypochondriaca*
S4A05213_20200607_010000.wav	6/6/2020	18:00:00	*P. hypochondriaca*
S4A05213_20200607_020000.wav	6/6/2020	19:00:00	*P. hypochondriaca*
S4A05213_20200607_030000.wav	6/6/2020	20:00:00	No notable sounds
S4A05213_20200607_040000.wav	6/6/2020	21:00:00	No notable sounds
S4A05213_20200607_200000.wav	6/7/2020	13:00:00	Birds
S4A05213_20200607_210000.wav	6/7/2020	14:00:00	*P. hypochondriaca* calls and trills
S4A05213_20200607_220000.wav	6/7/2020	15:00:00	*P. hypochondriaca*; train
S4A05213_20200607_230000.wav	6/7/2020	16:00:00	*P. hypochondriaca*
S4A05213_20200608_000000.wav	6/7/2020	17:00:00	*P. hypochondriaca*
S4A05213_20200608_010000.wav	6/7/2020	18:00:00	*P. hypochondriaca*
S4A05213_20200608_020000.wav	6/7/2020	19:00:00	*P. hypochondriaca*
S4A05213_20200608_030000.wav	6/7/2020	20:00:00	*P. hypochondriaca*
S4A05213_20200608_040000.wav	6/7/2020	21:00:00	*P. hypochondriaca*
S4A05213_20200608_200000.wav	6/8/2020	13:00:00	Birds
S4A05213_20200608_210000.wav	6/8/2020	14:00:00	*P. hypochondriaca*
S4A05213_20200608_220000.wav	6/8/2020	15:00:00	*P. hypochondriaca*
S4A05213_20200608_230000.wav	6/8/2020	16:00:00	*P. hypochondriaca*
S4A05213_20200609_000000.wav	6/8/2020	17:00:00	*P. hypochondriaca* calls and trills; possible mouse; train
S4A05213_20200609_010000.wav	6/8/2020	18:00:00	*P. hypochondriaca*; birds
S4A05213_20200609_020000.wav	6/8/2020	19:00:00	*P. hypochondriaca*
S4A05213_20200609_030000.wav	6/8/2020	20:00:00	*P. hypochondriaca*
S4A05213_20200609_040000.wav	6/8/2020	21:00:00	Birds
S4A05213_20200609_200000.wav	6/9/2020	13:00:00	Birds
S4A05213_20200609_210000.wav	6/9/2020	14:00:00	*P. hypochondriaca* calls and trills
S4A05213_20200609_220000.wav	6/9/2020	15:00:00	*P. hypochondriaca*
S4A05213_20200609_230000.wav	6/9/2020	16:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200610_000000.wav	6/9/2020	17:00:00	*P. hypochondriaca*; train
S4A05213_20200610_010000.wav	6/9/2020	18:00:00	*P. hypochondriaca* calls and trills; *L. catesbeianus*
S4A05213_20200610_020000.wav	6/9/2020	19:00:00	*P. hypochondriaca*; *L. catesbeianus*; birds
S4A05213_20200610_030000.wav	6/9/2020	20:00:00	*P. hypochondriaca*; *L. catesbeianus*; birds
S4A05213_20200610_040000.wav	6/9/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*; *A. boreas* in background
S4A05213_20200610_200000.wav	6/10/2020	13:00:00	*L. catesbeianus*; birds; possibly another very loud bird or a different animal
S4A05213_20200610_210000.wav	6/10/2020	14:00:00	*P. hypochondriaca* calls and trills; *L. catesbeianus*
S4A05213_20200610_220000.wav	6/10/2020	15:00:00	*P. hypochondriaca* calls and trills; *L. catesbeianus*
S4A05213_20200610_230000.wav	6/10/2020	16:00:00	*P. hypochondriaca* calls and trills
S4A05213_20200611_000000.wav	6/10/2020	17:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
S4A05213_20200611_010000.wav	6/10/2020	18:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200611_020000.wav	6/10/2020	19:00:00	*P. hypochondriaca*; *L. catesbeianus*; footsteps
S4A05213_20200611_030000.wav	6/10/2020	20:00:00	*P. hypochondriaca*; *L. catesbeianus*; train; birds in background
S4A05213_20200611_040000.wav	6/10/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*

S4A05213_20200611_200000.wav	6/11/2020	13:00:00	Train; birds
S4A05213_20200611_210000.wav	6/11/2020	14:00:00	*P. hypochondriaca* calls and trills
S4A05213_20200611_220000.wav	6/11/2020	15:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200611_230000.wav	6/11/2020	16:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200612_000000.wav	6/11/2020	17:00:00	*P. hypochondriaca*; *L. catesbeianus*; birds
S4A05213_20200612_010000.wav	6/11/2020	18:00:00	*P. hypochondriaca*; *L. catesbeianus*; train; birds
S4A05213_20200612_020000.wav	6/11/2020	19:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200612_030000.wav	6/11/2020	20:00:00	*P. hypochondriaca*; *L. catesbeianus*; train; possibly *A. boreas* or a bird
S4A05213_20200612_040000.wav	6/11/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*; train; birds; *A. boreas*
S4A05213_20200612_200000.wav	6/12/2020	13:00:00	*L. catesbeianus*; birds; squeaking
S4A05213_20200612_210000.wav	6/12/2020	14:00:00	No notable sounds
S4A05213_20200612_220000.wav	6/12/2020	15:00:00	*P. hypochondriaca*; dirt bike
S4A05213_20200612_230000.wav	6/12/2020	16:00:00	*P. hypochondriaca*
S4A05213_20200613_000000.wav	6/12/2020	17:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200613_010000.wav	6/12/2020	18:00:00	*P. hypochondriaca*; *L. catesbeianus*; birds
S4A05213_20200613_020000.wav	6/12/2020	19:00:00	*P. hypochondriaca*; *L. catesbeianus*; birds; train
S4A05213_20200613_030000.wav	6/12/2020	20:00:00	*P. hypochondriaca* calls and trills; *L. catesbeianus*; bird
S4A05213_20200613_040000.wav	6/12/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*; birds; train
S4A05213_20200613_200000.wav	6/13/2020	13:00:00	Birds
S4A05213_20200613_210000.wav	6/13/2020	14:00:00	*P. hypochondriaca*; train
S4A05213_20200613_220000.wav	6/13/2020	15:00:00	*P. hypochondriaca*; train
S4A05213_20200613_230000.wav	6/13/2020	16:00:00	*P. hypochondriaca*
S4A05213_20200614_000000.wav	6/13/2020	17:00:00	*P. hypochondriaca*; train
S4A05213_20200614_010000.wav	6/13/2020	18:00:00	*P. hypochondriaca*; train
S4A05213_20200614_020000.wav	6/13/2020	19:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200614_030000.wav	6/13/2020	20:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200614_040000.wav	6/13/2020	21:00:00	*L. catesbeianus*; birds
S4A05213_20200614_200000.wav	6/14/2020	13:00:00	*L. catesbeianus*; many birds; mourning doves (*Zenaida macroura*)
S4A05213_20200614_210000.wav	6/14/2020	14:00:00	*L. catesbeianus*
S4A05213_20200614_220000.wav	6/14/2020	15:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200614_230000.wav	6/14/2020	16:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200615_000000.wav	6/14/2020	17:00:00	*P. hypochondriaca*; train
S4A05213_20200615_010000.wav	6/14/2020	18:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200615_020000.wav	6/14/2020	19:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200615_030000.wav	6/14/2020	20:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
S4A05213_20200615_040000.wav	6/14/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*; *A. boreas*; birds; squeaking
S4A05213_20200615_200000.wav	6/15/2020	13:00:00	*L. catesbeianus*; birds; train
S4A05213_20200615_210000.wav	6/15/2020	14:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200615_220000.wav	6/15/2020	15:00:00	*P. hypochondriaca* calls and trills; *L. catesbeianus*
S4A05213_20200615_230000.wav	6/15/2020	16:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200616_000000.wav	6/15/2020	17:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200616_010000.wav	6/15/2020	18:00:00	*P. hypochondriaca* calls and trills; *L. catesbeianus*
S4A05213_20200616_020000.wav	6/15/2020	19:00:00	*P. hypochondriaca*; *L. catesbeianus*; train

S4A05213_20200616_030000.wav	6/15/2020	20:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
S4A05213_20200616_040000.wav	6/15/2020	21:00:00	*L. catesbeianus*; train
PALISADES_20200618_000000.wav	6/18/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200617_230000.wav	6/17/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200617_210000.wav	6/17/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*; possible owl
PALISADES_20200617_200000.wav	6/17/2020	20:00:00	*L. catesbeianus*; squeaking; train; birds; other random noises
PALISADES_20200617_220000.wav	6/17/2020	22:00:00	*P. hypochondriaca* calls and trills; *L. catesbeianus*
PALISADES_20200618_200000.wav	6/18/2020	20:00:00	*P. hypochondriaca*; *L. catesbeianus*; birds
PALISADES_20200618_210000.wav	6/18/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*; chewing
PALISADES_20200618_220000.wav	6/18/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200618_230000.wav	6/18/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*; music
PALISADES_20200619_000000.wav	6/19/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200619_200000.wav	6/19/2020	20:00:00	*L. catesbeianus*; birds; possible whistling or another bird; squeaking
PALISADES_20200619_210000.wav	6/19/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200619_220000.wav	6/19/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200619_230000.wav	6/19/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200620_000000.wav	6/20/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200620_200000.wav	6/20/2020	20:00:00	*L. catesbeianus*; birds; loud squeaking
PALISADES_20200620_210000.wav	6/20/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200620_220000.wav	6/20/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200620_230000.wav	6/20/2020	23:00:00	*P. hypochondriaca* calls and trills; *L. catesbeianus*
PALISADES_20200621_000000.wav	6/21/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200621_200000.wav	6/21/2020	20:00:00	*L. catesbeianus*; birds; train
PALISADES_20200621_210000.wav	6/21/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*; music
PALISADES_20200621_220000.wav	6/21/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*; music
PALISADES_20200621_230000.wav	6/21/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200622_000000.wav	6/22/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200622_200000.wav	6/22/2020	20:00:00	Birds; squeaking; train
PALISADES_20200622_210000.wav	6/22/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*; owl
PALISADES_20200622_220000.wav	6/22/2020	22:00:00	*P. hypochondriaca* calls and trills; *L. catesbeianus*
PALISADES_20200622_230000.wav	6/22/2020	23:00:00	*P. hypochondriaca* calls and trills; *L. catesbeianus*
PALISADES_20200623_000000.wav	6/23/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200623_200000.wav	6/23/2020	20:00:00	Birds
PALISADES_20200623_210000.wav	6/23/2020	21:00:00	*P. hypochondriaca* calls and trills; *L. catesbeianus*
PALISADES_20200623_220000.wav	6/23/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200623_230000.wav	6/23/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200624_000000.wav	6/24/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200624_200000.wav	6/24/2020	20:00:00	Birds; chewing; rustling
PALISADES_20200624_210000.wav	6/24/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200624_220000.wav	6/24/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*; loud and aggressive animal fight, possibly coyotes
PALISADES_20200624_230000.wav	6/24/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*

PALISADES_20200625_000000.wav	6/25/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200625_200000.wav	6/25/2020	20:00:00	Birds; train
PALISADES_20200625_210000.wav	6/25/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200625_220000.wav	6/25/2020	22:00:00	*P. hypochondriaca* calls and trills; *L. catesbeianus*
PALISADES_20200625_230000.wav	6/25/2020	23:00:00	*P. hypochondriaca* calls and trills; *L. catesbeianus*; train
PALISADES_20200626_000000.wav	6/26/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200626_200000.wav	6/26/2020	20:00:00	Birds; additional loud, angry bird
PALISADES_20200626_210000.wav	6/26/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*; odd rattling sound
PALISADES_20200626_220000.wav	6/26/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200626_230000.wav	6/26/2020	23:00:00	*P. hypochondriaca* calls and trills; *L. catesbeianus*
PALISADES_20200627_000000.wav	6/27/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200627_200000.wav	6/27/2020	20:00:00	Birds
PALISADES_20200627_210000.wav	6/27/2020	21:00:00	*P. hypochondriaca*; train
PALISADES_20200627_220000.wav	6/27/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200627_230000.wav	6/27/2020	23:00:00	*P. hypochondriaca* calls and trills
PALISADES_20200628_000000.wav	6/28/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200628_200000.wav	6/28/2020	20:00:00	Birds
PALISADES_20200628_210000.wav	6/28/2020	21:00:00	No notable sounds
PALISADES_20200628_220000.wav	6/28/2020	22:00:00	*P. hypochondriaca*; train
PALISADES_20200628_230000.wav	6/28/2020	23:00:00	*P. hypochondriaca*
PALISADES_20200629_000000.wav	6/29/2020	0:00:00	*P. hypochondriaca*
PALISADES_20200629_200000.wav	6/29/2020	20:00:00	Birds
PALISADES_20200629_210000.wav	6/29/2020	21:00:00	*P. hypochondriaca*
PALISADES_20200629_220000.wav	6/29/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200629_230000.wav	6/29/2020	23:00:00	*P. hypochondriaca* calls and trills; *L. catesbeianus*; train; odd sucking sound
PALISADES_20200630_000000.wav	6/30/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200630_200000.wav	6/30/2020	20:00:00	Birds; train
PALISADES_20200630_210000.wav	6/30/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200630_220000.wav	6/30/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200630_230000.wav	6/30/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200701_000000.wav	7/1/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200701_200000.wav	7/1/2020	20:00:00	Birds; train
PALISADES_20200701_210000.wav	7/1/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200701_220000.wav	7/1/2020	22:00:00	*P. hypochondriaca* calls and trills; *L. catesbeianus*
PALISADES_20200701_230000.wav	7/1/2020	23:00:00	*P. hypochondriaca* calls and trills; *L. catesbeianus*
PALISADES_20200702_000000.wav	7/2/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200702_200000.wav	7/2/2020	20:00:00	Birds
PALISADES_20200702_210000.wav	7/2/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200702_220000.wav	7/2/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200702_230000.wav	7/2/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*; possibly birds or a racoon
PALISADES_20200703_000000.wav	7/3/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200703_200000.wav	7/3/2020	20:00:00	*L. catesbeianus*; birds

PALISADES_20200703_210000.wav	7/3/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200703_220000.wav	7/3/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200703_230000.wav	7/3/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*; water activity
PALISADES_20200704_000000.wav	7/4/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200704_200000.wav	7/4/2020	20:00:00	Birds; train
PALISADES_20200704_210000.wav	7/4/2020	21:00:00	*P. hypochondriaca*
PALISADES_20200704_220000.wav	7/4/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*; train; gun shots or fireworks
PALISADES_20200704_230000.wav	7/4/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200705_000000.wav	7/5/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200705_200000.wav	7/5/2020	20:00:00	*L. catesbeianus*; birds
PALISADES_20200705_210000.wav	7/5/2020	21:00:00	*L. catesbeianus*
PALISADES_20200705_220000.wav	7/5/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200705_230000.wav	7/5/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200706_000000.wav	7/6/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200706_200000.wav	7/6/2020	20:00:00	Birds; squeaking
PALISADES_20200706_210000.wav	7/6/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200706_220000.wav	7/6/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200706_230000.wav	7/6/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*; squeaking
PALISADES_20200707_000000.wav	7/7/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200707_200000.wav	7/7/2020	20:00:00	*L. catesbeianus*; birds; squealing
PALISADES_20200707_210000.wav	7/7/2020	21:00:00	*L. catesbeianus*
PALISADES_20200707_220000.wav	7/7/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200707_230000.wav	7/7/2020	23:00:00	*P. hypochondriaca* calls and trills; *L. catesbeianus*; squeaking
PALISADES_20200708_000000.wav	7/8/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200708_200000.wav	7/8/2020	20:00:00	*L. catesbeianus*; birds; train
PALISADES_20200708_210000.wav	7/8/2020	21:00:00	*L. catesbeianus*; possible bird
PALISADES_20200708_220000.wav	7/8/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*; screeching; possible bird
PALISADES_20200708_230000.wav	7/8/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*; squeak
PALISADES_20200709_000000.wav	7/9/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*; possible bird; squeak
PALISADES_20200709_200000.wav	7/9/2020	20:00:00	*L. catesbeianus*; birds
PALISADES_20200709_210000.wav	7/9/2020	21:00:00	*L. catesbeianus*; squeaking
PALISADES_20200709_220000.wav	7/9/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200709_230000.wav	7/9/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*; possibly birds
PALISADES_20200710_000000.wav	7/10/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*; chewing; possible bird
PALISADES_20200710_200000.wav	7/10/2020	20:00:00	*L. catesbeianus*; birds
PALISADES_20200710_210000.wav	7/10/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200710_220000.wav	7/10/2020	22:00:00	*L. catesbeianus*; train
PALISADES_20200710_230000.wav	7/10/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*; chewing; possibly birds
PALISADES_20200711_000000.wav	7/11/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200711_200000.wav	7/11/2020	20:00:00	*L. catesbeianus*; birds
PALISADES_20200711_210000.wav	7/11/2020	21:00:00	*L. catesbeianus*
PALISADES_20200711_220000.wav	7/11/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*; train

PALISADES_20200711_230000.wav	7/11/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200712_000000.wav	7/12/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*; squeaking
PALISADES_20200712_200000.wav	7/12/2020	20:00:00	Birds
PALISADES_20200712_210000.wav	7/12/2020	21:00:00	*L. catesbeianus*; squeaking
PALISADES_20200712_220000.wav	7/12/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*; possible birds; squeaking
PALISADES_20200712_230000.wav	7/12/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*; possible bird
PALISADES_20200713_000000.wav	7/13/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200713_200000.wav	7/13/2020	20:00:00	Birds
PALISADES_20200713_210000.wav	7/13/2020	21:00:00	*L. catesbeianus*; possible bird or insect
PALISADES_20200713_220000.wav	7/13/2020	22:00:00	*L. catesbeianus*; possibly birds; train
PALISADES_20200713_230000.wav	7/13/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200714_000000.wav	7/14/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200714_200000.wav	7/14/2020	20:00:00	*L. catesbeianus*; birds; train
PALISADES_20200714_210000.wav	7/14/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*; squeak
PALISADES_20200714_220000.wav	7/14/2020	22:00:00	*L. catesbeianus*; train
PALISADES_20200714_230000.wav	7/14/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200715_000000.wav	7/15/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200715_200000.wav	7/15/2020	20:00:00	*L. catesbeianus*; birds
PALISADES_20200715_210000.wav	7/15/2020	21:00:00	*L. catesbeianus*
PALISADES_20200715_220000.wav	7/15/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200715_230000.wav	7/15/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*; train; possible chewing
PALISADES_20200716_000000.wav	7/16/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200716_200000.wav	7/16/2020	20:00:00	*L. catesbeianus*; birds; train
PALISADES_20200716_210000.wav	7/16/2020	21:00:00	*L. catesbeianus*
PALISADES_20200716_220000.wav	7/16/2020	22:00:00	*L. catesbeianus*; train
PALISADES_20200716_230000.wav	7/16/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200717_000000.wav	7/17/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200717_200000.wav	7/17/2020	20:00:00	*L. catesbeianus*; birds
PALISADES_20200717_210000.wav	7/17/2020	21:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200717_220000.wav	7/17/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*; squeaks
PALISADES_20200717_230000.wav	7/17/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*; train
PALISADES_20200718_000000.wav	7/18/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200718_200000.wav	7/18/2020	20:00:00	*L. catesbeianus*; birds; train
PALISADES_20200718_210000.wav	7/18/2020	21:00:00	Possible *P. hypochondriaca* trills; *L. catesbeianus*
PALISADES_20200718_220000.wav	7/18/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*; possibly birds; squeak
PALISADES_20200718_230000.wav	7/18/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*; train; airplane
PALISADES_20200719_000000.wav	7/19/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*; possible gun shot
PALISADES_20200719_200000.wav	7/19/2020	20:00:00	*L. catesbeianus*; many birds; possible music; odd animal sound
PALISADES_20200719_210000.wav	7/19/2020	21:00:00	*L. catesbeianus*; music
PALISADES_20200719_220000.wav	7/19/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200719_230000.wav	7/19/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*
PALISADES_20200720_000000.wav	7/20/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*

PALISADES_20200720_200000.wav	7/20/2020	20:00:00	Birds
PALISADES_20200720_210000.wav	7/20/2020	21:00:00	*L. catesbeianus*; train; possible pig snorts in background
PALISADES_20200720_220000.wav	7/20/2020	22:00:00	*P. hypochondriaca* calls and trills; *L. catesbeianus*; chewing; train
PALISADES_20200720_230000.wav	7/20/2020	23:00:00	*P. hypochondriaca*; *L. catesbeianus*; squeak
PALISADES_20200721_000000.wav	7/21/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*; airplane
S4A05213_20200616_220000.wav	6/16/2020	22:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200616_200000.wav	6/16/2020	20:00:00	Birds; train
S4A05213_20200616_210000.wav	6/16/2020	21:00:00	*P. hypochondriaca* trills and calls; *L. catesbeianus*
S4A05213_20200616_230000.wav	6/16/2020	23:00:00	*P. hypochondriaca* calls and trills; *L. catesbeianus*; train
S4A05213_20200617_000000.wav	6/17/2020	0:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200617_010000.wav	6/17/2020	1:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200617_020000.wav	6/17/2020	2:00:00	*P. hypochondriaca*; *L. catesbeianus*
S4A05213_20200617_030000.wav	6/17/2020	3:00:00	*P. hypochondriaca*; *L. catesbeianus*; birds; train
S4A05213_20200617_040000.wav	6/17/2020	4:00:00	*P. hypochondriaca*; *L. catesbeianus*

APPENDIX 6

Mohave Ground Squirrel Trapping Results:
Palisades Ranch,
Near the Community of Helendale,
San Bernardino County, California

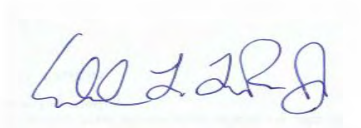
Prepared for:

Mojave Desert Land Trust
P.O. Box 1544, 60124 Twentynine Palms Highway
Joshua Tree, California 92252
PH: (760) 366-5440
Email: peter@mdlt.org
Contact: Peter Satin

Prepared by:

Edward L. LaRue, Jr.
(Permanent ID Number SC-001544)
Circle Mountain Biological Consultants, Inc.
P.O. Box 3197
Wrightwood, California 92397
PH: (760) 249-4948
FAX: (760) 249-4948
Email: ed.larue@verizon.net
Contact: Ed LaRue

I hereby certify that the statements furnished herein, including attached exhibits, present the data and information required for this Mohave ground squirrel trapping report, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief. Field work conducted for this trapping effort was performed by me or under my direct supervision. I certify that I have not signed a nondisclosure or consultant confidentiality agreement with the project applicant or applicant's representative and that I have no financial interest in the project.



Circle Mountain Biological Consultants, Inc.
Author and Field Investigator: Edward L. LaRue, Jr.

June 2020

Mohave Ground Squirrel Trapping Results:
Palisades Ranch,
Near the Community of Helendale,
San Bernardino County, California

INTRODUCTION

Circle Mountain Biological Consultants, Inc. (CMBC) performed voluntary trapping surveys on behalf of Mojave Desert Land Trust (MDLT) seeking the presence of the California State threatened Mohave ground squirrel (*Xerospermophilus mohavensis*), herein "MGS." There is no intent to develop this site; rather it is proactively managed by MDLT for numerous special status plant and animal species, including MGS.

CMBC (2016) prepared a management plan for the Palisades Ranch that documented MGS as occurring in 1983 just north of the community of Helendale, approximately six miles north and in 1987 in northern Adelanto, approximately six miles south of the trapping study documented herein. There have not been any focused trapping surveys at Palisades Ranch for MGS, so this is the first such survey, to our knowledge.

The management plan (CMBC 2016) identifies specific tasks, including those relative to Biological Element 5, pertaining to special status mammal species. First Tier, Biological Goal 1 states: "Ascertain presence and status of special status mammal species on the subject property, and if present, manage the site for sustained populations." Task 1 was further identified as: "Perform species-specific inventories to determine the occurrence of Mojave River vole and Mohave ground squirrel on the subject property." So, the current study was performed, in part, to implement Task 1 for Biological Element 5 of the management plan (CMBC 2016).

Location: Township 7 North, Range 5 West, west half of Section 13, S.B.B.&M.
Quad Map: Helendale Quadrangle
UTM (NAD 83) Coordinates of Grid: 466800 East, 3839400 North (center of grid)
Acreage of Project Site: +/- 100 acres (assuming 30-meter buffer around 4 grid lines)

The MGS is approximately 20 to 23 centimeters (8 to 9 inches) in length, sandy-colored on top, lighter underneath, with a bi-colored (dark above, light below) tail flattened dorso-ventrally.

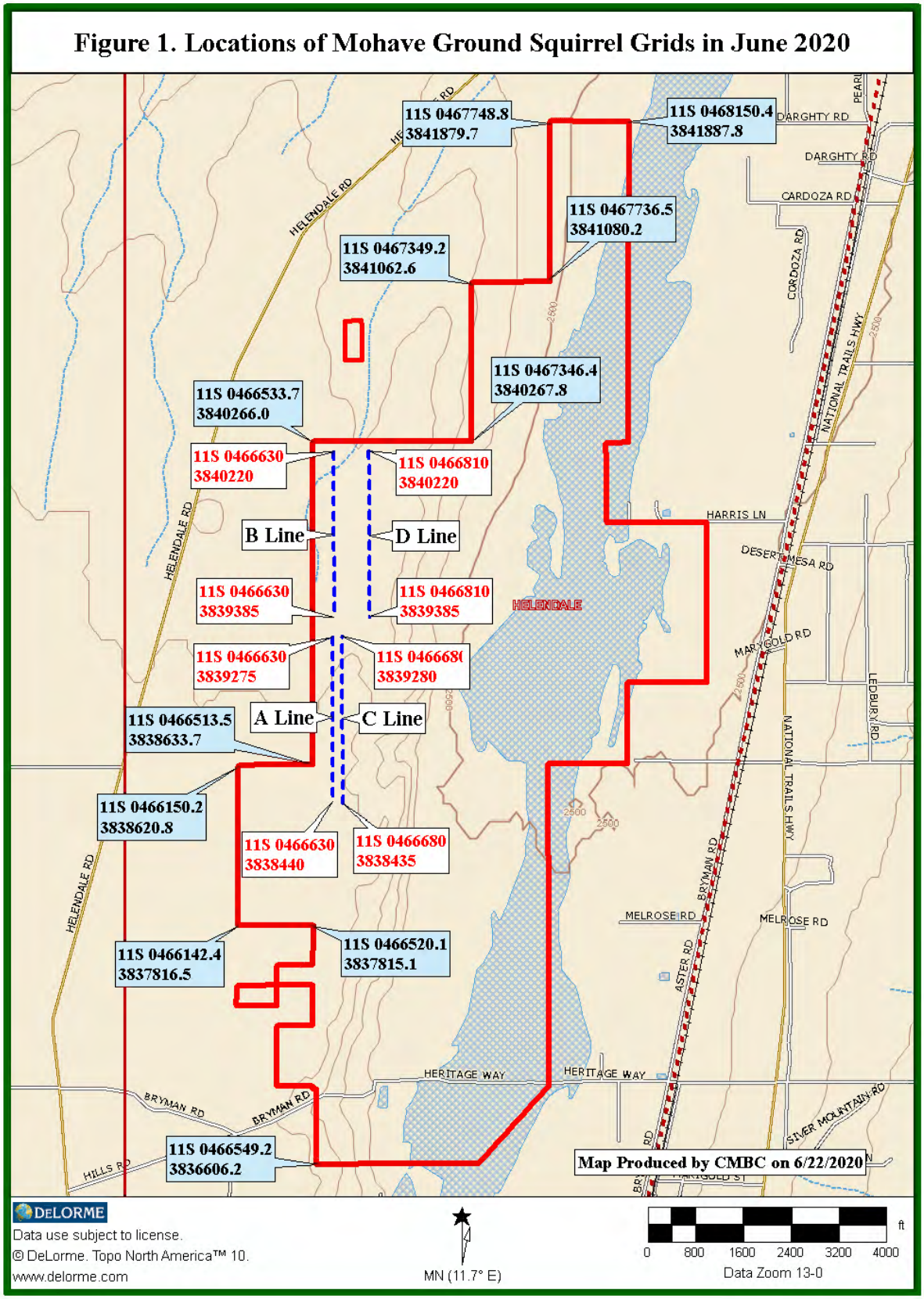
© Phil Leitner

The following information is published in various places (e.g., David Laabs' species account published in U.S. Bureau of Land Management 2005), and much of it was in the form of personal communication from Dr. Phil Leitner to Ed LaRue of CMBC. Following winters of sufficient rainfall [e.g., a minimum of about 7.5 centimeters (3 inches)], MGS emerge in February from dormancy, reproduce, and have a litter of up to nine young in late March to early April; they forego reproduction if there is less than about 3 inches of rainfall. If reproductive, they will remain active into the summer, with adults becoming dormant in June and July and juveniles as late as August; if there is no reproduction, adults will become dormant as early as late May. Their diet consists of seeds, leaves, flowers, and fruits of both annual and perennial plants; arthropods are occasionally taken. Their ability to overwinter depends on achieving a body weight of approximately 180 grams. The MGS is currently listed as Threatened by the California Fish and Game Commission. U.S. Fish and Wildlife Service (USFWS) has declined to list it federally following two petitions, the last of which was in 2005.

Unlike protocol trapping, where a given site is trapped for three five-day periods from mid-March to the end of April, May, and mid-June to mid-July, regional exploratory surveys are typically performed for five days between mid-March and mid-July. They are not as rigorous, in part because the sites being trapped are not intended for development and five days is judged to be a reasonable amount of time to determine presence. Even so, lack of detection during a five-day trapping period is not sufficient to determine that MGS is absent from the site.

Unlike protocol surveys with formal grids of 2 x 50, 4 x 25, or 10 x 10 trap stations spaced at 35-meter intervals, configurations for regional exploratory surveys are flexible allowing trapper discretion to place traps in a configuration most likely to capture MGS and usually spread over a wider area than the grid system. Both methodologies use 100 traps per grid, which is judged to be the maximum number of traps one biologist can effectively check and still ensure animal health. For this effort, the protocol methodology is described below and deviations from the protocol are shown in italicized font following the California Department of Fish and Game's (CDFG 2003 revised 2010) methodology.

Figure 1. Locations of Mohave Ground Squirrel Grids in June 2020



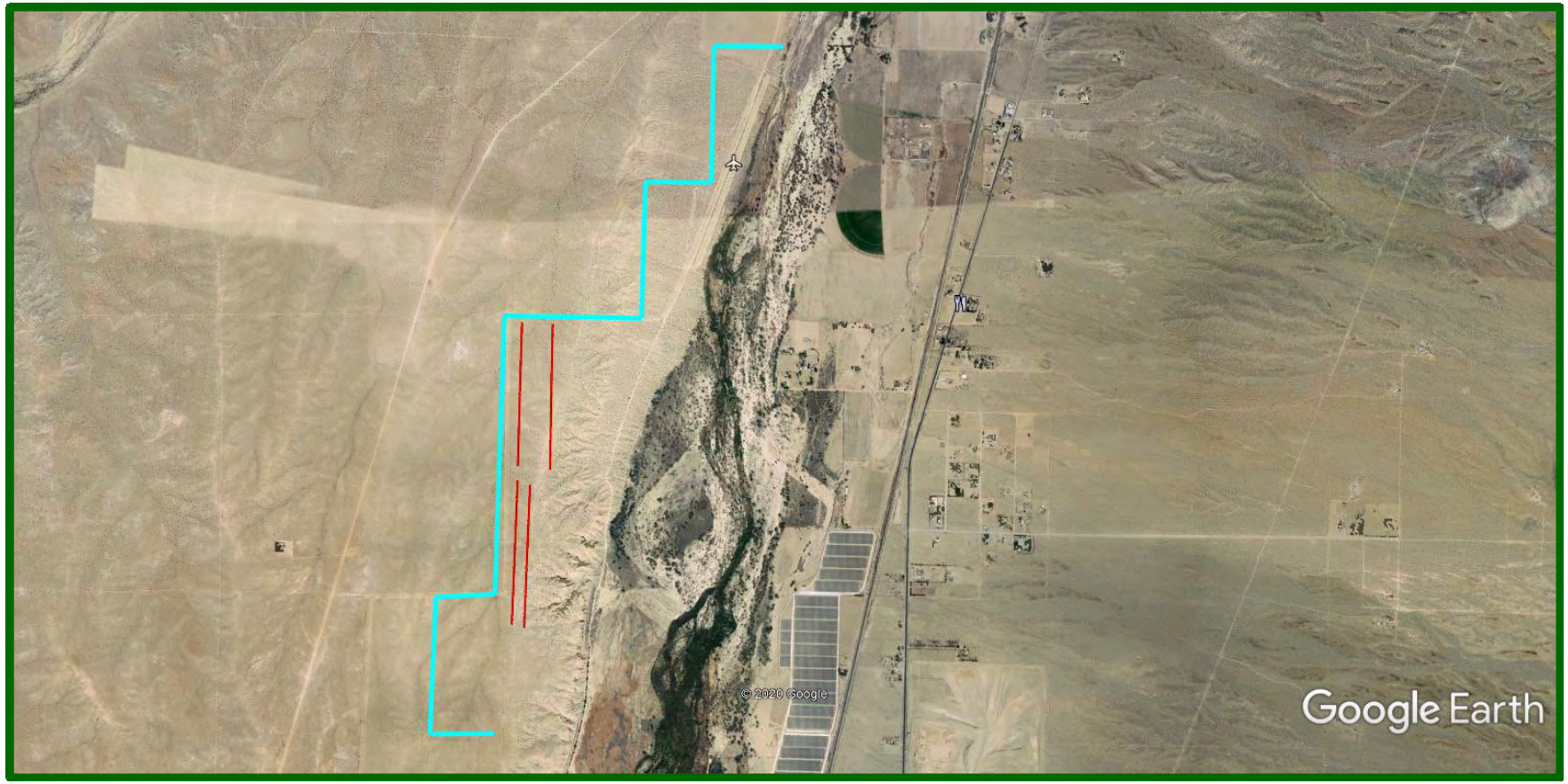


Figure 2. Aerial photograph of subject property from 28,500 feet± altitude, taken on 8/25/2018 (Google Earth ©2020) with western property boundaries shown in light blue and four grid lines in red

FIELD SURVEY METHODS

Surveys were conducted according to the following recommended guidelines. Actual implemented methods are reported in italics following the official methodology.

CALIFORNIA DEPARTMENT OF FISH AND GAME
MOHAVE GROUND SQUIRREL SURVEY GUIDELINES
(January 2003 revised 2010)

1. Visual surveys to determine Mohave ground squirrel activity and habitat quality shall be undertaken the period of 15 March through 15 April. All potential habitat on a project site shall be visually surveyed during daylight hours by a biologist who can readily identify the Mohave ground squirrel and the white-tailed antelope squirrel (*Ammospermophilus leucurus*). *Visual surveys were performed by Ed LaRue and Sharon Dougherty on 31 May 2020 while the grid was being established.*

2. If visual surveys do not reveal presence of the Mohave ground squirrel on the project site, standard small-mammal trapping grids shall be established in potential Mohave ground squirrel habitat. The number of grids will depend on the amount of potential habitat on the project site, as determined by the guidelines presented in paragraphs 4 and 5 of these guidelines. *For this effort only one grid was established to determine presence or absence within the 100-acre± site.*

3. For linear projects (for example, highways, pipelines, or electric transmission lines), each sampling grid shall consist of 100 Sherman live-traps (or equivalent; the minimum length of any trap is 12 inches) arranged in a rectangular pattern, 4 traps wide by 25 traps long, with traps spaced 35 meters apart along each of the four trap lines. At a minimum, one sampling grid of this type shall be established in each linear mile, or fraction thereof, of potential Mohave ground squirrel habitat along the project corridor. *Not applicable, as this was not a linear project.*

4. For all other types of projects, one sampling grid consisting of 100 Sherman live-traps (or equivalent; the minimum length of any trap is 12 inches) shall be established for each 80 acres, or fraction thereof, of potential Mohave ground squirrel habitat on the project site. The traps shall be arranged in a 10 x 10 grid, with 35-meter spacing between traps. *In this case, 100 12" Sherman traps spaced 35 meters apart on a north-south axis were placed on the subject property as shown in Figures 1 and 2. The configuration was chosen to (a) cover as much of the site and as wide an area as possible; (b) to place traps in habitats most likely to support MGS; and (c) to avoid barren areas, mountainous areas, etc. that are not ideal for MGS. When an area encompassing a +/- 30-meter buffer around the four corners of the grid is inscribed, the area contained within that polygon is approximately 100 acres, which is similar to the 80-acre/grid recommendation in this measure. The C line was moved to the west to avoid the steeper areas associated with bluffs west of the Mojave River. However, relatively more antelope ground squirrels were caught in these bluff areas, so it is recommended that at least one of the four lines be placed in these areas.*

5. Each sampling grid shall be trapped for a minimum five consecutive days, unless a Mohave ground squirrel is captured before the end of the five-day term on the grid or on another grid on the project site. If no Mohave ground squirrel is captured on a sampling grid on the project site in the first five-consecutive-day term, each sampling grid shall be sampled for a SECOND five-consecutive-day term. Trapping may be stopped before the end of the second term if a Mohave ground squirrel is captured on any sampling grid on the project site. If no Mohave ground squirrel is captured during the second five-consecutive-day term, each sampling grid shall be sampled for a THIRD five-consecutive -day term. The FIRST trapping term shall begin and be completed in the period of 15 March through 30 April. If a SECOND term is required, it shall begin at least two weeks after the end of the first term, but shall begin no earlier than 01 May, and shall be completed by 31 May. If a THIRD term is required, it shall begin at least two weeks after the end of the second term, but shall begin no earlier than 15 June, and shall be completed by 15 July. All trapping shall be conducted during appropriate weather conditions, avoiding periods of high wind, precipitation, and low temperatures (<50°F or 10°C). *Trapping was initiated on June 1, 2020, the day after the grid was established. Although the intent was to trap for five consecutive days, temperatures in excess of 100°F on June 2, 3, and 4, caused us to reschedule the surveys to June 5, 6, 7, and 8 when temperatures were favorable, and in fact, traps did not have to be closed prematurely; e.g., temperatures did not exceed 90°F.*

6. For projects requiring two or more sampling grids, capture of a Mohave ground squirrel on any grid will establish presence of the species on the project site. Trapping may be stopped on all grids on the project site at that time. For linear projects, very large project sites, project sites characterized by fragmented or highly-heterogeneous habitats, or in other special circumstances, continued trapping may be necessary. *Not applicable.*

7. A maximum 100 traps shall be operated by each qualified biologist. Each trap shall be covered with a cardboard A-frame or equivalent non-metal shelter to provide shade. Trap and shelter orientation shall be on a north-south axis. All traps shall be opened within one hour of sunrise and may be closed beginning one hour before sunset. Traps shall be checked at least once every four hours to minimize heat stress to captured animals. When traps are open, temperature shall be measured at a location within the sampling grid, in the shade, and one foot (approx. 0.3 meters) above the ground at least once every hour. Traps shall be closed when the ambient air temperature at one foot above the ground in the shade exceeds 90°F (32°C). Trapping shall resume on the same day after the ambient temperature at one foot (approx. 0.3 meters) above the ground in the shade falls to 90°F (32°C) and shall continue until one hour before sunset. Suggested baits are mixed grains, rolled oats, or bird seed, with a small amount of peanut butter. *These measures were implemented for the current effort. See #5 above resulting in a modified trapping schedule to avoid excessively hot temperatures.*

8. A qualified biologist shall complete the Survey and Trapping Form, which is found on page 5 of these guidelines [page @@ of this report]. This biologist, or the lead agency for the project, shall submit the completed form to the appropriate Department office (see page 4) with the biological report on the project site. *In addition to completing this form, LaRue also completed the Excel spread sheet provided by Dr. Scott Osborn in 2013, which supplements the one referenced in this point. Since no MGS were captured, no California Natural Diversity Data Base (CNDDB) forms were completed.*

9. The Department may allow variation on these guidelines, with the advance written approval of the appropriate regional habitat conservation planning office (see page 4). Such variations could include biologically-appropriate modification of the trapping dates or changes in grid configuration that would enhance the probability of detecting Mohave ground squirrels. Any variation which concerns trapping or marking methods must be incorporated into the MOU or permit that authorizes the work. *Variations for this trapping effort are documented above.*

10. If a survey conducted according to these guidelines results in no capture or observation of the Mohave ground squirrel on a project site, this is not necessarily evidence that the Mohave ground squirrel does not exist on the site or that the site is not actual or potential habitat of the species. However, in the circumstance of such a negative result, the Department will stipulate that the project site harbors no Mohave ground squirrels. This stipulation will expire one year from the ending date of the last trapping on the project site conducted according to these guidelines. *Although it is recommended that additional surveys be performed, with grid lines A, B, and C shifted to the east and in year(s) of less annual plant germination, the measures identified above are not applicable to this and future trapping efforts, as the surveys are not being performed in anticipation of developing the site.*

HABITAT DESCRIPTION

Dominant Annuals: See page 10 of this report and page 14 of CMBC 2016 for extensive descriptions of both annual and perennial plants in upland areas, including the trap grid.
Dominant Perennials: Creosote bush (*Larrea tridentata*), burrobush (*Ambrosia dumosa*), peach thorn (*Lycium cooperi*), Anderson's box-thorn (*Lycium andersonii*), Nevada joint-fir (*Ephedra nevadensis*), and several species of indigo bush (*Psorothamnus arborescens*, *Psorothamnus schottii*).

Land Form – Desert plain and rolling bluffs **Soil Type** – Sandy loam
Elevation – 2,660 to 2,700 feet **Slope** – 10-15% on south part grid lines C & D
Total Acres Trapped: 100 acres± **Number of Trapping Grids:** 1
Dates of sampling term(s): June 1, 5, 6, 7, and 8, 2020
Trapping conducted by: Edward L. LaRue, Jr. (4 days) and Sharon Dougherty (1 day)

TRAPPING RESULTS

No MGS were captured during this 5-day regional exploratory survey performed by CDFW-authorized personnel. As given above under point 10, the absence of MGS during this particular effort does not necessarily mean that MGS are absent from the trap area. Nor was all of the Palisades Ranch area managed by MDLT trapped (see grid location in Figures 1 and 2). There are both upland areas and even riparian areas that may harbor MGS and should be targeted in future surveys in an ongoing effort to seek MGS on the site.

The grid was trapped in a typical manner, using 100 Sherman traps, baited with four-way grain and peanut butter powder, during the five-day session described above. The following table contains information for animals captured and weather conditions during the trapping session.

Five-Day Trapping Session

DATE	TIME[1]	TEMP °F[2]	CAPTURES			CLOUD COVER		MAX WIND SPEED (mph)	
			AGS[4]	MGS	Other[3]	AM	PM	AM	PM
6/1/2020	0530	58°F	20 10♂, 10♀	0	0	70%	100%	0-5	0-5
	1800	88°F							
6/5/2020	0530	68°F	18 10♂, 8♀	0	0	100%	10%	0-5	25-30
	1900	76°F							
6/6/2020	0535	57°F	14 5♂, 9♀	0	0	50%	50%	10-15	20-25
	1910	72°F							
6/7/2020	0545	51°F	10 6♂, 4♀	0	0	0%	0%	15-20	25-30
	1900	70°F							
6/8/2020	0550	51°F	8 5♂, 3♀	0	0	0%	5%	0-5	10-15
	1900	76°F							
		51↑88 °F	**70 36♂, 34♀**	**0**	**0**	**0-100%**	**0-100%**	**0↑20**	**0↑30**

TIME[1] - The **1st** time given in column 2 is when the first trap was opened each day; **2nd** time given is when the last trap was closed each day.

TEMP °F[2] - The **1st** temperature ("air temperature") given in column 3 was measured 12" above the ground in new shade at the beginning of the day, followed by the **2nd** temperature, which was taken the same way at the beginning of the final check. Temperatures and maximum wind speeds were recorded using a hand-held Kestrel® weather and wind speed meter.

Other[3] - Codes for other animals potentially trapped are given in the 6th column, though none were caught:
AGS = Antelope ground squirrel (*Ammospermophilus leucurus*)
DSLI = Desert spiny lizard (*Sceloporus magister*)
DWRA = Desert wood rat (*Neotoma lepida*)
KRAT = Kangaroo rat species (*Dipodomys* sp.)
MGS = Mohave ground squirrel (*Xerospermophilus mohavensis*) highlighted in blue when trapped
RERA = Red racer (*Masticophis flagellum piceus*)
WWTA = Western whiptail (*Cnemidophorus tigris*)

AGS[4] – Results reported herein for antelope ground squirrel (AGS) indicate total numbers and sexes of animals captured each day for each session. Additional data including trap stations, reproductive status (e.g., scrotal males, lactating females, etc.), relative age (adult versus juvenile), and number of recaptures (up to four) were collected in the field and are available upon request.

CONCLUSIONS

No Mohave ground squirrels were caught or observed during the 5-day protocol trapping survey reported herein. Additional surveys are recommended but there are no standards as to how often they should be performed. It is suggested that future surveys be performed during dry years when there is limited germination of annual plants, which may result in increased likelihood of capturing squirrels that are attracted to the bait when available forage is at reduced levels. Whereas this report includes results of a regional survey for the Mohave ground squirrel, a more detailed report on all biota observed on the project site is given in Circle Mountain Biological Consultants, Inc. (2016), which is available from MDLT. That report includes photographs and extensive additional biological information characterizing upland portions of the subject property.

REFERENCES AND LITERATURE CITED

California Department of Fish and Game (currently "CDFW"). 2003 revised 2010. CDFG unpublished guidelines. Mohave Ground Squirrel Survey Guidelines. Sacramento, CA.

Circle Mountain Biological Consultants, Inc. 2016. Draft land management plan for Palisades Ranch, San Bernardino County, California. An unpublished report prepared by Circle Mountain Biological Consultants, Inc. on behalf of Helendale Community Services District and Western Rivers Conservancy. Sacramento, CA. (Management responsibilities were subsequently transferred to MDLT).

U.S. Bureau of Land Management. 2005. Final Environmental Impact Report and Statement for the West Mojave Plan, a Habitat Conservation Plan and California Desert Conservation Area Plan Amendment. Small mammal trapper, David Laabs, provides an in depth species account of the MGS in an appendix to the document. Moreno Valley, CA.

Mohave Ground Squirrel (MGS) Survey and Trapping Form (photocopy as needed)

PART 1 – PROJECT INFORMATION (Use a separate form for each sampling grid)

Project name: "Palisades Ranch MGS 2020 Survey" Property owner: Mojave Desert Land Trust

Locations: Township: 7 North Range: 5 West; West ½ Section 13

Quad map/series: Helendale UTM coordinates: 466800 East, 3839400 North (NAD 83)
GPS coordinates of site center (Datum)

Acreage of project site: 100 acres± Acreage of potential MGS habitat on site: 1.5 mi^2

Total acreage visually surveyed on project site: 100 acres± Dates: 31 May 2020

Visual surveys performed by: Ed LaRue and Sharon Dougherty (names of all persons by date)

Total acres trapped: 100 acres± Number of sampling grids: 1

Trapping conducted by: Ed LaRue and Sharon Dougherty
Names of all persons by sampling term and sampling grid (use back of form if needed)

Dates of sampling term(s): June 1, 5, 6, 7, and 8, 2020

PART II – GENERAL HABITAT DESCRIPTION (Use back of form if needed)
Dominant perennials: Creosote bush (*Larrea tridentata*), burrobush (*Ambrosia dumosa*), peach thorn (*Lycium cooperi*), Anderson's box-thorn (*Lycium andersonii*), Nevada joint-fir (*Ephedra nevadensis*), and several species of indigo bush (*Psorothamnus arborescens*, *Psorothamnus schottii*)
Other perennials: California buckwheat (*Eriogonum fasciculatum*), cheesebush (*Ambrosia salsola*), groundsel (*Senecio flaccidus*), desert goldenhead (*Acamptopappus sphaerocephalus*), bush peppergrass (*Lepidium fremontii*), winter fat (*Krascheninnikovia lanata*), and several species of cactus (*Cylindropuntia echinocarpa*, *Cylindropuntia ramosissima*).
Representative annuals: chia (*Salvia columbariae*), two species of poppy (*Eschscholzia glyptosperma*, *Eschscholzia minutiflora*), Bigelow coreopsis (*Coreopsis bigelovii*), red primrose (*Camissonia boothii*), brittle spineflower (*Chorizanthe brevicornu*), rigid spineflower (*Chorizanthe rigida*), desert trumpet (*Eriogonum inflatum*), desert wishbone plant (*Mirabilis bigelovii*), desert milk-aster (*Stephanomeria exigua*), syntrichopappus (*Syntrichopappus fremontii*), woolly-star (*Eriastrum* sp.), dicoria (*Dicoria canescens*), brown-eyed primrose (*Camissonia claviformis*), and Wallace's daisy (*Eriophyllum wallacii*).

Land forms (mesa, bajada, wash): Desert plain and bisected riverbank bluffs.

Soils description: Sandy loam.

Elevation: 2,660 to 2,700 feet **Aspect**: None to the west and variable but mostly easterly to the east

PART III – WEATHER (Report measurements in the following categories for each day of visual survey and each day of trapping; using 24-hour clock, indicate time of day each measurement was made; use a separate black sheet for each day)

Temperature: Air minimum and maximum; soil minimum and maximum; **Cloud cover**: % in AM and % in PM; **Wind speed**: In AM and in PM. *See tables on page* 8 *for pertinent data.*

APPENDIX 7

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

February 10, 2022
(2020-147)

Ms. Amy Langston, PhD
Natural Resources Program Director
Mojave Desert Land Trust
60124 29 Palms Hwy
Joshua Tree, CA 92252
Via Email: alangston@mdlt.org

Subject: **Results of a Focused Mojave River Vole Habitat Assessment and Trapping Survey Conducted at the Mojave Desert Land Trust Palisades Ranch, San Bernardino County, California**

Dear Ms. Langston:

This letter report presents the results of a focused Mojave River Vole (MRV; *Microtus californicus mohavensis*) habitat assessment and trapping survey conducted by ECORP Consulting, Inc. (ECORP) at the Palisades Ranch owned by the Mojave Desert Land Trust (MDLT) along the Mojave River south of Helendale, located in San Bernardino County, California. This letter report includes life history information for MRV, a description of the methods used to conduct the survey, and a summary and discussion of the survey results.

Location and Description

Palisades Ranch is a 1647-acre property owned by the MDLT located along the Mojave River in San Bernardino County, California, approximately 12 miles north of Victorville (Attachment A – Figure 1. Survey Vicinity). It is directly adjacent to the Bureau of Land Management (BLM) designated Fremont-Kramer Area of Critical Environmental Concern (ACEC) to the west and not far removed from both the Mojave monkeyflower and Mojave fishhook cactus ACECs to the east. The unincorporated community of Helendale is immediately to the north and the surrounding land is a patchwork of BLM and private property (Attachment B – Figure 2. Survey Location). The area is crisscrossed by open access off-highway vehicle (OHV) routes, some of which extend onto Palisades Ranch. Approximately 200 acres were previously used for farming alfalfa and have since gone fallow. The ranch itself contains several improvements, including access roads, a decommissioned landing strip, a dilapidated bridge crossing at Heritage Way (old Bryman Road), and several buildings and residences that supported the previous agricultural activity. Palisades Ranch is within the Alto Transition Zone, making it one of the few locations along the Mojave River where water flows aboveground year-round. This gives rise to a diversity of habitats, including cottonwood-willow forest, arroyo willow thickets, and screwbean mesquite bosque. The eastern half of the property occurs within the Mojave River floodplain and the western half is composed of upland areas including steep desiccated cliffs ("palisades"), bluffs, and flat alluvial areas. The many habitats and topographic features of Palisades Ranch attract over 35 federal and state listed special status species. Due to its high biodiversity, Palisades Ranch became US Fish and Wildlife Service's highest priority

acquisition for all Southern California in 2015. Elevation at the property ranges from approximately 2,530 feet in the southern end to about 2,470 above mean sea level (msl) in the norther end of the property.

Mojave River Vole Natural History and Species Records

The MRV is a California Department of Fish and Wildlife (CDFW) Species of Special Concern (SSC) and a member of the rodent family Cricetidae, which is endemic to southwestern California. It is one of 17 named subspecies of the California Vole (*Microtus californicus*), which is widely distributed throughout the western United States. This species' range includes the Coast Ranges, the Cascade Range, the Sierra Nevada, the Central Valley, the Transverse Ranges, and portions of Baja California. Relatively little is known regarding the subspecies *mohavensis,* however it is believed to be restricted to moist, riparian habitats along the Mojave River between Victorville and Helendale. According to a paper by Dr. Philip V. Brylski, the MRV museum specimens have been collected at only two areas along the Mojave River near Victorville and Oro Grande (Brylski 1998). A query of CDFW's California Natural Diversity Database revealed that MRV have been captured at four locations along the Mojave River, including in Victorville at the Mojave Narrows Regional Park, near Oro Grande, north of Oro Grande near Jericho Road, and near Helendale (CDFW 2021).

The MRV averages 7.5-8.4 inches in total length (body and tail). The pelage is brown with longer black hairs above and gray below. The tail is bicolor, a distinct feature, with black above and brown below; the tail averages one-third of the length of the head and body. Eyes are small and the ears are small, inconspicuous, and fur covered.

What is known regarding the MRV life history is largely gathered from characteristics of other subspecies of *M. californicus.* Suitable habitat consists of meadows, freshwater marshes, moist grasslands, irrigated pastures, ponds, and irrigated canals in the vicinity of the Mojave River proper. Burrows are shallow, often at the end of charactersitic runways, and constructed in friable soil (Laabs, no date). Non-flooded areas are preferred for burrow location, and they will make use of downed wood and brush piles (Brylski 1998). MRV is active diurnally and nocturnally, year-round. They forage on grasses with a preference for the biomass but will eat seeds in drier years.

The current population status of the MRV is unknown however population numbers are expected to be low. There are numerous potential threats to the species. Agriculture and urbanization threaten the natural, native habitat as well as flood characteristics of the areas they occupy. Non-native plants, including tamarisk, threaten the water regime of their habitat (Laabs, no date).

Methods

Habitat Assessment

The entire 1647-acre Palisades Ranch property was assessed for habitat that was suitable for MRV. The survey was conducted by ECORP Senior Biologists with extensive experience survey and trapping for small mammals in the Mojave Desert. During the habitat assessment the property was evaluated for habitat conditions potentially suitable for MRV and to determine suitable locations for future trapping efforts. During the survey numerous meandering transects were walked within the various habitats and vegetation communities within the property in search of clear evidence of MRV (e.g.,

runways, burrows, and scat). The biologists also conducted a focused analysis of all areas exhibiting potentially suitable habitat for MRV, where accessible. Locations with diagnostic or potential MRV sign were recorded with a global positioning system (GPS) receiver and flagged as potential trapping areas.

Trapping Survey

All members of the team carrying out the trapping survey were authorized to survey for, trap, and handle MRV under ECORP's Memorandum of Understanding with the CDFW and individual Scientific Collecting Permits issued by CDFW. Although there are no established survey level protocols for the MRV, ECORP biologists determined appropriate areas to place traps based on the information gathered from the habitat assessment, the subspecies' habitat preferences, and knowledge of the species' life history. Trapping efforts were done to assess the presence of MRV within the Palisades Ranch property. Traps were set within the Mojave River corridor within the property and a focus was put on areas that possessed suitable vegetation for runway corridors, potential burrows, and foraging vegetation. Traps were also set within upland habitats adjacent to the Mojave River, in potentially suitable vegetation for the MRV, to determine if the species was present further from the Mojave River.

To achieve sufficient coverage of the variations of suitable habitat within Palisades Ranch, traps were placed in meandering lines in a variety of habitats with varying levels of habitat suitability. The survey was completed in two two-night trapping sessions. The first trapping session included 57 traps in Trapping Area 1 and 34 traps in Trapping Area 4, for a total of 91 traps. The second trapping session included 69 traps at Trapping Area 2, 15 traps are Trapping Area 3, and 15 traps at Trapping Area 5, for a total of 99 traps. Traps were opened and baited with a mixture of bird seed at dusk each day and then traps were checked for captures and closed each morning near dawn. All captured animals were identified to species. Only 12-inch modified (i.e., with front door shortened slightly) collapsible Sherman live-traps were used during this survey. Notes and photographs were taken to document habitat conditions where traps were placed. Weather conditions at the time of the trapping study were also noted.

Results

Habitat Assessment

The habitat assessment was conducted on November 16 – November 18, 2020, by ECORP biologists, Phillip Wasz and Stephen Montgomery. Mr. Wasz and Mr. Montgomery both possess permits issued by CDFW to conduct trapping surveys for MRV and both biologists have extensive experience conducting surveys and habitat assessments for small mammal species of California. The Palisades Ranch property consisted of relatively undisturbed riparian, alluvial, and desert habitat. However, areas adjacent to the site contained disturbance from off-highway vehicle routes, some of which extended into the property. In Addition, approximately 200 acres within the Palisades Ranch property were previously used for farming alfalfa and have since gone fallow. The ranch itself contains several improvements, including access roads, a decommissioned landing strip, a dilapidated bridge crossing at Heritage Way (old Bryman Road), and several buildings and residences that supported the previous agricultural activity. Palisades Ranch is within the Alto Transition Zone, making it one of the

few locations along the Mojave River where water flows aboveground year-round. This gives rise to a diversity of habitats, including cottonwood-willow forest, arroyo willow thickets, and screwbean mesquite bosque. The eastern half of the property occurs within the Mojave River floodplain and the western half is composed of upland areas including steep desiccated cliffs ("palisades"), bluffs, and flat alluvial areas

Habitat within the Mojave River floodplain portions of the property were highly variable and included many different vegetation communities and soil types. Overall, the Mojave River floodplain portions of Palisades Ranch could be characterized as consisting of dense to extremely dense riparian habitat in the southern end of the property, along both the north and south sides of Heritage Way (old Bryman Road), which transitions to more of an alluvial floodplain the further north you travel along the Mojave River. The southern end of the property within the floodplain contained a mosaic of dense cottonwood-willow forest and arroyo willow thickets with dense canopy cover and varying levels of flooding and ponding. Moving north from Heritage Way/old Bryman Road, the riparian vegetation slowly starts to become less dense, the canopy cover begins to open slightly, and flooding and ponding are less frequent. As the Mojave River floodplain continues north from Turner Road, the habitat begins to take on the characteristics of an alluvial fan floodplain with dense riparian habitat, consisting mainly of arroyo willow thickets, being limited to the sporadically flooded areas within the river channel. Outside of the river channel, but still within the floodplain, the habitat is much more open and consisted of a sparse overstory of cottonwood trees with an understory that consisted mainly of mulefat, rabbit brush, and saltbush. Habitat outside of the floodplain was composed of a mixture of upland areas, desert habitats, disturbed areas, fallow agriculture, and steep cliffs and bluffs.

Habitat suitability within the floodplain was varied, with the highest quality habitat located in the southern end of the property on both the north and south sides of Heritage Way (old Bryman Road) within the Mojave River floodplain (Attachment C – Figure 3. Mojave River Vole Habitat Assessment). Much of this area was flooded or ponded but various high points within flooded areas, and the habitat on the periphery of the flooded areas, contained dense grass cover coupled with an extremely dense overstory. The high-quality habitat in this area was also characterized by the presence of moist friable soils, dense grass cover, downed logs, and brush piles, which made it ideal for MRV.

Moving north from Heritage Way (old Bryman Road) the habitat slowly begins to dry out and open slightly. The canopy density decreases, the presence of dense grasses adjacent to standing water becomes less frequent, and the soil moisture begins to decrease as the Mojave River starts to narrow and go underground at times. Consequently, the habitat suitability begins to transition from high to moderate habitat suitability about midway between Heritage Way (old Bryman Road) and Turner Road (Attachment C – Figure 3. Mojave River Vole Habitat Assessment).

North of Turner Road the river channel narrows substantially and continues to take on more characteristics of an alluvial floodplain. Dense riparian vegetation is reduced and limited to the main flow line of the river, sandy deposits become much more frequent, and the soil moisture decreases substantially. Consequently, the habitat suitability north of Turner Road starts out as moderate but

quickly transitions to a moderate-low habitat suitability due to lack of soil moisture. In this area the moderate and moderate-low quality habitats are restricted to the center of the river and are bordered by dry and sandy alluvial areas. Although, some of the habitat components outside of the main river channel are suitable for foraging, these areas were designated with a low habitat suitability classification because they lack the necessary soil moisture typical of high quality MRV habitat (Attachment C – Figure 3. Mojave River Vole Habitat Assessment).

North of Harris Lane, the soil moisture continues to decrease, and suitable habitat is limited to the main channel/flow line of the river. Although no water was observed in this area during the habitat assessment, it was evident that water does flow through this area at certain times of the year and after large rain events, which likely causes the soil moister and habitat quality to fluctuate throughout the year. The riparian vegetation (mainly willows [*Salix* ssp.]) remains dense within the main channel of the river, and the presence of sporadic downed trees and brush piles add to the habitat quality. However, the quality of the habitat within the main channel is likely heavily influenced by changes in soil moisture and during the drier parts of the year this area is probably not ideal for MRV. Therefore, the habitat within the main channel was given a moderate-low habitat suitability classification. North of Harris Lane, areas outside of the main river channel were classified as not suitable due to lack of soil moisture and dense riparian vegetation (Attachment C – Figure 3. Mojave River Vole Habitat Assessment).

Desert habitats outside of the Mojave River floodplain and disturbed/developed areas associated with the old Palisades Ranch were determined to be not suitable for MRV and the species is presumed to be absent from these areas (Attachment C – Figure 3. Mojave River Vole Habitat Assessment).

MRV Trapping Survey

The trapping survey was conducted by Phillip Wasz (SC-200440002). Mr. Wasz is permitted to trap and handle MRV under the authority of a CDFW Scientific Collecting Permit. Mr. Wasz was assisted by ECORP biologists, Don Mitchell, Alden Lovaas, and Corrina Tapia. Trapping was conducted over two two-night trapping sessions. The first session, which included Trapping Area 1 (57 traps) and Trapping Area 4 (34 traps), commenced with the setting and baiting of traps on the evening of June 7, 2021, and continued through the morning of June 9, 2021. The second trapping session, which included Trapping Areas 2 (69 traps), Trapping Area 3 (15 traps), and Trapping Area 5 (15 traps), started with the setting and baiting of traps on the evening of June 9, 2021, and continued through the morning of June 11, 2021.

Nighttime weather conditions during the two two-night trapping sessions were generally mild and suitable for small mammal trapping, with nightly lows ranging between 53- and 57-degrees Fahrenheit and daytime highs ranging between 75- and 88-degrees Fahrenheit, wind speeds ranging from 1 to 10 mph, and cloud cover ranging from cloudy to mostly sunny. No precipitation was recorded during the trapping period.

The trapping survey, consisting of two two-night trapping sessions, was conducted across five different trapping areas. The trapping survey yielded six MRV captures. All of the MRV captures were recorded within Trapping Area 1 and Trapping Area 2, and included adults, sub-adults, and juveniles

(Attachment D – Figure 4. Trapping Results). A total of 390 trap nights (one trap-night is one trap set for one night) yielded 105 animal captures, including six rodent species: MRV, San Diego pocket mouse (*Chaetodipus fallax*), deer mouse (*Peromyscus maniculatus*), house mouse (*Mus musculus*), desert woodrat (*Neotoma lepida*), and western harvest mouse (*Reithrodontomys megalotis*) (Table 1). Except for the MRV, the other species captured during the survey are very common throughout San Bernardino County and are typically found in habitats like those identified on Palisades Ranch. Representative photographs of the suitable habitat and MRV captures can be found in Attachment E.

Table 1. SBKR Trapping Survey Results

Date Traps Checked	Trapping Areas	Animals Captured					
		MRV	CHFA	PEMA	MUMU	NELE	REME
6/8/2021	Trapping Area 1 Trapping Area 4	0	1	9	1	1	1
6/9/2021	Trapping Area 1 Trapping Area 4	4	3	15	1	6	3
6/10/2021	Trapping Area 2 Trapping Area 3 Trapping Area 5	0	4	13	5	2	1
6/11/2021	Trapping Area 2 Trapping Area 3 Trapping Area 5	2	5	19	4	3	2
TOTALS		**6**	**13**	**56**	**11**	**12**	**7**

MRV = Mojave River Vole (*Microtus californicus mohavensis*)
CHFA = San Diego pocket mouse (*Chaetodipus fallax*)
PEMA = deer mouse (*Peromyscus maniculatus*)
MUMU = house mouse (*Mus Muculus*)
NELE = desert woodrat (*Neotoma lepida*)
REME = western harvest mouse (*Reithrodontomys megalotis*)

Discussion and Conclusions

Habitat suitability within the property was varied and heavily dependent on soil moisture, with the highest quality habitat located within the Mojave River floodplain in the southern end of the property on both the north and south sides of Heritage Way (old Bryman Road). All the MRV captured during the survey were recorded in Trapping Area 1 and Trapping Area 2 (Attachment D – Figure 4. Trapping Results). The habitat within these two trapping areas was similar and both areas contained the following habitat characteristics that were ideal for MRV:

- Dense grass cover
- Moist friable soils
- Dense canopy cover
- Adjacent to flooded or ponded marsh habitat
- Downed logs present
- Brush piles and woodrat middens present

Additionally, north American beaver (*Castor canadensis*) were present and active within Trapping Area 1 and Trapping Area 2, where MRV were captured. It was evident during the survey that the beavers within this area have heavily modified the habitat and various beaver dams, slides, and cuttings were observed. Beaver dams can keep water in streams during droughts and catch sediment which can benefit riparian vegetation and allow plant life to flourish. Additionally, the presence of beaver dams can slow the natural flow of water in a system and cause ponding of water which can increase soil moisture in areas where beavers are present. Beavers also modify habitats by cutting trees which could increase the presence of downed logs and brush piles but can also decrease canopy cover. Although the presence of MRV was correlated with area containing heavy beaver activity, we were not able to test causation. However, if beaver presence increases soils moisture, then the presence of beavers in the system could benefit MRV. Conversely, the presence of beaver dams alters the downstream water regime and habitats and may adversely affect species downstream.

No MRV were captured in Trapping Areas 3, 4, and 5. Although these drier portions of the river contained some structural characteristics that were suitable for the species, the lack of suitable soil moisture and associated vegetation likely precludes MRV from these drier northern reaches of the river. However, it is possible that MRV could disperse into and occupy these areas with the right conditions and/or during periods of heavy rain and flooding.

Management Recommendations

The following are management actions to consider that could benefit MRV and increase their presence on the property.

Invasive Plant Species Removal

Giant reed (*Arundo donax*) and salt cedar (*Tamarix* spp.) were observed in Trapping Areas 1 and 2 and within other areas of the Palisades Ranch property. Both species are considered high water consuming exotic plants. According to a 2011 report by the California Invasive Plant Council, one acre of the nonnative, invasive Arundo consumes 24 acre-feet of water per year, whereas an acre of native plants uses 4 acre-feet per year (CIPC 2011). Removal of high water consuming exotic plants from streams and other areas can reduce water consumption, increasing groundwater recharge, improve surface flows, resulting in the expansion of wetlands and riparian habitat. Therefore, a focused giant reed and salt cedar removal program could help increase soil moister and benefit the MRV and other special-status wildlife species that are dependent on riparian habitat. Because of the relatively closed nature of the riparian habitat at the ranch, it's likely that an Arundo and Tamarisk eradication program could succeed in just a few years of successive treatments. It's important to note that such removal efforts be staged with native riparian enhancement to prevent temporal loss of nesting habitat for riparian-breeding birds.

Nonnative herbaceous grasses and forbs were also present within Trapping Areas 1 and 2. Although it is usually preferable to have nonnative species replaced by native species, it was evident based on the capture locations that MRV are existing within and utilizing some of these nonnative herbaceous species, especially the grasses, and removal nonnative herbaceous species could reduce the available

habitat for MRV and replacing non-native herbaceous species with appropriate native species in riparian systems is exceedingly difficult.

Discourage or Eliminate OHV Use

OHV recreation was prevalent in the surrounding areas and some evidence of OHV use was observed within the survey area and on the property. Negative impacts of OHVs can include noise disturbance, damage to vegetation, soil compaction, increased runoff, soil erosion, and degradation of water quality. Therefore, discouraging or eliminating OHV use on the property could benefit to MRV and other native plant and wildlife species.

Hydrologic Considerations

It is also recommended that MDLT talk to a hydrologist familiar with western water conditions and dynamics, specifically in the Project area, to provide insights on how to effectively improve the soil moisture and expansion of wetland habitat within the river system. Actions to evaluate could include the following:

- Mechanisms for increasing the local ground water levels;
- Mechanisms for increasing local soil moisture;
- Evaluate additional ways to impound water to be released into the streambed slowly over time during dry periods;
- Mechanisms to laterally spread water out from the steam bed to expand the size of the wetland; and
- Ways to create denser and broader riparian habitat conditions around ponded areas.

American Bullfrog Removal

American bullfrogs (bullfrog; *Lithobates catesbeianus*) and bullfrog tadpoles were abundant within the ponded areas of Trapping Area 1 and Trapping Area 2, which is common in areas ponded as a result of beaver activity. Bullfrogs, which have been introduced to many parts of California and the western United States, are relatively large and adaptable and can have significant effects on some native species through competition for resources and predation. Both tadpoles and adult bullfrogs are voracious feeders and can consume benthic algae and the eggs or offspring of many species of native invertebrates and vertebrates including fishes, reptiles, amphibians, water birds, and small mammals. It is also believed that bullfrogs, once established, can compete directly with native birds, reptiles, amphibians, and fishes for limited food resources. Bullfrog removal efforts and subsequent stomach content analysis conducted at Marine Corps Base; Camp Pendleton have confirmed bullfrog predation on California voles (ECORP 2017). Bullfrogs have also been documented preying on the federally listed (endangered) arroyo toad (*Anaxyrus californicus*) and native fish species (ECORP 2017). Because the property contains suitable habitat for arroyo toad and the state and federally listed (endangered) Mohave tui chub (*Siphateles bicolor mohavensis*), a coordinated bullfrog removal project could provide a benefit to MRV, arroyo toad, Mohave tui chub, and numerous other native fish, reptiles, amphibians, birds, and small mammals.

Certification

Thank you for the opportunity to work on your property. If you have any questions regarding the contents of this letter report, please contact me at (909) 307-0046/pwasz@ecorpconsulting.com.

CERTIFICATION: I hereby certify that the statements furnished above and in the attached exhibits present data and information required for this biological evaluation, and the facts, statements, and information presented are true and correct to the best of my knowledge and belief.

SIGNED: _____ DATE: February 10, 2022

Phillip Wasz
Senior Wildlife Biologist
ECORP Consulting, Inc.
215 N. 5th Street
Redlands, CA 92374

Attachments:
Attachment A: Figure 1. Survey Vicinity
Attachment B: Figure 2. Survey Location
Attachment C: Figure 3. Mohave River Vole Habitat Assessment
Attachment D: Figure 4. Trapping Results
Attachment E: Representative Photographs

Literature Cited

Brylski, P.V. 1998. Mojave River vole, *Microtus californicus mohavensis*. Terrestrial Mammal Species of Special Concern in California, Bolster, B.C., Ed.

California Department of Fish and Wildlife (CDFW). 2021. RareFind California Natural Diversity Database (CNDDB). California. Sacramento, CA, California Department of Fish and Wildlife, Biogeographic Data Branch. Accessed June 2021.

California Invasive Plant Council (CIPC). 2011. *Arundo donax* (giant reed) Impact and Distribution Report.

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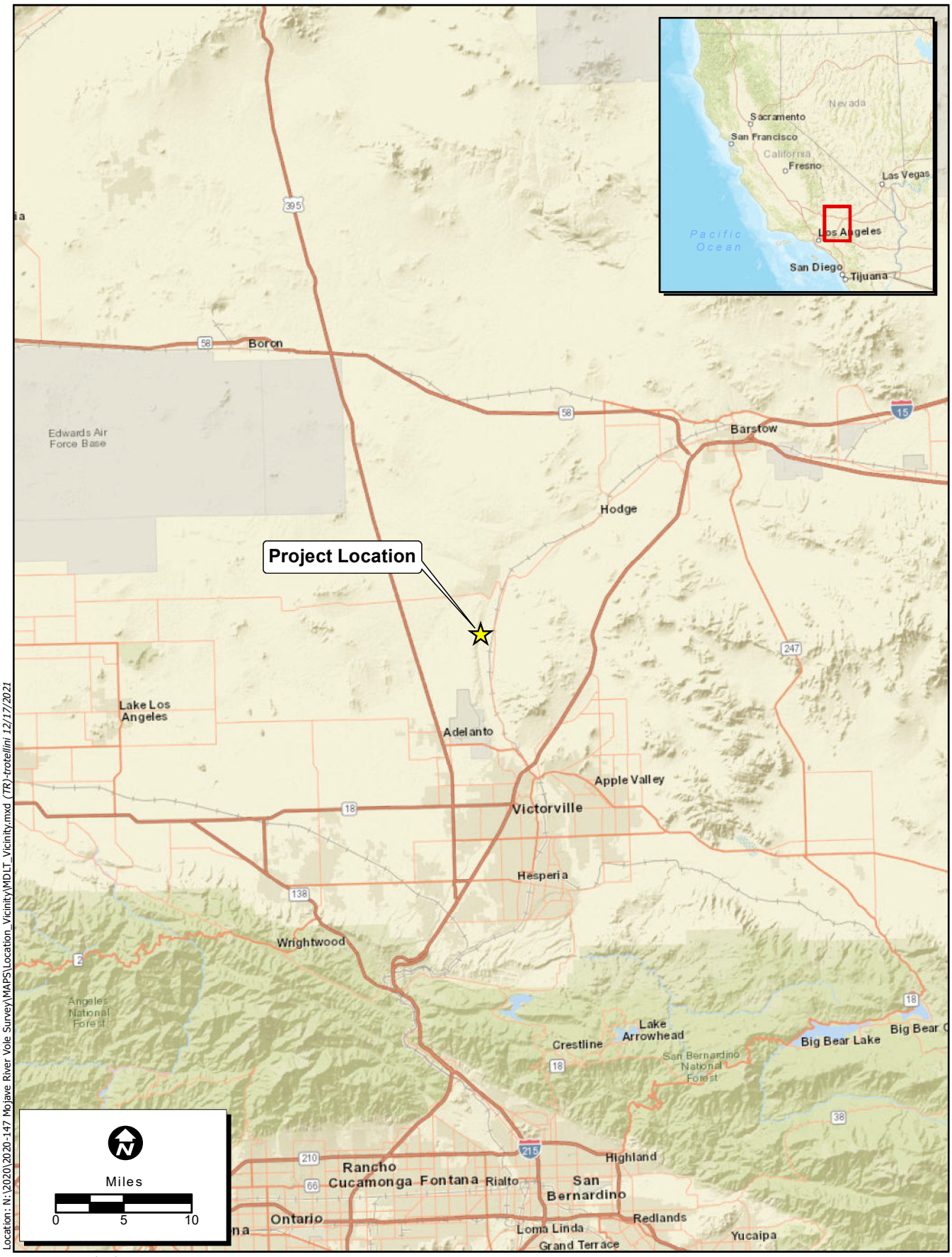
Laabs, D. no date. Mojave River Vole *Microtus californicus mohavensis*.

ATTACHMENT A

Figure 1. Survey Vicinity



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Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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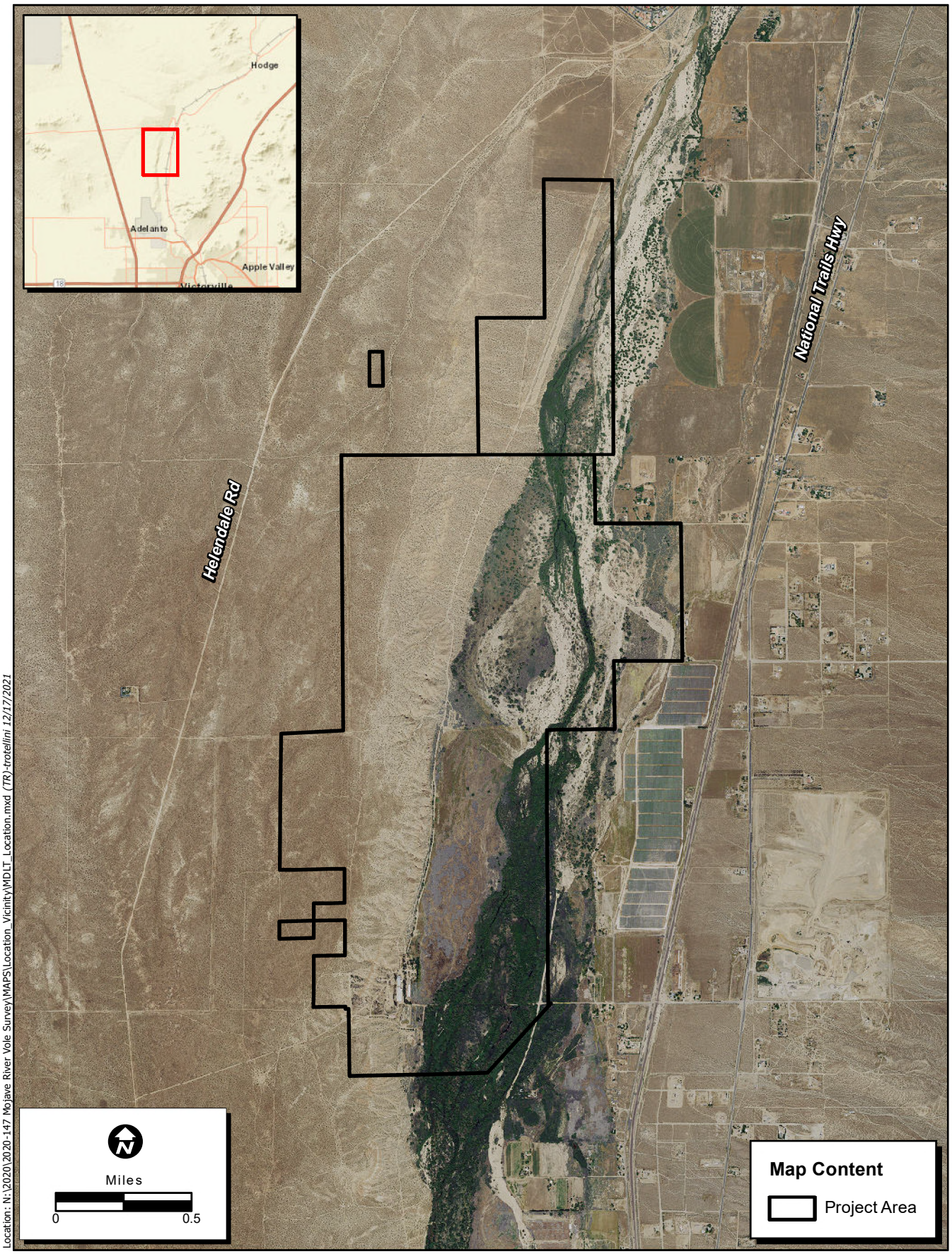
Figure 1. Survey Vicinity

2020-147 Mohave Desert Land Trust

ATTACHMENT B

Figure 2. Survey Location



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Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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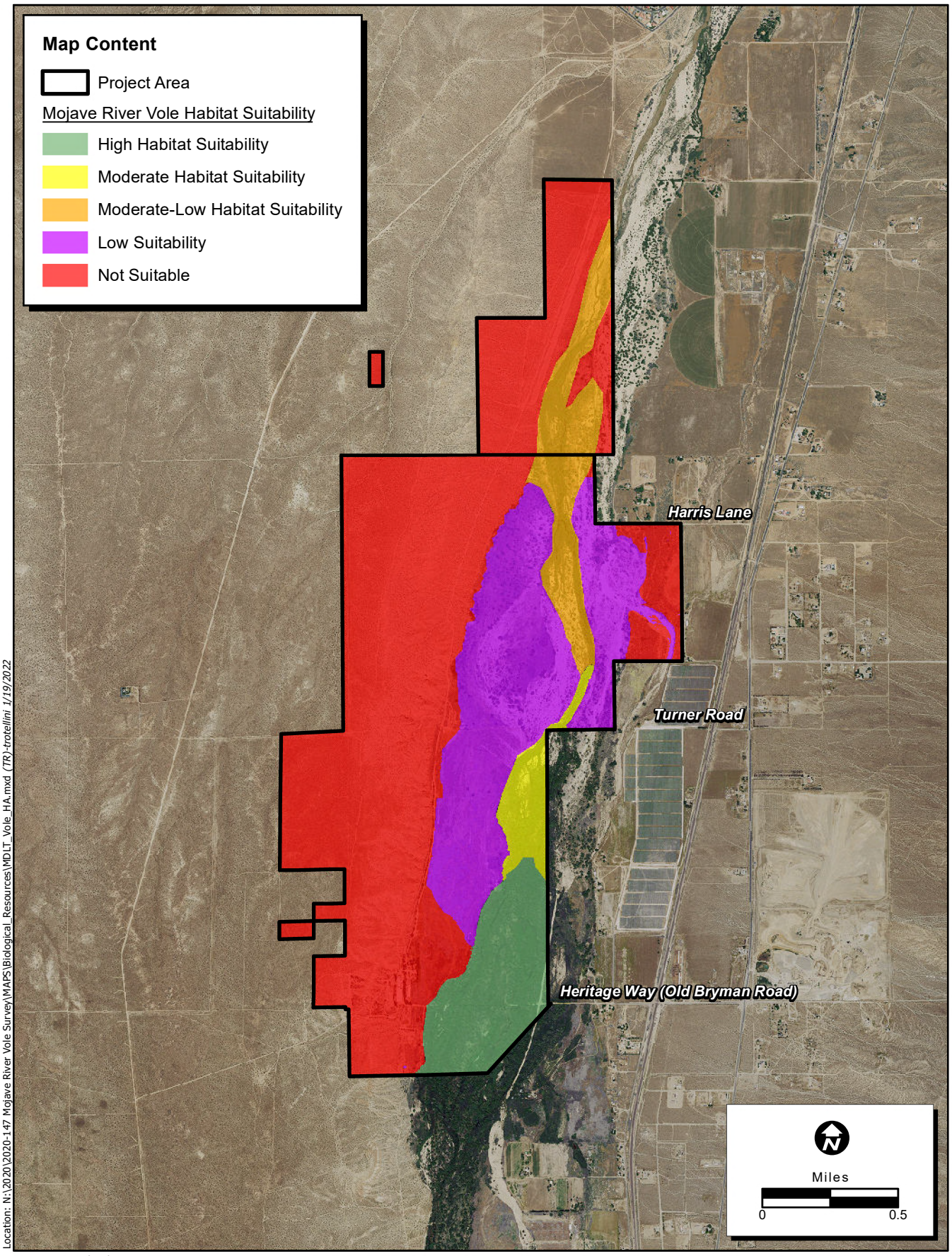
Figure 2. Survey Location

2020-147 Mohave Desert Land Trust

ATTACHMENT C

Figure 3. Mojave River Vole Habitat Assessment



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Map Date: 1/11/2022

Service Layer Credits:

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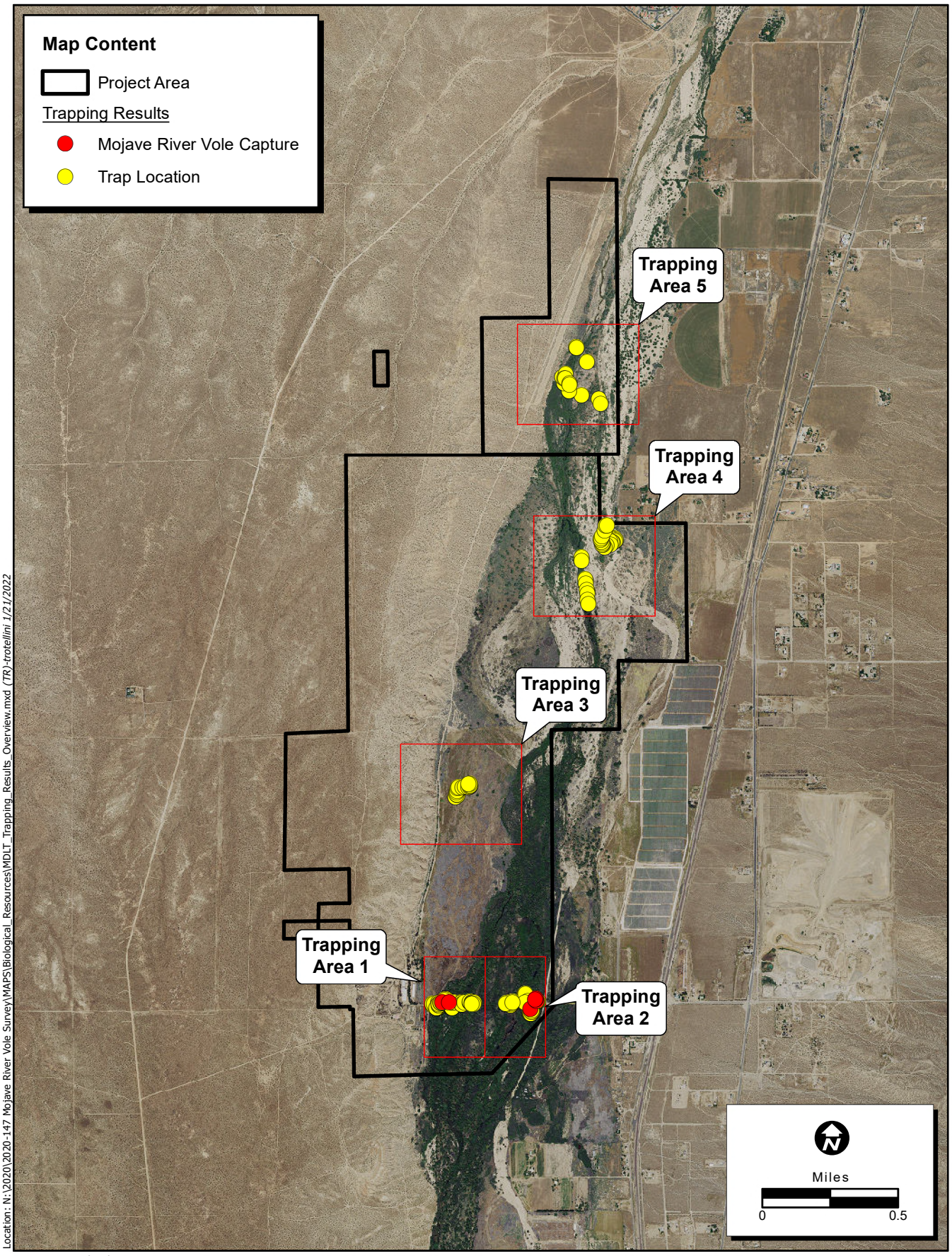
Figure 3. Mojave River Vole Habitat Assessment

2020-147 Mohave Desert Land Trust

ATTACHMENT D

Figure 4. Trapping Results



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Map Date: 1/21/2022

Service Layer Credits:

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Figure 4. Trapping Results Overview

2020-147 Mohave Desert Land Trust

Map Features

Project Area

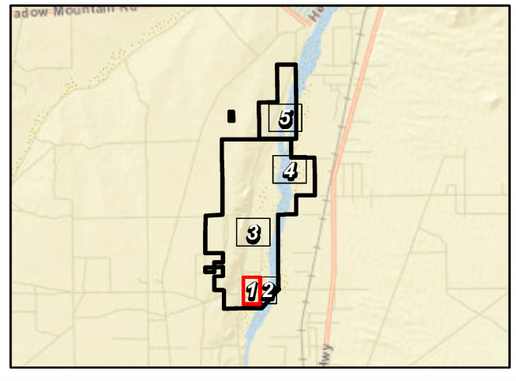
Trapping Results

Mojave River Vole Capture

Trap Location

Sources: NAIP (2020)

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community



ECORP- N:\2020\2020-147 Mojave River Vole Survey\MAPS\Biological_Resources\MDLT_Trapping_Results.mxd (TR)-tratellini 1/21/2022

Map Date: 12/17/2021

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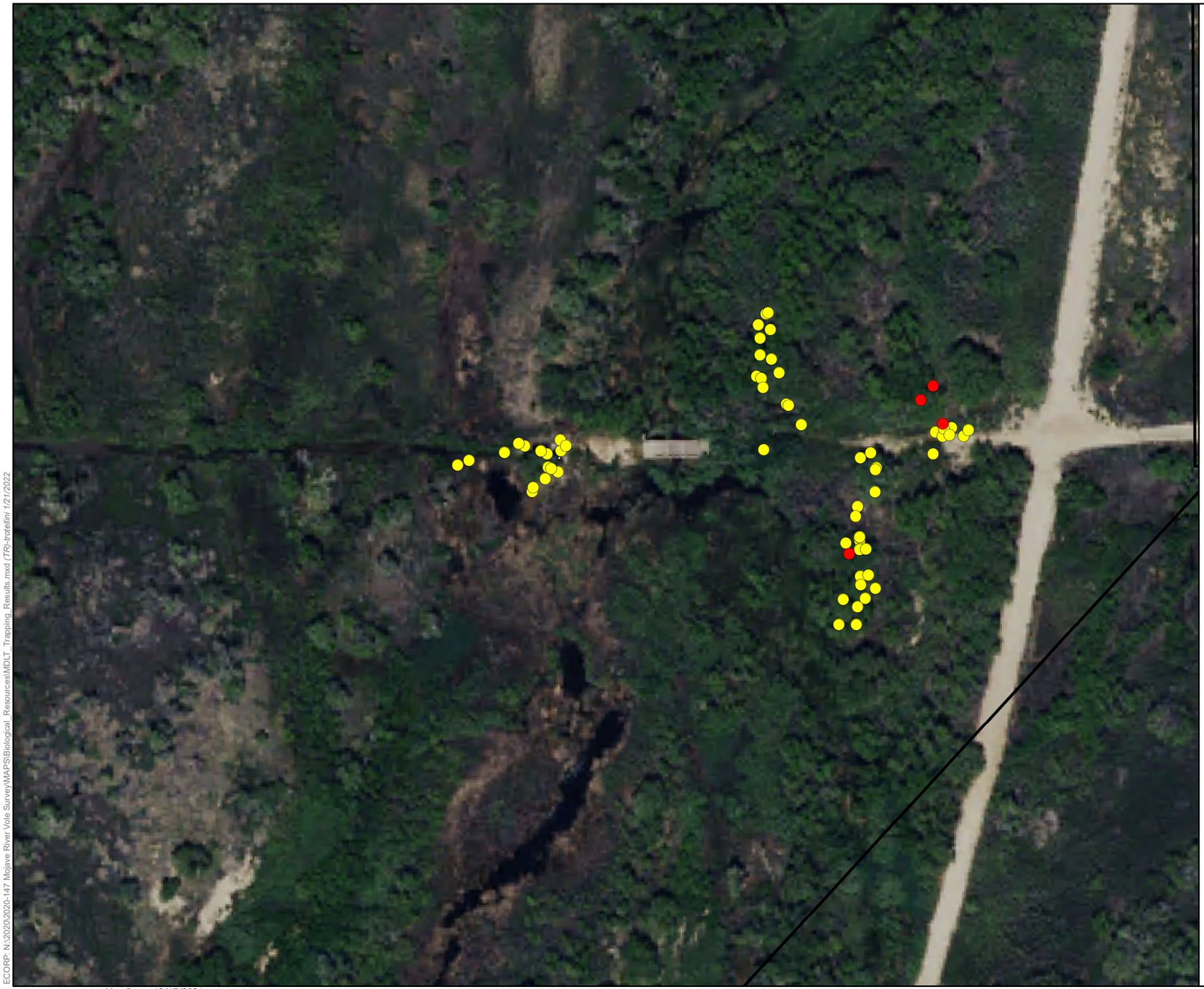
Scale in Feet
0 125

Figure 4. Trapping Results
Trapping Area 1 of 5
2020-147 Mohave Desert Land Trust



Map Features

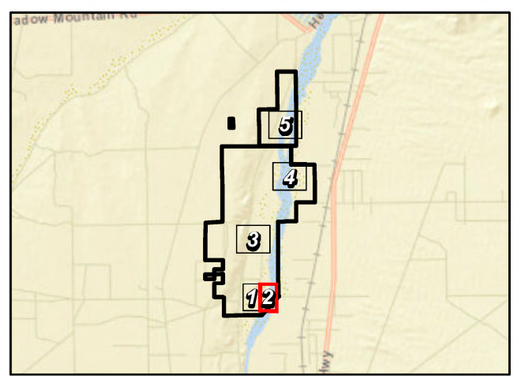
- Project Area

Trapping Results

- Mojave River Vole Capture
- Trap Location

Sources: NAIP (2020)

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community



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Map Date: 12/17/2021

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Scale in Feet
0 125

Figure 4. Trapping Results
Trapping Area 2 of 5
2020-147 Mohave Desert Land Trust

Map Features

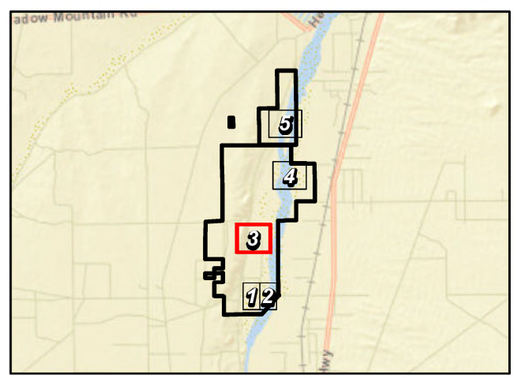
Project Area

Trapping Results

Trap Location

Sources: NAIP (2020)

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community



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Map Date: 12/17/2021

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Scale in Feet
0 200

Figure 4. Trapping Results
Trapping Area 3 of 5
2020-147 Mohave Desert Land Trust

Map Features

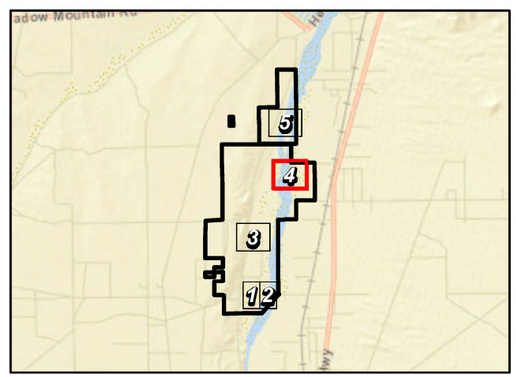
Project Area

Trapping Results

Trap Location

Sources: NAIP (2020)

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community



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Map Date: 12/17/2021

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Scale in Feet
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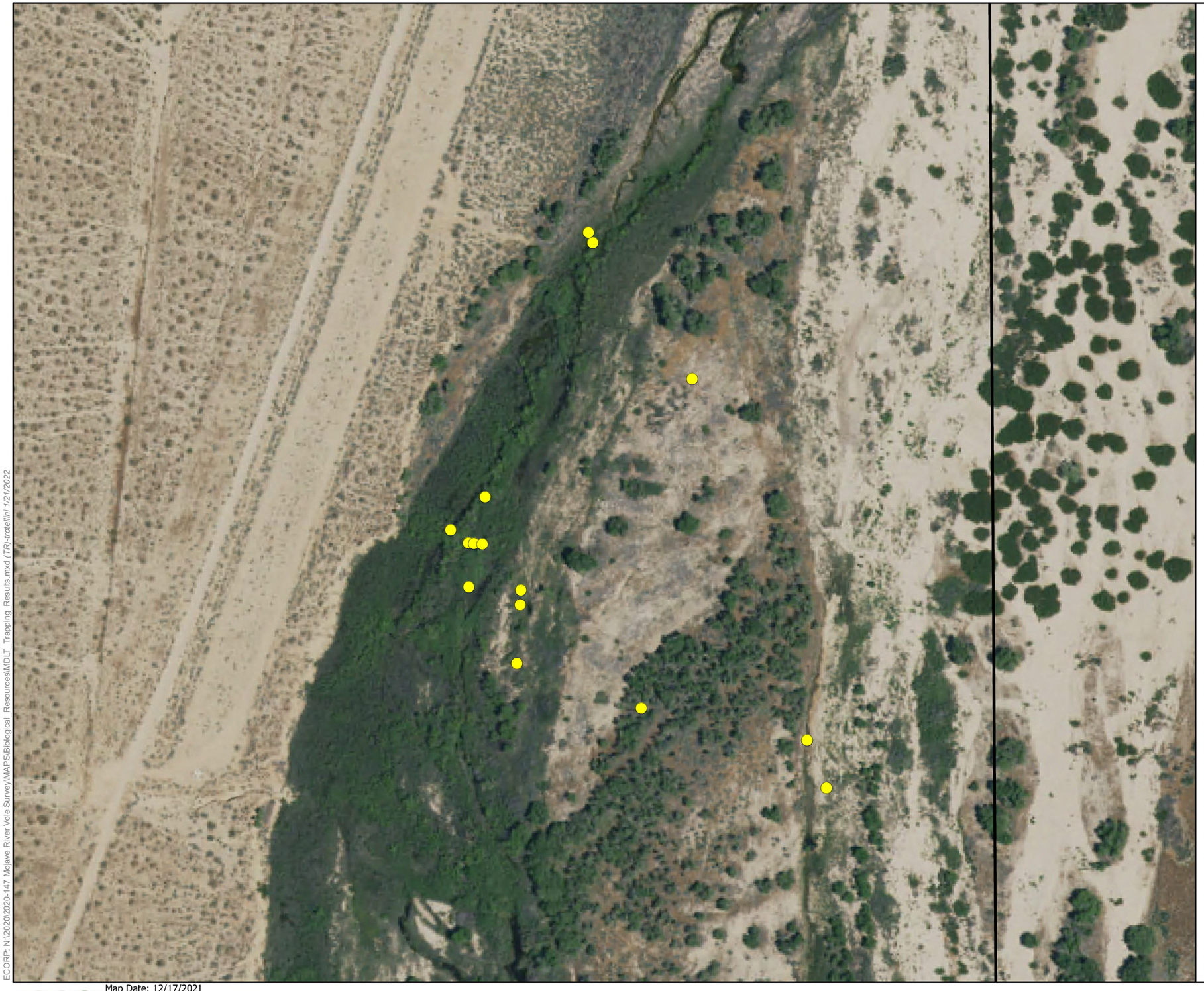
Figure 4. Trapping Results
Trapping Area 4 of 5
2020-147 Mohave Desert Land Trust



Map Features

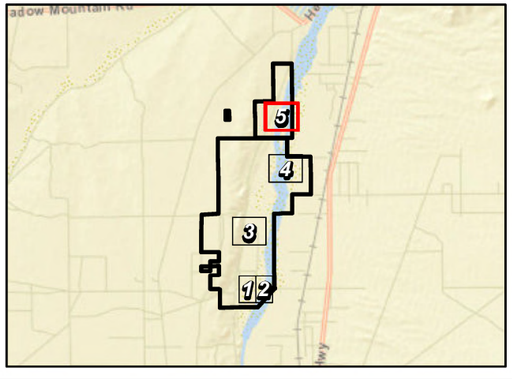
Project Area

Trapping Results

Trap Location

Sources: NAIP (2020)

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community



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Map Date: 12/17/2021

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Scale in Feet
0 200

Figure 4. Trapping Results
Trapping Area 5 of 5
2020-147 Mohave Desert Land Trust

ATTACHMENT E

Representative Photographs

Photo 1: Representative photo of habitat withing Trapping Area 1.

Photo 2: Representative photo of habitat within Trapping Area 1.

Photo 3: Mojave River Vole (MRV) captured in Trapping Area 1 (ventral view).

Photo 4: MRV captured in Trapping Area 1 (side view).

Photo 5: Representative photo of habitat at MRV Capture location (Trapping Area 1).

Photo 6: Representative photo of habitat within Trapping Area 2.

Photo 7: High quality grassy habitat within Trapping Area 2.

Photo 8: High quality grassy habitat within Trapping Area 2.

Photo 9: MRV captured in Trapping Area 2.

Photo 10: Representative photo of habitat at MRV capture location (Trapping Area 2).

Photo 11: Representative photo of habitat at MRV capture location (Trapping Area 2).

Photo 12: Representative photo of habitat within Trapping Area 3.

Photo 13: Representative photo of habitat within Trapping Area 3.

Photo 14: Representative photo of habitat within Trapping Area 4.

Photo 15: Representative photo of habitat within Trapping Area 4.

Photo 16: Representative photo of habitat within Trapping Area 4.

Photo 17: Representative photo of habitat within Trapping Area 5.

Photo 18: Representative photo of habitat within Trapping Area 5.

APPENDIX 8

IDENTIFICATION AND EVALUATION OF HISTORIC PROPERTIES

PALISADES RANCH ECOLOGICAL RESTORATION PROJECT

Helendale Area
San Bernardino County, California

For Submittal to:

Mojave Desert Resource Conservation District
15415 W. Sand Street, #103
Victorville, CA 92392
and
United States Army Corps of Engineers, Los Angeles District
915 Wilshire Boulevard
Los Angeles, CA 90017

Prepared for:

Tom Dodson & Associates
2150 N. Arrowhead Avenue
San Bernardino, CA 92405

Prepared by:

CRM TECH
1016 E. Cooley Drive, Suite A/B
Colton, CA 92324

Bai "Tom" Tang, Principal Investigator
Michael Hogan, Principal Investigator

April 21, 2022
CRM TECH Contract No. 3579

Title: Identification and Evaluation of Historic Properties: Palisades Ranch Ecological Restoration Project, Helendale Area, San Bernardino County, California

Author(s): Deirdre Encarnación, Archaeologist/Report Writer
Terri Jacquemain, Historian
Hunter O'Donnell, Archaeologist

Consulting Firm: CRM TECH
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(909) 824-6400

Date: April 21, 2022

For Submittal to: Mojave Desert Resource Conservation District
15415 W. Sand Street, #103
Victorville, CA 92392
(760) 843-6882
and
United States Army Corps of Engineers, Los Angeles District
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Los Angeles, CA 90017
(213) 452-3333

Prepared for: Tom Dodson, President
Tom Dodson & Associates
2150 N. Arrowhead Avenue
San Bernardino, CA 92405
(909) 882-3612

USGS Quadrangle: Helendale, Calif., 7.5' quadrangle; Section 7 of T7N R4W and Sections 12, 13, 24, and 25 of T7N R5W, San Bernardino Baseline and Meridian

Project Size: Approximately 200 acres

Resources: Site 36-000184: prehistoric habitation site; Site 36-026214: Grand Terrace bridge; Isolate 3579-1*: glass Coca-Cola bottle fragment; Isolate 3579-2*: 55-gallon metal drum; Site 3579-3*: glass bottle; Site 3579-4*: Palisades Ranch complex

* *Temporary designations, pending assignment of primary numbers in the California Historical Resources Inventory*

Keywords: Victor Valley; Mojave River valley; southern Mojave Desert

EXECUTIVE SUMMARY

Between January 2020 and April 2022, at the request of Tom Dodson & Associates, CRM TECH performed a cultural resources study on the Area of Potential Effects (APE) for the proposed Palisades Ranch Ecological Restoration Project in the unincorporated Helendale area of San Bernardino County, California. The undertaking entails the implementation of a habitat restoration plan, to include "soft" construction of channels and bank structures, revegetation, and other ecological improvements. The APE is located along the Mojave River wash and near the intersection of Bryman Road and Heritage Way, within Section 7 of T7N R4W and Sections 12, 13, 24, and 25, Township 7 North Range 5 West, San Bernardino Baseline and Meridian, as depicted in the United States Geological Survey Helendale, California, 7.5' quadrangle.

The purpose of the study is to provide the Mojave Desert Resource Conservation District (MDRCD) and the United States Army Corps of Engineers (COE), as the local and federal lead agencies for the proposed undertaking, respectively, with the necessary information and analysis to determine whether the undertaking would have an effect on any "historic properties," as defined by Section 106 of the National Historic Preservation Act and associated regulations (36 CFR 800.16(l)), that may exist in the APE. In order to identify such resources, CRM TECH performed a cultural resources records search, pursued historical and geoarchaeological background research, contacted Native American representatives, and carried out a systematic field survey.

The results of these research procedures indicate that two historical/archaeological sites were previously recorded as lying partially within the APE, and four additional cultural resources, including one site and three isolates, were identified in the APE during this study. These six cultural resources are listed below:

Identification Number	**Description**
Site 36-000184 (CA-SBR-184)	Prehistoric habitation remains with possible burials
Site 36-026214	Grand Terrace Bridge (relocated)
Isolate 3579-1*	Glass Coca-Cola bottle fragment
Isolate 3579-2*	55-gallon metal drum
Isolate 3759-3*	Small glass bottle
Site 3579-4*	Palisades Ranch complex

* *Temporary designations, pending assignment of primary numbers in the California Historical Resources Inventory*

Two of the three sites in the APE, 36-026214 and 3579-4, date to the historic period, as do all three of the isolates. The two sites have been found not to meet any of the criteria for listing in the National Register of Historic Places, and thus neither of them qualifies as a "historic property" under Section 106 provisions. The isolates, or localities with fewer than three artifacts, by definition do not constitute archaeological sites due to the lack of depositional context. Therefore, they are not considered potential "historic properties" and require no further consideration in the Section 106 compliance process.

The sole prehistoric—i.e., Native American—cultural resource in the APE, Site 36-000184, was first recorded in 1941 and last updated in 1963. During the field survey, no prehistoric cultural remains could be found on the ground surface in the general area of the site. The area has been extensively

disturbed since 1963 and is now occupied by four buildings constructed between 1973 and 1994. However, the field survey did not yield sufficient data to ascertain whether any buried components of the site may survive. Given the well-established sensitivity of the Mojave River Valley for prehistoric archaeology and the special cultural significance of human remains to the Native American community, any buried archaeological deposits similar to what was originally recorded on the surface at the site, if present, would need to be evaluated as potential "historic properties."

Based on these findings, CRM TECH recommends to the MDRCD and the COE that preliminary subsurface testing procedures consistent to an Extended Phase 1 archaeological study, such as excavation of backhoe trenches and shovel test pits, be implemented in the general vicinity of Site 36-000184 to determine the presence or absence of any buried components of the site. Further recommendations for Section 106 compliance will be formulated and presented on the basis of the testing results and significance evaluation of the findings, if any.

TABLE OF CONTENTS

EXECUTIVE SUMMARY i
INTRODUCTION 1
SETTING 4
Current Natural Setting 4
Cultural Setting 4
Prehistoric Context 4
Ethnohistoric Context 6
Historic Context 7
RESEARCH METHODS 8
Records Search 8
Geoarchaeological Analysis 8
Historical Background Research 8
Native American Participation 8
Field Survey 9
RESULTS AND FINDINGS 9
Previous Cultural Resources Studies in the Vicinity 9
Geoarchaeological Profile 11
Historical Overview 12
Native American Input 14
Cultural Resources Recorded in the APE 15
Site 36-000184 (Prehistoric Habitation Site) 15
Site 36-026214 (Grand Terrace Bridge) 15
Isolates 3579-1, -2, and -3 (Refuse Items) 16
Site 3579-4 (Palisades Ranch) 16
MANAGEMENT CONSIDERATIONS 17
Applicable Statutory/Regulatory Framework 17
Resource Evaluation 18
Site 36-000184 (Prehistoric Habitation Site) 18
Site 36-026214 (Grand Terrace Bridge) 18
Isolates 3579-1, -2, and -3 (Refuse Items) 18
Site 3579-4 (Palisades Ranch) 19
CONCLUSION AND RECOMMENDATIONS 19
REFERENCES 20
APPENDIX 1: Personnel Qualifications 22
APPENDIX 2: Correspondence with Native American Representatives 28
APPENDIX 3: Cultural Resources in the APE (Confidential) 37

LIST OF FIGURES

Figure 1. Project vicinity 1
Figure 2. Project location 2
Figure 3. Area of Potential Effects 3
Figure 4. Current natural setting of the APE 5
Figure 5. Previous cultural resources studies within the scope of the records search 10
Figure 6. The APE and vicinity in 1853-1855 12
Figure 7. The APE and vicinity in 1920-1932 13
Figure 8. The APE and vicinity in 1952-1956 13

INTRODUCTION

Between January 2020 and April 2022, at the request of Tom Dodson & Associates, CRM TECH performed a cultural resources study on the Area of Potential Effects (APE) for the proposed Palisades Ranch Ecological Restoration Project in the unincorporated Helendale area of San Bernardino County, California (Fig. 1). The undertaking entails the implementation of a habitat restoration plan, to include "soft" construction of channels and bank structures, revegetation, and other ecological improvements. The APE is located along the Mojave River wash and near the intersection of Bryman Road and Heritage Way, within Section 7 of T7N R4W and Sections 12, 13, 24, and 25, Township 7 North Range 5 West, San Bernardino Baseline and Meridian (Figs. 2, 3).

The purpose of the study is to provide the Mojave Desert Resource Conservation District (MDRCD) and the United States Army Corps of Engineers (COE), as the local and federal lead agencies for the proposed undertaking, respectively, with the necessary information and analysis to determine whether the undertaking would have an effect on any "historic properties," as defined by Section 106 of the National Historic Preservation Act and associated regulations (36 CFR 800.16(l)), that may exist in the APE.

In order to identify such resources, CRM TECH performed a cultural resources records search, pursued historical and geoarchaeological background research, contacted Native American representatives, and carried out a systematic field survey. The following report is a complete account of the methods, results, and final conclusion of the study. Personnel who participated in the study are named in the appropriate sections below, and their qualifications are provided in Appendix 1.

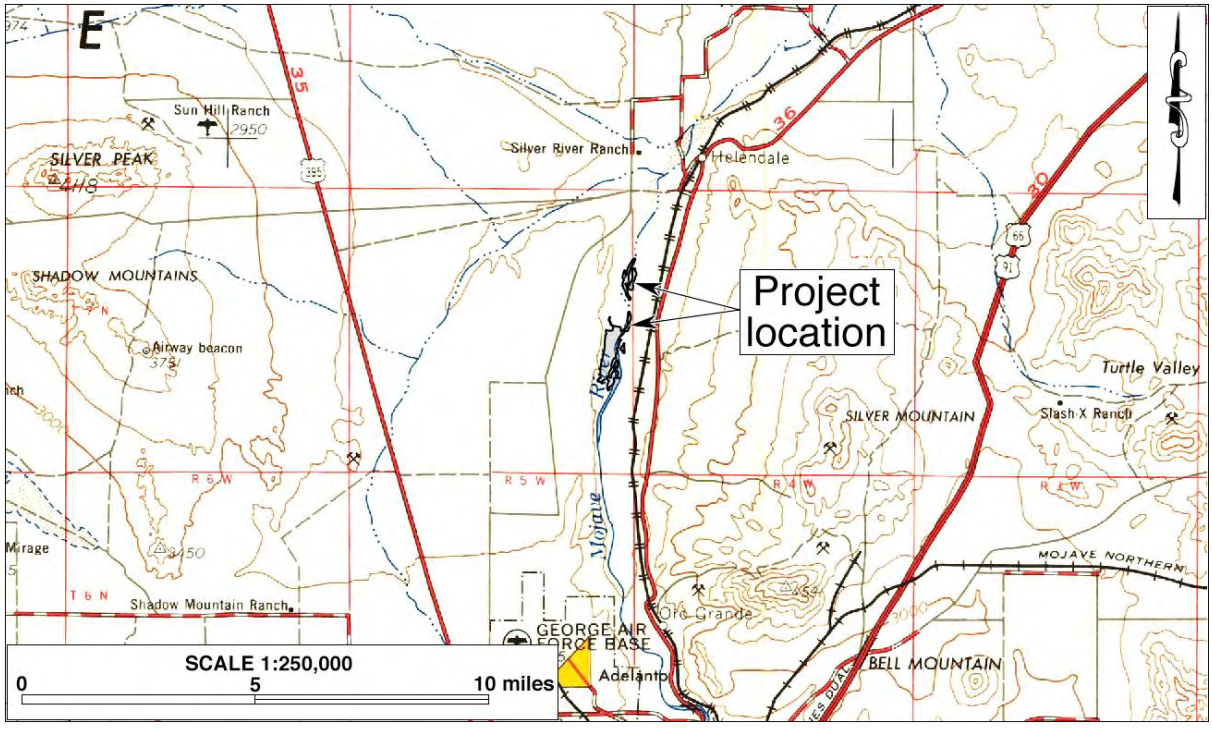

Figure 1. Project vicinity. (Based on USGS San Bernardino, Calif., 120'x60' quadrangle [USGS 1969])

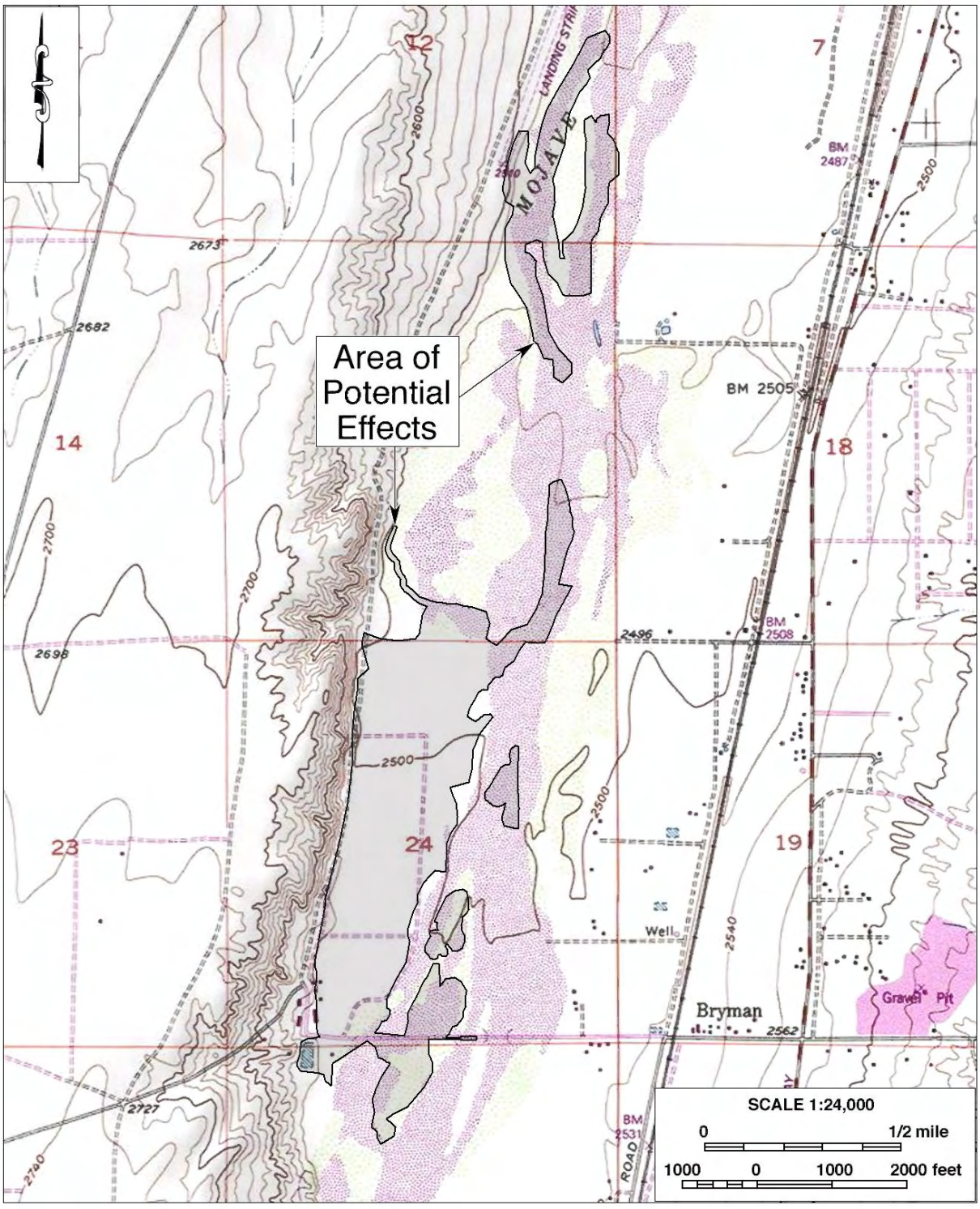

Figure 2. Project location. (Based on USGS Helendale and Victorville NW, Calif., 7.5' quadrangles [USGS 1993a; 1993b])

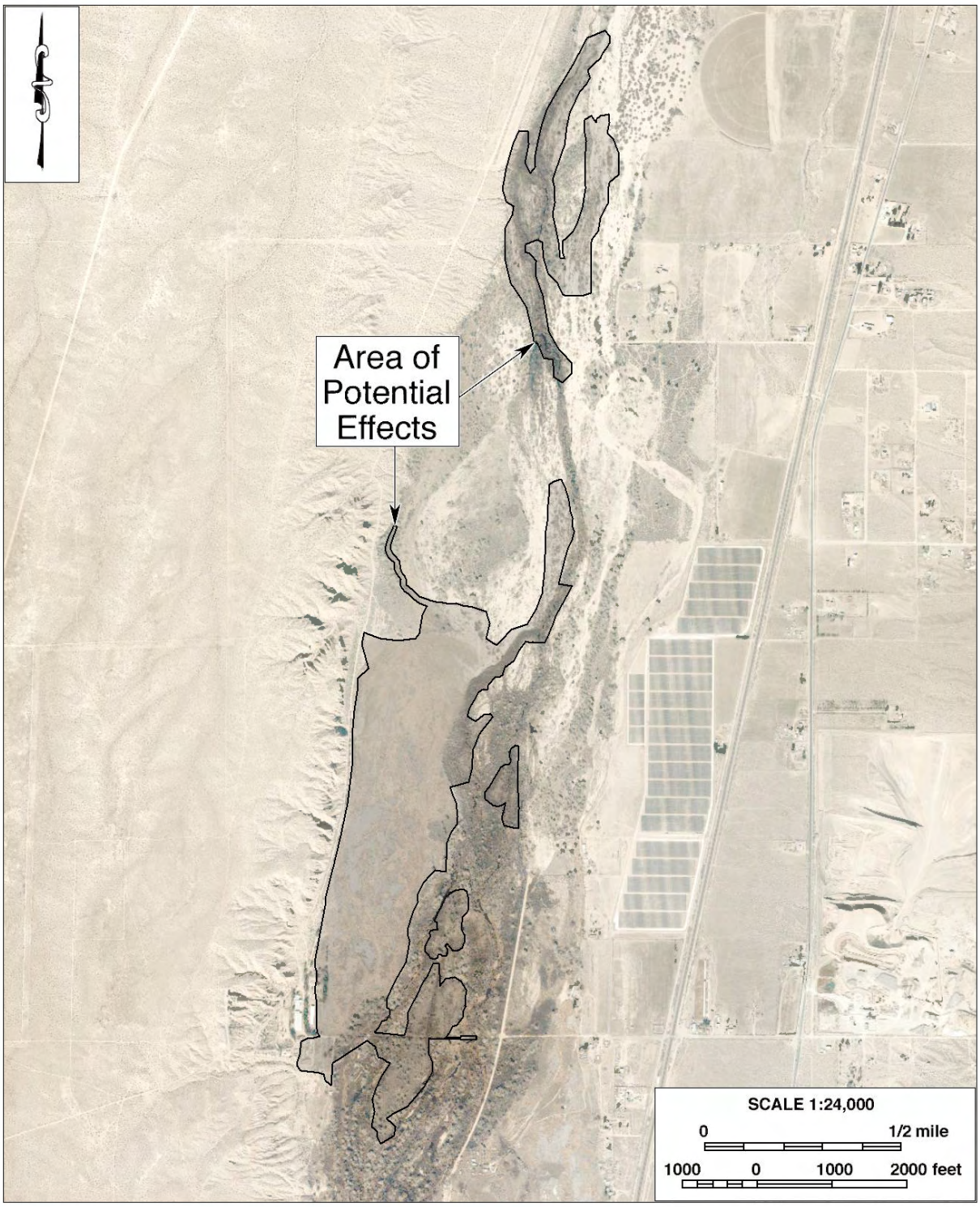

Figure 3. Recent satellite image of the Area of Potential Effects. (Based on Google Earth imagery)

SETTING

CURRENT NATURAL SETTING

The community of Helendale is located in the central Victor Valley, on the southern rim of the Mojave Desert, and to the north of the San Bernardino-San Gabriel mountain ranges. The climate and environment of the area is dictated by this geographic setting and typical of the southern California high desert region, so named because of its higher elevation than the Colorado Desert to the southeast. The climate is marked by extremes in temperature and aridity, with summer highs reaching well over 110ºF and winter lows dropping below freezing. Average annual precipitation is less than five inches.

During the Late Pleistocene and early Holocene epochs, the region experienced four separate high stands of Lake Mojave and other pluvial lakes. These episodes afforded the aboriginal population greater access to water, while the desiccation of the lakes forced them to move closer to the Mojave River, which provided not only a dependable water source and subsistence resources but also a major route for interregional trade. Not surprisingly, most of the Native American archaeological sites identified in and around the region occur along the banks of the Mojave River.

Situated mostly along the western bank of the Mojave River channel, the proposed restoration activities within the APE are largely within the river's floodplain (Figs. 3, 4). The APE and its vicinity include sand banks and dunes, steep bluffs, and former agricultural fields of the Palisades Ranch. Elevations range approximately from 2,465 to 2,530 feet above mean sea level, with the terrain declining gradually towards the north. Ground surface in the majority of the APE has been extensively disturbed in the past by farming activities, and natural erosion of the river has accounted for additional disturbance to the surface soils.

Agricultural fields located on the side of the river are now fallow, and some have been cleared while others are covered with dense vegetation. An abandoned old farmhouse, remains of other buildings, and roads of the Palisades Ranch still occupy part of the APE, with additional buildings associated with the ranch, clearly of later vintages, standing further to the west. Vegetation in the APE is typical of riparian habitats and includes arroyo willow, Fremont cottonwood, and mesquite, as well as naturalized invasive species such as Russian thistle, cheatgrass, pepperweed, and *Arundo* cane, among other desert grasses and shrubs.

CULTURAL SETTING

Prehistoric Context

In order to understand the progress of Native American cultures prior to European contact, archaeologists have devised chronological frameworks on the basis of artifacts and site types that date back some 12,000 years. Currently, the chronology most frequently applied in the Mojave Desert divides the region's prehistory into five periods marked by changes in archaeological remains, reflecting different ways in which Native peoples adapted to their surroundings. According to Warren (1984) and Warren and Crabtree (1986), the five periods are as follows: the Lake Mojave Period, 12,000 years to 7,000 years ago; the Pinto Period, 7,000 years to 4,000 years ago; the

Figure 4. Overview of the current natural setting of the APE. (Photograph taken on December 2, 2021, from a drone; view to the west)

Gypsum Period, 4,000 years to 1,500 years ago; the Saratoga Springs Period, 1,500 years to 800 years ago; and the Protohistoric Period, 800 years ago to European contact.

More recently, Hall (2000) presented a slightly different chronology for the region, also with five periods: Lake Mojave (ca. 8000-5500 B.C.), Pinto (ca. 5500-2500 B.C.), Newberry (ca. 1500 B.C.-500 A.D.), Saratoga (ca. 500-1200 A.D.), and Tecopa (ca. 1200-1770s A.D.). According to Hall (*ibid*.:14), small mobile groups of hunters and gatherers inhabited the Mojave Desert during the Lake Mojave sequence. Their material culture is represented by the Great Basin Stemmed points and flaked stone crescents. These small, highly mobile groups continued to inhabit the region during the Pinto Period, which saw an increased reliance on ground foods, small and large game animals, and the collection of vegetal resources, suggesting that "subsistence patterns were those of broad-based foragers" (*ibid*.:15). Artifact types found in association with this period include the Pinto points and *Olivella* sp. spire-lopped beads.

Distinct cultural changes occurred during the Newberry Period, in comparison to the earlier periods, including "geographically expansive land-use pattern…involving small residential groups moving between select localities," long-distance trade, and diffusion of trait characteristics (Hall 2000:16). Typical artifacts from this period are the Elko and Gypsum Contracting Stem points and Split Oval beads. The two ensuing periods, Saratoga and Tecopa, are characterized by seasonal group settlements near accessible food resources and the intensification of the exploitation of plant foods,

as evidenced by groundstone artifacts (*ibid*.:16). Hall (*ibid*.) states that "late prehistoric foraging patterns were more restricted in geographic routine and range, a consequence of increasing population density" and other variables. Saratoga Period artifact types include Rose Spring and Eastgate points as well as Anasazi grayware pottery. Artifacts from the Tecopa Period include Desert Side-notched and Cottonwood Triangular points, buffware and brownware pottery, and beads of the Thin Lipped, Tiny Saucer, Cupped, Cylinder, steatite, and glass types (*ibid*.).

Ethnohistoric Context

The Victor Valley area is situated near the presumed boundary between the traditional territories of the Serrano and the Vanyume peoples. The basic written sources on Serrano and Vanyume cultures are Kroeber (1925), Strong (1929), and Bean and Smith (1978), and the following ethnographic discussion is based on these sources. Linguistically the Vanyume of the Mojave River valley were probably related to the Serrano, although politically they seem to have differed from the Serrano proper. The number of Vanyumes, never large, dwindled rapidly between 1820 and 1834, when much of the Native population in southern California was removed to the various missions and their *asistencias*, and the group virtually disappeared well before 1900. As a result, very little is known about the Vanyume today.

The Serrano's territory is centered at the San Bernardino Mountains, but also includes part of the San Gabriel Mountains, most of the San Bernardino Valley, and the southern rim of the Mojave Desert, reaching as far east as the Cady, Bullion, Sheep Hole, and Coxcomb Mountains. However, it is nearly impossible to assign definitive boundaries for the Serrano territory due to the nature of the tribe's clan-based organization as well as the lack of reliable data. The name of the group, Serrano, was derived from a Spanish term meaning "mountaineer" or "highlander."

Prior to European contact, Serrano subsistence was defined by the surrounding landscape and primarily based on the gathering of wild and cultivated foods and hunting, exploiting nearly all of the resources available. They settled mostly on elevated terraces, hills, and finger ridges near where flowing water emerged from the mountains. Loosely organized into exogamous clans led by hereditary heads, the clans were in turn affiliated with one of two exogamous moieties, the Wildcat (*Tukutam*) or the Coyote (*Wahiiam*). The exact nature of the clans, their structure, function, and number are not known, except that each clan was the largest autonomous political and landholding unit. The core of the unit was the patrilineage, although women retained their own lineage names after marriage. There was no pan-tribal political union among the clans.

The Serrano had a variety of technological skills that they used to acquire food, shelter, and clothing as well as to create ornaments and decorations. Common tools included manos and metates, mortars and pestles, hammerstones, fire drills, awls, arrow straighteners, and stone knives and scrapers. These lithic tools were made from locally sourced material as well as materials procured through trade or travel. They also used wood, horn, and bone spoons and stirrers; baskets for winnowing, leaching, grinding, transporting, parching, storing, and cooking; and pottery vessels for carrying water, storage, cooking, and serving food and drink. Much of this material cultural, elaborately decorated, does not survive in the archaeological record. As usual, the main items found archaeologically relate to subsistence activities.

Although contact with Europeans may have occurred as early as 1771 or 1772, Spanish influence on Serrano lifeways was minimal until the 1810s, when a mission *asistencia* was established on the southern edge of Serrano territory. Between then and the end of the mission era in 1834, most of the Serrano in the western portion of their traditional territory were removed to the nearby missions. In the eastern portion, a series of punitive expeditions in 1866-1870 resulted in the death or displacement of almost all remaining Serrano population in the San Bernardino Mountains. Today, most Serrano descendants are affiliated with the San Manuel Band of Mission Indians, the Morongo Band of Mission Indians, or the Serrano Nation of Indians.

Historic Context

The first European visitor known to have arrived in the present-day Victor Valley area was the famed Spanish explorer Francisco Garcés, who traveled through the valley in 1776, shortly after the beginning of Spanish colonization of Alta California in 1769 (Beck and Haas 1974:15). The earliest Euroamerican settlements appeared in the Victor Valley as early as 1860 (Peirson 1970:128). Despite these "early starts," due to its harsh environment, development in the arid high desert country of southern California was slow and limited for much of the historic period, and the Victor Valley remained only sparsely populated until the second half of the 20th century.

Garcés traveled through the Victor Valley along an ancient Indian trading route known today as the Mojave Trail (Beck and Haase 1974:15). In the early 1830s, part of this trail was incorporated into the Old Spanish Trail, an important pack-train road that extended between southern California and Santa Fe, New Mexico (Warren 2004). Some 20 years later, when the historic wagon road known as the Mormon Trail or Salt Lake Trail was established between Utah and southern California, it followed essentially the same route across the Mojave Desert (NPS 2001:5). Since then, the Victor Valley has always served as a crucial link on a succession of major transportation arteries, where the heritage of the ancient Mojave Trail was carried on by the Santa Fe Railway since the 1880s, by the legendary U.S. Highway 66 ("Route 66") during the early and mid-20th century, and finally by today's Interstate Highway 15.

Despite its location on one of California's most important transportation arteries in history, the Helendale area was slow in growth until the last few decades. Known initially as Point of Rocks, the area was settled by non-Indians at least by 1862 (Garret 1996:152). During the 1860s and 1870s, Point of Rocks became a designated stop on the Old Spanish Trail, which was then in frequent use by the U.S. military (*ibid.*). In 1885, the Santa Fe Railway constructed a siding at this location, and subsequently renamed it Helen in 1897, after the daughter of a railroad official (*ibid.*:90, 152).

As often occurred along railroad lines in the West, a small community gradually developed around the siding. By 1909, there was a sufficient population in the community to warrant the establishment of a post office under the name of Judson (Garret 1996:90). Nine years later, the names of both the railroad siding and the post office were changed to Helendale (*ibid.*). In the 1950s, the town had a total population of 250 (*ibid.*). In the 1970s, prompted by the construction of the nearby Silver Lakes resort, Helendale's growth accelerated, and within two decades its population reached 3,500 (*ibid.*). Today, the socio-economic life of Helendale is focused mostly on Silver Lakes, the largest resort in the Mojave Desert (*ibid.*:178).

RESEARCH METHODS

RECORDS SEARCH

The historical/archaeological resources records search for this study was conducted by CRM TECH archaeologist Nina Gallardo at the South Central Coastal Information Center (SCCIC) of the California Historical Resources Information System on January 21, 2020. Located on the campus of California State University, Fullerton, the SCCIC is the State of California's official cultural resource records repository for the County of San Bernardino. During the records search, Gallardo examined the center's digital maps, records, and databases for previously identified cultural resources and existing cultural resources reports within a one-mile radius of the APE. Previously identified cultural resources include properties designated as California Historical Landmarks, Points of Historical Interest, or San Bernardino County Landmarks, as well as those listed in the National Register of Historic Places, the California Register of Historical Resources, or the California Historical Resources Inventory.

GEOARCHAEOLOGICAL ANALYSIS

As a part of the research procedures, CRM TECH archaeologist Deirdre Encarnación pursued geoarchaeological analysis to assess the APE's potential for the deposition and preservation of subsurface cultural deposits from the prehistoric period, which cannot be detected through a standard surface archaeological survey. Sources consulted for this purpose included primarily topographic, geologic, and soil maps and reports pertaining to the surrounding area. Findings from these sources were used to develop a geomorphologic history of the APE and address geoarchaeological sensitivity of the vertical APE.

HISTORICAL BACKGROUND RESEARCH

Historical background research for this study was conducted by CRM TECH historian Terri Jacquemain on the basis of published literature in local and regional history, historical maps and aerial/satellite photographs of the project vicinity, archival property records of the U.S. Bureau of Land Management (BLM) and the County of San Bernardino, and online genealogical databases. Among the maps consulted were U.S. General Land Office (GLO) land survey plat maps dated 1855-1856 and United States Geological Survey (USGS) topographic maps dated 1934-1993, which are accessible at the websites of the BLM and the USGS. The aerial and satellite images, taken between 1929 and 2020, are available from the Nationwide Environmental Title Research (NETR) Online website, the University of California, Santa Barbara, geospatial online collection, and the Google Earth software.

NATIVE AMERICAN PARTICIPATION

On January 16, 2020, CRM TECH submitted a written request to the State of California's Native American Heritage Commission (NAHC) for a records search in the commission's Sacred Lands File. Following the NAHC's recommendations, CRM TECH further contacted five tribal representatives in the region in writing and by telephone between July 7, 2020, and November 24, 2021, for additional information on potential Native American cultural resources in the project

vicinity. The correspondences between CRM TECH and the Native American representatives are attached to this report in Appendix 2.

FIELD SURVEY

On December 2-3, 2021, CRM TECH archaeologists Hunter O'Donnell, Salvadore Boites, and Arturo Aldaco conducted the on-foot field survey of the APE. Whenever possible, the field personnel walked parallel transects laid out according to the terrain and accessibility and spaced 15 meters (approximately 50 feet) apart. The heavily overgrown vegetation in the agricultural fields and the riparian corridors prevented consistent level of survey effort, and a few small pockets of the APE were unreachable, including impassable bluffs and areas without safe access.

The ground surface in the APE was examined to the best of the field personnel's ability for evidence of human activities dating to the prehistoric or historic periods (i.e., 50 years or older). Ground visibility ranged from essentially zero in the heavily overgrown agricultural fields to excellent (90-95%) in areas that have been cleared. On average, visibility in the accessible portions of the APE was fair (35-40%). In light of the history of past disturbances to the ground surface from both agricultural activities and flooding, the accessibility, visibility, and level of survey effort possible were deemed to be acceptable for the purpose of this study.

When artifacts or features were discovered during the survey, their locations were marked with survey flags. Upon completion of the survey, further field recordation, including descriptions of the artifacts, a location map with UTM coordinates, and a scaled sketch map, were completed to document the exact locations and nature of the finds. The field maps, descriptions, and other data were then compiled into standard site record forms for submittal to the SCCIC and inclusion in the California Historical Resources Inventory (see App. 3).

RESULTS AND FINDINGS

PREVIOUS CULTURAL RESOURCES STUDIES IN THE VICINITY

According to SCCIC records, portions of the APE have been subject to at least 12 cultural resources studies completed as early as 1940 and as recent as 2014 (Fig. 5). Most of these studies were not performed at an intensive level, however, but included two narrative reports, three overview-level cultural resources inventories, and two studies that were essentially ethnographic accounts regarding a series of archaeological sites recorded along the Mojave River and the Mojave Trail. One study carried out by the San Bernardino County Museum in 1978 covered 2000 acres, including the southern portion of the APE, but was also conducted on a reconnaissance level either from motor vehicles or on foot at 100-foot intervals.

As a result of the previous survey efforts in the vicinity, two historical/archaeological sites, designated 36-000184 (CA-SBR-184) and 36-026214 in the California Historical Resources Inventory, have been recorded as lying partially within the APE boundaries. Site 36-000184 was described in the 1940s-1960s as a prehistoric—i.e., Native American—habitation area with possible burials, and Site 36-026214 was recorded in 2013 as a steel Pratt pony truss bridge that had been

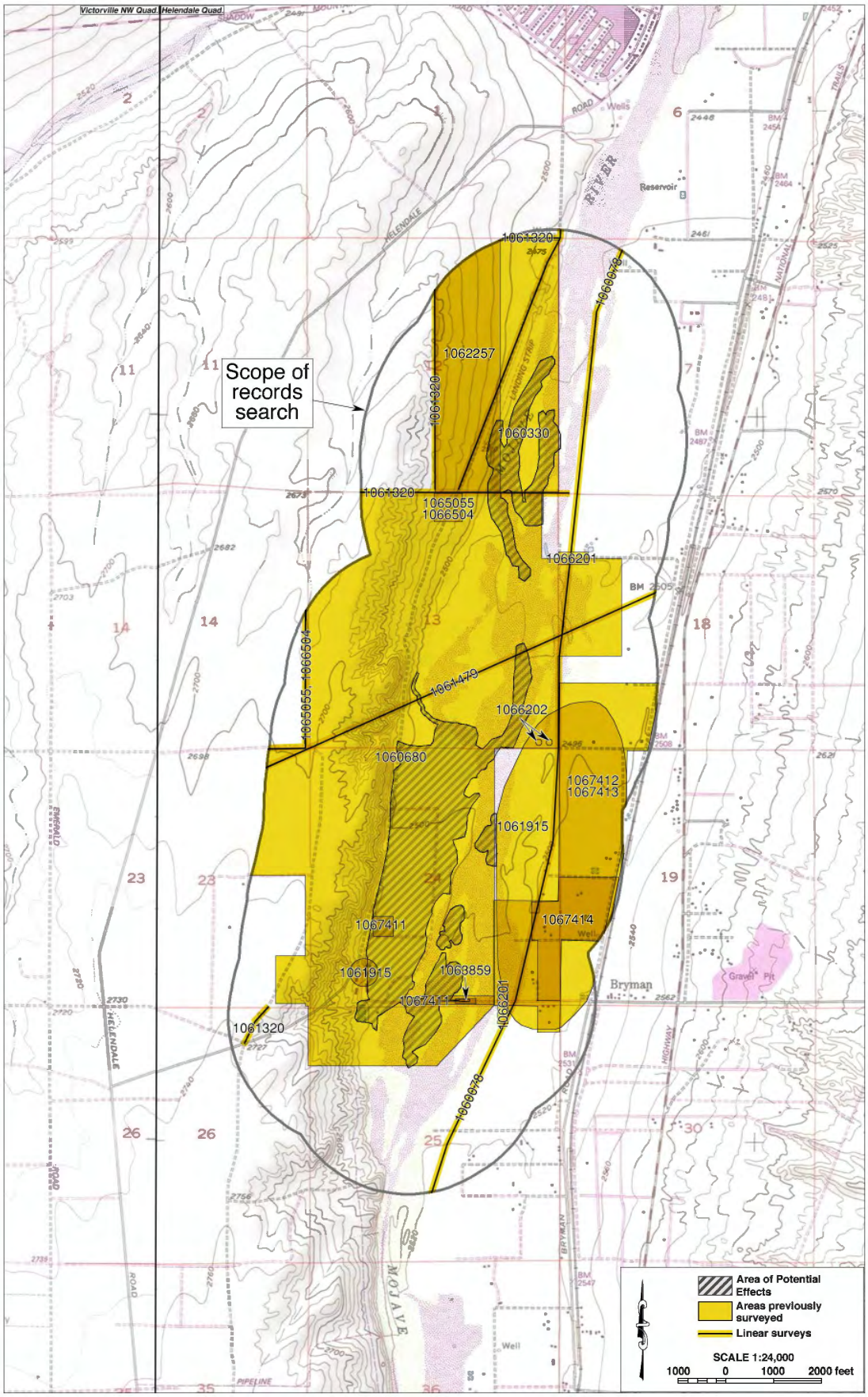

Figure 5. Previous cultural resources studies within the scope of the records search, listed by SCCIC file number. Location of historical/archaeological resources are not shown as a protective measure.

Table 1. Previously Recorded Cultural Resources within the Scope of the Records Search		
Site No.	**Recorded by/Date**	**Description**
36-000183	Various 1909-2015	Village site with scattered artifacts, house pits, and burials
36-000184*	Smith 1941	Prehistoric habitation site with possible burials
36-002074	Smith 1973	Sparse lithic scatter
36-002910	Various	Former U.S. Highway 66/National Old Trails Highway
36-003033	Various	Segments of the Mojave Trail
36-010317	Various 1993-2016	Barstow to Victorville 34.5kV transmission line
36-020970	Brunzell and Leonard 2009	Farmstead with associated structures and other features
36-020971	Brunzell and Leonard 2009	Historic-period refuse scatter
36-020972	Brunzell and Leonard 2009	Historic-period refuse scatter
36-020973	Brunzell and Leonard 2009	Historic-period refuse scatter
36-025616	Castells 2013	Two single-family residences, circa 1957 and 1968
36-025617	Castells 2013	Two single-family residences, circa 1922 and 1968
36-025618	Castells 2013	Single-family residence, circa 1930
36-025619	Castells 2013	Ranch-style single-family residence, circa 1948
36-025620	Castells 2013	Minimal Traditional-style single-family residence, circa 1965
36-026214*	Glentis 2013	Grand Terrace Bridge
36-028539	HDR, Inc. 2015	Isolate: chert flaked tool

*Recorded as lying partially within the APE

relocated from the City of Grand Terrace in 1988-1989 (Smith 1941; Vititow 1963; Glentis 2013). These two sites will be discussed further in the sections below.

Within the one-mile scope of the records search, SCCIC records identified at least 15 other previous studies on various tracts of land and linear features (Fig. 5). In all, more than half of the land within the one-mile radius has been surveyed, resulting in the recordation of 14 additional historical/ archaeological sites and one isolate—i.e., a locality with less than three artifacts—as listed in Table 1. Two of the sites and the one isolate were prehistoric in nature, with the isolate consisting of a single chert flaked tool. One of the sites was a village site originally recorded roughly 0.26 mile to the east as scatters of artifacts, numerous house pits, and multiple burials, while the other was recorded as a sparse lithic scatter containing six pieces of flaked stone (see Table 1).

The other 12 sites all dated to the historic period and represented six buildings or groups of buildings (including a farmstead), three refuse scatters, and three linear features, namely the Mojave Trail, the former U.S. Route 66, and a power transmission line (see Table 1). None of these 15 additional cultural resources was found in the immediate vicinity of the APE, and thus none of them requires further consideration during this study.

GEOARCHAEOLOGICAL PROFILE

Geologic mapping by Dibblee (1967; 2008) shows the APE to be situated primarily upon alluvial sediments derived from the Mojave River or adjacent higher ground. Subject to frequent flooding and constant erosion, these sediments in the Mojave River floodplain would not have presented a favorable setting for long-term human habitation in prehistoric times, nor are they conducive to the preservation of archaeological deposits *in situ*. The deeper sediments in the Victorville area, underneath the Mojave River alluvium, are generally considered to be of Pleistocene age. Deposited

more than 11,700 years ago, these older sediments predated the proliferation of human settlements in southern Mojave Desert and are likely to be culturally sterile.

Past archaeological findings in the Victor Valley region (Tang et al. 2005; Dahdul et al. 2007) and ethnohistorical literature (Bean and Smith 1978) indicate that longer-term residential settlement of the Native population in prehistoric times was more likely to occur on elevated terraces, hills, and finger ridges, in proximity to natural waterways but outside the active floodplain, which would have been used mainly for resource procurement and travel. Given its geomorphologic profile, the subsurface sediments in the APE appears to relatively low in sensitivity for any intact, potentially significant archaeological remains of prehistoric origin, except at higher elevations.

HISTORICAL OVERVIEW

Historical sources consulted for this study demonstrate that the APE lies within a half-mile from what was historically the main transportation corridor across the Victor Valley, where the Mojave/Salt Lake Trail, the Santa Fe Railway, and U.S. Highway 66 were all routed through (Figs. 6-8). However, development in the project vicinity was evidently dictated much more by the closer presence of the Mojave River and its floodplain, as little evidence of settlement activities was observed in the APE during the historic period except at the headquarters of the Palisades Ranch in the southwestern corner, with the rest of the property used solely as farmlands (Figs. 6-8; UCSB 1929-1973; NETR Online 1952-1969).

Most of the farmlands of the ranch, lying on level terrain along the western side of the Mojave River wash, falls within the boundary of a 160-acre homestead patent that George Washington Decrow obtained from the U.S. government in 1892 (BLM n.d.). A life-long farmer, George Decrow (1841-1902) and his wife Lucy (1849-1921; nee Pollock) were both former Midwesterners who had settled in California at least ten years before (Ancestry n.d.).

After George Decrow's death in 1902, one of their six children, a son named Jesse, apparently continued the family's farming operations in the Helendale area to at least 1930 (Ancestry n.d.). However, it is unclear whether these operations involved George Decrow's former homestead claim in the APE, which comprised the east half of the west half of Section 24. According to historical maps and aerial photographs, no buildings or cultivated fields were present on that property in the 1920s-1930s era (Fig. 7; UCSB 1929).

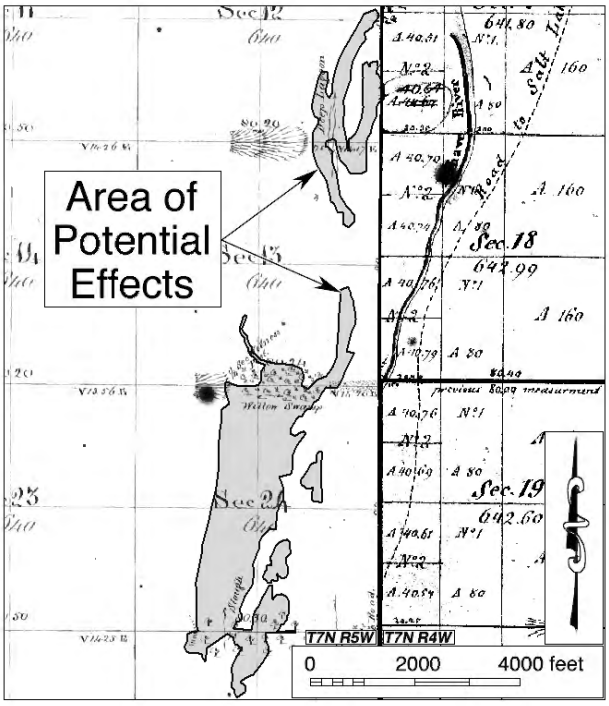

Figure 6. The APE and vicinity in 1853-1855. (Source: GLO 1855; 1856)

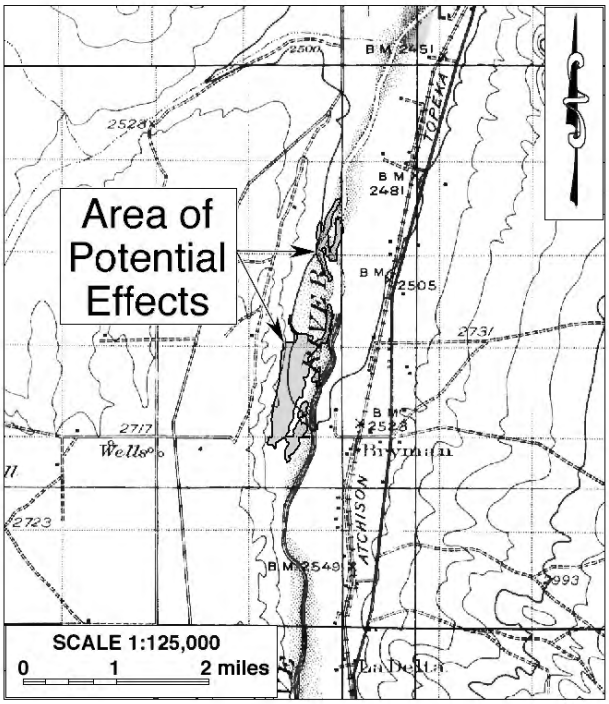

Figure 7. The APE and vicinity in 1920-1932. (Source: USGS 1934)

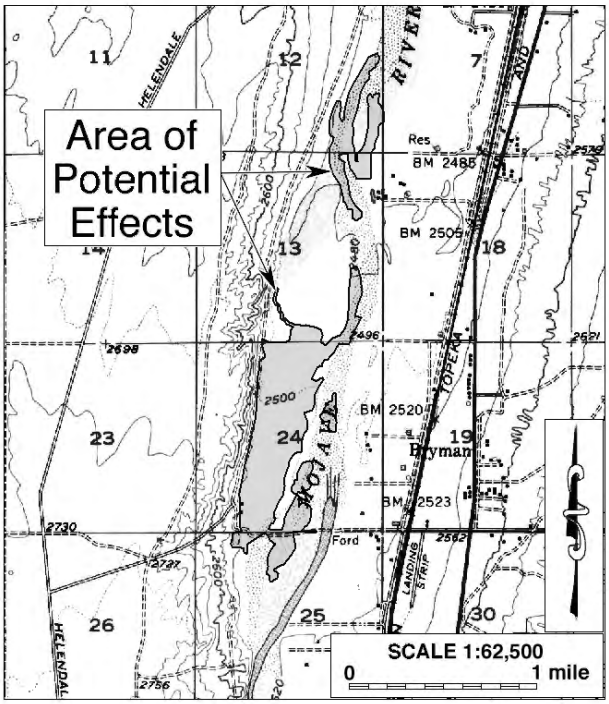

Figure 8. The APE and vicinity in 1952-1956. (Source: USGS 1956)

In 1946, the U.S. government issued to Harold Howard Hill a 40-acre patent under provisions of the Desert Land Act, which covered the southwest quarter of the southwest quarter of Section 24, immediately to the west of the former Decrow homestead claim (BLM n.d.). Also a life-long farmer and a Midwest native, Harold Hill (1895-1963) was known to be farming in Van Nuys, California, in the 1910s (Ancestry.com n.d.). After his wife Edna Marguerite Bucklin (1900-1938), a fellow Minnesota transplant, died in 1938, Harold Hill moved to the Oro Grande-Helendale area sometime before 1942, where he died in 1963 (*ibid.*).

Correspondingly, by 1952 a group of buildings had appeared in the southwestern corner of the APE, around the old farmhouse that is still extent today, representing the first notable development effort in the APE (Fig. 8; NETR Online 1952; UCSB 1952-1959). To the north and east of the buildings, a large expanse of cultivated farmlands had been established along the riverbank, which included much of the former Decrow property, now evidently under same ownership (NETR Online 1952; UCSB 1952-1959). The history of the Palisades Ranch, thus, can be traced to Hill's acquisition in 1946.

In 1976, Robert T. and Barbara T. Older acquired the property from an entity known as Lake World (County Assessor n.d.), which ushered in another growth spurt in the history of the ranch. County records indicate that additional construction occurred on the property in that same year and again in 1989-1990 (*ibid*.). Aerial photographs show that between 1973 and 1994, a number of buildings were added in the vicinity of the older farmhouse, including three additional residences, two large storage buildings, and an open-sided pole barn (NETR Online 1968-1994; UCSB 1973). All of these buildings, however, are located outside the APE boundary and further to the west (*ibid.*).

Robert Theodore Older (1921-1995), a southern California native and a World War II veteran, was well-known locally and is remembered today for serving as San Bernardino County Supervisor from the First District in 1980-1982 (Findingagrave.com n.d.). In 1990, he filed for non-profit status for the Palisades Ranch Museum (State of California 1990). It was around that time that the steel bridge at Site 36-026214 was moved to the property from Grand Terrace (Glentis 2013). No other man-made features were identified within or adjacent to the APE from any of the historical sources consulted.

NATIVE AMERICAN INPUT

In response to CRM TECH's inquiry, the NAHC replied in a letter dated January 23, 2020, that the Sacred Lands File search yielded negative results for Native American cultural resources in the vicinity. Noting that the absence of specific information does not preclude the presence of cultural resources, the NAHC recommended that local Native American groups be contacted for additional information and provided a list of 10 potential contacts representing six tribal organizations for that purpose (see App. 2).

Upon receiving the NAHC's response, CRM TECH initiated consultation with the four tribal organizations of Serrano and/or Vanyume heritage, whose ancestral territories are located in the Victor Valley-Mojave Desert region (see App. 2), while the two organizations of Kawaiisu, Tubatulabal, and/or Koso heritage in Kern County were not contacted. For the Morongo Band of Mission Indians, the designated spokesperson on cultural resources issues was contacted in lieu of the tribal political leader on the list, as recommended in the past by the tribal government staff. In all, five tribal representatives were contacted in writing and by telephone, as listed below:

- Travis Armstrong, (then) Tribal Historic Preservation Officer, Morongo Band of Mission Indians;
- Donna Yocum, Chairperson, San Fernando Band of Mission Indians;
- Lee Clauss, Cultural Resources Director, San Manuel Band of Mission Indians;
- Mark Cochrane, Co-Chairperson, Serrano Nation of Mission Indians;
- Wayne Walker, Co-Chairperson, Serrano Nation of Mission Indians.

As of this time, three of the tribal organizations contacted have responded in writing, and one other has provided their comment by telephone (see App. 2). Among them, Travis Armstrong of the Morongo Band stated that the Morongo Band had no comments to provide at the time but might provide additional information to the lead agencies during future government-to-government consultation process. Mark Cochrane of the Serrano Nation requested immediate notification should any inadvertent discoveries be made during the undertaking.

Donna Yocum of the San Fernando Band and Alexandra McCleary, tribal archaeologist for the San Manuel Band, found the APE to be part of a sensitive area for Native American cultural resources, and both of them noted the presence of known village sites in the surrounding area. Ms. Yocum requested that tribal monitor(s) from the San Fernando Band be present during ground-disturbances in the APE, while Ms. McCleary expressed the San Manuel Band's desire for further consultation regarding this undertaking. During later follow-up on the initial contact, Ryan Nordness, cultural resource analyst for the San Manuel Band, reiterated Ms. McCleary's comments and emphasized that the area was of "great concern" to the tribe.

CULTURAL RESOURCES RECORDED IN THE APE

As stated above, two historical/archaeological sites were previously recorded as lying partially within the APE. During the field survey, four additional cultural resources, including one site and three isolates, were identified and recorded in the APE. These six cultural resources are listed below:

Identification Number	Description
Site 36-000184 (CA-SBR-184)	Prehistoric habitation remains with possible burials
Site 36-026214	Grand Terrace Bridge (relocated)
Isolate 3579-1*	Glass Coca-Cola bottle fragment
Isolate 3579-2*	55-gallon metal drum
Isolate 3759-3*	Small glass bottle
Site 3579-4*	Palisades Ranch complex

* *Temporary designations, pending assignment of primary numbers in the California Historical Resources Inventory*

The six cultural resources recorded in the APE are discussed individually in the following sections. Further details about these resources, including photographs, are provided in the California Historical Resources Inventory record forms attached in Appendix 3, along with a map illustrating their locations in relation to the APE.

Site 36-000184 (Prehistoric Habitation Site)

Located in the general vicinity of the Palisades Ranch headquarters in the southwestern portion of the APE, Site 36-000184 was originally recorded in 1941 as a prehistoric village site with stone clusters indicating circular houses, fire pits, projectile points, and faunal remains (Smith 1941). A site record update from 1963 noted rich surface deposits of charcoal with "burnt bones laying around," interpreted as burials, as well as pottery sherds and many other unspecified artifacts on the surface (Vititow 1963). Few further details were provided about the cultural deposits in these early records, and the exact locations of the features and artifacts were unclear.

During the field survey, no prehistoric cultural remains could be found on the ground surface in the general area of the site, as depicted on maps provided by the SCCIC. As historical aerial photographs demonstrate, the area has been extensively disturbed since 1963 and is now the site of four buildings constructed between 1973 and 1994, including one of the residences, the two storage buildings, and the pole barn (NETR Online 1968-1994; UCSB 1968; 1973). However, the field survey did not yield sufficient data to ascertain whether any buried archaeological remains may survive in the site area. Further archaeological investigations will be necessary to determine the presence or absence of any subsurface components of the site.

Site 36-026214 (Grand Terrace Bridge)

Site 36-026214 represents the Grand Terrace Bridge, situated on Heritage Way and across the Mojave River at the southeastern end of the APE. As discussed above, Robert Older, then owner of the Palisades Ranch, relocated this steel Pratt pony truss bridge to its current site from the City of Grand Terrace in 1988-1989 (Glentis 2013). When it was recorded in 2013, the bridge was described as being approximately 80 feet long and 22 feet wide, with a roughly 18-foot-wide

roadway base built of 2x8-inch wood planks and resting on poured concrete abutments (*ibid.*). At the time, the bridge was no longer functional for vehicular travel due to a severe earthen blowout at the eastern approach (*ibid.*).

As a part of the field survey for this study, an attempt was made to inspect the current condition of the bridge, but it was found to be inaccessible as raised water level in the river has submerged Heritage Way on both sides. The western approach was additionally too overgrown with thick vegetation to be accessible. However, the bridge was inspected during a preliminary field visit of the APE on January 13, 2020. At that time, it was observed that the bridge had been impacted by rust and graffiti, and several planks were missing from the deck. Additionally, the earthen blowout described in 2013 had progressed to cover Heritage Way completely west of the unnamed dirt road where the Palisades Ranch sign is located (see App. 3).

Isolates 3579-1, -2, and -3 (Refuse Items)

The three isolates recorded during this study represent a single historic-period artifact at each locality. Isolate 3579-1 consists of an aqua blue glass Coca-Cola bottle fragment. The body fragment, which includes a portion of the embossed logo, is heavily degraded. Isolate 3579-2 consists of a 55-gallon metal drum. A closed lid is present, and a hose port is found in the side near the top. The drum is heavily rusted. Isolate 3579-3 consists of a clear glass bottle with a maker's mark representing a 1960s-era Ball Corporation logo. Based on the shape and the presence of coagulated soap inside, this was a dish soap bottle. A rusted single thread closure cap is present. All three of the isolates appear to have been deposited at their present locations along the river terrace by fluvial processes during periods of high water flow and thus out of their original depositional context.

Site 3579-4 (Palisades Ranch)

Site 3579-4 consists primarily of the older portion of the Palisades Ranch, featuring the 1940s-1950s farmhouse, the foundation of a second building, two pump stations, a Dayton capacitor-start AC motor on what appears to be a well, three refuse items, and associated agricultural fields, basin, and roads, but also includes a prehistoric jasper flake and modern features such as the pole barn, which was constructed between 1985 and 1994 (NETR Online 1984-1994). The site is located on relatively level terrain between the Mojave River to the east and a stretch of palisade bluffs to the west, covering an area of approximately 1.1 miles (north-south) by 0.3 mile (east-west).

The primary feature of the site is the now-dilapidated farmhouse, a simple one-story wood-frame building with a poured concrete foundation, stucco-clad exterior walls, and a low-pitched front-gable roof covered with composition shingles, typical of the modest vernacular farmhouses of utilitarian character from the mid-20th century. Originally rectangular in shape, the house has been altered with a number of additions to the front, rear, and side. The windows are all modern replacements, featuring mainly aluminum-framed double-hungs, as is the glazed and paneled front door set in a screened porch. According to historical aerial photographs, several other buildings surrounded the farmhouse in the 1950s, but currently only one concrete foundation exists in the vicinity (NETR Online 1952; UCSB 1953).

There are approximately 144 acres of agricultural fields within the site boundaries, along with a basin and what remains of the access roads that bordered each of the agricultural fields. Much of the former agricultural areas and associated roads are overgrown, essentially no longer accessible, and only vaguely discernable. A few scattered artifacts were observed at the site, including the prehistoric jasper lithic flake mentioned above, an aqua glass insulator fragment, a milk glass fragment, and two metal-and-rubber awls. These artifacts were all found in the former agricultural fields.

As outlined in the "Historical Overview" section, the Palisades Ranch was developed in several distinctive phases after Harold Hill acquired the land where the buildings stand from the U.S. government in 1946. The first development evidently occurred between 1946 and 1952, which resulted in the farmhouse, another building nearby at the location of the surviving foundation, the AC pump motor, one of the pump stations, and a large expanse of agricultural fields. In 1953-1959, the agricultural fields were further expanded, and the second pump station was added.

The next major growth spurts in the history of the ranch took place in 1976 and in 1989-1990, after Robert T. and Barbara T. Older became the property owners. By 1994, three additional residences, two large storage buildings, and the open-sided pole barn had been built in the general vicinity of the old farmhouse. Most of these modern buildings are located to the west of the historic-period features, across the main access road that serves as the site boundary in that area. Only the pole barn stands on the east side of the road and is included in the site boundary.

MANAGEMENT CONSIDERATIONS

APPLICABLE STATUTORY/REGULATORY FRAMEWORK

Section 106 of the National Historic Preservation Act mandates that federal agencies take into account the effects of their undertakings on historic properties and seek ways to avoid, minimize, or mitigate any adverse effects on such properties (36 CFR 800.1(a)). "Historic properties," as defined by the Advisory Council on Historic Preservation, include "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior" (36 CFR 800.16(l)). The eligibility for inclusion in the National Register is determined by applying the following criteria, developed by the National Park Service as per provision of the National Historic Preservation Act:

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and
> (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
> (b) that are associated with the lives of persons significant in our past; or
> (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
> (d) that have yielded, or may be likely to yield, information important in prehistory or history. (36 CFR 60.4)

RESOURCE EVALUATION

In summary of the research results presented above, a total of six cultural resources, including three historical/archaeological sites and three isolates, have been identified and recorded within or partially within the APE boundaries (see App. 3). The potential qualifications of these cultural resources as "historic properties" under Section 106 provisions are discussed in the sections below.

Site 36-000184 (Prehistoric Habitation Site)

This prehistoric archaeological site was first recorded in 1941 and last updated in 1963, when extensive archaeological deposits were observed on the surface, representing the remains of a village or at least habitation area with possible human burials (Smith 1941; Vititow 1963). None of the features or artifacts reported in 1941 or 1953 could be found on the surface in the general area of the site during the current survey. In light of the extent of ground disturbance in the vicinity and the presence of four buildings constructed between 1973 and 1994 at this location, the site may no longer exist.

However, at this time there is insufficient evidence to rule out the possibility of buried cultural remains surviving in the site area. Further archaeological investigations will be necessary to ascertain the presence or absence of such remains below the surface, especially at less disturbed—both by recent human activities and by past fluvial processes in the Mojave River wash—locations in the site. Given the well-established sensitivity of the Mojave River Valley for prehistoric archaeology and the special cultural significance of human remains to the Native American community, any buried archaeological deposits similar to what was originally recorded on the surface at the site, if present, would need to be evaluated as potential "historic properties."

Site 36-026214 (Grand Terrace Bridge)

Site 36-026214, known as the Grand Terrace Bridge, represents a standard steel truss highway bridge of historical—albeit undocumented—origin that has been moved to this location in the modern era. When first recorded in 2013, the site was found to be ineligible for listing in the National Register (Glentis 2013). Due to its lack of any documented association with persons or events of recognized historic significance, of any special quality in design, engineering, construction, technology, or aesthetics, and of any potential for important historical/archaeological data, the current study concurs with the previous assessment that Site 36-026214 does not appear eligible for the National Register. Therefore, it does not qualify as a "historic property" under Section 106 provisions

Isolates 3579-1, -2, and -3 (Refuse Items)

These historic-period isolates each consist of a single item of common domestic refuse. Such isolates, or localities with fewer than three artifacts, by definition do not qualify as archaeological sites due to the lack of contextual integrity. In particular, these artifacts appear likely to have been redeposited at their current locations by water flow in the Mojave River and thus out of the original depositional context entirely. As such, Isolates 3579-1, -2, and -3 do not constitute potential "historic properties" and require no further consideration in the Section 106 compliance process.

Site 3579-4 (Palisades Ranch)

Site 3579-4 represents the portion of the Palisades Ranch that is historical in origin, dating evidently to the 1940s-1950s era, although an isolated prehistoric artifact and modern features such as the pole barn are also included in the site boundary. The results of this study have yielded no evidence that the ranch and its various features were closely associated with any persons or events of recognized significance during the historic period. While one of the past owners, Robert T. Older, did earn some local prominence during his time on the ranch, his association with the property is limited to the modern era, and his contribution in history appears to fall short of the level required by the National Register criteria.

The ranch and its various contributing components, such as the farmhouse and the surviving agricultural equipment, do not represent important or particularly notable examples of any style, type, period, region, or method of construction, nor are they known to embody the work of any prominent architect, designer, builder, or engineer. As common features from the post-WWII era, a period that is well documented in historical literature, contemporary accounts, as well as archival records, the ranch and its contributing components hold little potential for any important historical or archaeological data. Based on these considerations, the present study concludes that Site 3579-4 does not appear to meet any of the criteria for listing in the National Register of Historic Places, and does not constitute a "historic property."

CONCLUSION AND RECOMMENDATIONS

In conclusion, among the six cultural resources identified within or partially within the APE, the two historic-period sites, 36-026214 and 3579-4, and the three historic-period isolates, 3579-1 to 3579-3H, do not appear the meet the statutory definition of "historic properties," as provided in Section 106 of the National Historic Preservation Act and associated federal regulations (36 CFR 800.16(l)). The sole prehistoric cultural resource in the APE, Site 36-000184, was originally recorded in the 1940s-1960s and could not be found in the field during this study, as recent development activities in the area since the 1960s have evidently removed all surface manifestations of the site. However, due to the well-established sensitivity of the Mojave River Valley for prehistoric archaeology and the reported presence of human remains at the site prior to the disturbances, the possibility of potentially significant archaeological deposits surviving subsurface cannot be ruled out.

Based on these findings, CRM TECH recommends to the MDRCD and the COE that preliminary subsurface testing procedures consistent to an Extended Phase 1 archaeological study, such as excavation of backhoe trenches and shovel test pits, be implemented in the general vicinity of Site 36-000184 to determine the presence or absence of any buried components of the site. Further recommendations for Section 106 compliance will be formulated and presented on the basis of the testing results and significance evaluation of the findings, if any.

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1956 Map: Victorville, Calif. (7.5', 1:24,000); aerial photographs taken in 1952, field-checked in 1956.
1969 Map: San Bernardino, Calif. (120'x60', 1:250,000); 1958 edition revised.
1993a Map: Helendale, Calif. (7.5', 1:24,000); 1956 edition photorevised in 1989.
1993b Map: Victorville NW, Calif. (7.5', 1:24,000); 1956 edition photorevised in 1989.
Vititow, Hubert
1963 California Historical Resources Inventory record forms, Site 36-000184 (update). On file, South Central Coastal Information Center, California State University, Fullerton.
Warren, Claude N.
1984 The Desert Region. In Michael J. Moratto (ed.): *California Archaeology*; pp. 339-430. Academic Press, Orlando, Florida.
Warren, Claude N., and Robert H. Crabtree
1986 Prehistory of the Southwestern Area. In Warren L. D'Azevedo (ed.): *Handbook of North American Indians*, Vol. 11: *Great Basin*; pp. 183-193. Smithsonian Institution, Washington, D.C.
Warren, Elizabeth von Till
2004 The Old Spanish National Historic Trail. https://oldspanishtrail.org/our-history.

APPENDIX 1:
PERSONNEL QUALIFICATIONS

PRINCIPAL INVESTIGATOR/HISTORIAN
Bai "Tom" Tang, M.A.

Education

1988-1993	Graduate Program in Public History/Historic Preservation, University of California, Riverside.
1987	M.A., American History, Yale University, New Haven, Connecticut.
1982	B.A., History, Northwestern University, Xi'an, China.
2000	"Introduction to Section 106 Review," presented by the Advisory Council on Historic Preservation and the University of Nevada, Reno.
1994	"Assessing the Significance of Historic Archaeological Sites," presented by the Historic Preservation Program, University of Nevada, Reno.

Professional Experience

2002-	Principal Investigator, CRM TECH, Riverside/Colton, California.
1993-2002	Project Historian/Architectural Historian, CRM TECH, Riverside, California.
1993-1997	Project Historian, Greenwood and Associates, Pacific Palisades, California.
1991-1993	Project Historian, Archaeological Research Unit, University of California, Riverside.
1990	Intern Researcher, California State Office of Historic Preservation, Sacramento.
1990-1992	Teaching Assistant, History of Modern World, University of California, Riverside.
1988-1993	Research Assistant, American Social History, University of California, Riverside.
1985-1988	Research Assistant, Modern Chinese History, Yale University.
1985-1986	Teaching Assistant, Modern Chinese History, Yale University.
1982-1985	Lecturer, History, Xi'an Foreign Languages Institute, Xi'an, China.

Cultural Resources Management Reports

Preliminary Analyses and Recommendations Regarding California's Cultural Resources Inventory System (with Special Reference to Condition 14 of NPS 1990 Program Review Report). California State Office of Historic Preservation working paper, Sacramento, September 1990.

Numerous cultural resources management reports with the Archaeological Research Unit, Greenwood and Associates, and CRM TECH, since October 1991.

PRINCIPAL INVESTIGATOR/ARCHAEOLOGIST
Michael Hogan, Ph.D., RPA (Registered Professional Archaeologist)

Education

1991	Ph.D., Anthropology, University of California, Riverside.
1981	B.S., Anthropology, University of California, Riverside; with honors.
1980-1981	Education Abroad Program, Lima, Peru.
2002	"Section 106—National Historic Preservation Act: Federal Law at the Local Level," UCLA Extension Course #888.
2002	"Recognizing Historic Artifacts," workshop presented by Richard Norwood, Historical Archaeologist.
2002	"Wending Your Way through the Regulatory Maze," symposium presented by the Association of Environmental Professionals.
1992	"Southern California Ceramics Workshop," presented by Jerry Schaefer.
1992	"Historic Artifact Workshop," presented by Anne Duffield-Stoll.

Professional Experience

2002-	Principal Investigator, CRM TECH, Riverside/Colton, California.
1999-2002	Project Archaeologist/Field Director, CRM TECH, Riverside, California.
1996-1998	Project Director and Ethnographer, Statistical Research, Inc., Redlands, California.
1992-1998	Assistant Research Anthropologist, University of California, Riverside.
1992-1995	Project Director, Archaeological Research Unit, U.C. Riverside.
1993-1994	Adjunct Professor, Riverside Community College, Mt. San Jacinto College, U.C. Riverside, Chapman University, and San Bernardino Valley College.
1991-1992	Crew Chief, Archaeological Research Unit, U.C. Riverside.
1984-1998	Project Director, Field Director, Crew Chief, and Archaeological Technician for various southern California cultural resources management firms.

Research Interests

Cultural Resource Management, Southern Californian Archaeology, Settlement and Exchange Patterns, Specialization and Stratification, Culture Change, Native American Culture, Cultural Diversity.

Cultural Resources Management Reports

Principal investigator for, author or co-author of, and contributor to numerous cultural resources management study reports since 1986.

Memberships

Society for American Archaeology; Society for California Archaeology; Pacific Coast Archaeological Society; Coachella Valley Archaeological Society.

PROJECT ARCHAEOLOGIST/REPORT WRITER
Deirdre Encarnación, M.A.

Education

2003	M.A., Anthropology, San Diego State University, California.
2000	B.A., Anthropology, minor in Biology, San Diego State University, California; with honors.
2021	Certificate of Specialization, Kumeyaay Studies, KCC/Cuyamaca College.
2001	Archaeological Field School, San Diego State University.
2000	Archaeological Field School, San Diego State University.

Professional Experience

2004-	Project Archaeologist/Report Writer, CRM TECH, Riverside/Colton, California.
2001-2003	Part-time Lecturer, San Diego State University, California.
2001	Research Assistant for Dr. Lynn Gamble, San Diego State University.
2001	Archaeological Collection Catalog, SDSU Foundation.

Memberships

Society for California Archaeology; Society for Hawaiian Archaeology; California Native Plant Society; Journal of California and Great Basin Anthropology.

PROJECT ARCHAEOLOGIST
Salvadore Z. Boites, M.A.

Education

2013	M.A., Applied Anthropology, California State University, Long Beach.
2003	B.A., Anthropology/Sociology, University of California, Riverside.
1996-1998	Archaeological Field School, Fullerton Community College, Fullerton, California.

Professional Experience

2014-	Project Archaeologist, CRM TECH, Colton, California.
2010-2011	Adjunct Instructor, Anthropology, Everest College, Anaheim, California.
2003-2008	Project Archaeologist, CRM TECH, Riverside/Colton, California.
2001-2002	Teaching Assistant, Moreno Elementary School, Moreno Valley, California.
1999-2003	Research Assistant, Anthropology Department, University of California, Riverside.

Research Interests

Cultural Resource Management, Applied Archaeology/Anthropology, Indigenous Cultural Identity, Poly-culturalism.

PROJECT ARCHAEOLOGIST/FIELD DIRECTOR
Daniel Ballester, M.S., RPA (Registered Professional Archaeologist)

Education

2013	M.S., Geographic Information System (GIS), University of Redlands, California.
1998	B.A., Anthropology, California State University, San Bernardino.
1997	Archaeological Field School, University of Las Vegas and University of California, Riverside.
1994	University of Puerto Rico, Rio Piedras, Puerto Rico.
2007	Certificate in Geographic Information Systems (GIS), California State University, San Bernardino.
2002	"Historic Archaeology Workshop," presented by Richard Norwood, Base Archaeologist, Edwards Air Force Base; presented at CRM TECH, Riverside, California.

Professional Experience

2002-	Field Director/GIS Specialist, CRM TECH, Riverside/Colton, California.
2011-2012	GIS Specialist for Caltrans District 8 Project, Garcia and Associates, San Anselmo, California.
2009-2010	Field Crew Chief, Garcia and Associates, San Anselmo, California.
2009-2010	Field Crew, ECorp, Redlands.
1999-2002	Project Archaeologist, CRM TECH, Riverside, California.
1998-1999	Field Crew, K.E.A. Environmental, San Diego, California.
1998	Field Crew, A.S.M. Affiliates, Encinitas, California.
1998	Field Crew, Archaeological Research Unit, University of California, Riverside.

PROJECT ARCHAEOLOGIST/NATIVE AMERICAN LIAISON
Nina Gallardo, B.A.

Education

2004	B.A., Anthropology/Law and Society, University of California, Riverside.

Professional Experience

2004-	Project Archaeologist, CRM TECH, Riverside/Colton, California.

Cultural Resources Management Reports

Co-author of and contributor to numerous cultural resources management reports since 2004.

PROJECT HISTORIAN
Terri Jacquemain, M.A.

Education

2004	M.A., Public History and Historic Resource Management, University of California, Riverside.
2002	B.S., Anthropology, University of California, Riverside.
2001	Archaeological Field School, University of California, Riverside.
1991	A.A., Riverside Community College, Norco Campus.

Professional Experience

2003-	Historian/Architectural Historian/Report Writer, CRM TECH, Riverside/Colton, California.
2002-2003	Teaching Assistant, Religious Studies Department, University of California, Riverside.
2002	Interim Public Information Officer, Cabazon Band of Mission Indians.
2000	Administrative Assistant, Native American Student Programs, University of California, Riverside.
1997-2000	Reporter, *Inland Valley Daily Bulletin*, Ontario, California.
1991-1997	Reporter, *The Press-Enterprise*, Riverside, California.

Membership

California Preservation Foundation.

PROJECT ARCHAEOLOGIST
Hunter C. O'Donnell, B.A.

Education

2016-	M.A. Program, Applied Archaeology, California State University, San Bernardino.
2015	B.A. (*cum laude*), Anthropology, California State University, San Bernardino.
2012	A.A., Social and Behavioral Sciences, Mt. San Antonio College, Walnut, California.
2011	A.A., Natural Sciences and Mathematics, Mt. San Antonio College, Walnut, California.
2014	Archaeological Field School, Santa Rosa Mountains; supervised by Bill Sapp of the United States Forest Service and Daniel McCarthy of the San Manuel Band of Mission Indians.

Professional Experience

2017-	Project Archaeologist, CRM TECH, Colton, California.
2016-2018	Graduate Research Assistant, Applied Archaeology, California State University, San Bernardino.
2016-2017	Cultural Intern, Cultural Department, Pechanga Band of Luiseño Indians, Temecula, California.
2015	Archaeological Intern, U.S. Bureau of Land Management, Barstow, California.
2015	Peer Research Consultant: African Archaeology, California State University, San Bernardino.

PROJECT ARCHAEOLOGIST
Arturo E. Aldaco, B.S.

Education

2020	B.S., Anthropology, University of California, Riverside.
2018	A.S., Anthropology, Chaffey College, Rancho Cucamonga, California.

Professional Experience

2021-	Project Archaeologist, CRM TECH, Colton, California.
2020	Field Archaeologist, McKenna et al., Whittier, California.
2019-2020	Peer Educator, University of California, Riverside.
2019	Field Crew Member, Northern Arizona University: Belize Valley Archaeological Reconnaissance, San Ignacio, Belize.

APPENDIX 2

CORRESPONDENCE WITH NATIVE AMERICAN REPRESENTATIVES*

* Five local Native American representatives were contacted during this study; a sample letter is included in the appendix.

SACRED LANDS FILE & NATIVE AMERICAN CONTACTS LIST REQUEST

NATIVE AMERICAN HERITAGE COMMISSION
1550 Harbor Boulevard, Suite 100
West Sacramento, CA 95691
(916)373-3710
(916)373-5471 (Fax)
nahc@nahc.ca.gov

Project: Proposed Palisades Ranch Ecological Restoration Project (CRM TECH No. 3579)

County: San Bernardino

USGS Quadrangle Name: Helendale and Victorville NW, Calif.

Township 7 North **Range** 4 West SB **BM; Section(s)**: 18

Township 7 North **Range** 5 West SB **BM; Section(s)**: 12, 13, and 23-25

Company/Firm/Agency: CRM TECH

Contact Person: Nina Gallardo

Street Address: 1016 E. Cooley Drive, Suite A/B

City: Colton, CA **Zip:** 92324

Phone: (909) 824-6400 **Fax:** (909) 824-6405

Email: ngallardo@crmtech.us

Project Description: The primary component of the project is an ecological restoration on approximately 200 acres of land located along the west side of the Mojave River, north (and east) of Heritage Way, and south of Helendale, San Bernardino County, California. A reconnaissance/ sensitivity assessment of approximately 600 acres of additional riparian habitat is also included.

January 16, 2020

January 27, 2020

Lee Clauss, Cultural Resources Analyst
San Manuel Band of Mission Indians
26569 Community Center Drive
Highland, CA 92346

RE: Proposed Palisades Ranch Ecological Restoration
800 Acres near the Area of Oro Grande
San Bernardino County, California
CRM TECH Contract #3579

Dear Ms. Clauss:

I am writing to bring your attention to an ongoing Section 106-compliance study for the proposed project referenced above, which entails the ecological restoration of approximately 200 acres of land and a sensitivity assessment of an additional 600 acres of riparian habitat. In all. the Area of Potential Effects (APE) for the undertaking encompasses approximately 800 acres located along the west side of the Mojave River and to the north and east of Heritage Way, near the unincorporated community of Helendale, San Bernardino County, California. The accompanying map, based on the USGS Helendale and Victorville NW, Calif., 7.5' quadrangles, depicts the location of the APE in Section 18, T7N R4W, and Sections 12, 13, and 23-25, T7N R5W, SBBM.

In a letter dated January 23, 2020, the Native American Heritage Commission reports that the results of the Sacred Lands File search for the APE are negative for tribal cultural resources but recommends that local Native American groups be contacted for further information (see attached). Therefore, as part of the cultural resources study for this project, I am writing to request your input on potential Native American cultural resources in or near the APE.

Please respond at your earliest convenience if you have any specific knowledge of sacred/religious sites or other sites of Native American traditional cultural value in or near the APE, or any other information to consider during the cultural resources investigations. Any information or concerns may be forwarded to CRM TECH by telephone, e-mail, facsimile, or standard mail. Requests for documentation or information we cannot provide will be forwarded to our client and/or the lead agencies, namely the Mojave Desert Resource Conservation District and/or the US Army Corps of Engineers (COE).

We would also like to clarify that, as the cultural resources consultant for the project, CRM TECH is not involved in the AB 52-compliance process or in government-to-government consultations. The purpose of this letter is to seek any information that you may have to help us determine if there are cultural resources in or near the project area that we should be aware of and to help us assess the sensitivity of the APE. Thank you for your time and effort in addressing this important matter.

Respectfully,

Nina Gallardo
Project Archaeologist/Native American liaison
CRM TECH
Email: ngallardo@crmtech.us

Encl.: NAHC response letter and project location map

From: Travis Armstrong <TArmstrong@morongo-nsn.gov>
Sent: Tuesday, February 4, 2020 2:00 PM
To: 'ngallardo@crmtech.us'
Subject: Palisades Ranch Ecological Restoration Project

Hello,

Regarding the above referenced project, we have no additional comments to provide at this time but may provide other information to the lead agency during the official consultation process.

Thank you for reaching out to our office.

Sincerely,
Travis Armstrong
Tribal Historic Preservation Officer
Morongo Band of Mission Indians
Email: thpo@morongo-nsn.gov

From: Alexandra McCleary <Alexandra.McCleary@sanmanuel-nsn.gov>
Sent: Tuesday, February 25, 2020 9:35 PM
To: ngallardo@crmtech.us
Subject: RE: NA Scoping for the Proposed Palisades Ranch Ecological Restoration, near the Area of Oro Grande, San Bernardino County (CRM TECH #3579)

Dear Nina,

Thank you for contacting San Manuel Band of Mission Indians regarding the Proposed Palisades Ranch Ecological Restoration near Oro Grande, San Bernardino County.

The proposed project is located in an area known to SMBMI to be highly sensitive for Serrano cultural resources. We know of two recorded sites, P-36-002074 and P-36-00183. 36-002074 is a lithic scatter and 36-000183 is a village site most recently recorded that are located within or immediately adjacent to the project areas. To the northeast of the project area is an additional village site with numerous archaeological site records ascribed to it. More broadly, the Mojave River was a crucial residential and travel corridor from its source in the San Bernardino Mountains through the Mojave Desert, providing a nexus for numerous Serrano villages along its path. In addition to these villages, numerous archaeological sites that evince millennia of Serrano occupation are located all along the entirety of the river and its watershed, including lithic and food production sites, ad season and intermittent camps. Any project, including those aimed at ecological restoration, should bear in mind the cultural sensitivity of the Mojave River and its watershed to the Serrano.

We look forward to working in partnership with CRM Tech and consulting with the Lead Agency regarding this proposed project.

Respectfully,
Alexandra McCleary
TRIBAL ARCHAEOLOGIST

From: donna <ddyocum@comcast.net>
Sent: Friday, March 20, 2020 3:11 PM
To: ngallardo@crmtech.us
Subject: RE: NA Scoping for the Proposed Palisades Ranch Ecological Restoration, near the Area of Oro Grande, San Bernardino County (CRM TECH #3579)

Hello Nina,

Thank you for the information regarding proposed Palisades Ranch Ecological Restoration, near the Area of Oro Grande, San Bernardino County (CRM TECH #3579). I came across this email and do not know if I have already responded to it or not as I have lost my sent emails somewhere! In any case, the San Fernando Band of Mission Indians find this area for said project to be in a potentially Culturally sensitive area for our tribe as it is within our Vanyume territory. SFBMI has ancestral Village sites near Victorville, Adelanto, Edwards Air Force Base and throughout that geographical area. SFBMI request our Native American Monitor(s) be present during ground disturbance and or any excavation as it allows us the opportunity to protect our cultural resources whenever possible. We look forward to working with you.

Donna Yocum, Chairwoman
SFBMI
503-539-0933
SFBMI.org

From: ngallardo@crmtech.us
Sent: Wednesday, November 24, 2021 11:40 AM
To: 'serranonation1@gmail.com'; Jessica Mauck (jessica.mauck@sanmanuel-nsn.gov); 'ABrierty@morongo-nsn.gov'; 'ddyocum@comcast.net'
Cc: 'thpo@morongo-nsn.gov'; 'dtorres@morongo-nsn.gov'; 'Ryan Nordness'
Subject: Update and Request for Additional Information & Comments for the Proposed Palisades Ranch Ecological Restoration

Hello,

I'm emailing you to inform you on the progress of the proposed Palisades Ranch Ecological Restoration (CRM TECH No. 3579) and that the Area of Potential Effects (APE) has changed since I contacted you via email and/or telephone between January and February of 2020. The APE now only entails the ecological restoration of approximately 200 acres of land (see attached map), located along the west side of the Mojave River and to the north and east of Heritage Way, near the unincorporated community of Helendale in San Bernardino County. Now that the project will proceed again, CRM TECH would like to know if the tribe has any additional information and/or comments to be included into the cultural resources report.

Thank you for your time and input on this project.

Nina Gallardo
(909) 824-6400 (phone)
(909) 824-6405 (fax)

CRM TECH
1016 E. Cooley Drive, Ste. A/B
Colton, CA 92324

From: Ryan Nordness <Ryan.Nordness@sanmanuel-nsn.gov>
Sent: Monday, December 13, 2021 3:20 PM
To: ngallardo@crmtech.us
Subject: RE: Update and Request for Additional Information & Comments for the Proposed Palisades Ranch Ecological Restoration

Hey Nina,

Regarding the updated APE, the project is still located within areas of propagation for culturally sensitive plants, a Serrano village site, and several orbiting archaeological sites. The area is of great concern to SMBMI. If you have any additional questions or comments please reach out to me at your earliest convenience.

Respectfully,
Ryan Nordness

TELEPHONE LOG

Name	Tribe/Affiliation	Telephone Contacts	Comments
Travis Armstrong, Tribal Historic Preservation Officer	Morongo Band of Mission Indians	None	Mr. Armstrong responded by e-mail on February 4, 2020 (copy attached).
Donna Yocum, Chairperson	San Fernando Band of Mission Indians	4:25 pm, February 10, 2020; 8:38 am, February 25, 2020	Ms. Yocum responded by e-mail on March 20, 2020 (copy attached).
Jessica Mauck, Director of Cultural Resources Management	San Manuel Band of Mission Indians	4:17 pm, February 10, 2020; 8:36 am, February 25, 2020	Alexandra McCleary, Tribal Archaeologist, and Ryan Nordness, Cultural Resource Analyst, responded by e-mail on February 25, 2020, and December 13, 2021, respectively (copies attached).
Mark Cochrane, Co-Chairperson	Serrano Nation of Mission Indians	4:22 pm, February 10, 2020	Mr. Cochrane requested immediate notification if human remains or other Native American cultural resources were discovered.
Wayne Walker, Co-Chairperson	Serrano Nation of Mission Indians	None	Mark Cochrane responded on behalf of the tribe (see above).

APPENDIX 3

CULTURAL RESOURCES IN THE APE

(Confidential)