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| **Docket Number:** | 24-OPT-03 |
| **Project Title:** | Soda Mountain Solar |
| **TN #:** | 257933 |
| **Document Title:** | Appendix E1 Aquatic Resources Delineation |
| **Description:** | This Appendix describes the desktop data, field data, remote sensing data, and modeling and machine learning that were used to delineate aquatic resources potentially subject to regulation by the U.S. Army Corps of Engineers (USACE) pursuant to Clean Water Act (CWA) Section 404 (for discharge of fill material into "waters of the United States"), the California Water Boards by the Lahontan Regional Water Quality Control Board (RWQCB) pursuant to the CWA Section 401 (for discharge of fill material into "waters of the United States / waters of the State") and the Porter Cologne Water Quality Control Act (Porter-Cologne) waste discharge requirements (for discharge into "waters of the State"), and the California Department of Fish and Wildlife (CDFW) pursuant to the California Fish and Game Code Section 1602 Lake and Streambed Alteration Program and its subsequent revisions (for substantial changes to "streambed"). |
| **Filer:** | Hannah Gbeh |
| **Organization:** | Resolution Environmental |
| **Submitter Role:** | Applicant Consultant |
| **Submission Date:** | 7/22/2024 5:19:38 PM |
| **Docketed Date:** | 7/23/2024 |

# Aquatic Resources Delineation Report for the Soda Mountain Solar Project, San Bernardino County, California

DECEMBER 2023 (REVISED JUNE 2024)

PREPARED FOR

**Soda Mountain Solar LLC**

PREPARED BY

**SWCA Environmental Consultants**

# AQUATIC RESOURCES DELINEATION REPORT FOR THE SODA MOUNTAIN SOLAR PROJECT, SAN BERNARDINO COUNTY, CALIFORNIA

Prepared for

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SWCA Project No. 68347

December 2023
(Revised June 2024)

# EXECUTIVE SUMMARY

On behalf of Soda Mountain Solar LLC, SWCA Environmental Consultants (SWCA) completed an aquatic resources delineation for the proposed Soda Mountain Solar Project (project), located approximately 6 miles southwest of Baker in San Bernardino County, California, on land managed by the Bureau of Land Management (BLM), centered at approximately 35.147316˚ N, 116.176306˚ W. The project includes installation of a new photovoltaic solar power generation facility to provide 300 megawatts of energy capacity by connecting to the existing 500-kilovolt transmission line and grid.

Desktop data, field data, remote sensing data, and modeling and machine learning were used to delineate aquatic resources potentially subject to regulation by the U.S. Army Corps of Engineers (USACE) pursuant to Clean Water Act (CWA) Section 404 (for discharge of fill material into "waters of the United States"), the California Water Boards by the Lahontan Regional Water Quality Control Board (RWQCB) pursuant to the CWA Section 401 (for discharge of fill material into "waters of the United States / waters of the State") and the Porter Cologne Water Quality Control Act (Porter-Cologne) waste discharge requirements (for discharge into "waters of the State"), and the California Department of Fish and Wildlife (CDFW) pursuant to the California Fish and Game Code Section 1602 Lake and Streambed Alteration Program and its subsequent revisions (for substantial changes to "streambed").

This delineation has been conducted in accordance with the *Corps of Engineers Wetland Delineation Manual* (USACE 1987) and regional supplements, including *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE 2008a) and the *Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (USACE 2008b), and the *National Ordinary High Water Mark Field Delineation Manual for Rivers and Streams: Interim Version* (USACE 2022). In addition, guidance from *USACE Ordinary High Water Mark Identification* Regulatory Guidance Letter No. 05-05 (USACE 2005) was considered.

Potential federal jurisdiction was assessed pursuant to the current Waters of the United States (WOTUS) *Conforming Rule*, which took effect September 8, 2023 (USACE and U.S. Environmental Protection Agency 2023) and is currently in effect in the State of California. Under several prior waters of the United States federal regulations, including the Rapanos Guidance regulatory regime (2006–2015; 2021–2023 in California), Navigable Waters Protection Rule (2020–2021), and the Revised Definition of Waters of the United States rule (January 2023), the aquatic features in the project site met the criteria for being non-relatively permanent waters and isolated (through application of the 2001 Solid Waste Agency of Northern Cook County case under Rapanos Guidance) and therefore are not federally jurisdictional (see prior USACE Approved Jurisdictional Determination [Soda Mountain Solar (SPL-2010-01042-SLP) dated June 5, 2013]). In application of the WOTUS *Conforming Rule*, aquatic features fail to connect to a Traditional Navigable Water and therefore are not federally jurisdictional.

The study area coincides with the BLM right-of-way and project site. The "review area" where the aquatic resources survey occurred includes the project's study area (2,670 acres) and an additional area beyond the disturbance area. In 2024 the California Energy Commission (CEC) became the California Environmental Quality Act Lead Agency, and the Review Area was expanded to include aquatic features within 250 feet of the disturbance area to meet CEC requirements.

**The aquatic resource findings of this report are summarized below:**

| | |
|---|---|
| Review area, survey size: | 3,418 acres |
| Review area, potential waters of the Unites States: | 0 acre |
| Review area, potential non-wetland waters of the State/CDFW 1600: | 643.4 acres |

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| BLM | Bureau of Land Management |
| CDFW | California Department of Fish and Wildlife |
| CWA | Clean Water Act |
| EPA | U.S. Environmental Protection Agency |
| FAC | facultative |
| FACW | facultative wetland |
| FEMA | Federal Emergency Management Agency |
| GIS | geographic information system |
| GPS | Global Positioning System |
| NHD | National Hydrography Dataset |
| NRCS | Natural Resources Conservation Service |
| NWI | National Wetlands Inventory |
| OBL | obligate |
| OHWM | ordinary high water mark |
| project site | area where the project is proposed |
| review area | area surveyed for aquatic resources |
| ROW | right of way |
| RWQCB | Regional Water Quality Control Board |
| study area | parcels where the project would occur |
| USACE | U.S. Army Corps of Engineers |
| USDA | U.S. Department of Agriculture |
| USGS | U.S. Geological Survey |
| WOUS | waters of the United States features as defined and delineated |
| WOTUS | waters of the United States in reference to the WOTUS rule |

# 1 INTRODUCTION

## 1.1 Contact Information

Applicant: Soda Mountain Solar, LLC.

Property Owner: United States Bureau of Land Management (BLM).

Agent: SWCA Environmental Consultants, Pasadena, California.
Bonnie Rogers, M.S., Professional Wetland Scientist (PWS), Principal Wetland Scientist.

## 1.2 Location and Desktop Review

### *1.2.1 Location*

The project site is in San Bernardino County (**Figure 1**) near the city of Baker, within portions of Sections 1 and 11–14, Township 12 North, Range 7 East; Sections 25 and 36, Township 13 North, Range 7 East; and Sections 6, 7, 8, and 18, Township 13 North, Range 8 East, San Bernardino Meridian, California, as shown on the U.S. Geological Survey (USGS) San Bernardino 7.5-minute quadrangle (**Figure 2; Figure A-2 in Appendix A**). The project site is centered at approximately 35.147316˚, -116.176306˚ in the alluvial valley dividing the northern and southern portions of the Soda Mountains in the Mojave Desert and extends approximately 8.5 miles along the southeast side of Interstate 15 (Mojave Freeway).

The project site occurs on the following San Bernardino County Assessor's Parcel Numbers (APN): 0543-24-117-0000, 0543-24-119-0000, 0543-20-107-0000, 0543-25-101-0000, 0543-20-110-0000, 054320-109-0000, 0543-25-112-0000, and 0543-21-118-0000.

The site may be reached by traveling east on Interstate 10 from Los Angeles, then taking Interstate 15 north approximately 166 miles and passing Barstow, exiting Rasor Road at the Rasor Road Services Shell Oil gas station (66150 Rasor Road, Baker, California 92309), and then following the unpaved portion of Rasor Road onto the project site.

The review area (approximately 3,418 acres; see **Figure 2**) is the area surveyed for indicators and characteristics that distinguish aquatic resources; it is larger than the 2,670-acre project site.


**Figure 1. Project site vicinity.**

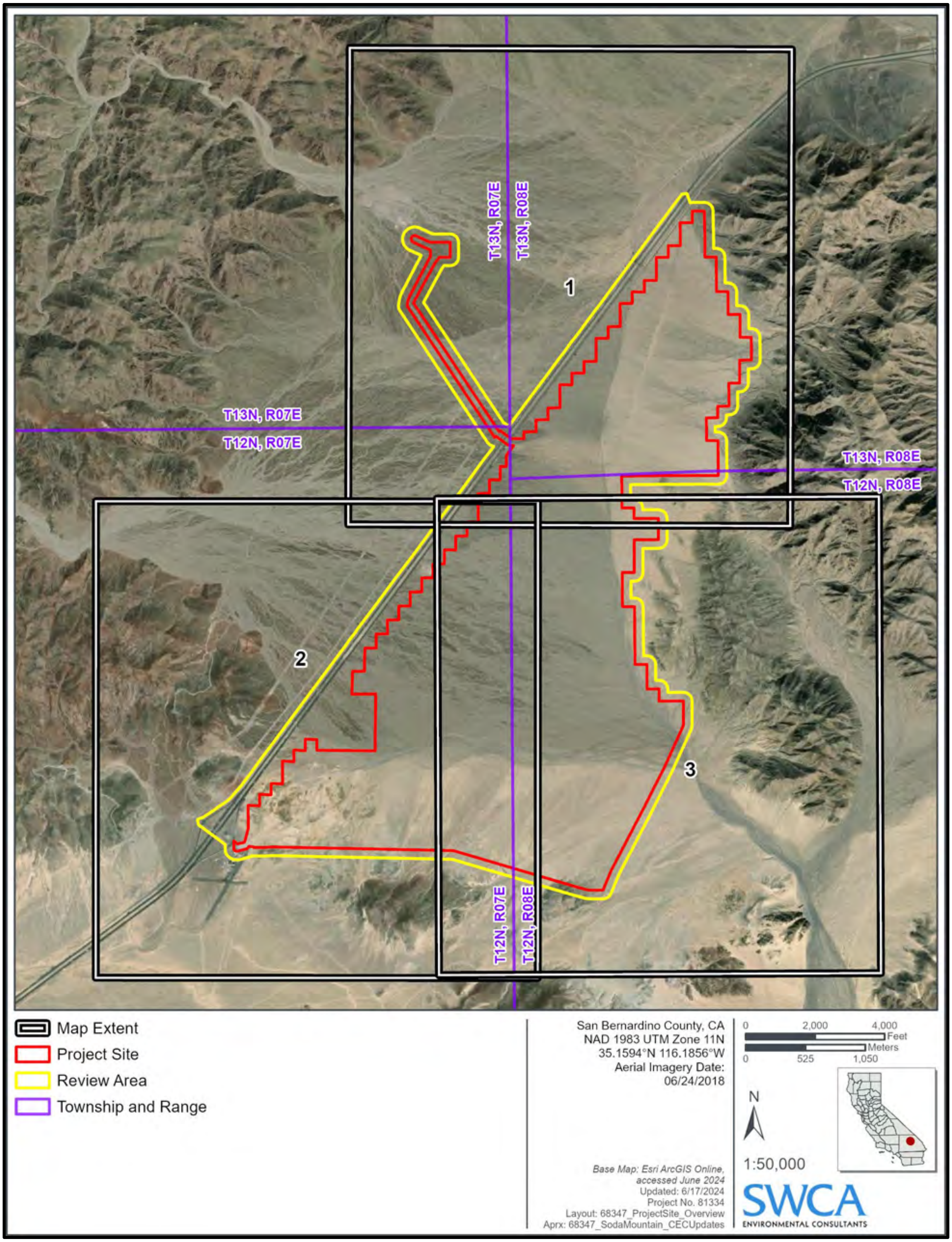


**Figure 2. Project site and review area on USGS 7.5-minute quadrangle base.**

## 1.3 Project Description

The project includes installation of a new photovoltaic solar power generation facility with four array areas and a new 500-kilovolt generation tie line connected to the existing grid, to provide 300 megawatts of energy capacity.

The project includes four arrays where solar panels would be installed: East Array (341 acres), South Array 1 (205 acres), South Array 2 (632 acres), and South Array 3 (326 acres) (**Figure 3**). A substation pad would be constructed between East Array and South Array 1 adjacent to a laydown yard and equipment storage area. A switchyard would be installed near the end of the generation tie line. Inverters would be installed within the footprint of the arrays. Grading using heavy equipment would occur within portions of the arrays to prepare for construction, resulting in an estimated 71,000 cubic yards of cut and 91,000 cubic yards of fill, or 20,000 cubic yards of net fill. Two temporary laydown yards would be used to store equipment and project-related materials. Fences and gates would be installed to keep wildlife out of construction and work areas, and for permanent security.

A portion of the existing dirt access road (Rasor Road) would be graded to approximately 20 feet wide, compacted, and filled with cemented soil and gravel. New 16-foot-wide access roads would be established by grading within the arrays with turnaround end points. Concrete box culverts at road crossings would be 3 feet tall with four openings each 12 feet wide. Constructed low water crossings would be installed roughly at-grade of geotextile fabric and riprap.

Three constructed drainage channels with outlets would be installed between East Array and South Array 1, between South Array 1 and South Array 2, and between South Array 2 and South Array 3 to collect and manage water used for solar panel cleaning. Drainage Channel 1 would be 60 feet wide and 2,700 feet long, Channel 2 would be 80 feet wide and 4,984 feet long, and Channel 3 would be 60 feet wide and 8,056 feet long, and each would be 3 feet deep.

All water for construction dust control and solar panel cleaning would be imported from off-site. Eight temporary sediment detention basins of varied dimensions would be installed adjacent to the arrays. Temporary water diversion ditches installed across the site would control water and sediment during construction. Temporary (earthen) and permanent (earthen with fabric and riprap) water diversion berms (3 feet high × 20 feet wide) would be constructed. Permanent berms would be located between Interstate 15 and the arrays to divert flows entering the site from under-highway culverts and road runoff. Standard Best Management Practices would be employed before and during construction, including drainage features described above and erosion control.

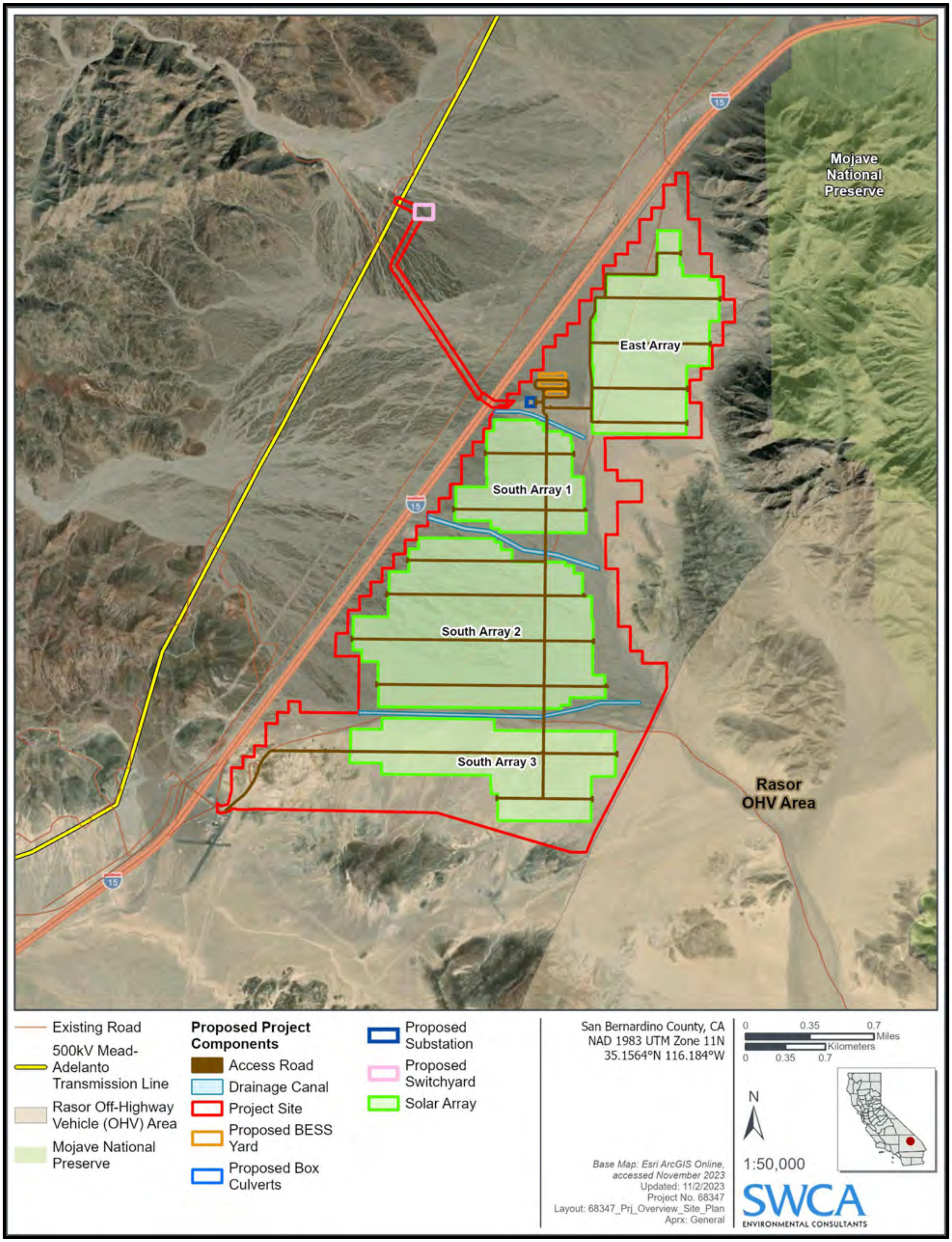


**Figure 3. Draft design showing arrays and project components.**

## 1.4 Desktop Review

Existing desktop information was reviewed to assess and summarize land use, weather, geology, soils, hydrology, vegetation, and general conditions of the site and its vicinity.

### *1.4.1 Land Use*

The entire site is open space and managed by the Bureau of Land Management (BLM). An on-site dirt road, Rasor Road, provides vehicle access from the Rasor Road Services Shell Oil gas station (off-site) to the nearby Rasor Off-Highway Vehicle (OHV) Area (also off-site) which is managed by BLM. Rasor Road within the project site is a BLM ground transportation feature (Road AC8828). Although the project site is not within an OHV area, vehicle tracks and disturbance are prevalent across the project site in multiple areas, frequently coinciding with drainage areas.

Aerial imagery over multiple years was reviewed on Google Earth Pro, HistoricAerials.com, and University of California Santa Barbara Frame Finder online to assess landscape level conditions and use over time. Interstate 15 (Mojave Freeway) is a multi-lane highway established in 1966, which was formerly U.S. Route 91 which has been in place since prior to 1947, thus for at least the last 76 years. It is a highly used interstate providing access across the Mojave Desert from Southern California to Las Vegas, Nevada. Aerial imagery from 1952 and 1995 (**Figures 4 and 5; Figures A-4 and A-5a in Appendix A**) shows site conditions are overall unchanged, despite a 43-year difference between images.

### *1.4.2 Weather*

The site is within the Mojave Desert, which is characterized by hot summer temperatures and cool winters. High temperatures in the summer typically exceed 100 degrees Fahrenheit, and the winter lows typically drop to freezing temperatures (National Park Service 2023). Large temperature fluctuations are typical within a day. The Mojave Desert has two distinct rainy periods per year (winter and late summer) with low annual precipitation. Most of the annual precipitation falls between November and April, with May and June being the driest months.

Total annual precipitation data from USGS Parameter elevation Regression on Independent Slopes Model (PRISM) Climate Data (USGS 2023a) between 1991 and 2020 was modeled between 4.2 and 4.4 inches at the project site (**Figure 6; Figure A-6 in Appendix A**).

Climate data from the closest National Oceanic and Atmospheric Administration local climatological data station database, Bicycle Lake Fort Irwin Army Air Field, California (Network ID: WBAN:03182), located approximately 26 miles northwest of the site at coordinates 35.28333°, -116.63333°, shows an annual precipitation range from a low of 0.96 inch in 2021 to a high of 6.76 inches in 2019. Average monthly precipitation in the same 9-year period ranges from a low of 0.08 inch in June to a high of 0.66 inch in January. Closer to the review area, the site received an average of 2.96 inches of annual precipitation over the previous 9 years (January 2014–December 2022) (National Oceanic and Atmospheric Administration 2023).

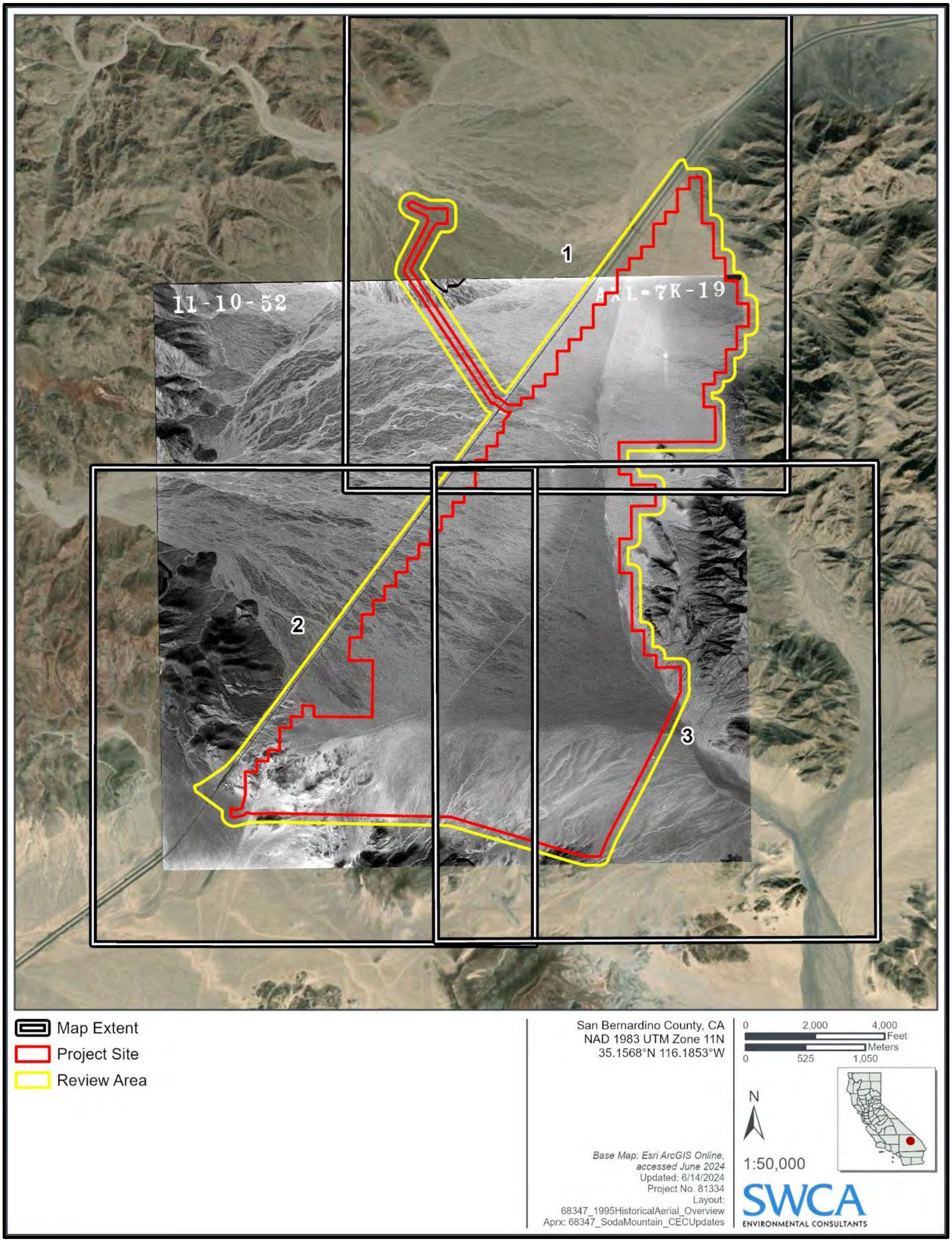


**Figure 4. Project site on historic aerial image (1952; UCSB FrameFinder).**

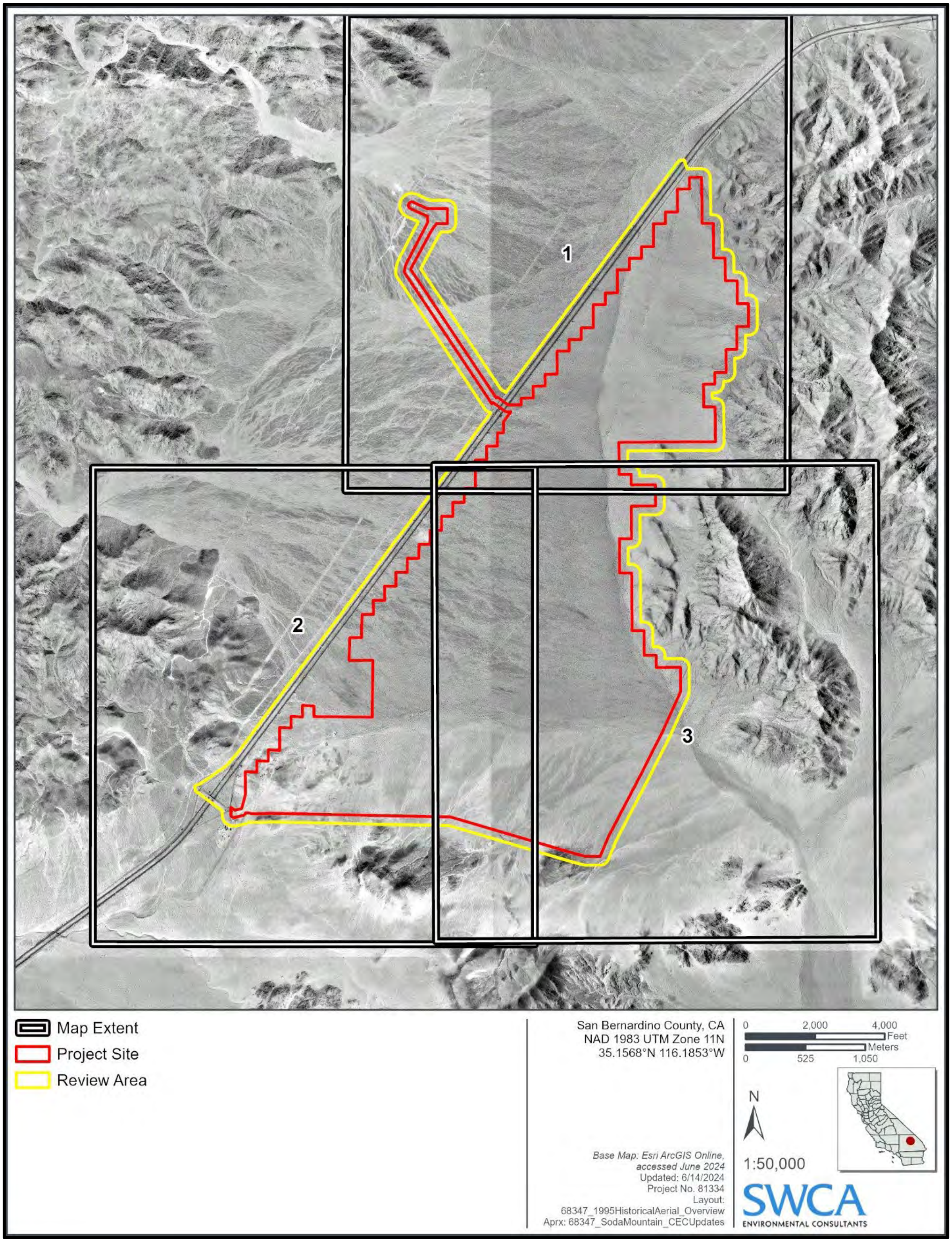


**Figure 5. Project site on historic aerial image (1995; Google Earth Pro).**

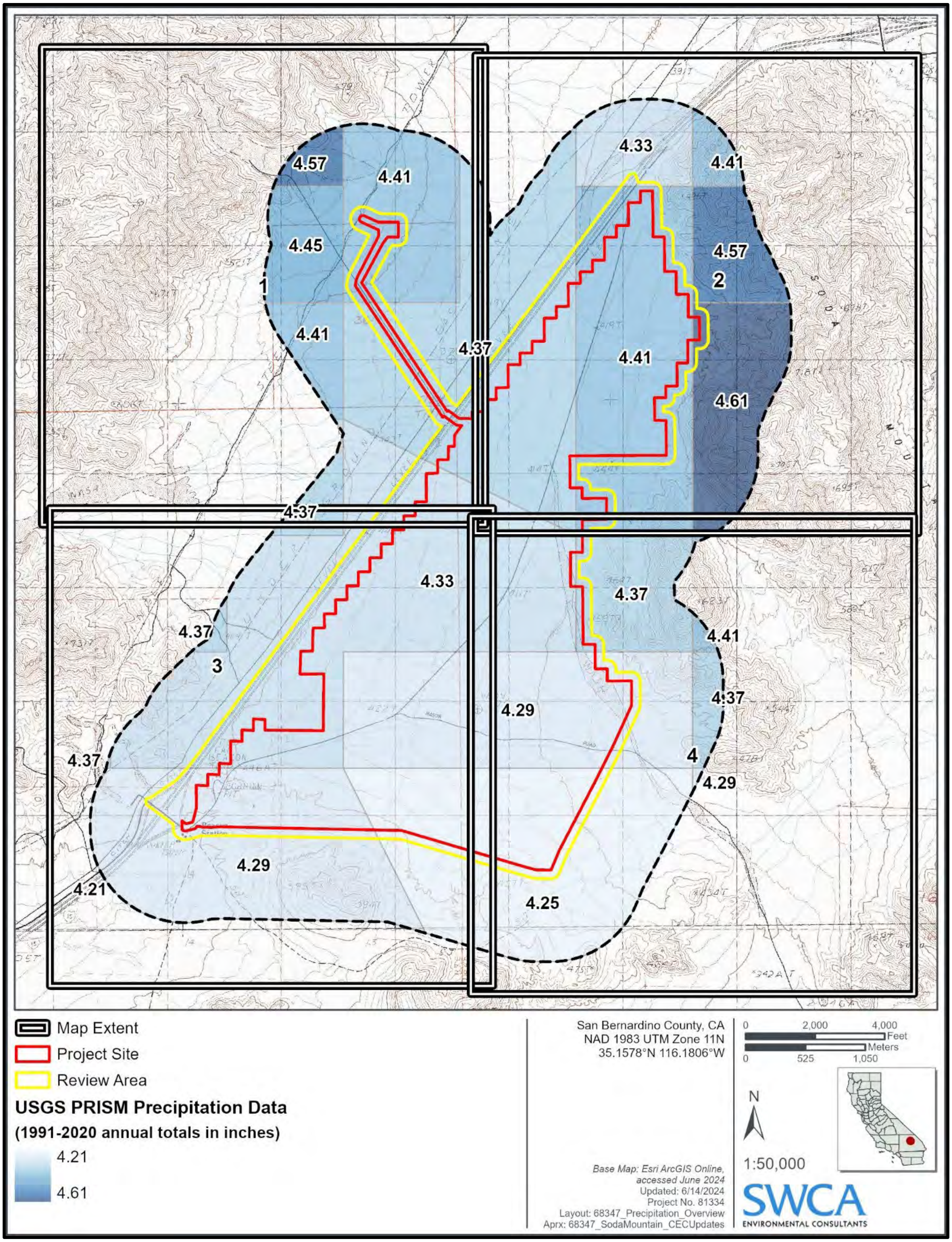


**Figure 6. USGS PRISM data total annual precipitation.**

The USACE Antecedent Precipitation Tool version 2 was run for the project center point to assess precipitation conditions during the winters of 2020, 2021, and 2022 and during the dates fields surveys were conducted in 2023. Weather stations used by the Antecedent Precipitation Tool include Barstow-Daggett AP (39 miles away), Barstow 4.2 NE (14 miles away), and Goldstone Echo #2 (29 miles away). Antecedent Precipitation Scores indicate how much drier or wetter conditions were that month compared with the 30-Year Normal Range (**Table 1**). Palmer's Drought Severity Index is used to interpret how drought may affect the Antecedent Precipitation Score and Condition. Precipitation conditions in the region varied by year and season with an overall trend from 2020 to 2023 of drier to wetter conditions. Overall conditions during the site visits in summer (dry season) were either normal or wetter than normal when compared with the 30-Year Normal Range (see **Table 1**).

**Table 1. Antecedent Precipitation Tool Data for the Project Region**

| Date | Field Survey | PDSI Value* | PDSI Class | Season | Antecedent Precipitation Score/Condition |
|---|---|---|---|---|---|
| 2020 January 15 | | -0.69 | Incipient drought | Wet Season | 17 (Wetter than Normal) |
| 2021 January 15 | | -3.3 | Severe drought | Wet Season | 7 (Drier than Normal) |
| 2022 January 15 | | -3.56 | Severe drought | Wet Season | 13 (Normal Conditions) |
| 2023 January 15 | | 1.18 | Mild wetness | Wet Season | 16 (Wetter than Normal) |
| 2023 May 22 | x | 2.44 | Moderate wetness | Dry Season | 13 (Normal Conditions) |
| 2023 June 12 | x | 2.63 | Moderate wetness | Dry Season | 16 (Wetter than Normal) |
| 2023 September 6 | x | 3.14 | Severe wetness | Dry Season | 15 (Wetter than Normal) |

PDSI = Palmer's Drought Severity Index

## *1.4.3 Geology and Soils*

The site is positioned in a low-lying historic alluvial fan basin valley dividing the northern and southern portions of the Soda Mountains. Geologic composition is defined by the California Geologic Survey as primarily young subsurface Quaternary-aged (late to middle Holocene era, 4,200 to 8,200 years ago) alluvial deposits (code Qyf) characterized as material above active wash made of partially developed soil profiles (**Figure 7; Figures A-7 in Appendix A**) (Lancaster et al. 2012).

Natural Resources Conservation Service (NRCS) State Soil Geographic (STATSGO 2) Digital General Soil Map online data (NRCS 2006) were reviewed to assess general climate information, wetness characteristics of soils, soil properties (frequency, duration, and timing of inundation), and soil classification (soil series and phases).

Four soil series are mapped within the review area (NRCS 2023): Tecopa-Rock outcrop-Lithic Torriorthents (s1126) (well-drained; calcareous; loamy), Rock outcrop (s1131) (somewhat excessively drained; calcareous; loamy), Rositas-Carrizo (s1137) (somewhat excessively drained), and Rillito-Gunsight (s1140) (somewhat excessively drained; loamy) (**Figure 8; Figure A-8 in Appendix A**). Soils within the review area are generally composed of Rositas-Carrizo soils which are very deep, excessively drained soils formed in mixed igneous alluvium. The series is extremely gravelly sand covered by approximately 70% gravel, which moderate alkalinity (pH 8.0) (NRCS 2023). Texture in the A horizon (top 5 centimeters) is coarse sand, sand, loamy sand, loamy coarse sand, sandy loam, or fine sandy loam.

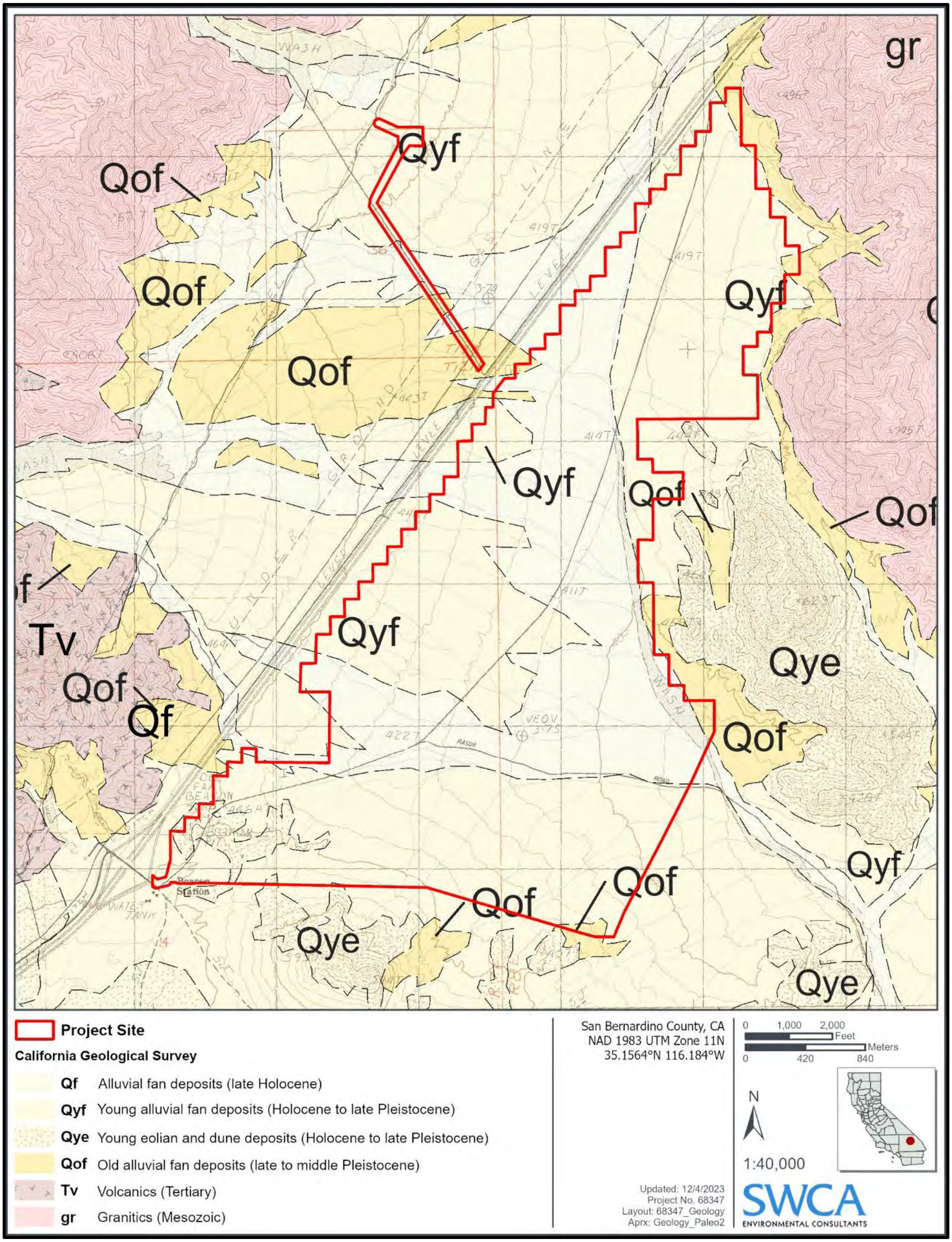


**Figure 7. California Geological Survey geologic material types primarily composed of young alluvial fan deposits in the project site.**

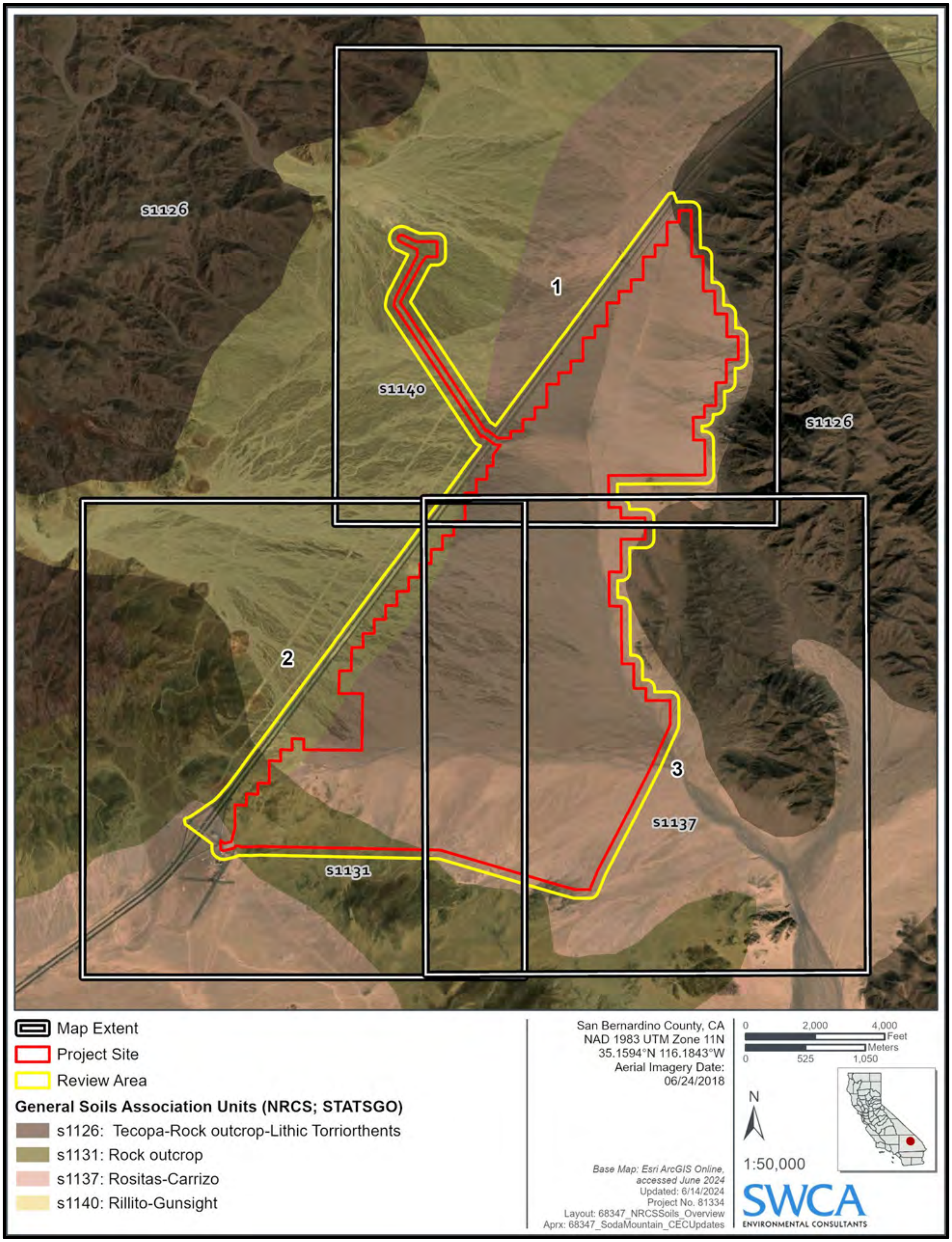


**Figure 8. Soil series types.**

Soils in this region have high levels of calcium carbonate (lime), a natural cement-like material, often referred to as “caliche”. Caliche forms in the soil profile of desert alluvial fan environments of arid regions because of water infiltration and evaporation. Its impermeability and presence can affect soil structure, hydrology, vegetation patterns, and other processes.

Aeolian processes play a role on the surface of the land within and outside drainages. Aeolian processes refer to the movement, transport, and deposition of sediment by the wind. Dry fine soil particles are picked up by strong winds and carried for varying distances before being deposited, leaving behind coarser material on the surface, causing deflation. These aeolian processes shape the overall desert landscape, including landforms, erosion, and sediment distribution. Further, the process contributes to the formation of desert pavement, a rocky dark surface covered with tightly packed pebbles and larger fragments. Weathering spanning hundreds or thousands of years causes the desert pavement to gradually become varnished with a polished, dark appearance. Areas of younger desert pavement also have tightly packed rocks and a darkened color, but they are relatively lighter in color than black varnished pavement.

### *1.4.4 Hydrology*

The study area is situated in the Mojave Watershed (Hydrologic Unit Code [HUC]-8 18090208) and sub-watersheds (HUC-12 180902082502) (19,830 acres) and partially within HUC-12 180902082504 (21,888 acres) and HUC-12 180902081706 (21,809.75 acres) (**Figure 9**) (USGS 2023b). Hydrology in the vicinity generally flows from west to east and then once on-site drains in two diverging directions, with the northern portion of the site draining north, terminating in Soda Dry Lake, and the southern portion draining south, also terminating in Soda Dry Lake. Soda Dry Lake is a playa in the Mojave Desert that periodically holds water after rainfall and comprises salt and alkali deposits. Soda Dry Lake does not drain to waters of the United States (WOUS) or Traditional Navigable Water (TNW) (**Figure 10**). A small portion of the lower left corner of the site is part of the watershed that ultimately drains to Cronise Valley and East Cronise Lake, also a dry lakebed with no outlet that does not drain to a WOUS or TNW.

The study area is in the Soda Lake Valley groundwater basin surrounded by Soda Lake Valley Highlands, with a small area in the southern portion of the project site draining to East Cronise Lake, which is surrounded by Cronise Valley Highlands (**Figure 11**).

The study area is within a Federal Emergency Management Agency (FEMA) flood hazard area Zone D, which represents areas with possible but undetermined flood hazards (FEMA 2020).

Hydrology within these watersheds at the site have been historically disturbed following construction of Interstate 15; flow concentrates on the highway’s north side and is conveyed through a series of underpass culverts directed onto the project site.

The USGS StreamStats (USGS 2003c) drainage area at the site includes the Soda Mountains, which are located on either side of the study area. StreamStats reports the drainage area as 24.7 square miles ranging in elevation from 989 to 3,642 feet with a mean basin elevation of 1,792 feet.

USGS StreamStats Peak Flow Statistics Flow Report data calculate the 50% flood event (2-year storm / return interval) at 52.2 cubic feet per second (Average Standard Error 214) and the 1% flood event (100-year storm / return interval) at 6,840 cubic feet per second (Average Standard Error 444). Conceptually, a 50% flood event appears as 52 cubic boxes each 1 cubic foot flowing past a single point every second. Similarly, a 1% flood event would appear as 6,840 cubic boxes each 1 cubic foot flowing past a single point every second. Bankfull Statistics Flow Report data of estimated channel width and depth are highly variable, between 20.5 and 39.4 feet wide and averaging 0.9 foot deep.

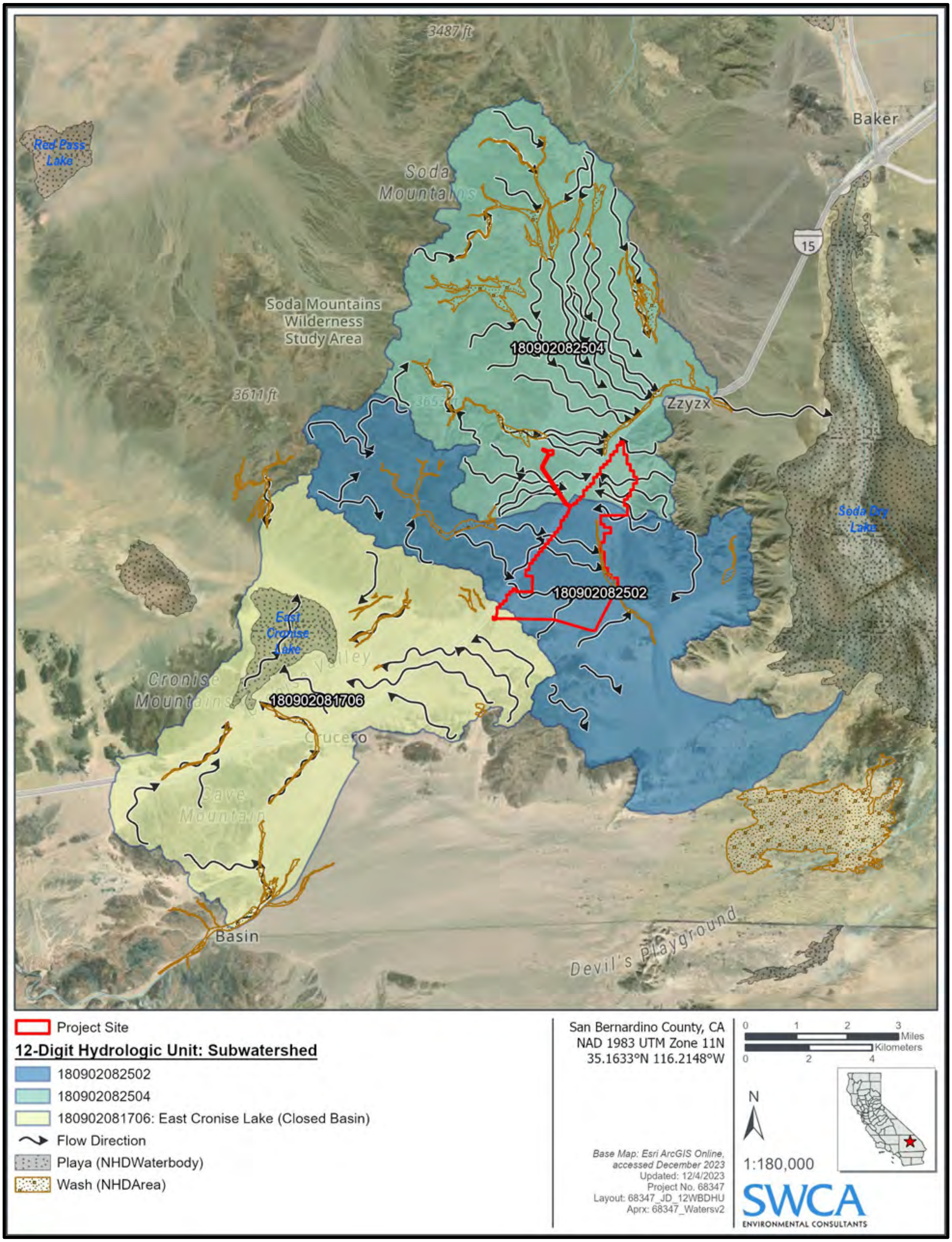


**Figure 9. NHD HUC-12 watersheds and general flow directions.**

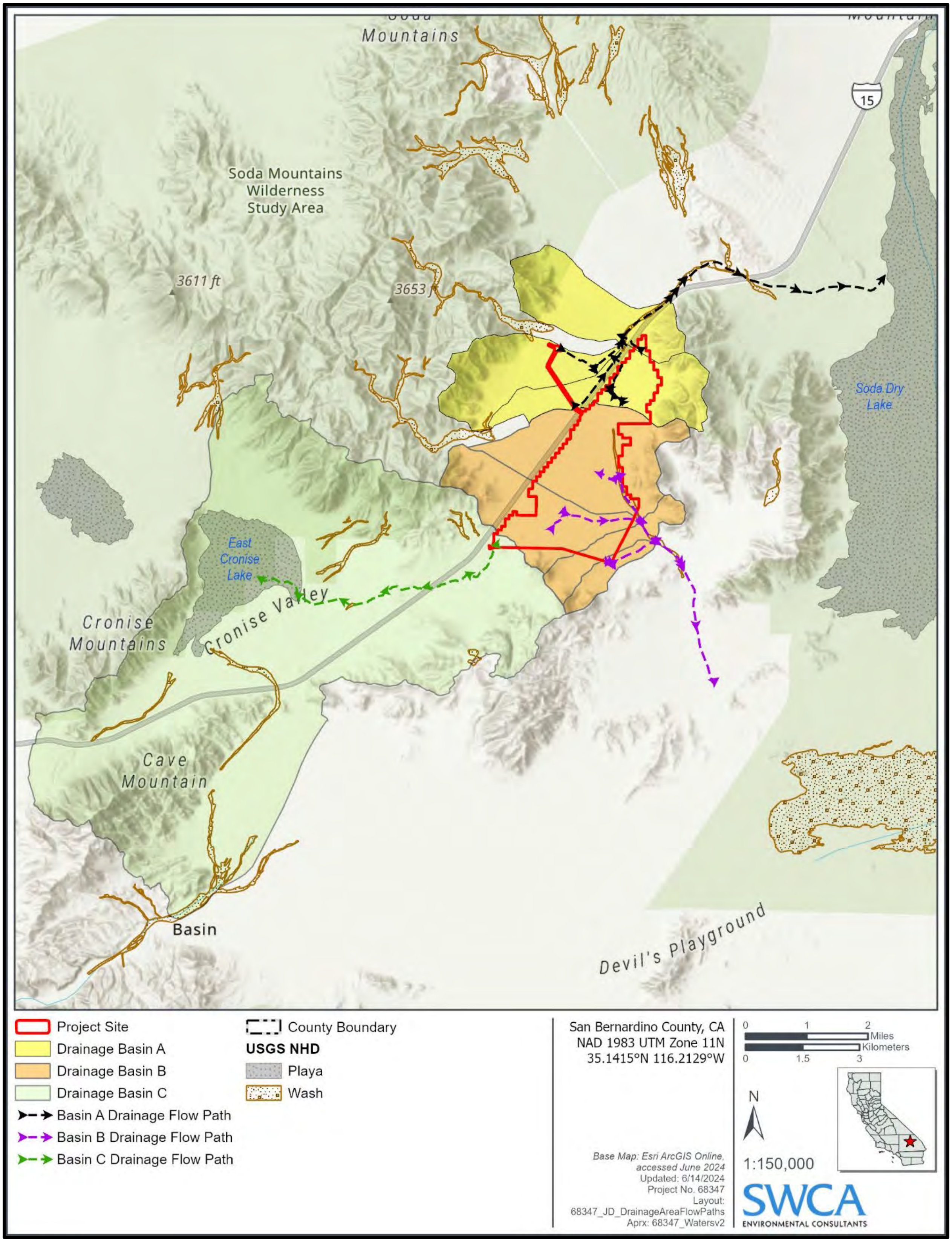


**Figure 10. Drainage flow paths from site to isolated dry lakes.**

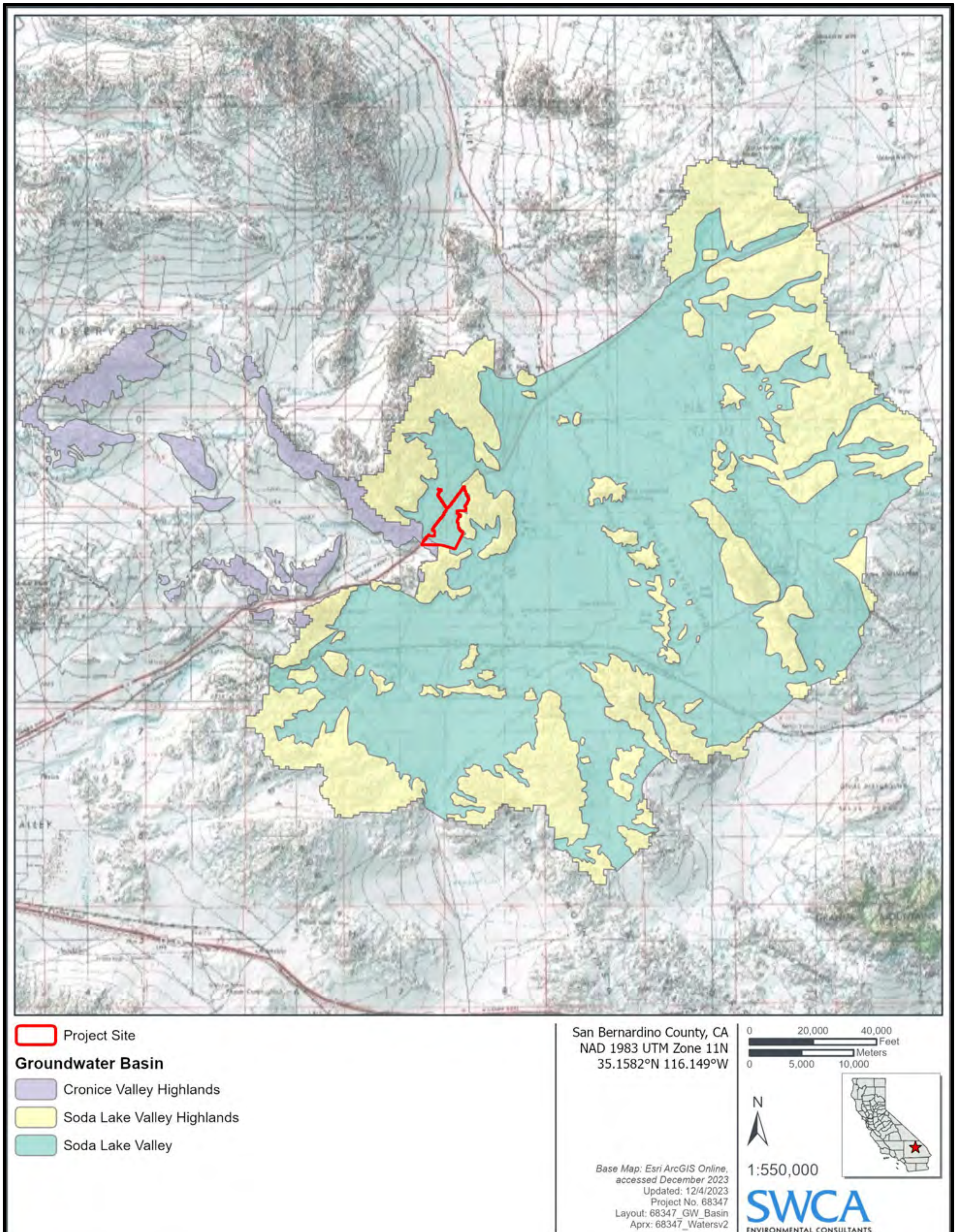


**Figure 11. Groundwater basins.**

The U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) maps shows the classification of aquatic resources including regime modifiers, flooding, and soil saturation characteristics (USFWS 2022). Fifteen linear NWI riverine features intersect or traverse the review area (**Figure 12; Figure A-12 in Appendix A**). The codes are shown below (**Table 2**).

**Table 2. NWI Features**

| Feature(s) | Code | Acres | Code Description |
|---|---|---|---|
| 1 Riverine | R4SBjx | 6.05 | Riverine, Intermittent, Streambed, Intermittently Flooded*, Excavated |
| 2–15 Riverine | R4SBj | 51.4 | Riverine, Intermittent, Streambed, Intermittently Flooded* |

*Intermittently Flooded: The substrate is usually exposed, but surface water is present for variable periods without detectable seasonal periodicity. Weeks, months, or even years may intervene between periods of inundation.

USGS National Hydrography Dataset (NHD) maps show potential location and extent of watercourses and streams, drainage patterns, topographic models, and other hydrologic information. NHD features are mapped similar to NWI and are all categorized by NHD as having ‘ephemeral’ stream flow (**Figure 13**). As shown by NHD arrows, flow direction travels north in the northern section of the project and south-east in the southern portion.

The study area is within a portion of a large historic alluvial fan system dating back to the Quaternary era (Griffith et al. 2016). Portions of the multi-part historic alluvial fan system are abandoned amongst upland desert pavement and are intersected by Interstate 15 (Mojave Freeway) along the western extent of the project. Hydrologic connectivity of areas on the northwest side to the southeast side of Interstate 15 within the study area are highly modified by the intersecting freeway. This adjacent portion of Interstate 15 includes four large box culverts—Turtle Ditch, Opah Ditch, Marl Ditch, and Unnamed Ditch—under the freeway to convey upslope flows to downslope areas within the study area (**Figure 14; Figure A-14 in Appendix A**).

Freeway culvert Turtle Ditch is 17.5 feet wide, and there is about 5 feet between the surface ground level and the top of the culvert. Opah Ditch is the widest ditch at 77 feet, and there is between 4 and 7 feet between the surface ground level and the top of the culvert. Marl Ditch is 17.5 feet wide, and there is about 8 feet between the surface ground level and the top of the culvert. The Unnamed Ditch is 8 feet wide, and there is about 5 feet between the surface ground level and the top of the culvert. These culverts provide a total of 120 feet of width along the 4.3-mile (22,704 feet) section of freeway for any upslope flows to pass into the study area. A berm along the north side of the highway and subsequent ditch direct flows along the toe of the berm toward each of the culverts. As a result, hydrologic flows are significantly restricted, causing abnormal concentration of water on the upslope side of the freeway within a ditch and through the culverts at volumes and velocities different than historical conditions. Such concentrations of flow have caused these broad alluvial channels to be confined into concentrated singular channels at the culverts, which then disperse in the study area into compound channels.

The freeway slopes from approximately 1,500 feet at its southwest end to 1,300 feet at its northeast end, descending at an average 1% grade decline. In addition to the four large under-freeway culverts, the freeway itself serves as an impervious surface to concentrate and convey rainfall. The paved freeway includes a short paved elevated berm along its outer edge on the downslope side with constructed disruptions, or water conveyance flumes in the berm which convey water off the freeway into the study area. There are approximately 23 flumes each spaced between 400 and 1,300 feet apart along the freeway’s edge (see Figure 13). Ten of the flumes have trees (approximately 12 feet in height) associated with topographic depressions immediately downslope of the flume.

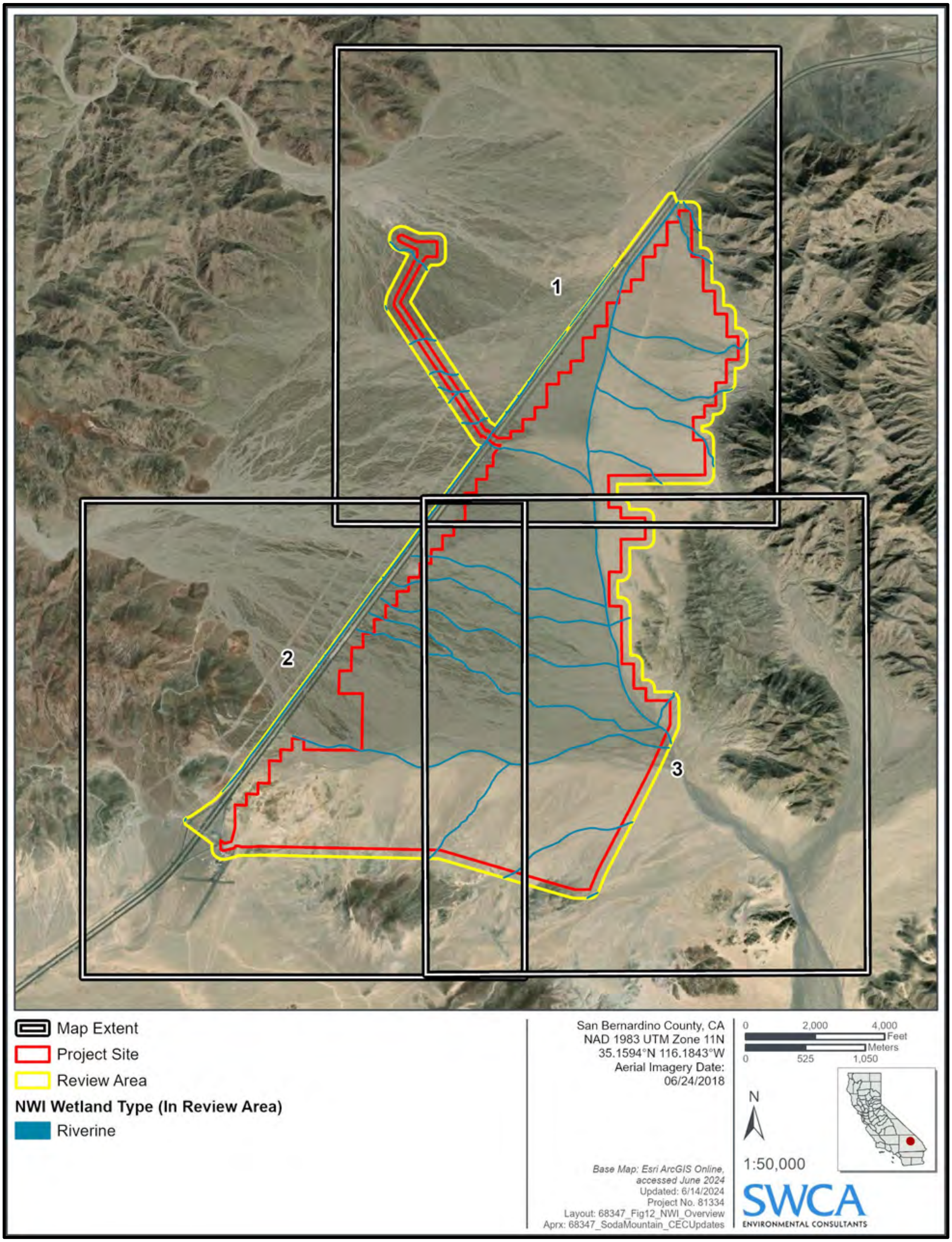


**Figure 12. NWI aquatic features.**

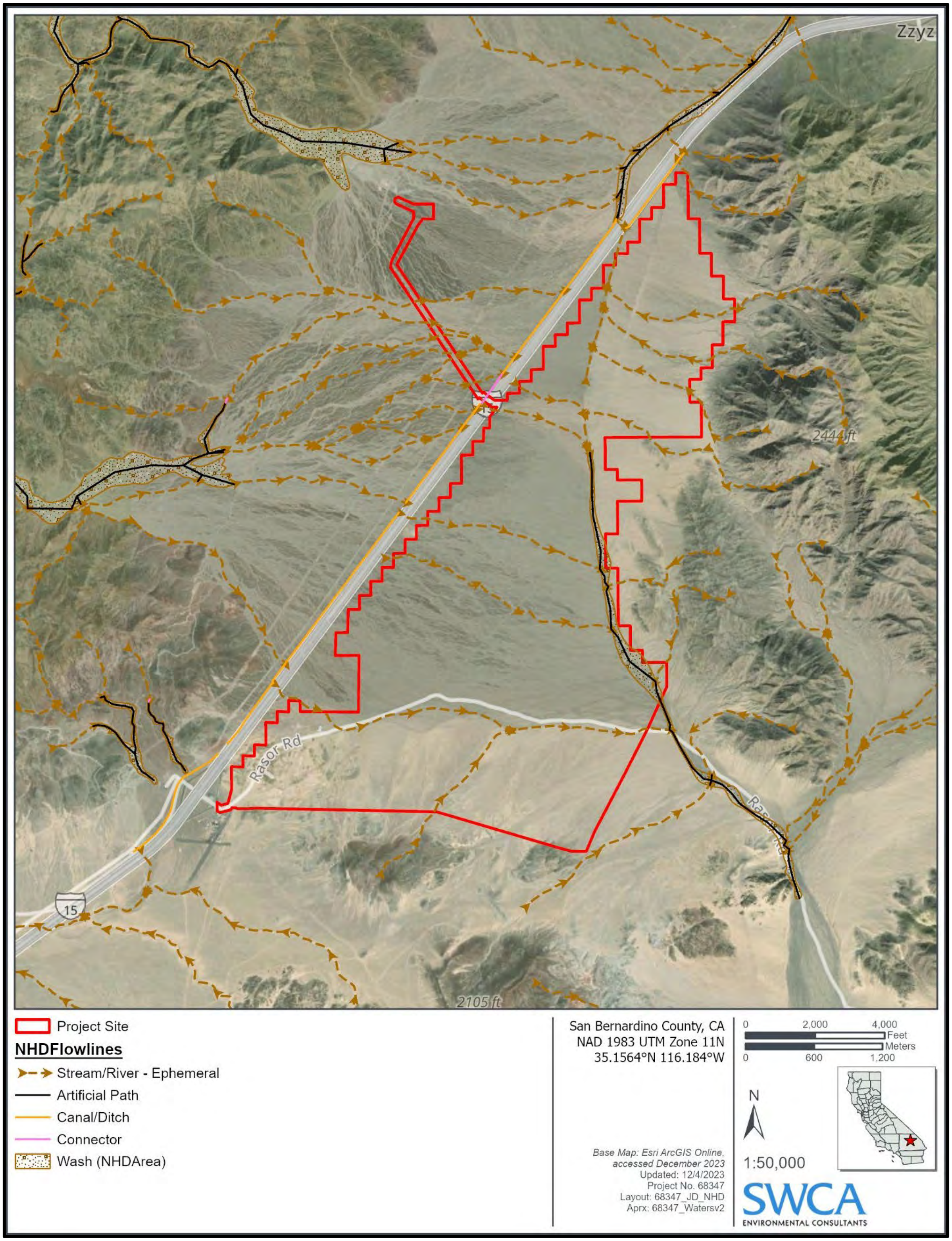


**Figure 13. NHD aquatic features and flow direction.**

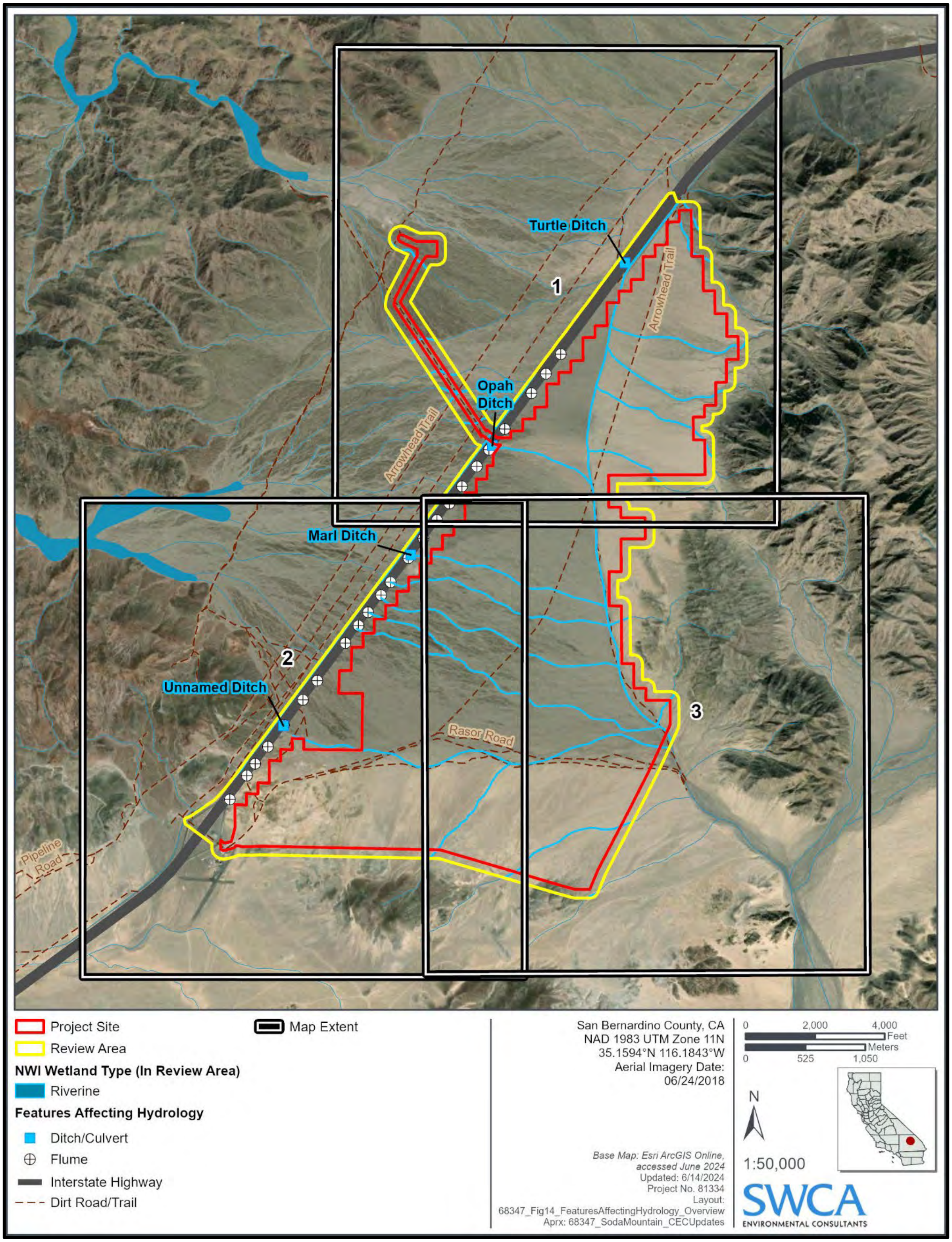


**Figure 14. Features affecting hydrology.**

As part of project-related studies, a hydraulic analysis was conducted to assess hydrology, with the results reported in the September 2023 *Soda Mountain Solar Project Stormwater Drainage Report, San Bernardino, California* (SWCA 2023). The analysis included the application of USACE's Hydrologic Engineering Center's River Analysis System (HEC-RAS) software, which is widely used for modeling, simulating, and analyzing channel hydraulics. HEC-RAS uses digital elevation model and precipitation data to produce an informed model of flow conditions. A copy of the final map showing the model's output for the 10-Year depth is provided in **Appendix B**.

### *1.4.5 Vegetation Communities*

Ecoregions are described by the U.S. Environmental Protection Agency (EPA) as areas where ecosystems (type, quality, quantity of resources) are generally similar (Griffith et al. 2016). The study area is in the U.S. EPA Level III ecoregion, Mojave Basin and Range (code 14). The Mojave Basin and Range has a dry subtropical desert climate with hot summers and warm winters and is one of the hottest places on the continent. Desert vegetation is sparse and dominated by creosote bush (*Larrea tridentata*).

Vegetation community surveys conducted by SWCA in 2023 following *A Manual of California Vegetation* version 2 online (CNPS 2023) include the following vegetation communities ordered from most prevalent to least: Creosote Bush – White Bursage Scrub; Creosote Bush Scrub, Rigid Spineflower – Hairy Desert Sunflower (*Chorizanthe rigida – Geraea canescens* Desert Pavement Association); Cheesebush (Sweetbush Scrub) (*Ambrosia Salsola – Bebbia junc*ea Shrubland Alliance); and California joint fir – longleaf joint-fir scrub (*Ephedra californica – Ambrosia salsola* Association). Each constituent species and its wetland indicator rating are provided in **Table 3** (USACE 2020).

**Table 3. Vegetation Community Species**

| Scientific Name | Common Name | Wetland Indicator Status* |
|---|---|---|
| *Ambrosia dumosa* | White bursage scrub | Not listed |
| *Ambrosia salsola* | Cheesebush | Not listed |
| *Chorizanthe rigida* | Rigid spineflower | Not listed |
| *Ephedra californica* | California joint fir | Not listed |
| *Ephedra trifurca* | Longleaf joint fir scrub | Not listed |
| *Geraea canescens* | Hairy desert sunflower | Not listed |
| *Larrea tridentata* | Creosote bush | Not listed |

*The USACE National Wetland Plant List indicator status of 'Not listed' also typically infers the species is an upland species.

The study area is not located within or near USFWS-designated Endangered Species Act Critical Habitat. The closest Critical Habitat is desert tortoise (*Gopherus agassizii*) and is approximately 6.8 miles west and outside of the site.

# 1.5 Regulatory Background

## *1.5.1 Clean Water Act Section 404*

The Clean Water Act (CWA) was enacted to restore and maintain the chemical, physical, and biological integrity of the nation's waters by regulating discharges of pollutants. The CWA provides USACE and EPA the authority to issue permits for activities that may result in a discharge unless the activity is exempt.

The Definition of Waters of the United States (33 Code of Federal Regulations [CFR] 328) was revised by the 2023 WOTUS rule and its final rule amendment which took effect September 8, 2023 ('Conforming Rule') (Federal Register 61964 Volume 88 No. 173). In general, WOUS are waterbodies such as lakes, rivers, streams, wetlands, and ponds.

WOUS include navigable waters, certain non-wetland waters, and adjacent wetlands with a continuous surface connection to a WOUS. Non-wetland WOUS, such as streams, are delineated by the Ordinary High Water Mark (OHWM) and must have a continuous surface connection to a WOUS that has a continuous surface connection a TNW. Non-wetland WOUS streams may be relatively permanent waters or non-relatively permanent waters as determined by USACE. The OHWM is defined as "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" (33 CFR 329.11). In situations where an alluvial fan braided stream system has channels located close to one another with small upland areas in between, likened to capillaries of tissue, both the aquatic and upland areas may all be combined within the full outer bounds of the WOUS extent (see 9th Circuit court case Save Our Sonoran Inc. v. Flowers, 2004).

### 1.5.1.1 USACE JURISDICTIONAL DETERMINATION HISTORY

An Approved Jurisdictional Determination (AJD) reviewed by the USACE under *Rapanos Guidance* (2008c) for the Soda Mountain Solar Project, File Number SPL-2010-01042-SLP, was issued June 5, 2013, covering 411 acres of delineated features within a larger study area than the current revised project. The AJD found that flows on-site extend both northeast and southeast into Soda Dry Lake. In the AJD, USACE used jurisdictional report information submitted by Panorama Environmental Inc. dated November 2009 and 2013. USACE found acreages of the drainage areas (active floodplain) were "accurately calculated using GIS data and polygons". The USACE concluded the drainages were isolated non-relatively permanent waters that are tributary to an isolated, intrastate dry lake, and not ultimately tributary to a TNW. USACE concluded all 411 acres of delineated features as non-jurisdictional.

In addition to the AJD, USACE issued an associated *Approved Jurisdictional Determination regarding presence/absence of geographic jurisdiction* letter, and *Determination regarding requirement for department of the Army Permit* letter, both dated August 21, 2013, which expired 5 years later in 2018.

## *1.5.2 California Fish and Game Code Section 1600 et seq.*

California Department of Fish and Wildlife (CDFW) in practice takes jurisdictional authority under the California Fish and Game Code (FGC) Sections 1600–1616 et seq. (CFGC 2017) of the bed and bank of lakes and streams that may support wildlife, aquatic life, and riparian habitat. The streambed is interpreted by CDFW to include the top of bank extending on one side of the aquatic feature to its opposite top of bank, and if riparian vegetation is present, extends to the riparian vegetation edge (drip line).

In dryland systems where sediment transport is high and flow conditions are variable, episodic channel configurations with multiple interconnected features occur across broad flat areas where the outer bounds of a defined bed and bank forms are typically subtle and lack topographic relief. In addition, the bed and bank bounds of single and compound channels may be shared or different depending on conditions. In these arid systems, it is common for channels to become abandoned and not be reengaged by flow events for years or decades. Relic channels, which may exhibit a topographic low relative to their surroundings, are evident by the lack of fluvial indicators and/or having transitioned into uplands.

Section 1602 of the FGC requires an entity to notify CDFW before commencing an activity that will “substantially divert or obstruct the natural flow, or substantially change or use any material from the bed, channel or bank of any river, stream, or lake.” Following notification, CDFW determines whether a Lake and Streambed Alteration (LSA) Agreement is required.

#### 1.5.2.1 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE PERMIT HISTORY

A CDFW LSA Agreement (File Number 1600-2016-0237-R6) was previously issued for the former project (slightly different scope), for 372.67 acres of impacts to jurisdictional streambed. No work was completed, and the LSA expired March 24, 2022. The project scope has since been reduced. CDFW is the new California Environmental Quality Act (CEQA) Lead Agency for the Environmental Impact Report.

### *1.5.3 Water Board Waste Discharge Requirement*

The California Water Boards regulate discharges of waste to protect the quality of waters of the State, broadly defined as “the chemical, physical, biological, bacteriological, radiological, and other properties and characteristics of water which affects its use” (California Water Code Section 13050). All surface waters and groundwaters are considered waters of the State. All waters of the State are also managed for beneficial uses under California law. Examples of discharge of waste may include any deleterious material such as earthen materials (soil, silt, sand, clay, rock, or other organic or mineral material) and any other waste as defined.

The Water Board regulates “waters of the State” under both the CWA and the state Porter-Cologne Water Quality Control Act (California Code of Regulations Title 23). Because federally regulated WOUS are not present at the project site under Section 404 of the CWA, fill activities to waters of the State are regulated under the Porter-Cologne Water Quality Control Act, making the applicable permit the Waste Discharge Requirement.

Although federally regulated WOUS are not present, the Water Board and Lahontan Regional Water Quality Control Board (Lahontan RWQCB) apply methods in USACE delineation manuals to assess aquatic features. It is common practice for the Water Board to rely on the USACE’s review and verification of delineations including AJDs. An AJD request for the project may be submitted to the USACE for re-verification that federal jurisdiction is absent, which if obtained would be shared with the Water Board.

The project is in the South Lahontan Basin area of the Mojave River Hydrologic Area, in Bulletin 118 Groundwater Basin 6-033 (Soda Lake Valley) (Water Board 2015). The Lahontan RWQCB implements the Water Quality Control Plan for the Lahontan Region (Basin Plan) and is a responsible agency pursuant to the CEQA.

#### 1.5.3.1 WATER BOARD PERMIT HISTORY

A previous delineation was conducted in 2009 by URS and 2012 by Panorama Environmental Inc. The 2012 map shows waters of the State. Note, the prior 2013 project had included a groundwater draw component, which is no longer part of the current project. It is not known whether a Waste Discharge Requirement permit was drafted by the Water Board at the time.

Previous letter correspondence in 2012 from the Lahontan RWQCB indicates several Beneficial Uses of Water occur in the subject basin, including municipal and domestic supply, agricultural supply, groundwater recharge, freshwater replenishment, water contact recreation, non-contact water recreation, warm freshwater habitat, cold freshwater habitat, wildlife habitat, preservation of biological habitats of special significance, rare threatened and endangered species, spawning reproduction and development, water quality enhancement, and flood peak attenuation/flood water storage.

# 2 METHODS

## 2.1 Field Delineation Survey

### *2.1.1 Introduction*

An aquatic resources delineation field survey was led by an experienced SWCA delineator and conducted by a team over 13 days, during May 22–26, June 12–16, and September 6–8, 2023. Data and photographs were recorded, along with location and heading. All data were recorded using the Esri ArcGIS Field Maps collector application paired to a Juniper Systems Geode GPS unit set to submeter accuracy. Following the collection of field data, data were reviewed and used to inform a delineation model. The delineation model was produced using several input data layers and delineator training data, which are discussed in Section 2.3 below.

In 2024 the California Energy Commission (CEC) became the California Environmental Quality Act Lead Agency and this ARDR was updated to include an expanded Review Area extending 250 feet from the edge of the Limits of Disturbance around the entire site. For some areas within the 250-foot area that were not previously mapped, a lead delineator mapped aquatic resources by desktop only. These features were incorporated into the maps and tables. In addition, to meet CEC mapping requirements maps were revised to display at a 1:24,000 scale.

This delineation has been conducted in accordance with the *Corps of Engineers Wetland Delineation Manual* (USACE 1987) and regional supplements, including *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE 2008a), *Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (USACE 2008b), and *National Ordinary High Water Mark Field Delineation Manual for Rivers and Streams: Interim Version* (USACE 2022). In addition, guidance from *USACE Ordinary High Water Mark Identification* Regulatory Guidance Letter No. 05-05 (USACE 2005) was considered.

### *2.1.2 Transect Surveys*

As described in Regulatory Guidance Letter 05-05 (USACE 2005) "where physical characteristics are inconclusive, misleading, unreliable, or otherwise not evident, the OHWM may be determined by using other appropriate means that consider the characteristics of the surrounding areas." Because many areas on the site have very subtle or inconclusive OHWM indicators, it was important to be able to recognize and categorize indicators associated with uplands and transitionary zones before setting out to identify the OHWM and streambed. Therefore, the first field visit included conducting a large-scale transect survey to understand site conditions and site-specific common indicators.

Based on field observation, the lead delineator prepared a data form including upland, out of channel, and fluvial indicators prevalent and distinguishable at the site, along with descriptions and photographic examples for the team. The purpose of the list was to facilitate rapid and consistent evaluation at each sample plot by multiple field delineators. The indicators for upland, out of channel, and fluvial indicators in each zone are summarized in **Table 4**.

Ten transects (Transects 1–10) were placed by desktop, oriented perpendicular to the direction of stream flow to capture indicators at points across hundreds of channels. Six transects were 2,000 meters long (T1, T2, T4, T5, T6, T8), one transect (T9) was 900 meters long, one transect (T10) was 600 meters long, and two transects were 1,400 meters long (T3 and T7), with each evaluation point placed approximately 50 meters apart, resulting in about 40 evaluation points per transect depending on transect length.
For each transect, the surveyor recorded a data point every 50 meters. If a point was located between two or more different zones, the point location was shifted to capture just one zone type.

**Table 4. Select Upland and Fluvial Indicators**

| Category | Indicators |
|---|---|
| Upland – Desert pavement and dark in place substrates | Vesicular pores, caliche coatings layers or fragments, deflated surface of scattered pebbles on a sandy surface, pavement surface of interlocking pebbles, relict bars and swales infilled abandoned and weathering, fractured rock in place, rock varnish, rock weathering, rubified rock underside, surface rounding of landform, woody debris in place. |
| Upland – Out of channel upland zones abandoned or relic | Relic bar forms of gravel, bifurcated form around obstructions, drainage swales in between stream network, flow lineation of laminar sheet-flow, gravel oriented in direction of flow, mud cracks above stream network, organic drift delineating margins above channels, sediment ramp accumulation preventing flow from passing, sediment gravel sheet from lateral spread, sediment difference outside channels of finer sizes, vegetation channel alignment patterns, wrack caused by high flows jumping out of channels. |
| Fluvial – Channels supporting flow events | Cut bank, shelving, erosion, headcut, scour on banks, scour in channel bottom, secondary channel apparent from low-flow channels, water-cut benches, water level marks, vegetation alignment patterns, sediment sorting. |

Following this exercise, upland indicators were more distinguishable from fluvial indicators by delineators during field evaluation and delineation model field confirmation.

# 2.2 Remote Sensing

## *2.2.1 Introduction*

Since the publication of the USACE Wetland Delineation Manual (USACE 1987), USACE has promoted and acknowledged the usefulness of remote sensing data in delineation assessments. Section B of the manual (Preliminary Data Gathering and Synthesis) indicates "remote sensing is one of the most useful information sources available for wetland identification and delineation," and refers to aerial photography including infrared, and recent satellite images. Similarly, the NRCS *Engineering Field Handbook* dedicates a chapter (Chapter 19, Hydrology Tools for Wetland Identification and Analysis) to the methodology and applicability of remote sensing imagery for examining aerial signatures for normal, wet, and dry years (NRCS 1997).

In addition, the *Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Arid West (Version 2.0)* (USACE 2008b) includes suggesting review of remote sensing data to assess climate, drought conditions over time, and problematic vegetation situations. In 2016, USACE published *Synthesizing the Scientific Foundation for Ordinary High Water Mark Delineation in Fluvial Systems* (USACE 2016), which includes use of remote assessments to estimate channel and floodplain dimensions and upstream extent of the channel network. One method includes use of satellite images to delineate the extent of channel and floodplain edges while looking for differences in vegetation communities or topographic features where visible. The second method described includes use of high-resolution light detection and ranging (LiDAR) imagery "to detect topography commonly associated with the active channel," which is described as holding great promise for "accurate delineation of channel boundaries."

The USACE Regulatory Guidance Letter 05-05 (USACE 2005) acknowledges that "where the physical characteristics are inconclusive, misleading, unreliable, or otherwise not evident, districts may determine the OHWM by using other appropriate means that consider the characteristics of the surrounding areas, provided those other means are reliable. Such other reliable methods that may be indicative of the OHWM include, but are not limited to, lake and stream gage data, elevation data, spillway height, flood predictions, historic records of water flow, and statistical evidence."

The USACE Minimum Standards for Acceptance of Aquatic Resources Delineation Reports (USACE 2016) requests that "if remote sensing tools were used to aid in the delineation, list what tools were used and provide a copy of the maps if possible."

Lastly USACE's most recent supplemental guidance, *National Ordinary High Water Mark Field Delineation Manual for Rivers and Streams*: *Interim Version* (USACE 2022), presents an approach, examples, and discussion on the application of remote sensing for delineation mapping. Examples include use of satellite imagery, topographic maps, geologic data, and LiDAR to evaluate sites, alongside field data collection and a weight of evidence approach.

Using the above guidance, remote sensing data, field data, and modeling were applied.

## *2.2.2 Drone Data and Local Relief Model*

Publicly available LiDAR data are not widely available in the non-coastal regions of California. Even in inland areas where LiDAR is available, its resolution is too low (30 meter or 10 meter) for aquatic resource mapping. Therefore, SWCA flew a remotely operated aircraft (drone). The drone model is WingtraOne Gen II with a Sony camera capable of 1-centimeter horizontal absolute accuracy. The drone flights were conducted April 10, 11, and 12, 2023, across the review area to collect point cloud data. Imagery resolution was 1.8 centimeter/pixel ± 4 centimeter on x/y axis and ±7 centimeter on z axis. Using software, the data were processed to create a seamless mosaic from multiple adjoining images, outliers removed, and 3D point coordinates produced. Finally, the data were used to reconstruct a Local Relief Model of surface terrain. The Local Relief Model is a representation of the local micro-topographic variation in elevation within a defined neighborhood radius, on a scale of −1 to 1. The dataset values were normalized to a grayscale spectral range, from 0 to 255 colors (lighter color to darker color), in preparation for multi-factor modeling. Zero represents a relative flat point with no topographic relief, whereas 255 represents the highest relative topographic relief.

### 2.2.3 Satellite Data

Satellite aerial imagery was ordered from SkySat, and images were collected in February 2023. Satellite data resolution is 50 centimeter/pixel (1 pixel = 20-inch square) and 4-band with wavelengths red, green, blue (RGB) and near infrared (NIR). This on-demand satellite imagery provides high-resolution recent imagery of site conditions, allowing review of current site conditions by desktop. The high-resolution satellite data were loaded onto field data collection tablets for viewing in the field during surveys. The spectrum scale is 0 to 255 colors and represents a scale of relative lightness and darkness.

### 2.2.4 Vegetation Density Model

The high-resolution satellite RGB and NIR color reflectance values of each spectral band were used to calculate vegetation indices with the Visible Atmospherically Resistant Index (VARI) model ([Green-Red])/[Green+Red-Blue]). VARI was selected because it reduces atmospheric scattering on the assessment. The VARI layer does not read well in an overview figure, so a similar map of the Normalized Difference Vegetation Index (NDVI) (model (NIR-Red)/(NIR+Red)) using the same data input data was produced (**Figure 15; Figure A-15 in Appendix A**). The result is a grayscale image with values ranging from −1 to 1, whereby higher values indicate denser vegetation, and lower values suggest sparse or stressed vegetation. Productive vegetation reflects more NIR and green light but absorbs more red and blue light using chlorophyll. Upland vegetation (primarily white bursage scrub and cheesebush) is prevalent across the site and is detected by the drone and represented in the NDVI. The dataset values were normalized to the grayscale spectral range, from 0 to 255 colors, in preparation for multi-factor delineation modeling.

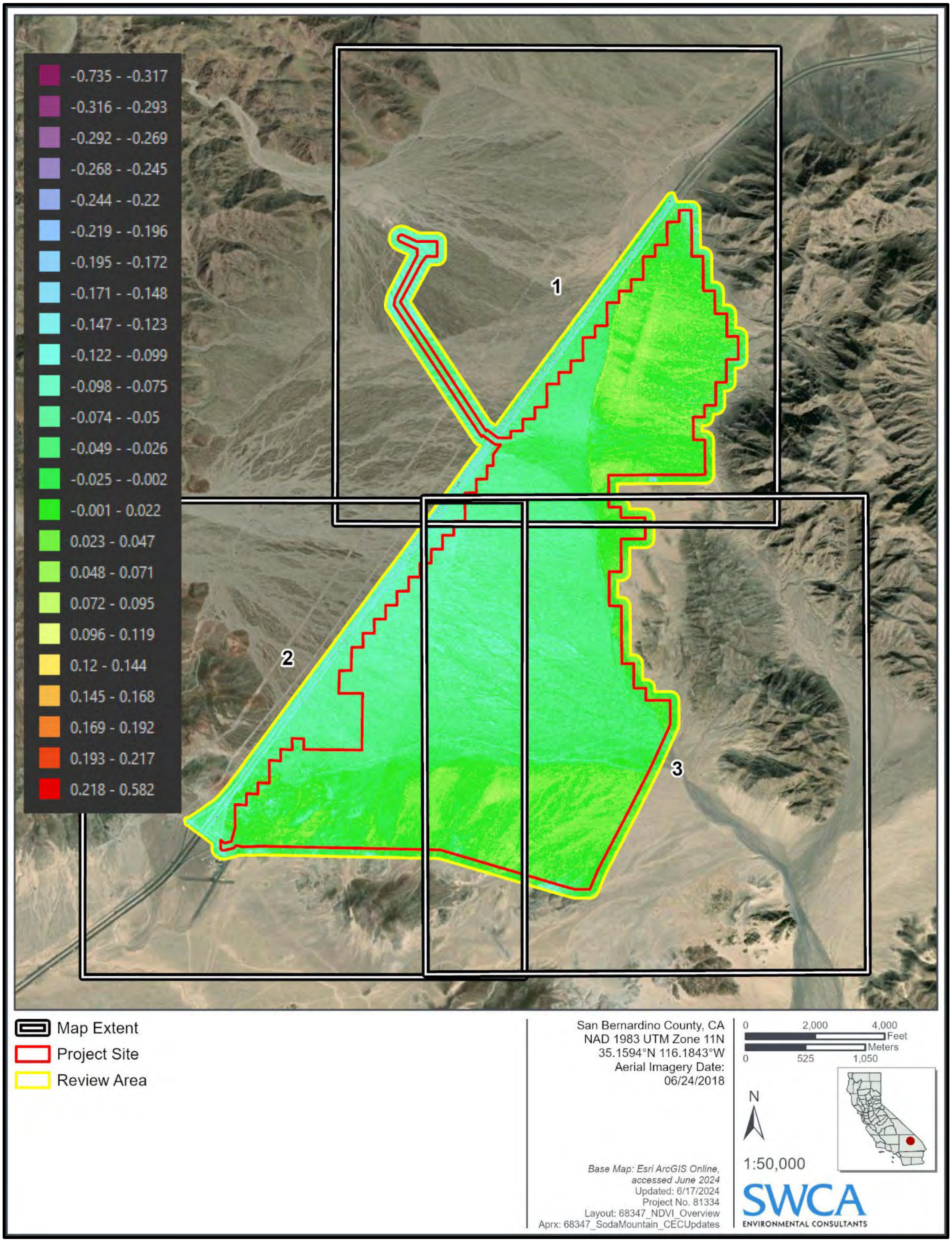


**Figure 15. NDVI showing relative vegetation density.**

## 2.3 Modeling

### *2.3.1 Training Data*

In preparation for further modeling, training data of both aquatic and non-aquatic (upland) features were mapped by one experienced delineator using field data and information from on-site evaluation. On-site data used included mapped lines and data points, fluvial and inactive indicator data, remote sensing data layers, and high-resolution satellite imagery. The delineator mapped all features within an approximately 100-acre sample area of the site. Features mapped were categorized as either upland desert pavement/elevated (**Figure 16** and **Figure 17**), inactive and relic channel forms lacking fluvial indicators (**Figure 18 and Figure 19**), or active channel (**Figure 20**). **Table 5** summarizes the data features.

**Table 5. Training Data Features**

| Class | Symbology Color | Description |
|---|---|---|
| Upland desert pavement dark, varnished, or darkened | Dark gray | Dark and varnished desert pavement; darkened uplands transitioning to dark desert pavement; or highly elevated; only upland indicators are present. |
| Uplands between desert pavements and channel forms | Light gray | Lacking desert pavement and darkened surfaces and lacking fluvial indicators. Abandoned relic channel forms with only upland indicators may be present. |
| Channels forms | Blue | Containing weak or strong fluvial indicators marked primarily by light-colored sediments and sorting, subtle or major scour or erosion, and vegetation patterns associated with channel forms. |

**Figure 16. Upland desert pavement or darkened upland (Transect 1; 35.149484˚, −116.189958˚), representative photograph. Strong reliable upland indicators differentiate type.**

**Figure 17. Uplands less dark than desert pavement (Transect 2; 35.166258˚, −116.17905˚), representative photograph showing darkened deflated surface. Lack of fluvial indicators and presence of strong upland indicators differentiates type.**

**Figure 18. Uplands between desert pavements and channel forms (Transect 2; 35.158630˚, −116.180109˚), representative photograph showing deflated surface and lack of channel forms. Lack of fluvial indicators and presence of upland indicators differentiates type.**

**Figure 19. Channel forms abandoned (Transect 1; 35.155111˚, -116.184718˚), representative photograph showing relic channel forms and relic swales. Absent or unreliable weak fluvial indicators differentiates the type.**

**Figure 20. Channel forms active (Transect 1; 35.149950˚, -116.189525˚), representative photograph showing overturned rocks, sediment sorting, and strong vegetation alignment. The presence of reliable fluvial indicators in the field differentiates the type.**

### 2.3.2 Machine Learning Assisted Modeling

#### 2.3.2.1 MACHINE LEARNING PROCESS

Machine learning is a subset of artificial intelligence that allows computers to learn using data, find patterns, and make predictions. An experienced data analyst used ArcGIS modeling tools to provide a machine learning program access to project data along with the correct answers (from delineator training data). To increase the number of data sample points, the data were duplicated and rotated to create additional data samples. The high-resolution aerial imagery, Local Relief Model, grayscale color, VARI vegetation density, and training data were input into the machine learning assisted model for analysis by a neural network. The machine was asked to learn from the delineator training data and find patterns in the datasets to classify features into one of five categories (upland desert pavement, upland, upland transitional, inactive relic channel forms, and active channel).

Machine learning for multi-class classification uses what is called a confusion matrix for evaluating and reporting its performance (accuracy, precision, and recall). Performance includes assessing instances where features were correctly predicted by the model or not and are reported as true or false positive or negatives. In addition to performance, normalized data for each base data layer (Local Relief Model, grayscale color, and VARI vegetation density) were provided as inputs, and box-whisker plots were reviewed to assess the distribution and differences in elevation, color, and vegetation density, among five initial feature categories (upland desert pavement, upland, upland transitional, inactive relic channel forms, and active channel). The upland desert pavement and the active channel box plot median values were distinct from the other category medians. The upland and upland transitional categories trended similar to the upland desert pavement, whereas the inactive relic channel forms trended more similarly with the active channel.

The model was run to produce a delineation map for the entire review area. Overall machine performance was self-assessed at values higher than 85% correctness. It is important to note the machine learning predictions are similar to a multivariate model whereby the input layers are utilized to determine trends and find patterns; however, further statistical significance and error values were not analyzed because methods conducted by machine learning cannot be reduced to a discrete multi-variate model.

#### 2.3.2.2 MODEL REFINEMENT

An experienced delineator reviewed the delineation model map in detail, its performance, and box plot distribution to assess delineation mapping appropriateness. Areas that could be improved were identified by the delineator. Corrections made included adjusting a color cast differential on the right half of the project from satellite imagery. In addition, further training data were produced of primary channels with strong OHWM linearity to assist the model in picking up channel system extents. Modeled data were reviewed during the last field site visit across the site specifically in the southernmost area of the project. Following field evaluation, additional training data were produced in areas where the model predictions could be improved to reflect site conditions and observations more accurately. To account for aquatic resource variation across the site and differences in sediment color, the delineator mapped an additional approximately 100 acres of example features across the review area for training. After the above data refinements, the layers were fed back to the model, whereby it was trained again, and the predictive mapping revised. The model and model refinement incorporated direction observations by delineators and knowledge about hydrologic indicators occurring on-site. In short, the field delineators used data collected, photos recorded, and experience to verify the model’s extent, accuracy, and representation of the site to the best of their ability.

# 3 RESULTS

## 3.1 Field Data

### *3.1.1 Culverts*

Interstate 15 intersects a large historic alluvial fan landscape, and culverts were constructed beneath the highway to collect and allow passage of upstream water from the north side of the highway to the south side (see **Figure 14**). Culvert widths were measured with a measuring tape and walked to assess hydrologic connectivity (**Table 6**). In addition to the culverts, large berms and the elevated highway prevent upstream water from passing through until diverted toward and through one of the culverts.

**Table 6. Culverts and Dimensions**

| Ditch/Culvert | Location | Culvert Structure Width | Distance Between Culverts |
|---|---|---|---|
| Unnamed Ditch | 35.142620°, -116.203046° | 8.0 feet | 1.2 miles |
| Marl Ditch | 35.156067°, -116.190648° | 17.5 feet | 0.7 mile |
| Opah Ditch | 35.164668°, -116.182698° | 77.0 feet | 1.2 miles |
| Turtle Ditch | 35.179039°, -116.169775° | 17.5 feet | 0.5 mile |

The only other direct upstream water source onto the project site is derived from highway runoff, which is allowed to exit the road prism at locations where the highway asphalt road berm has an exit point (water chute/flume), which directs accumulated rain off the road and onto the project site (**Figure 21; see Figure 14**).

**Figure 21. Example of a highway water chute/flume where there is a break in the asphalt highway berm; view from the highway, facing the project site.**

### 3.1.2 Transect Surveys

Transects surveys allowed for review of hundreds of drainages and hydrologic systems across the 2,670-acre site. Not every channel or feature was evaluated in the field. Many areas on-site contain desert pavement or upland areas between or closely bordering active channels. Each transect data point was compared with high-resolution aerial imagery in context of the hydrologic system and reviewed when refining the delineation model.

### 3.1.3 Rapid Ordinary High Water Mark Plots

The review area was evaluated in the field while viewing several remote sensing datasets (high-resolution aerial imagery, Local Relief Model, VARI vegetation density, and grayscale) on field tablets. After substantial desktop review and initial field data review, Rapid OHWM plot locations were selected to either confirm observations or gather more data to reach a conclusion. Photographs were recorded (**Figure 22**; **Figure C-22** and **Photographs C-1 through C-17** in **Appendix C**) and USACE Rapid OHWM Datasheets (**Appendix D**). Rapid OHWM datasheet results were collected and maintained for selected areas even if an OHWM was found to be absent.

Ten Rapid OHWM sampling plots were evaluated to document channel forms and the relevance, strength, and reliability of hydrologic data (**Table 7**; **Figure 23; Figure A-23 in Appendix A**).

All Rapid OHWM plots with a physical OHWM (rOHWM-02, rOHWM-03, rOHWM-05, rOHWM-07, rOHWM-08, rOHWM-09, rOHWM-10) included a break in slope, sediment sorting, changes in the character of the soil, and changes in vegetation type and/or density. Other indicators recorded include channel bars, shelving, instream bedload evidence, and wracking of organic litter.

For Rapid OHWM plots where evidence for an OHWM was lacking (rOHWM-0, rOHWM-04, rOHWM-06), indicators were absent, weak, and/or not reliable.

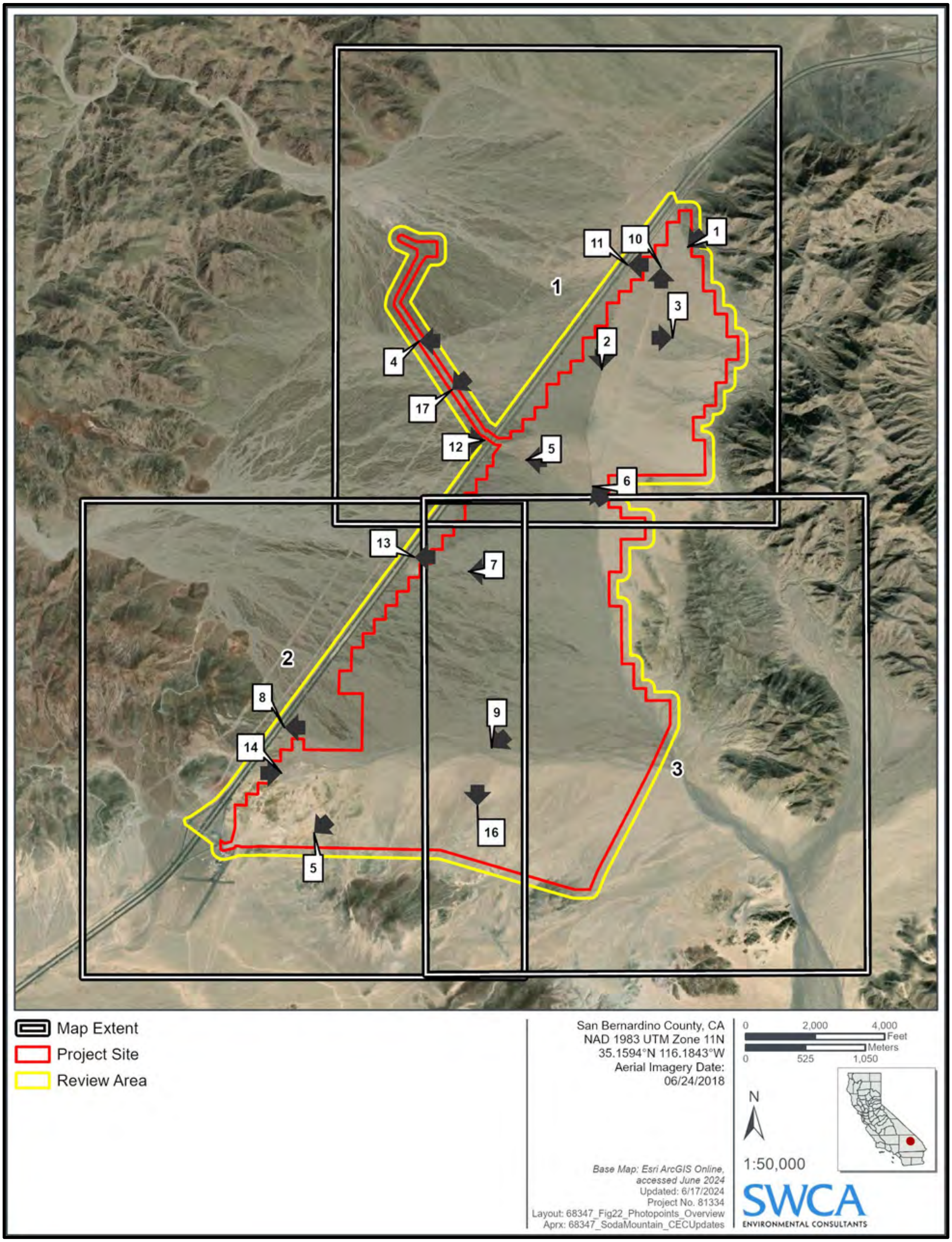


**Figure 22. Photo-point map showing the location and direction of photographs (see Photographs C-1 through C-17 in Appendix C).**

**Table 7. Rapid OHWM Sampling Plots**

| Plot point | Relative Location | Coordinates | Channel Form | Result |
|---|---|---|---|---|
| rOHWM-1 | East Array. Within highly traveled dirt and degraded paved road. | 35.179725°, -116.166012° | Channel form and indicators absent. | Indicators absent in road. OHWM absent. |
| rOHWM-2 | Eastern edge of review area at base of mountains. | 35.172081°, -116.15887° | Well-developed highly active multi-channel stream; 130 feet wide. | Strong indicators, reliable on aerial imagery. OHWM present; depth 3.5 feet. |
| rOHWM-3 | East Array. East side of project. | 35.166557, -116.168432 | Shallow narrow drainage; 1.5 feet wide. | Moderate aerial definition reliability. OHWM present; depth 0.3 foot. |
| rOHWM-4 | East Array. | 35.169334°, -116.173413° | Poor definition with landscape rounding. | Weak active indicators and weak aerial signature. OHWM absent. |
| rOHWM-5 | Downstream of Opah Ditch. | 35.164413, -116.182409 | Well-developed drainage with multiple low flow channels and indicators; 60 feet wide. | Strong indicators, reliable on aerial imagery. OHWM present; depth 3 feet. |
| rOHWM-6 | South Array 2. Within highly traveled dirt road. | 35.148987, -116.180009 | Channel form and indicators absent. | Indicators absent in road and no aerial definition. OHWM absent. |
| rOHWM-7 | Eastern edge of review area within main wash at base of mountains. | 35.143198, -116.168067 | Broad well-developed drainage with multiple low-flow channels and indicators; 275 feet wide. | Strong indicators. OHWM present; depth 1.5 feet. |
| rOHWM-8 | South Array 3. Eastern edge of review area. | 35.138014, -116.168682 | Shallow narrow drainage with sediment sorting; 3 feet wide. | Moderate aerial definition reliability. OHWM present; depth 0.16 foot. |
| rOHWM-9 | Adjacent to Rasor Road. | 35.141901, -116.189309 | Shallow wide channel bordered by uplands; 9 feet wide. | Moderate aerial definition reliability. OHWM present; depth 0.16 foot. |
| rOHWM-10 | North of highway adjacent to dirt roads. | 35.169095, -116.185545 | Well-defined active drainage with multiple indicators; 32 feet wide. | Strong indicators, reliable on aerial imagery. OHWM present; 2 feet deep. |

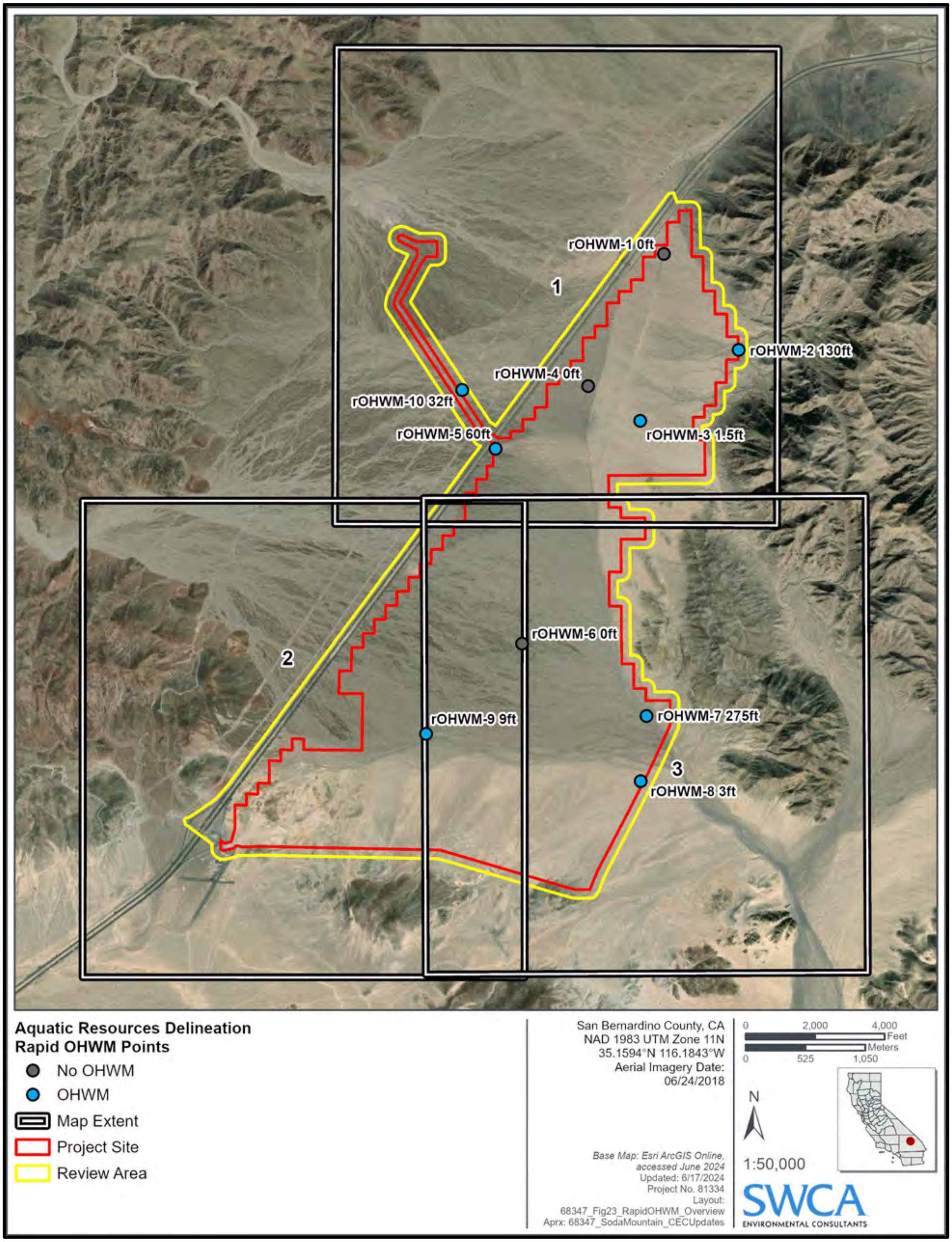


**Figure 23. Rapid OHWM points.**

## 3.2 Aquatic Resources Inventory

Aquatic resources mapped within the review area are all non-wetland waters. Potential wetlands were not present.

Features modeled captured the extent of both single channels and compound channels. Many channels that are relatively close to one another have upland desert pavement or other upland areas adjacent and in between channels. As a result, many channels near one another are separated by uplands and are therefore not included in the immediate channel system. The review area was divided into SubAreas (A, B, C, D, E, and F) to describe and categorize the variety of channels present (**Figure 24; Figure A-24 in Appendix A**).

The most prominent non-wetland channels and channel systems, which are the most prominent on the landscape or appear to convey the most flow, based on professional judgement and field observations, were highlighted by hand in GIS on a figure (**Figure 25; Table 8; Figure A-25 in Appendix A**). These highlighted prominent non-wetland channels are shown alongside the remaining non-prominent non-wetland channels.

The full delineation (**Figure 26**) and zoomed-in delineation sheets for the aquatics resources inventory (**Figure E-26 in Appendix E**) are provided.

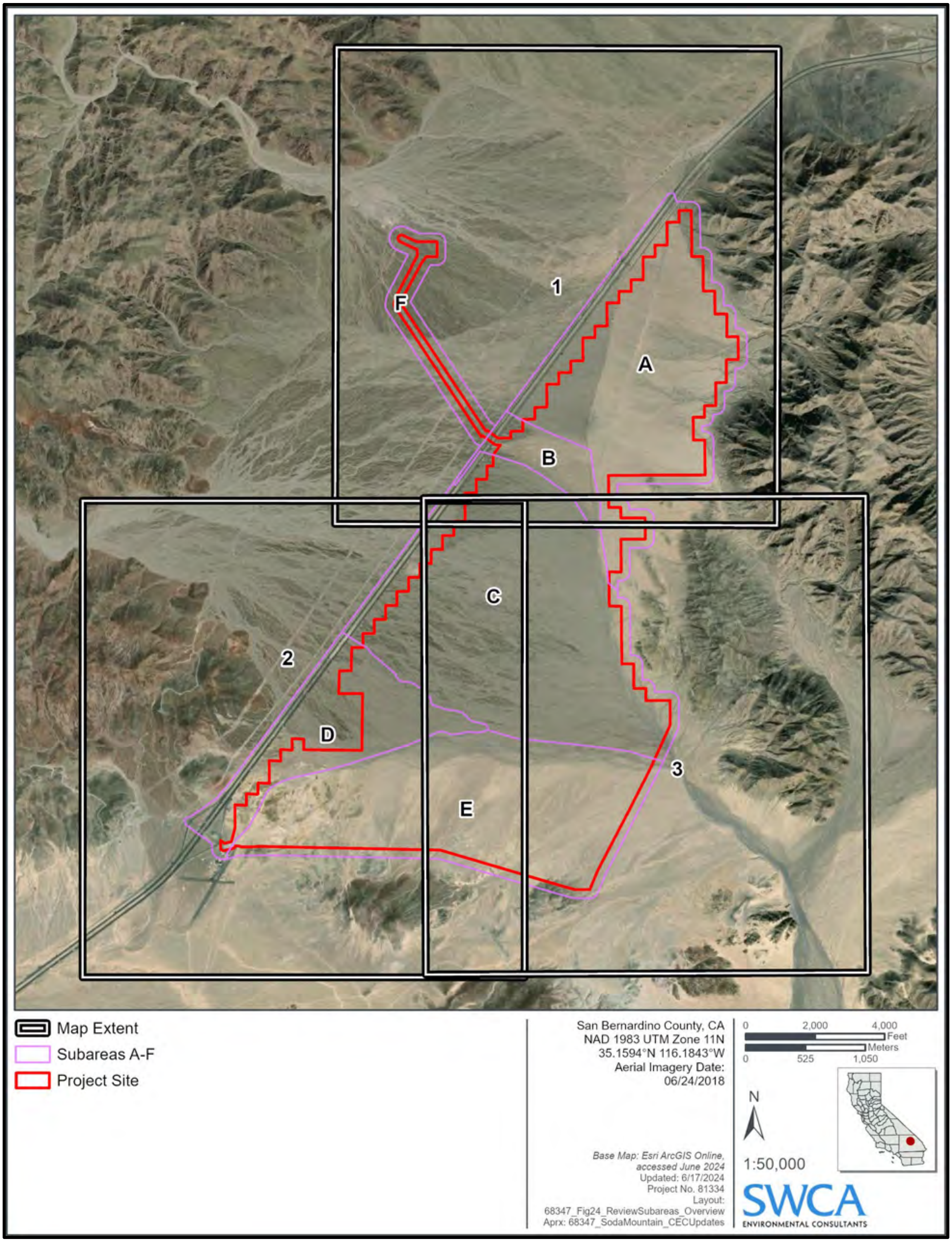


**Figure 24. SubAreas within the review area.**

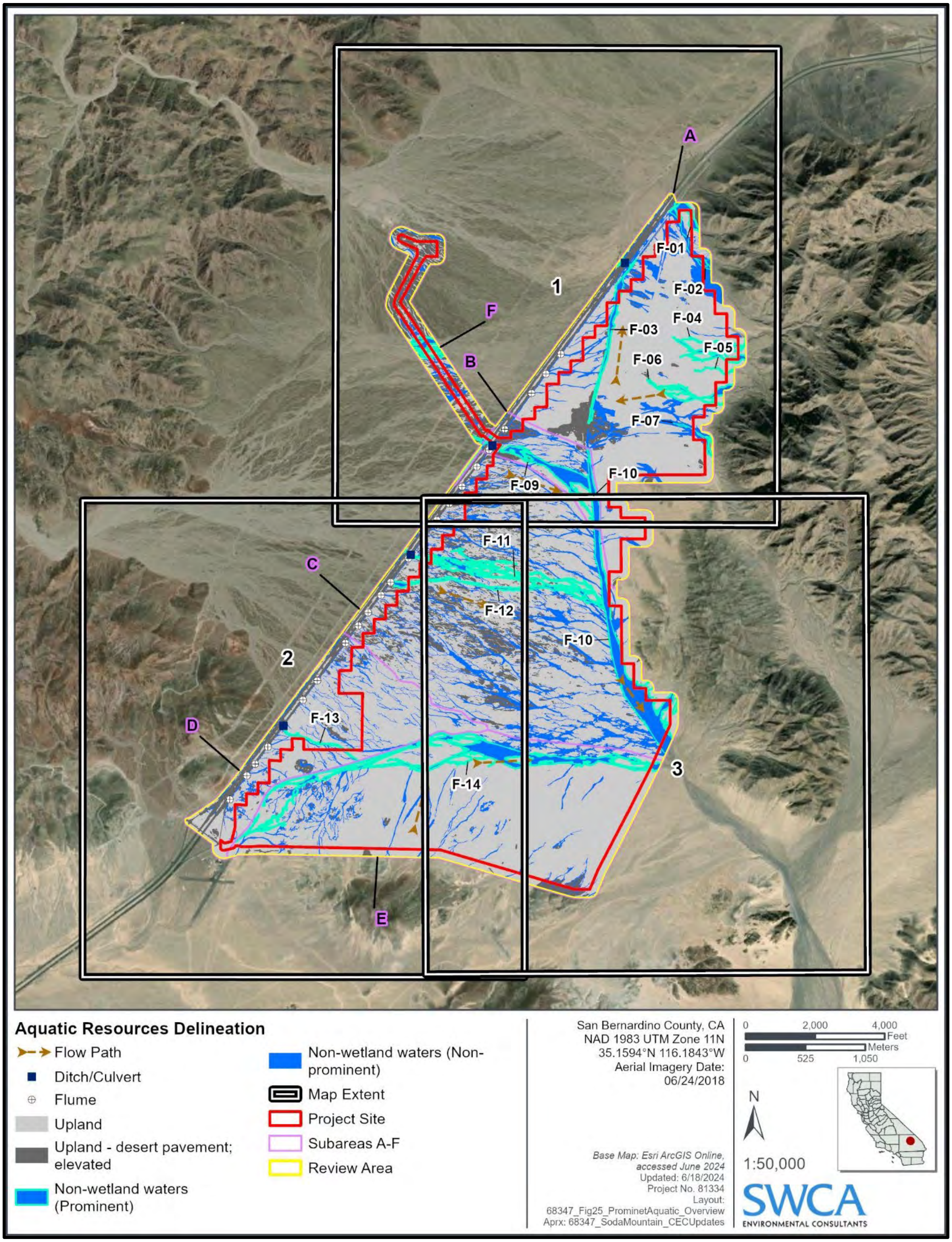


**Figure 25. Prominent and non-prominent channels.**

### Table 8. Aquatic Resources within the Review Area

| Aquatic Resource Name | SubArea | Cowardin* Classification | Channel Width (feet) | Approximate Location (latitude/longitude) | Aquatic Resource size (acres) | Length (linear feet) |
|---|---|---|---|---|---|---|
| **PROMINENT CHANNELS** | | | | | | |
| F-01 Non-wetland | A | Riverine | 145.4 | 35.18324, -116.163929 | 4.60 | 1,005 |
| F-02 Non-wetland | A | Riverine | 57.2 | 35.18026, -116.163726 | 3.96 | 2,490 |
| F-03 Non-wetland | A | Riverine | 88.4 | 35.17061, -116.172104 | 10.53 | 5,187 |
| F-04 Non-wetland | A | Riverine | 37.7 | 35.17309, -116.165242 | 7.66 | 7,695 |
| F-05 Non-wetland | A | Riverine | 20.4 | 35.17061, -116.161447 | 0.65 | 1,167 |
| F-06 Non-wetland | A | Riverine | 35.5 | 35.16870, -116.164256 | 6.97 | 5,808 |
| F-07 Non-wetland | A | Riverine | 56.1 | 35.16477, -116.162051 | 2.69 | 1,241 |
| F-08 Non-wetland | F | Riverine | 101.6 | 35.17299, -116.189667 | 6.32 | 1,710 |
| F-09 Non-wetland | B | Riverine | 109.1 | 35.16350, -116.179489 | 20.86 | 8,043 |
| F-10 Part 2 Non-wetland | C | Riverine | 275.4 | 35.14479, -116.169260 | 50.68 | 7,608 |
| F-10 Part 1 Non-wetland | B | Riverine | 144.4 | 35.16139, -116.173073 | 7.70 | 2,324 |
| F-11 Non-wetland | C | Riverine | 57.5 | 35.15473, -116.185109 | 23.05 | 17,451 |
| F-12 Non-wetland | C | Riverine | 67.2 | 35.15404, -116.189206 | 6.04 | 3,917 |
| F-13 Non-wetland | D | Riverine | 43.3 | 35.14250, -116.202964 | 2.52 | 2,537 |
| F-14 Non-wetland | E | Riverine | 71.7 | 35.14076, -116.183009 | 56.74 | 33,968 |
| **Subtotal** | | | | | **210.97** | **102,151** |
| **NON-PROMINENT CHANNELS** | | | | | | |
| F-15 Group Non-wetland | A | Riverine | 6.0 | SubArea A | 102.28 | 1,997 |
| F-16 Group Non-wetland | B | Riverine | 6.2 | SubArea B | 14.35 | 698 |
| F-17 Group Non-wetland | C | Riverine | 6.2 | SubArea C | 189.36 | 1,148 |
| F-18 Group Non-wetland | D | Riverine | 6.2 | SubArea D | 49.01 | 1,226 |
| F-19 Group Non-wetland | E | Riverine | 6.2 | SubArea E | 64.44 | 1,206 |
| F-20 Group Non-wetland | F | Riverine | 6.1 | SubArea F | 12.98 | 1,081 |
| **Subtotal** | | | | | **432.43** | **7,356** |
| | | | | | | |
| **Grand Total** | | | | | **643.4** | **109,507** |

*Cowardin, 1979.

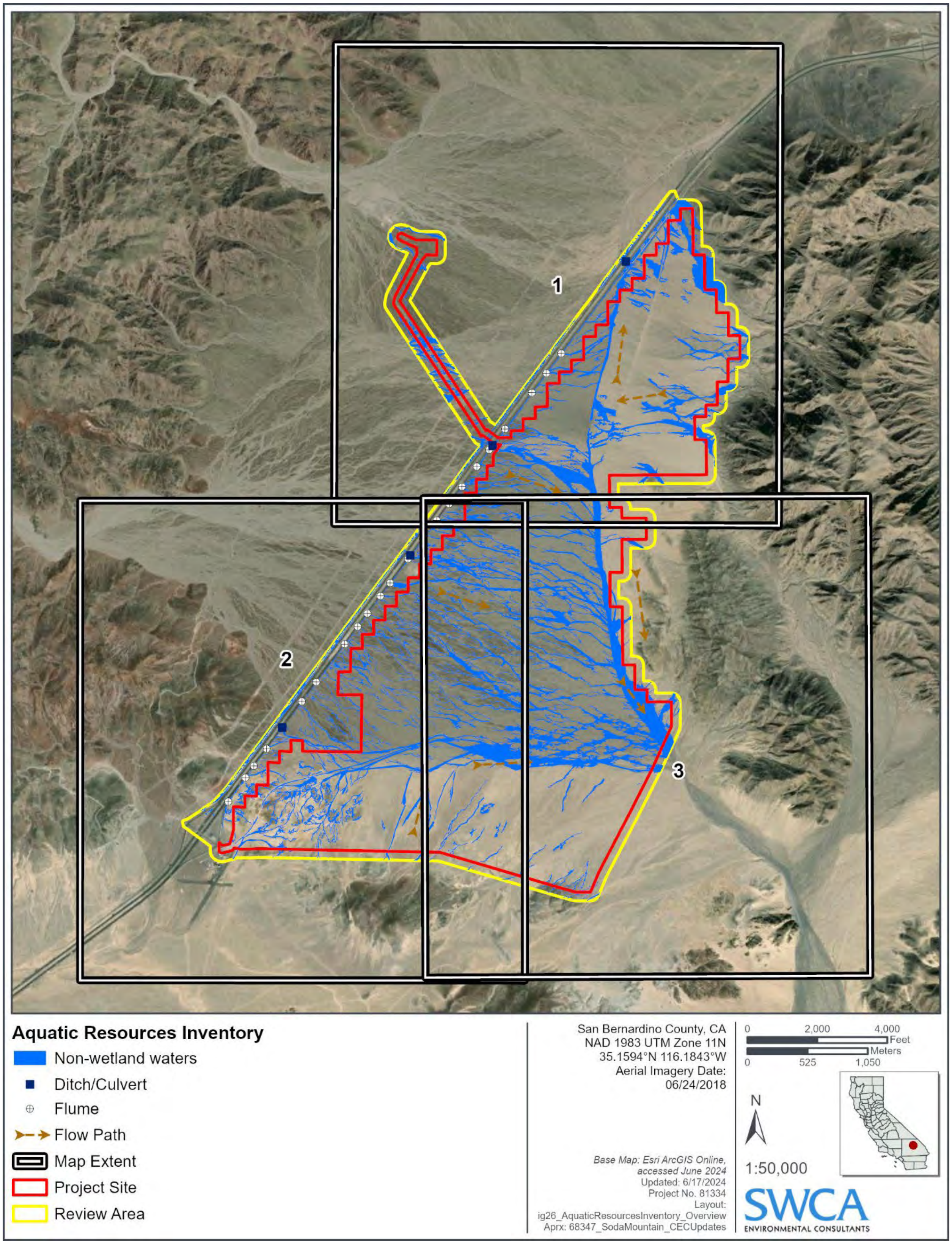


**Figure 26. Aquatic resources inventory map.**

**SubArea A** (non-wetland):

SubArea A is in the northern portion of the review area. In this section of the review area, overall flow direction is from south to north. SubArea A can be divided into two main areas: the east side and the west side.

The east side is a large flat area (average 0.7% decline) containing drainages from the adjacent eastern Soda Mountains. Several primary channels exit the mountain ranges and empty into the review area, ultimately spreading out laterally across the flattened topography. The first section of these channels closer to the base of the mountains may be described as single channels with strong OHWM indicators including a break in slope, change in sedimentation, and a change in vegetation pattern. As the channels continue, the flow spreads out laterally, creating multiple smaller channels. About halfway before reaching Arrowhead Road (see **Figure 14**) in the central portion of SubArea A, channels become less defined and OHWM indicators become weak or absent. Before reaching Arrowhead Road, OHWM indicators become inconclusive. On aerial imagery, the east side is overall lighter in color than most of the remaining review area and has upland areas that support an evenly spaced density of sparse upland vegetation.

Turtle Ditch (17.5 feet wide) concentrates upstream flow into SubArea A and into F-03. The west side of SubArea A is flat (average 2% decline) and drains from the highway toward the center, where it converges with Prominent Feature F-10 and flows north. Along the south side of Interstate 15 is a depressional ditch that also conveys flow from south to north, where it ultimately dissipates or exits the review area and flows north toward Soda Dry Lake.

One culvert, Turtle Ditch, and three highway water chutes convey into the review area of SubArea A.

SubArea A contains Prominent Features F-01, F-02, F-03, F-04, F-05, F-06, and F-07, totaling approximately 37.06 acres.

All remaining Non-prominent features (F-15 Group) in SubArea A total approximately 102.28 acres. These features exhibit weaker indicators of sediment sorting and a vegetation pattern where vegetation is generally sparse within channels and more prevalent outside channels.

**SubArea B** (non-wetland):

SubArea B is in the northern portion of the review area and is derived from the largest on-site culvert, Opah Ditch (77 feet wide). In SubArea B, the overall flow direction is from west to southeast. Opah Ditch concentrates upstream flow from outside the review area through the culvert, into the review area, across the review area, and east toward the main channel, F-10 Part 1, which then conveys flow south to Soda Dry Lake.

SubArea B is one of the lightest-colored sections of the review area on aerial imagery; lightness of color is often correlated with hydrologically active areas. Flows first exit Opah Ditch as a single channel (F-09) then spread out laterally into multiple channels, and then generally combine again prior to converging with the main channel (F-10 Part 1).

In the western portion of SubArea B just south of Interstate 15 is an upland area that is highly elevated and darkened in color where desert pavement is present. Between areas of this desert pavement are single narrow channels, which are included in the delineated features.

One culvert, Opah Ditch, and two highway water chutes convey flow into the review area of SubArea B.

SubArea B contains Prominent Feature F-09 totaling approximately 28.56 acres.

All remaining Non-prominent features (F-16 Group) in SubArea B total approximately 14.35 acres. These features exhibit indicators of hydrologic erosion, sediment sorting, and vegetation (creosote bush) channel alignment and robustness.

**SubArea C** (non-wetland):

SubArea C is in the south-central portion of the review area, where the majority of the upslope section is hydrologically restricted by the elevated Interstate 15 highway. One of the four large culverts, Marl Ditch (17.5 feet wide), conveys upstream flow entering the middle of SubArea C at the highway. As a result, two interrelated prominent features form (F-11 and F-12) conveying flows downslope toward Arrowhead Road. This portion of the site on aerial imagery shows a lightness in color, which can reflect more hydrologically active areas. Channels delineated within this area are shallow, compound, and spread out laterally as they dissipate and lose definition.

In the northwest corner of SubArea C is a large upland area with desert pavement and other uplands, depicted as dark in color on an aerial image and in the field. Similarly, in the southwestern portion of SubArea C are dozens of dark upland desert pavement areas and other upland areas that are elevated amongst delineated channels.

One culvert, Marl Ditch, and ten highway water chutes convey flow into the review area of SubArea C.

SubArea C contains Prominent Features F-10 Part 2, F-11 and F-12, totaling approximately 79.77 acres.

All remaining Non-prominent features (F-17 Group) in SubArea C total approximately 189.36 acres. These features exhibit indicators of sediment sorting and vegetation (creosote bush) channel alignment.

**SubArea D** (non-wetland):

SubArea D is in the southwestern portion of the review area, where the majority of the upslope section is hydrologically restricted by the elevated Interstate 15 highway. One of the four large culverts, Unnamed Ditch (8 feet wide), conveys upstream flow under the highway into the review area. As a result, a prominent feature forms (F-13), conveying flows downslope toward Rasor Road.

In the central portion of SubArea D is a large upland area with desert pavement and other uplands, depicted as dark in color on an aerial image and in the field. The southwesternmost portion of SubArea D toward the site's Rasor Road entrance is highly disturbed by vehicle use, sediment stockpiling, dumping of trash, and manipulated topography.

One culvert, Unnamed Ditch, and five highway water chutes convey into the review area of SubArea D.

SubArea D contains Prominent Feature F-13, totaling approximately 2.52 acres.

All remaining Non-prominent features (F-18 Group) in SubArea D total approximately 49.01 acres. These features generally exhibit fluvial erosion, indicators of sediment sorting, and absence of vegetation within channels.

**SubArea E** (non-wetland):

SubArea E is in the southern portion of the review area, where hydrology from its shallow sloping hillside appears largely unmanipulated. On the far side of the SubArea D hillside is another topographic valley, so hydrology within SubArea D is derived from its immediate mountain top only. At the base of the hillside is Rasor Road, a highly traveled dirt road that traverses the southern extent of the site and provides access to the off-site BLM OHV area. Rasor Road is a major hydrologic conveyance and is also a Prominent Feature F-14.

SubArea E contains Prominent Feature F-14, totaling approximately 56.74 acres.

All remaining Non-prominent features (F-19 Group) in SubArea E total approximately 64.44 acres. These features are generally very shallow and narrow, exhibiting indicators of sediment sorting and absence of vegetation within channels.

**SubArea F** (non-wetland):

SubArea F is on the north side of Interstate 15 within the review area and is the location of the proposed generation tie line. Hydrology in this region is overall unobstructed but flow direction appears to be substantially affected by several established dirt roads. One dirt road runs up the center of the generation tie review area. Flows exit the Soda Mountains from tributaries historically present, which are the source of the alluvial fan channel forms, sediment influx, and hydrology for the entire vicinity and all of the review area.

A large portion of SubArea F comprises upland desert pavement in its southern section and on the hill in its northern section. Once the hill begins, it rises at an approximate 11% incline across upland desert pavement very dark in color on an aerial image and in the field. Amongst the desert pavement are small narrow drainages that are highly confined.

SubArea F contains Prominent Feature F-08, totaling approximately 6.32 acres.

All remaining Non-prominent features (F-20 Group) in SubArea F total approximately 12.98 acres. These features with strong indicators of break in slope, erosion, sediment sorting, and vegetation channel alignment.

## 3.3 Potentially Jurisdictional Aquatic Resources

Potentially jurisdictional aquatic resources include prominent and non-prominent drainages. The review area contains a total of approximately 643.4 acres potential non-wetland RWQCB waters of the State and CDFW Jurisdiction/1600 (**Table 9**).

Under several prior waters of the United States federal regulations, including the Rapanos Guidance regulatory regime (2006–2015; 2021–2023 in California), Navigable Waters Protection Rule (2020–2021), and the Revised Definition of Waters of the United States rule (January 2023), the aquatic features in the project site met the criteria for being isolated (through application of the 2001 Solid Waste Agency of Northern Cook County case under Rapanos Guidance) and therefore were not federally jurisdictional. Under the WOTUS *Conforming Rul*e, delineated waters would remain non-jurisdictional because they lack a continuous surface connection to a TNW. Because features on-site are not jurisdictional by USACE, there are 0 acres WOUS (**Table 9**).

**Table 9. Potentially Jurisdictional Aquatic Resources and Impacts**

| Aquatic resources group | Non-wetland WOUS (acres / linear feet)* | Non-wetland waters of the State / CDFW Jurisdiction (acres / linear feet) | Potential impacts** to waters of the State / CDFW Jurisdiction (acres) |
|---|---|---|---|
| Prominent non-wetland drainages | 0 | 210.97 (102,151) | 117.96 |
| Non-prominent non-wetland drainages | 0 | 432.43 (7,356) | 255.54 |
| **Total** | **0** | **643.40 (109,507)** | **373.5** |

* USACE previously determined in an AJD that features on-site are non-jurisdictional.
** Impacts include both project components and the Limits of Disturbance.

# 4 SUMMARY AND RECOMMENDATIONS

## 4.1 Summary

Potentially regulated prominent and non-prominent aquatic resources (F-01 – F-20) within the 3,418-acre review area total approximately 643.40 acres non-wetland RWQCB waters of the State and CDFW Jurisdiction/1600.

No potential WOUS occur on site.

An impact assessment describing project-related estimated impacts to non-wetland waters of the State and CDFW Jurisdiction/1600 is provided in a separate memo.

## 4.2 Recommendations

SWCA recommends an AJD request be submitted to USACE to verify and document that aquatic features are non-jurisdictional.

Impacts to waters of the State would require a RWQCB Waste Discharge Requirement permit under the Porter-Cologne Water Quality Control Act. Direct impacts are limited to surface water features; based on proposed project activities no groundwater permits would be needed. Compensatory mitigation for project-related impacts is expected to be required.

Impacts to CDFW Jurisdiction/1600 under Section 1602 requires a notification be submitted to CDFW for an LSA Agreement. CDFW also requires a complete CEQA Environmental Impact Report (EIR) for an LSA Agreement; CDFW is the CEQA Lead Agency. Compensatory mitigation for project-related impacts is expected to be required.

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# APPENDIX A

## California Energy Commission 1:24,000–Scale Maps

(Figures 2, 4, 5, 6, 8, 12, 14, 15, 23, 24, and 25)

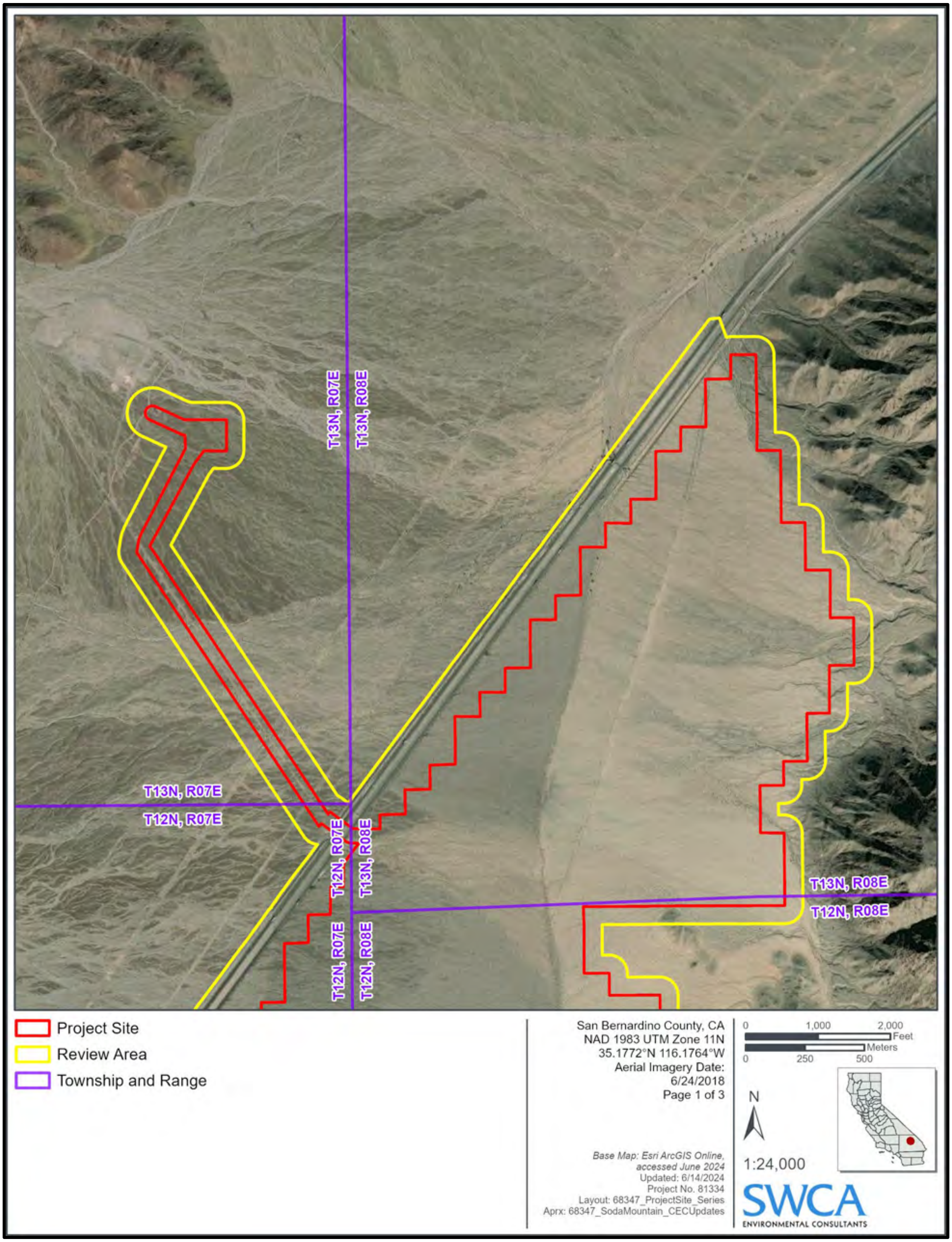


**Figure A-2. CEC subset maps. Project site and review area on 2018 aerial imagery (1 of 3) (Google Earth Pro).**

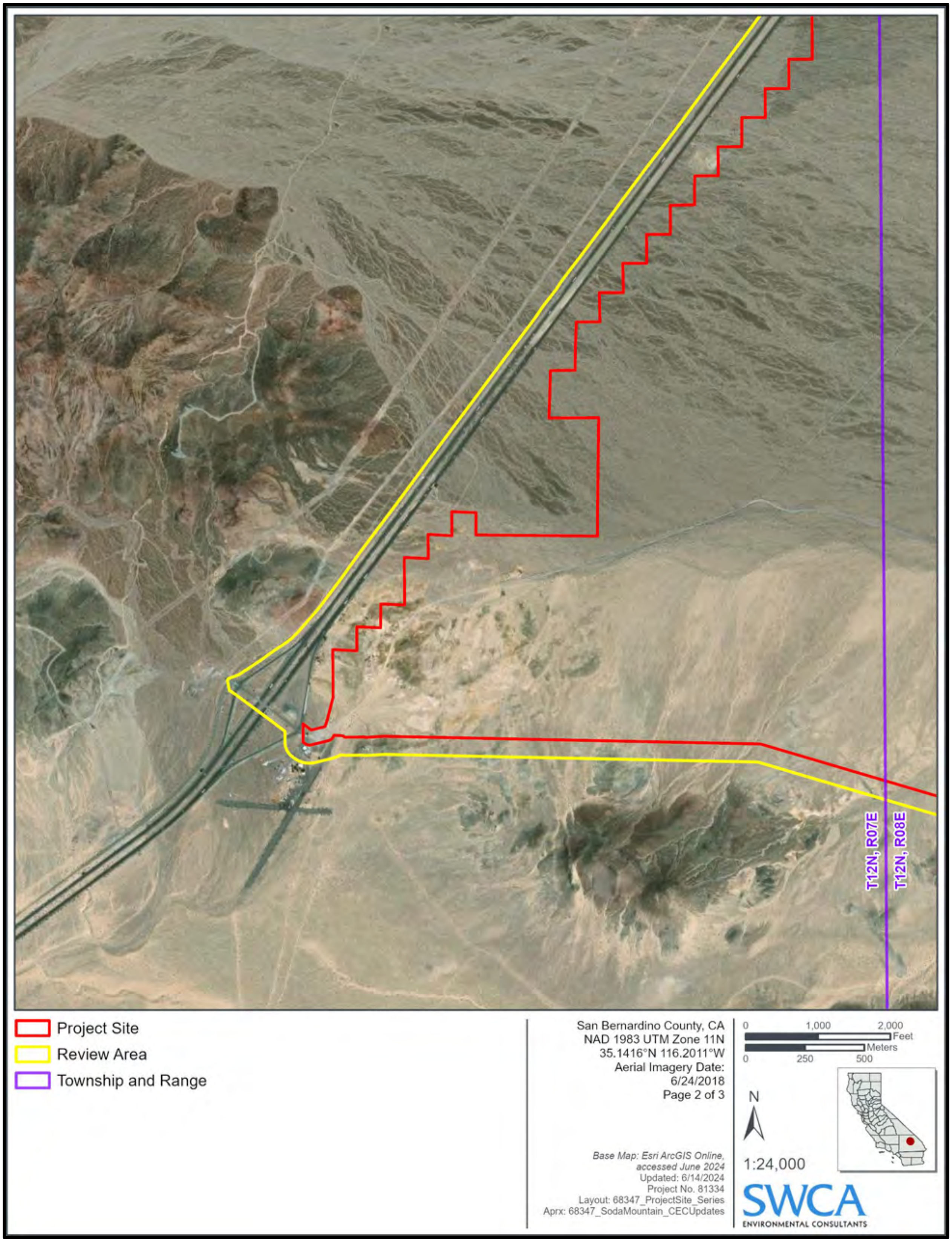


**Figure A-2. CEC subset maps. Project site and review area on 2018 aerial imagery (2 of 3) (Google Earth Pro).**

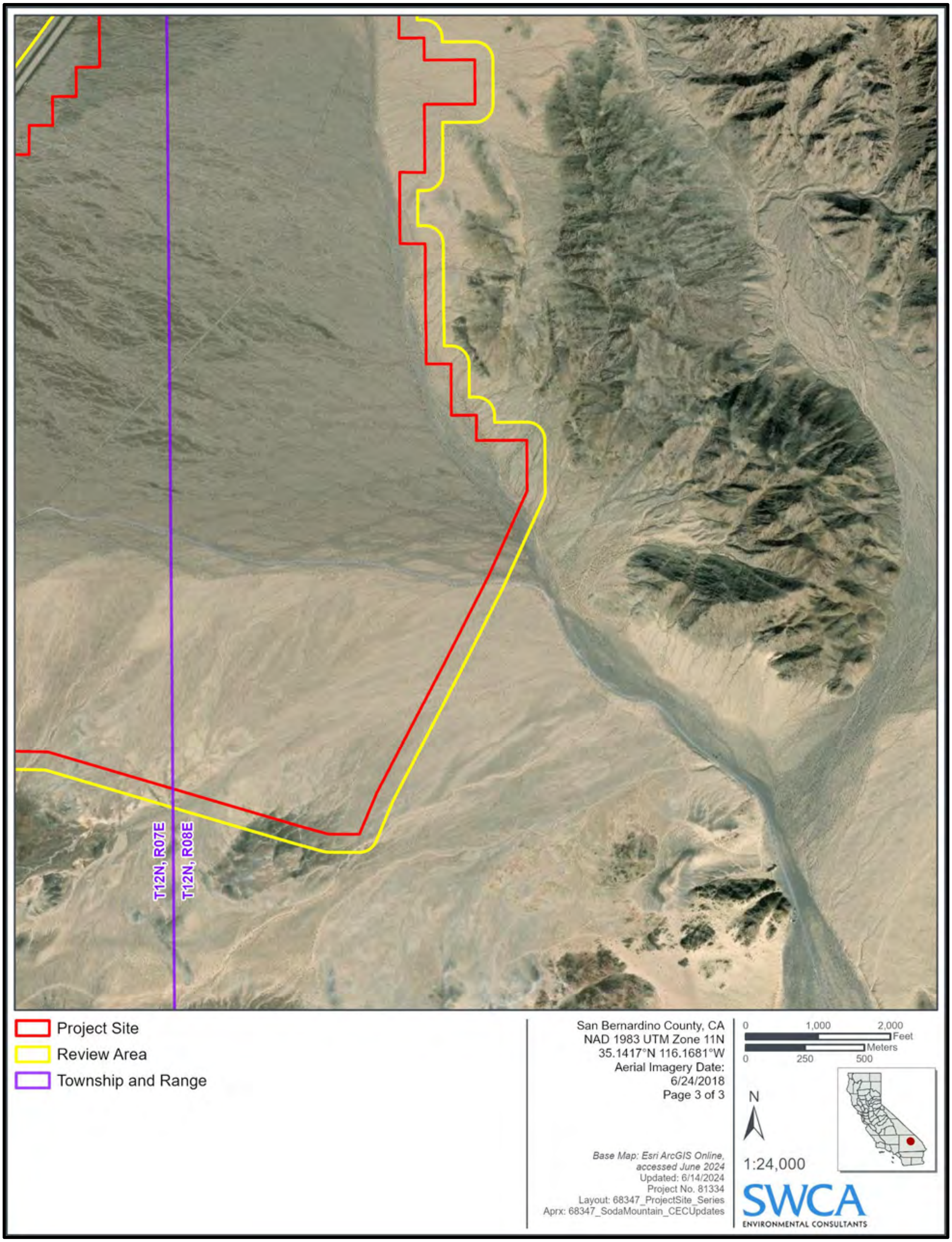


**Figure A-2. CEC subset maps. Project site and review area on 2018 aerial imagery (3 of 3) (Google Earth Pro).**

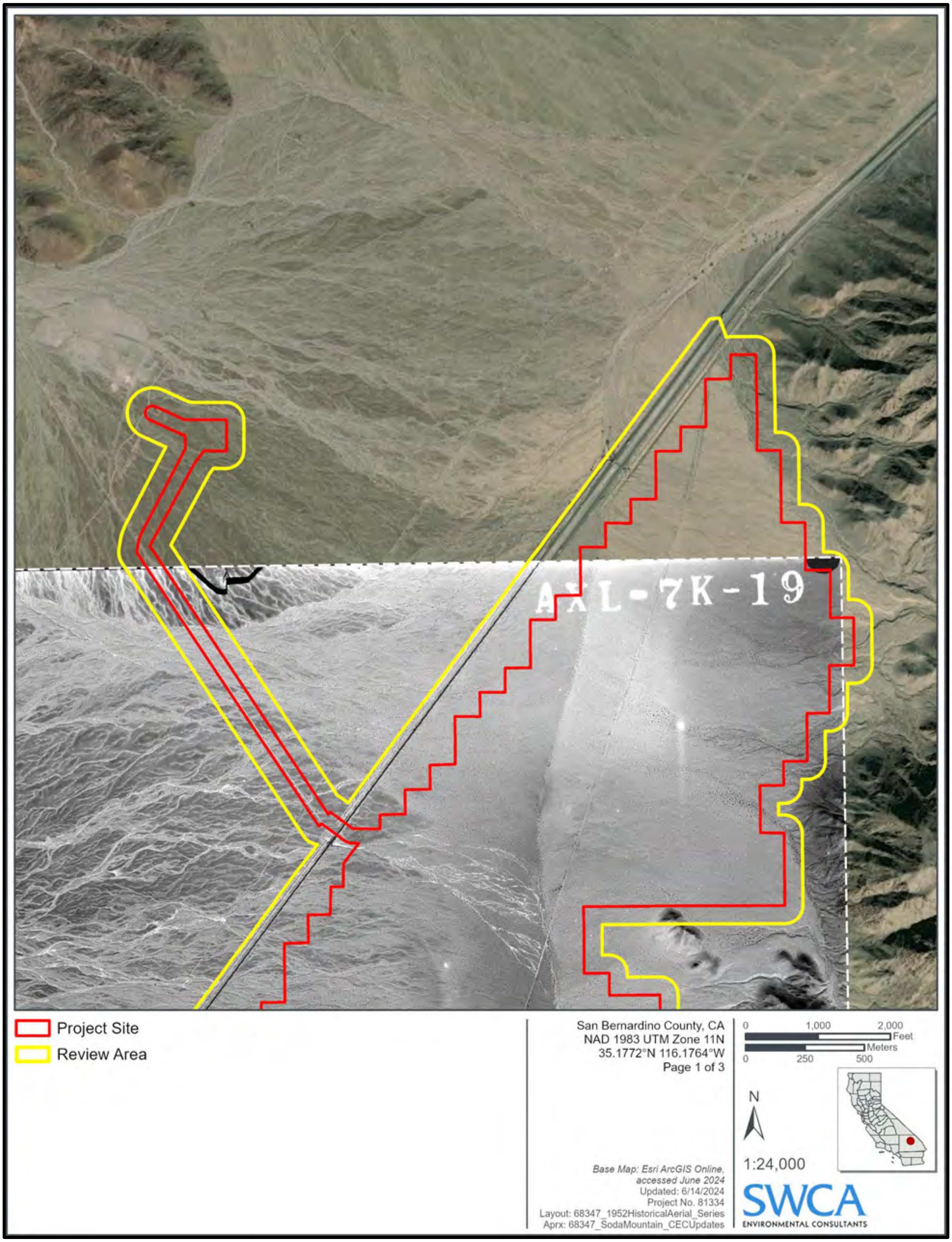


**Figure A-4. CEC subset maps. Project site on 1952 aerial imagery (1 of 3) (UCSB FrameFinder).**

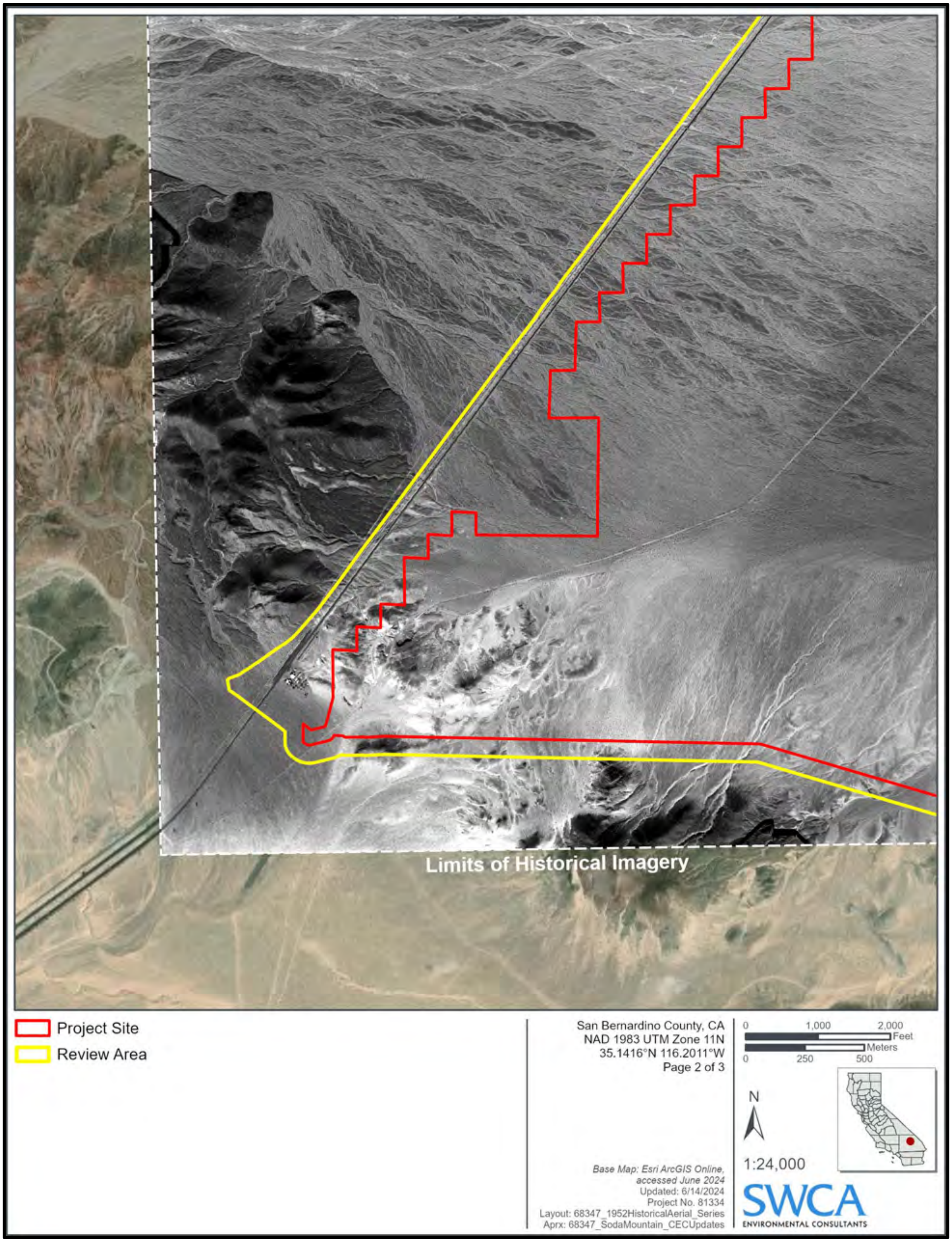


**Figure A-4. CEC subset maps. Project site on 1952 aerial imagery (2 of 3) (UCSB FrameFinder).**

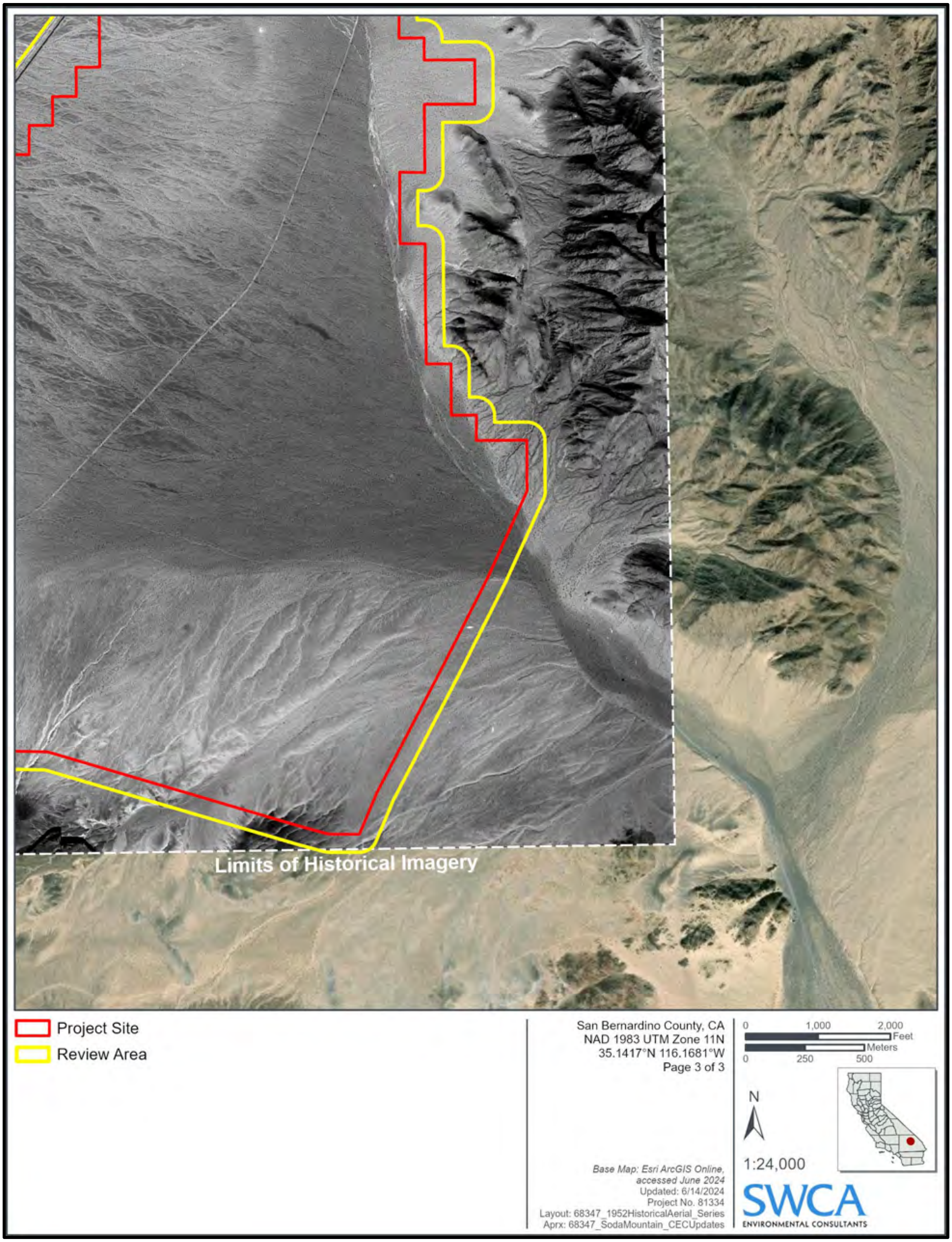


**Figure A-4. CEC subset maps. Project site on 1952 aerial imagery (3 of 3) (UCSB FrameFinder).**

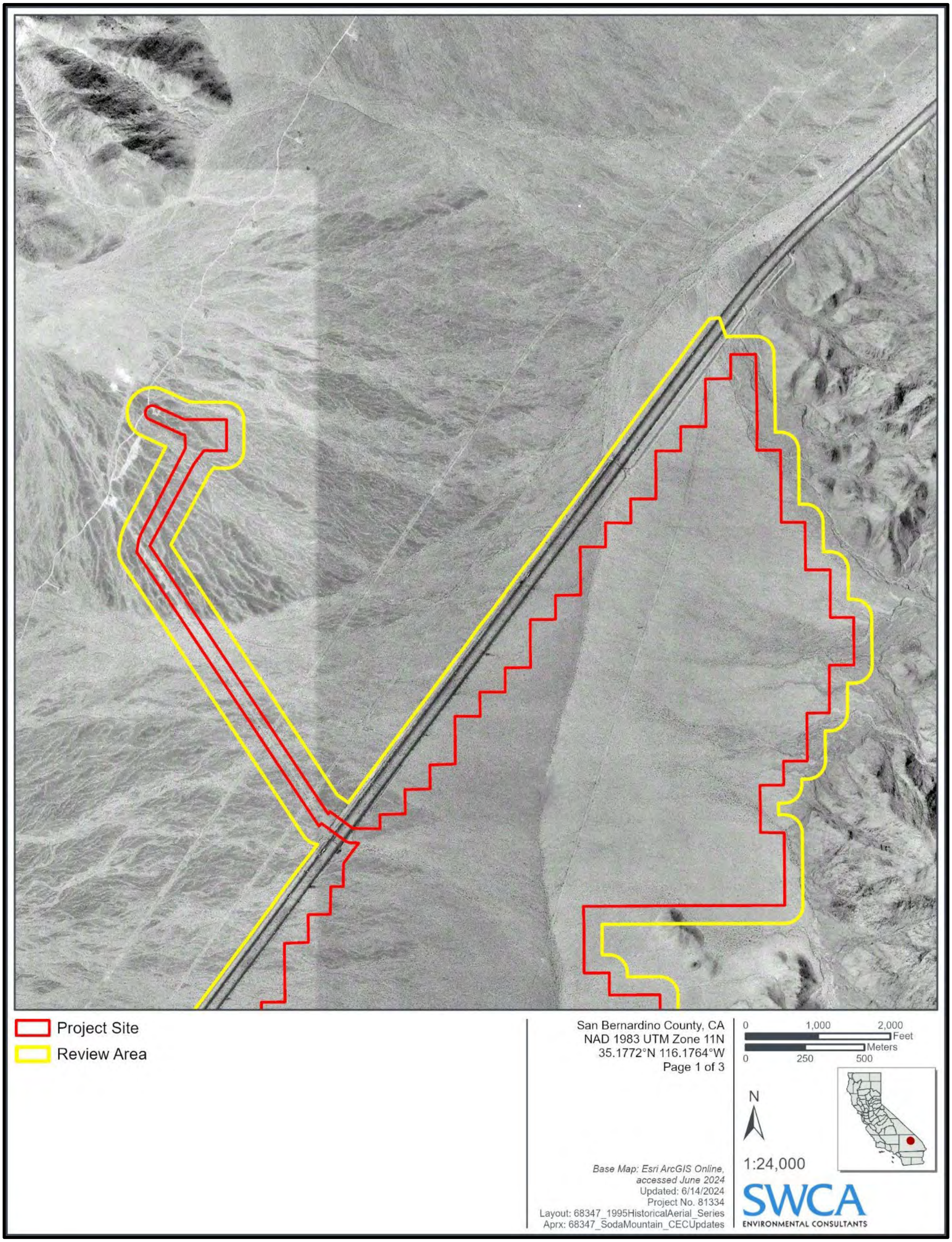


**Figure A-5. CEC subset maps. Project site on 1995 aerial imagery (1 of 3) (Google Earth Pro).**

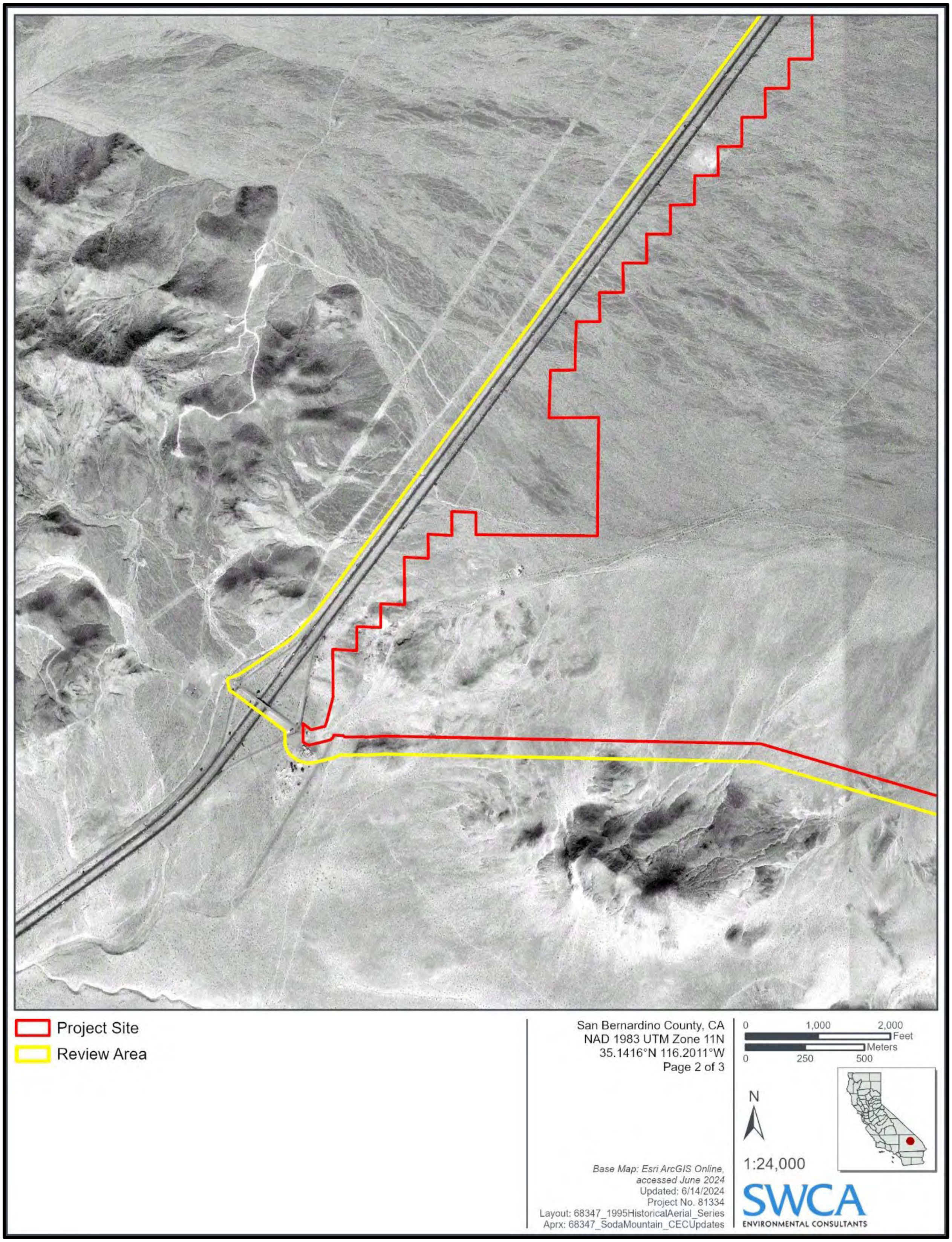


**Figure A-5. CEC subset maps. Project site on 1995 aerial imagery (2 of 3) (Google Earth Pro).**

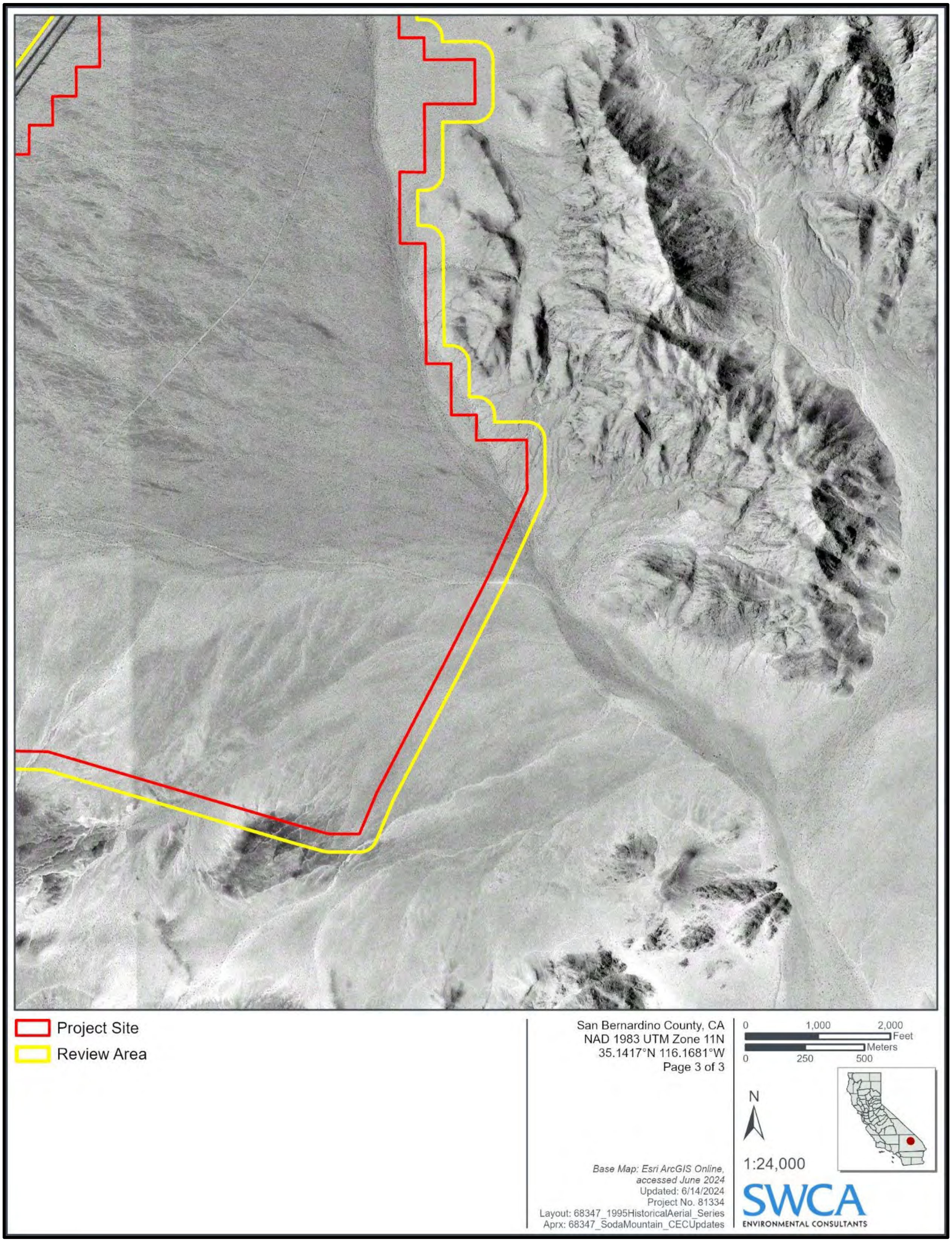


**Figure A-5. CEC subset maps. Project site on 1995 aerial imagery (3 of 3) (Google Earth Pro).**

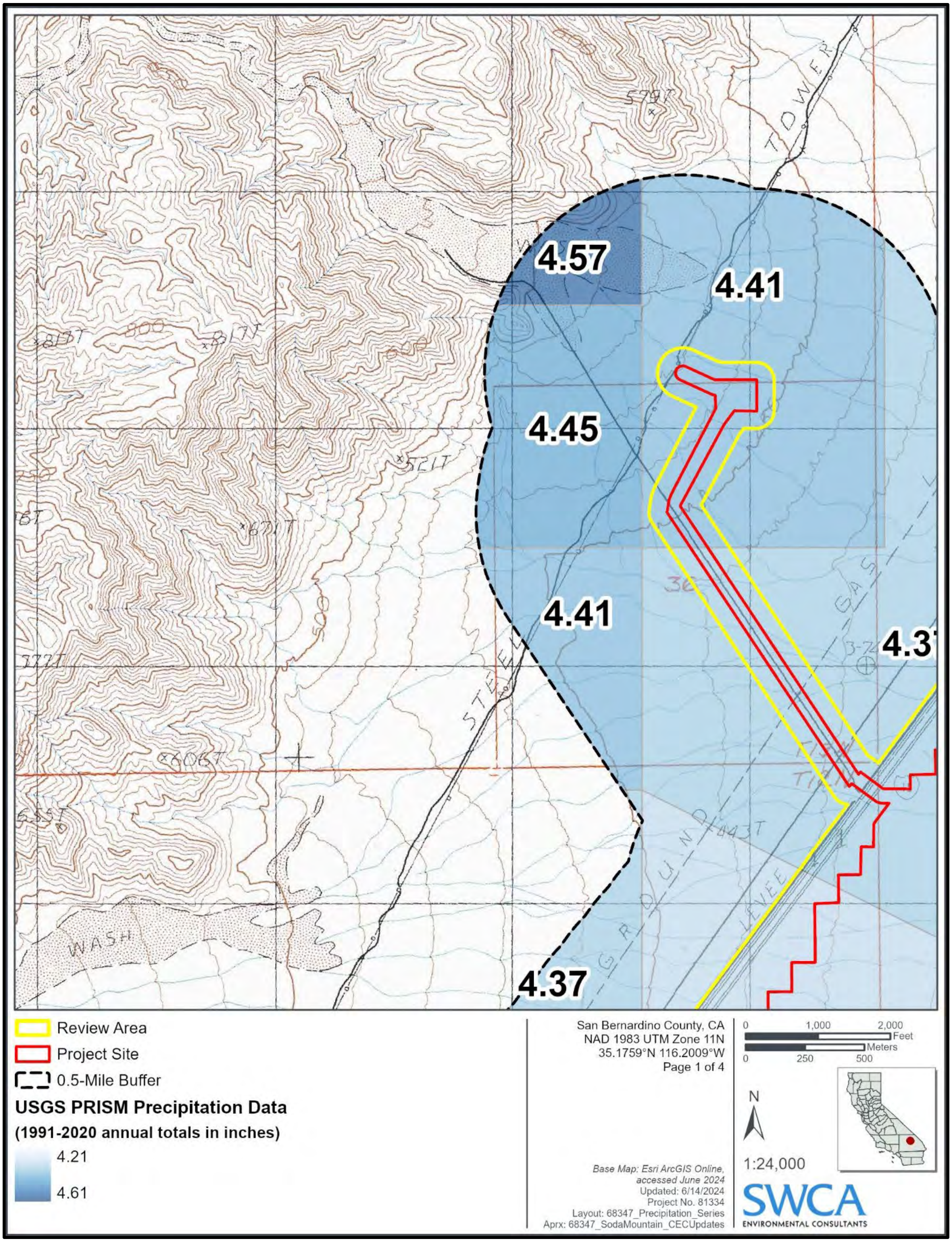


**Figure A-6. CEC subset maps. USGS PRISM data total annual precipitation on USGS quadrangle (1 of 4).**

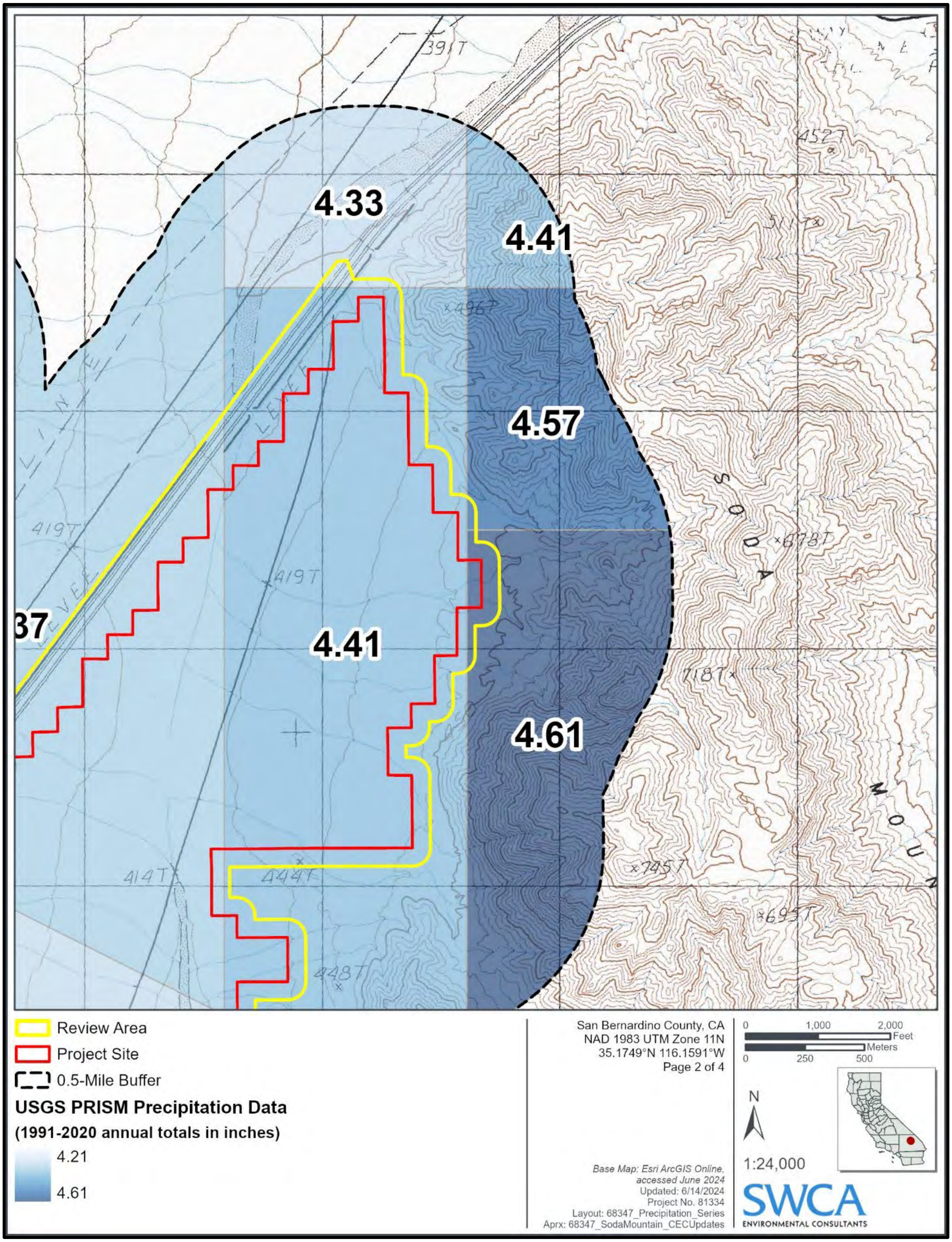


**Figure A-6. CEC subset maps. USGS PRISM data total annual precipitation on USGS quadrangle (2 of 4).**

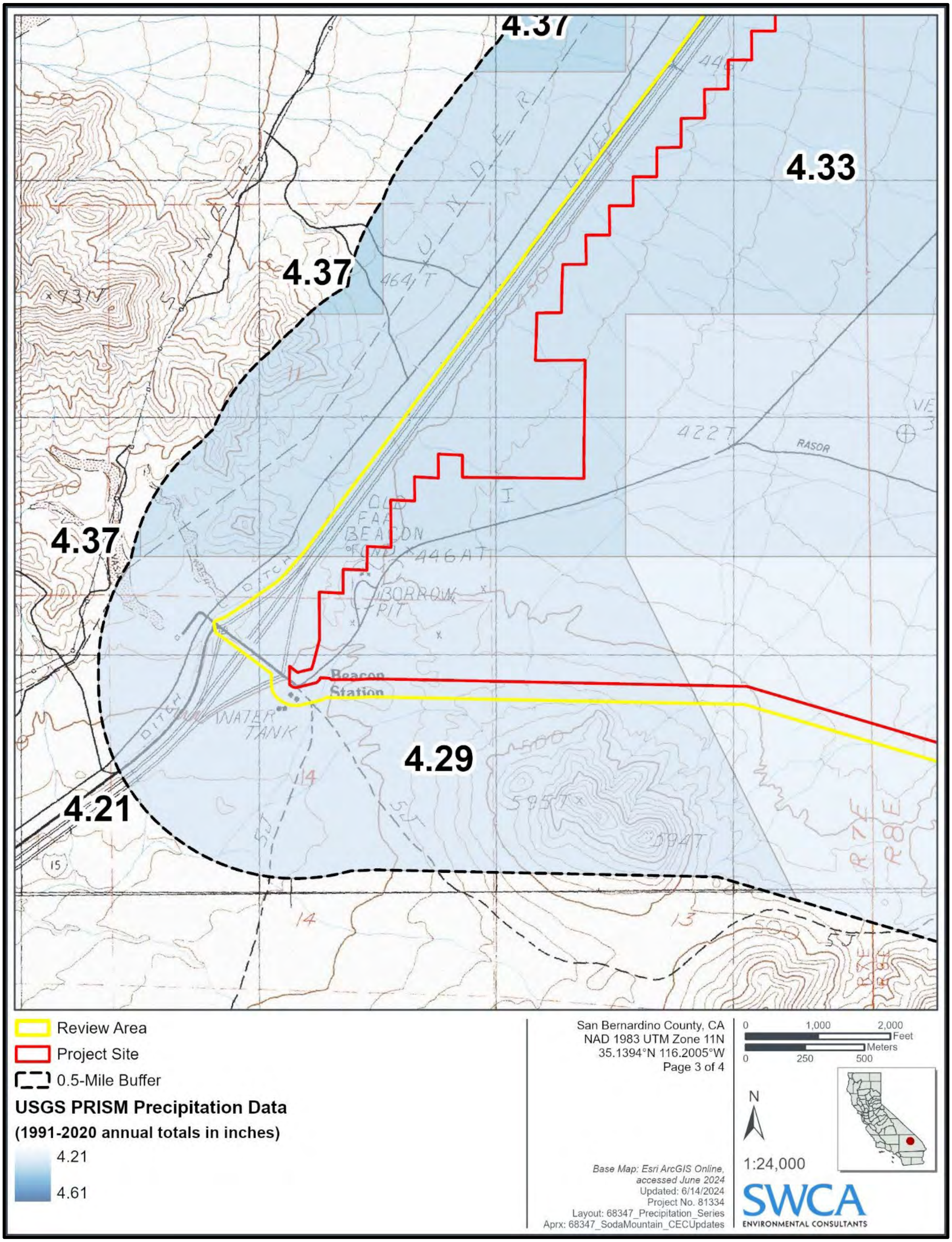


**Figure A-6. CEC subset maps. USGS PRISM data total annual precipitation on USGS quadrangle (3 of 4).**

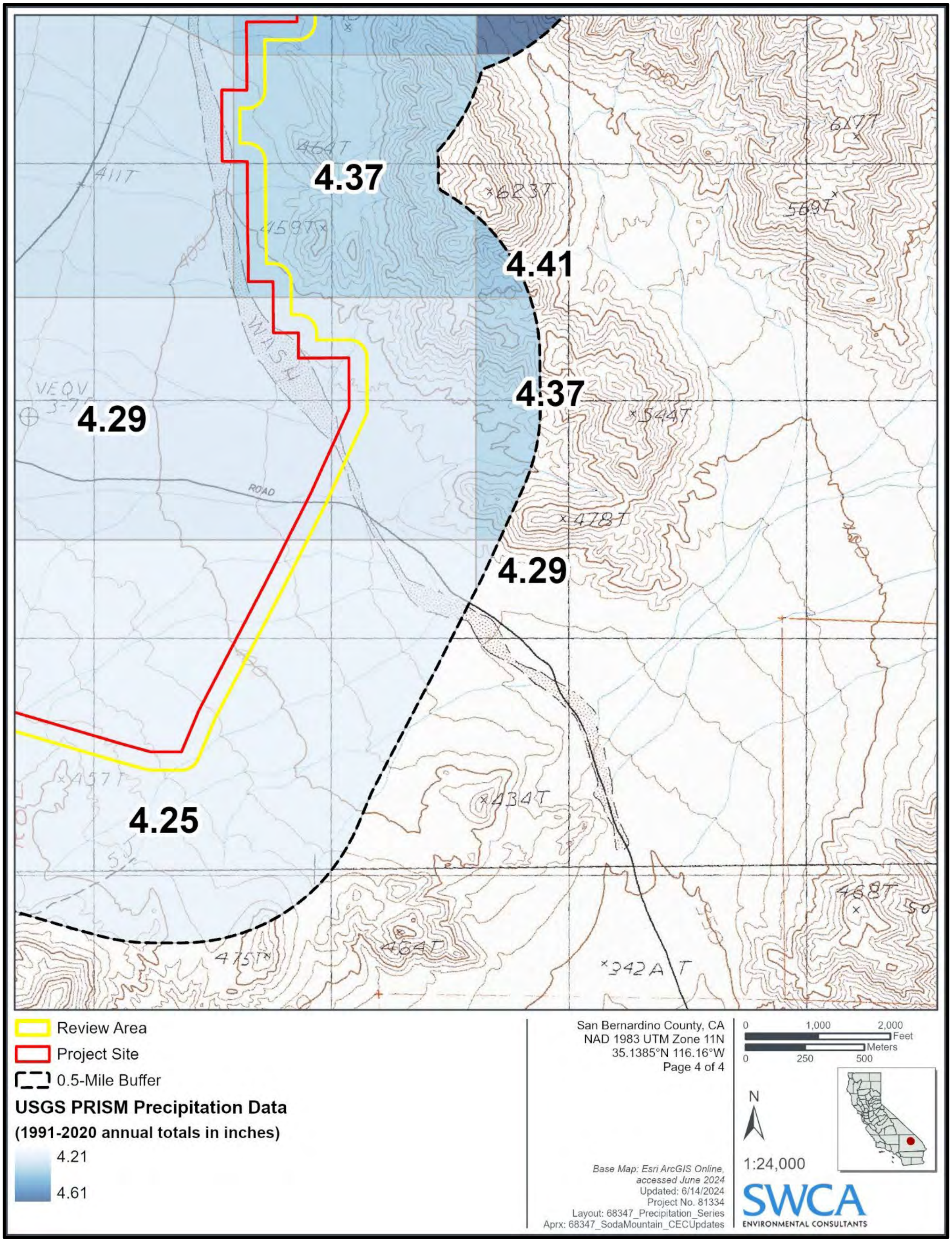


**Figure A-6. CEC subset maps. USGS PRISM data total annual precipitation on USGS quadrangle (4 of 4).**

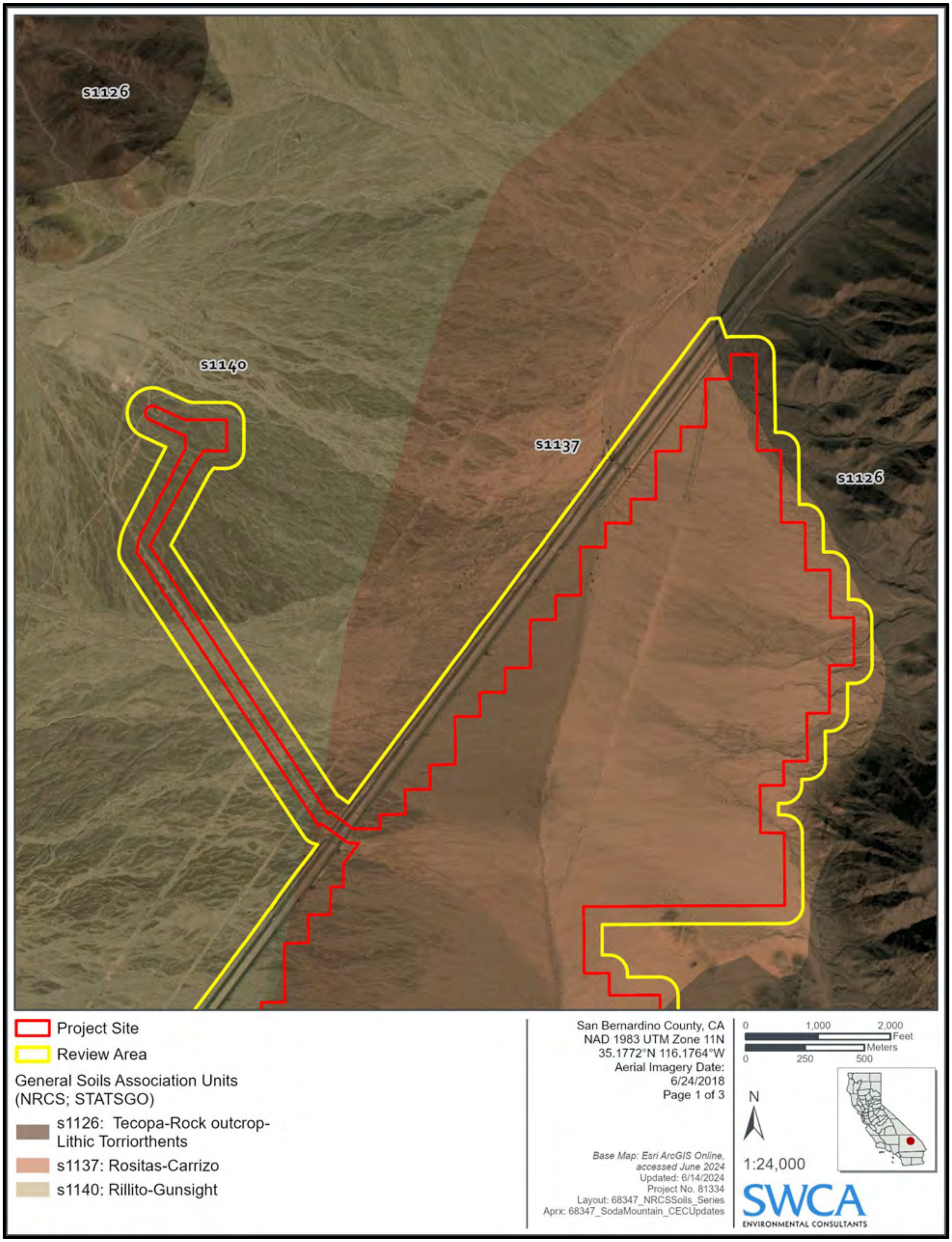


**Figure A-8. CEC subset maps. Soil series types on 2018 aerial imagery (1 of 3) (Google Earth Pro).**

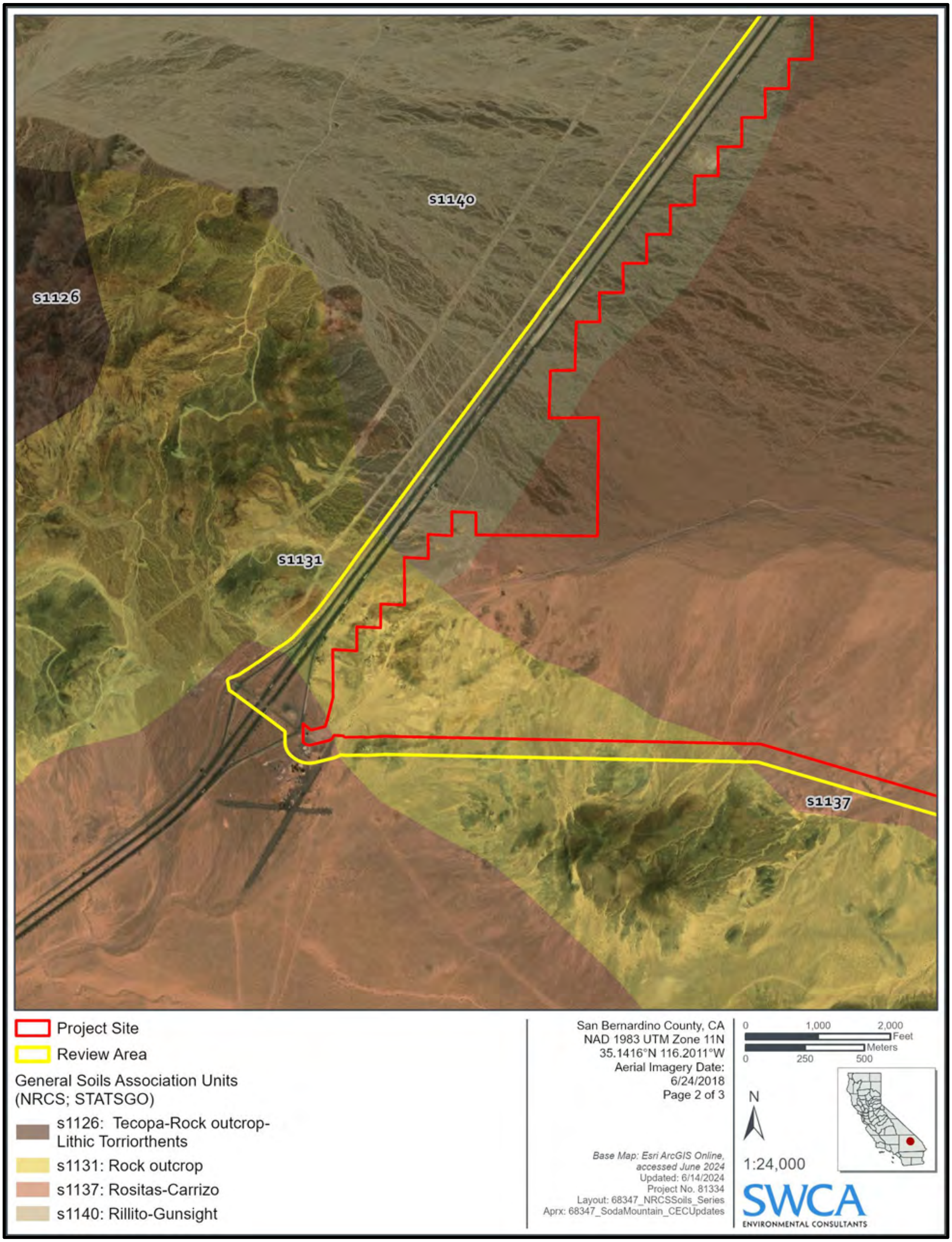


**Figure A-8. CEC subset maps. Soil series types on 2018 aerial imagery (2 of 3) (Google Earth Pro).**

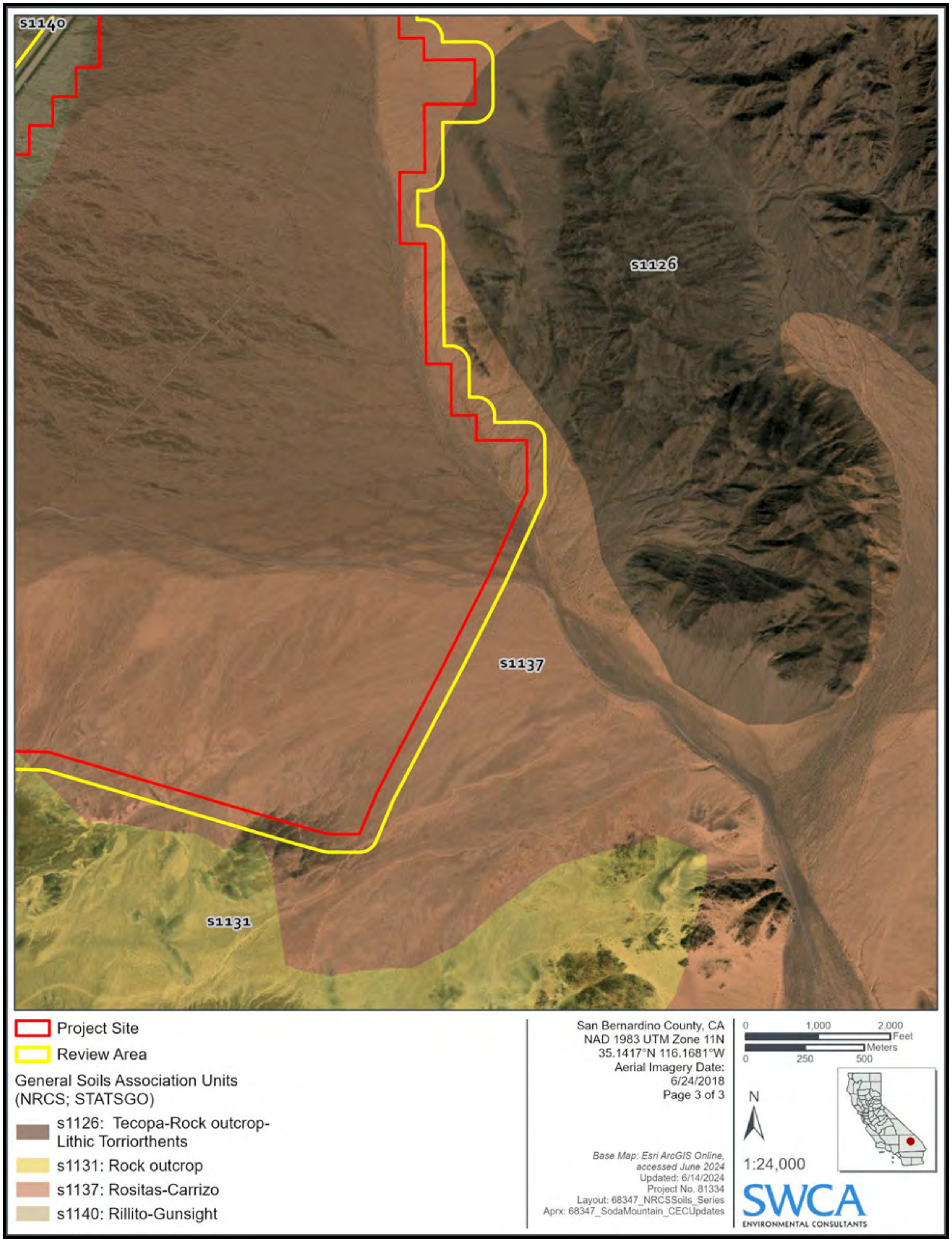


**Figure A-8. CEC subset maps. Soil series types on 2018 aerial imagery (3 of 3) (Google Earth Pro).**

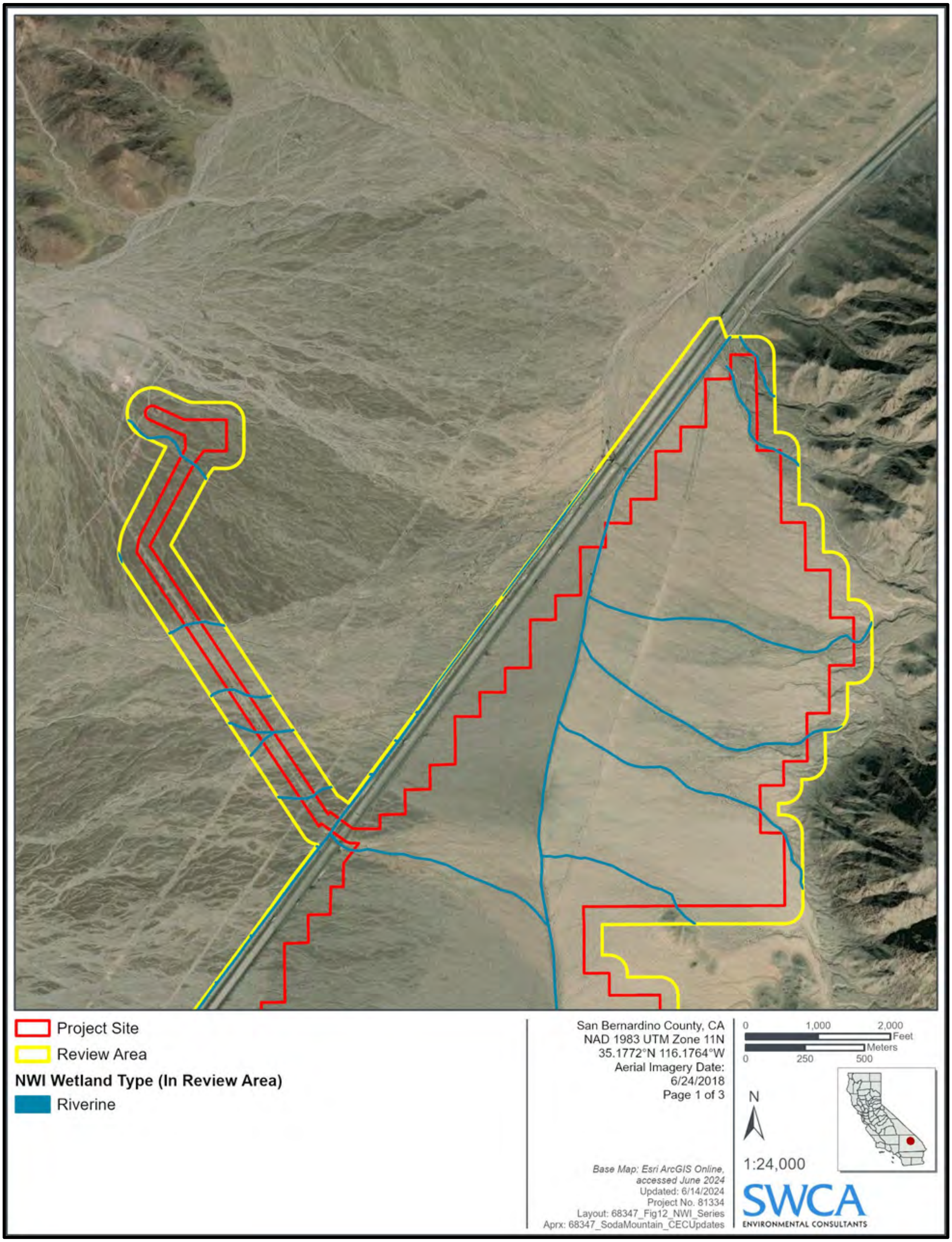


**Figure A-12. CEC subset maps. NWI aquatic features on 2018 aerial imagery (1 of 3) (Google Earth Pro).**

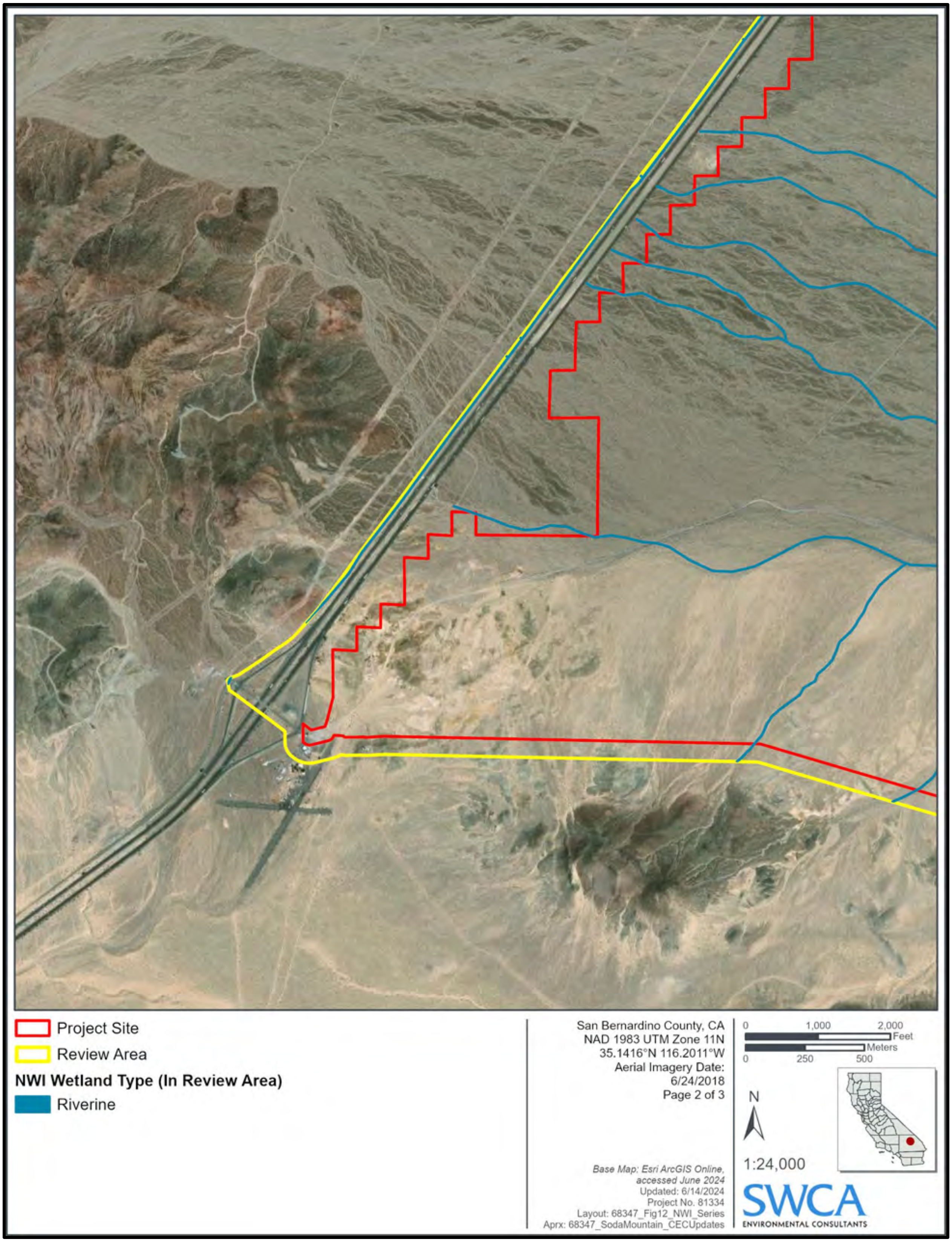


**Figure A-12. CEC subset maps. NWI aquatic features on 2018 aerial imagery (2 of 3) (Google Earth Pro).**

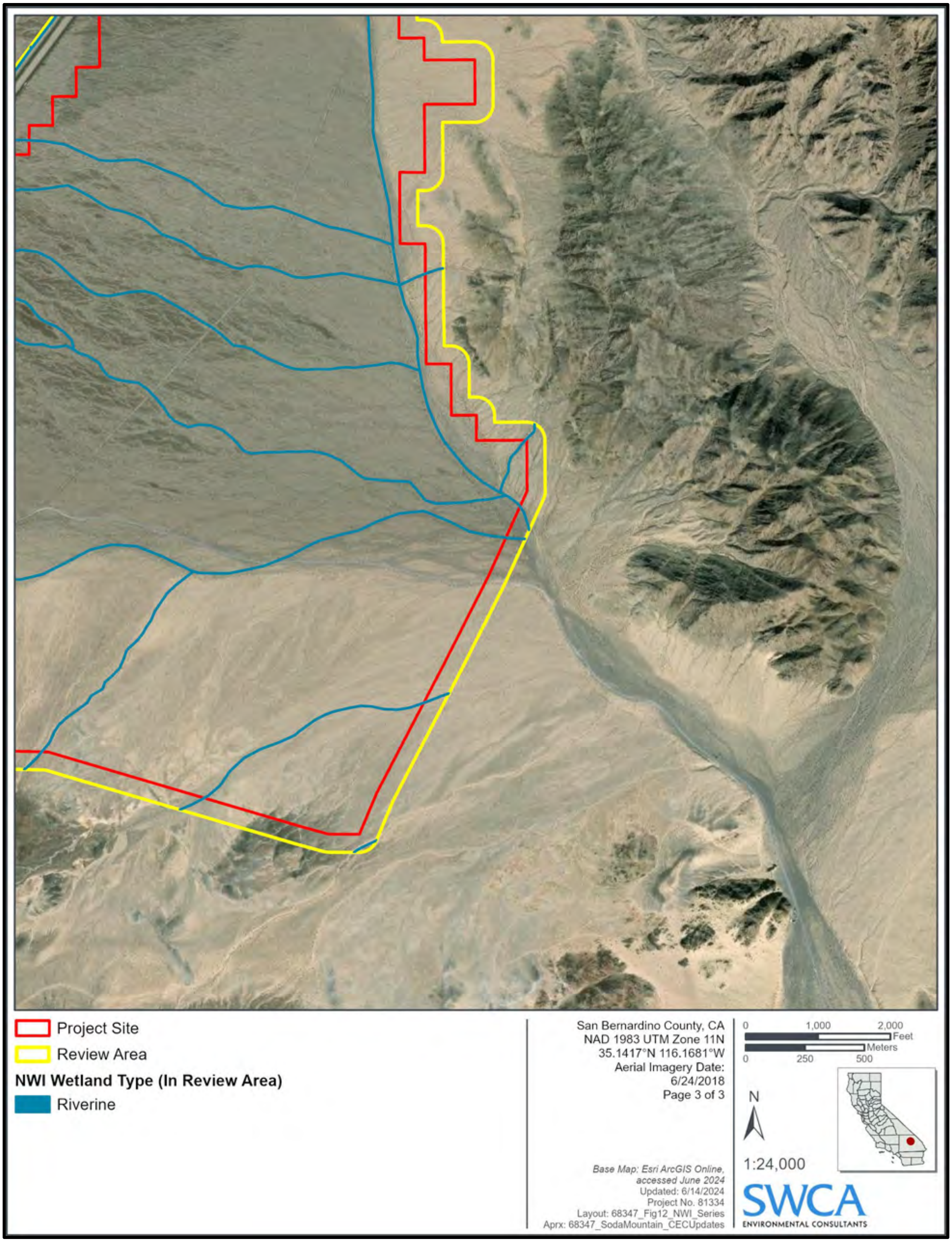


**Figure A-12. CEC subset maps. NWI aquatic features on 2018 aerial imagery (3 of 3) (Google Earth Pro).**

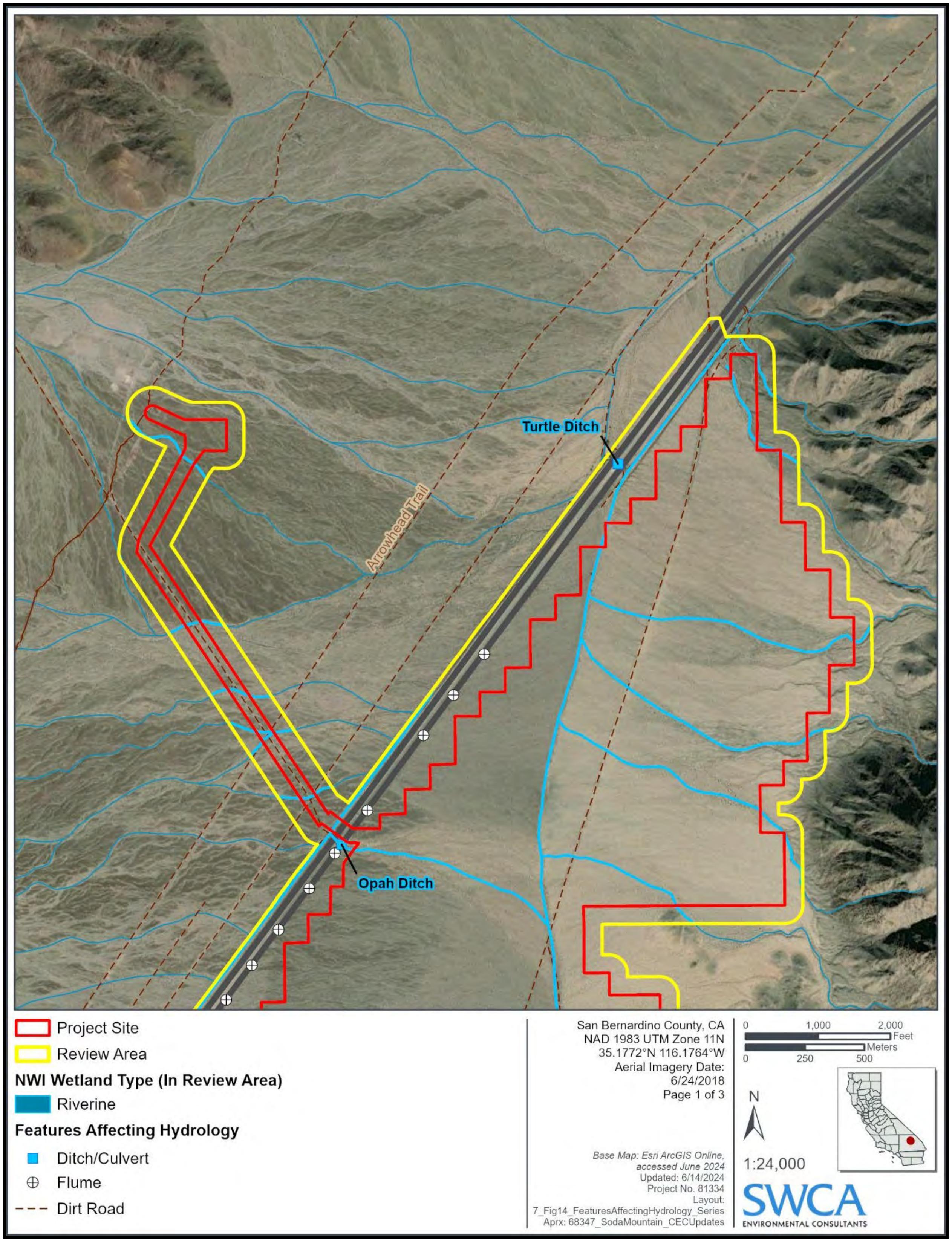


**Figure A-14. CEC subset maps. Features affecting hydrology on 2018 aerial imagery (1 of 3) (Google Earth Pro).**

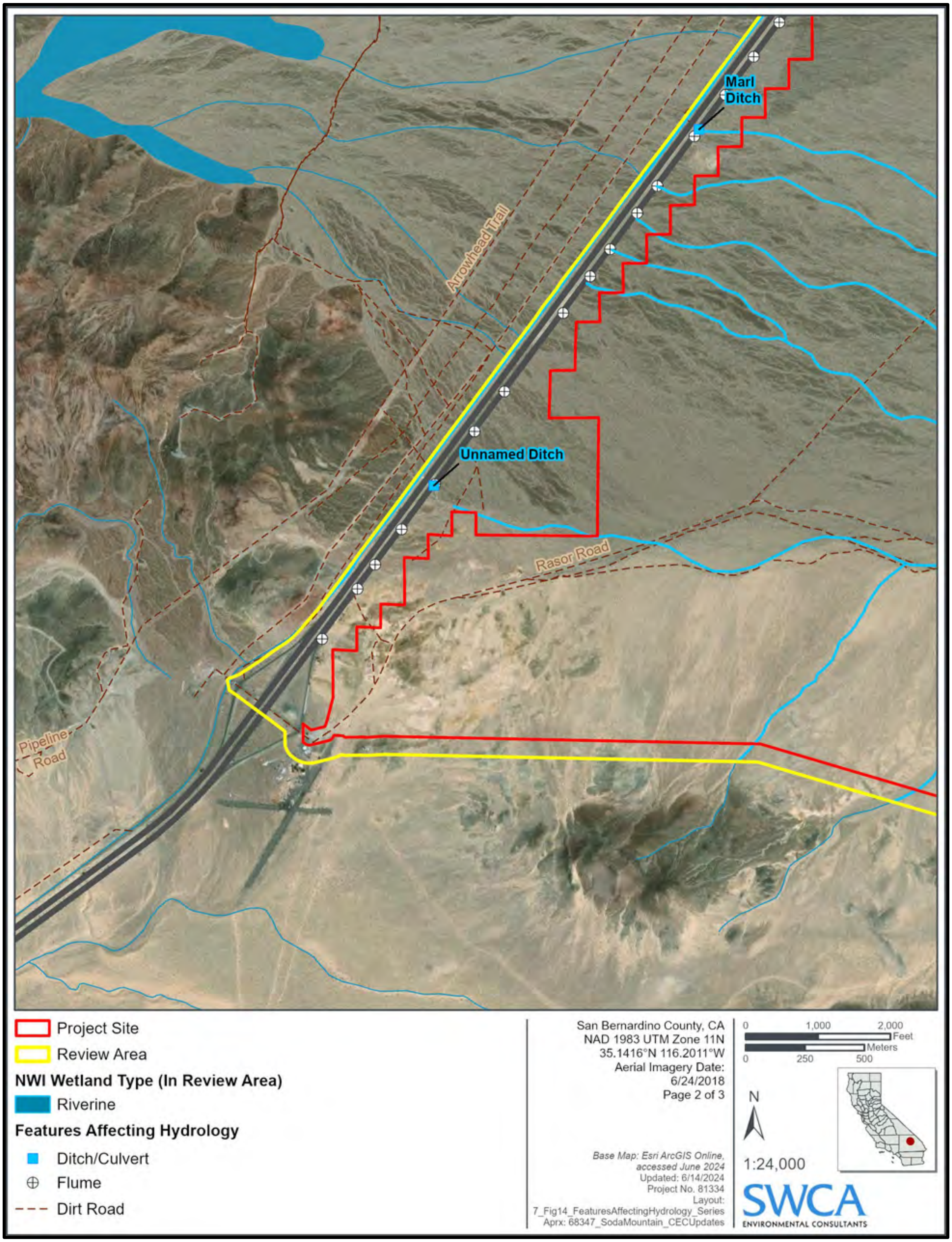


**Figure A-14. CEC subset maps. Features affecting hydrology on 2018 aerial imagery (2 of 3) (Google Earth Pro).**

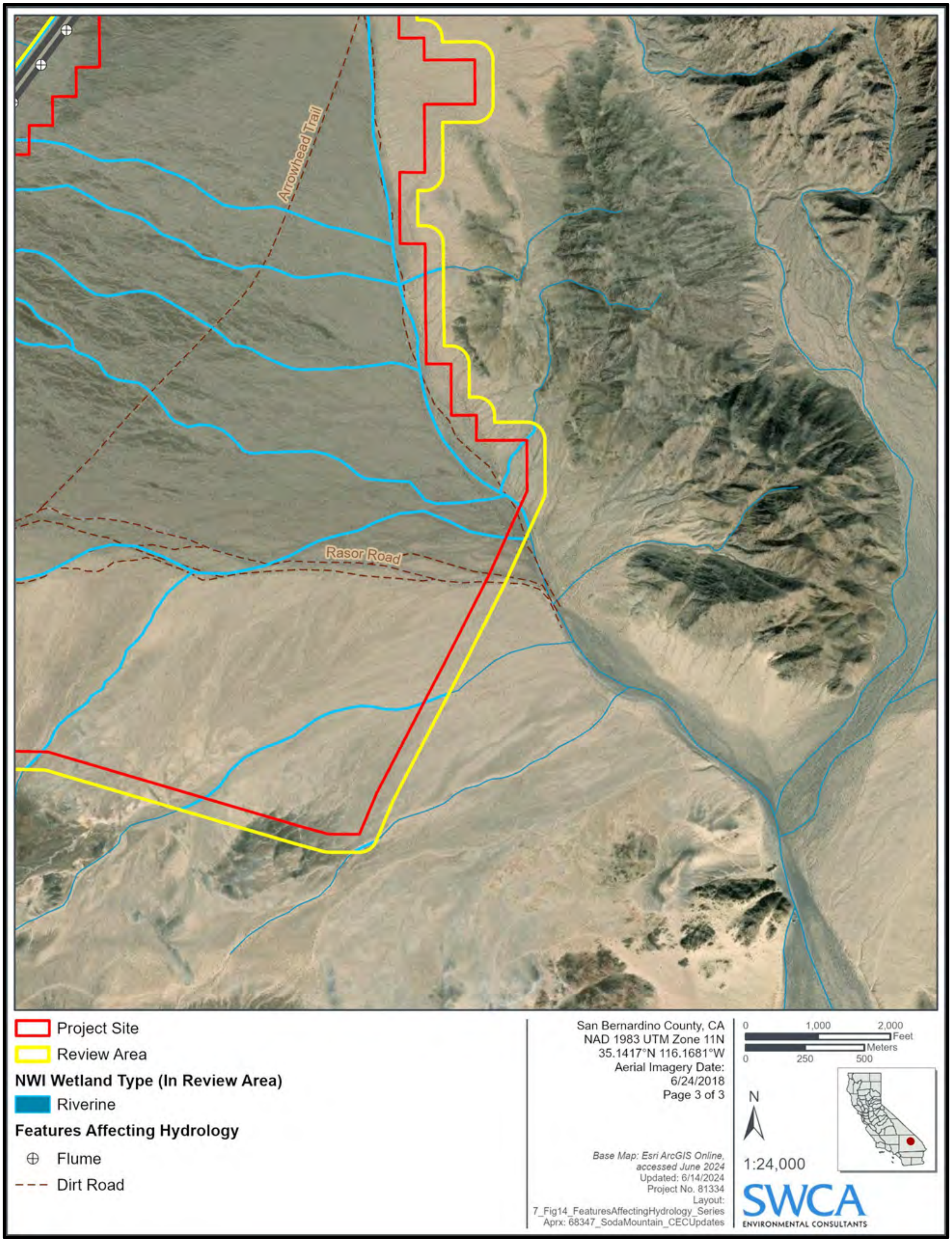


**Figure A-14. CEC subset maps. Features affecting hydrology on 2018 aerial imagery (3 of 3) (Google Earth Pro).**

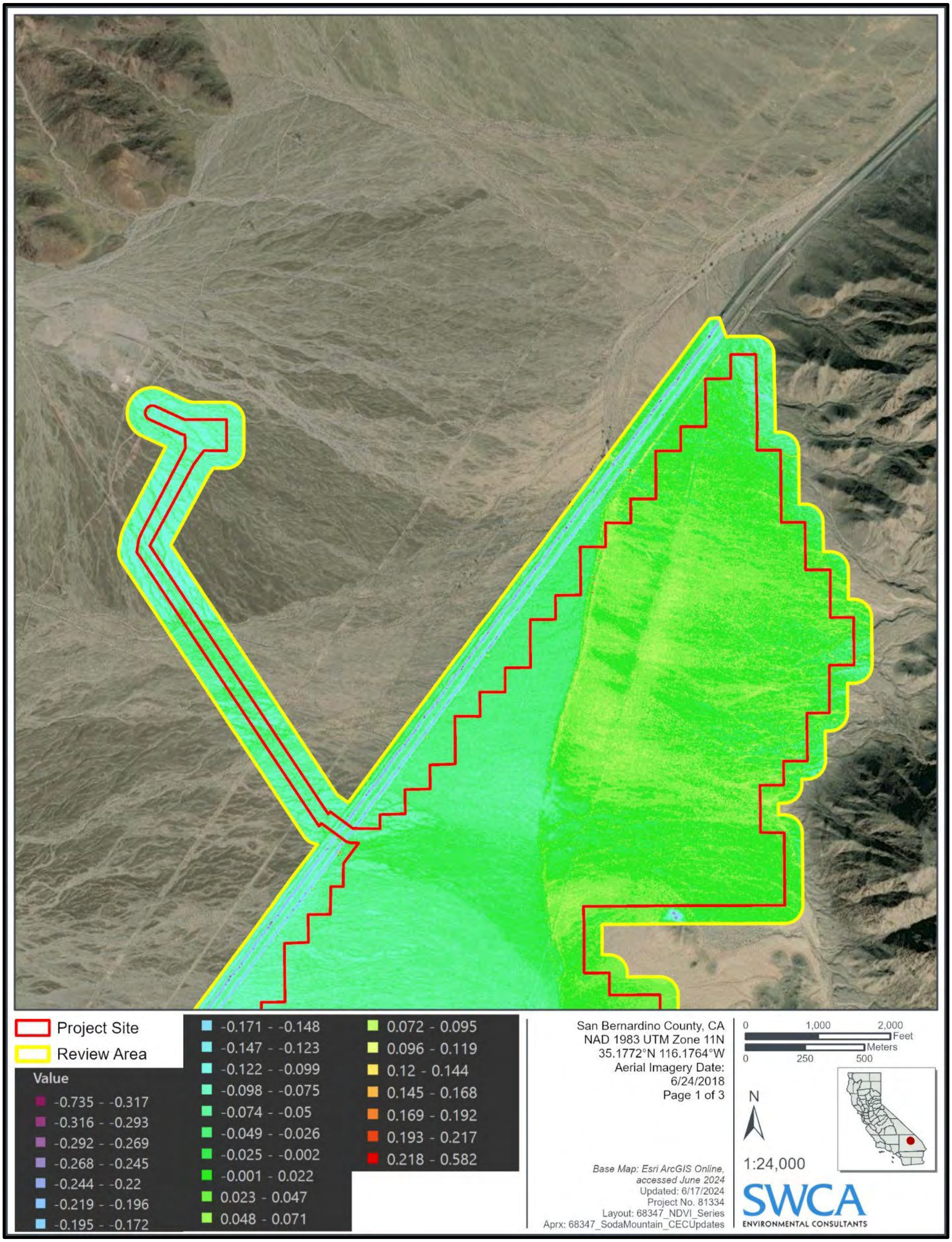


**Figure A-15. CEC subset maps. NDVI showing relative vegetation density on 2018 aerial imagery (1 of 3) (Google Earth Pro).**

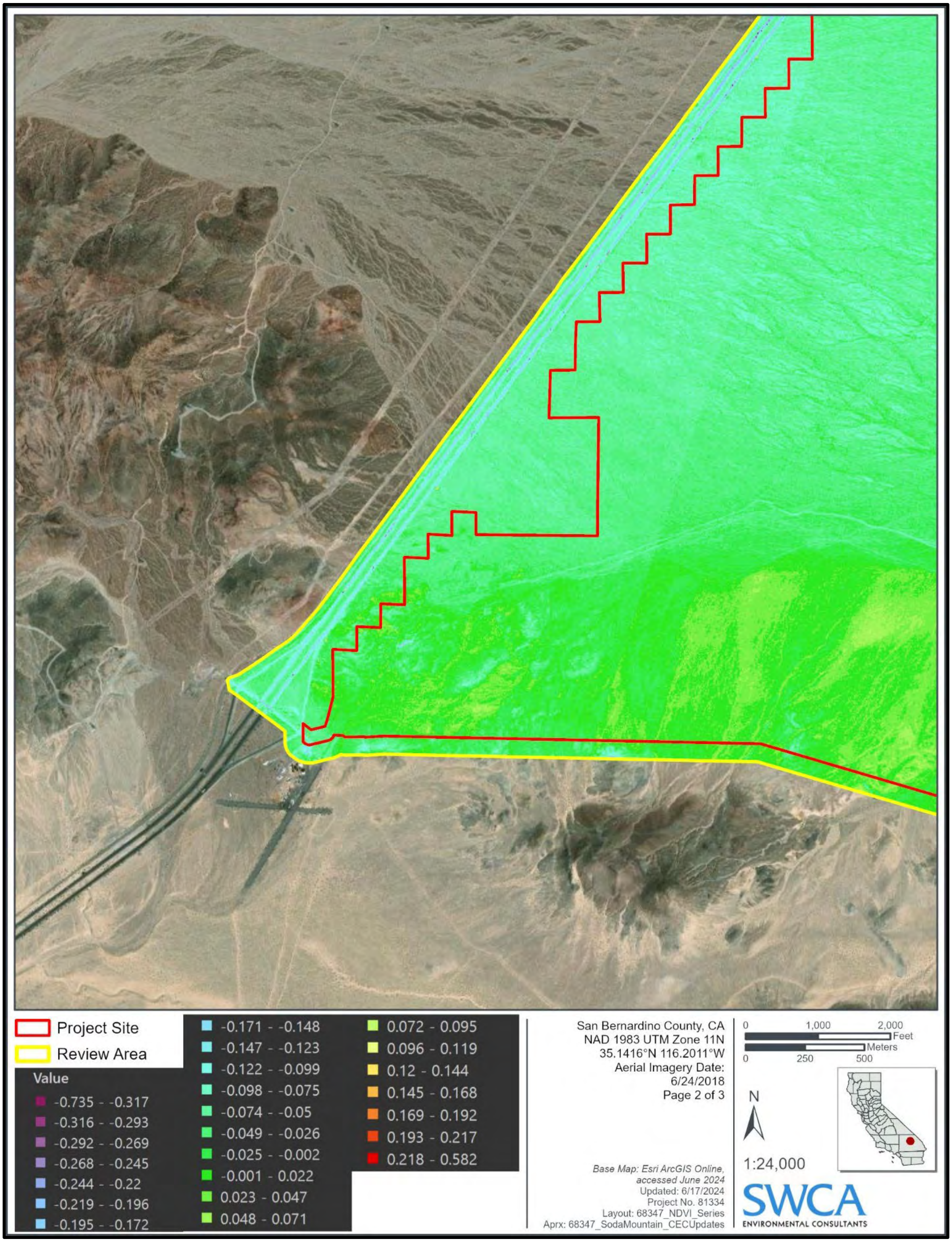


**Figure A-15. CEC subset maps. NDVI showing relative vegetation density on 2018 aerial imagery (2 of 3) (Google Earth Pro).**

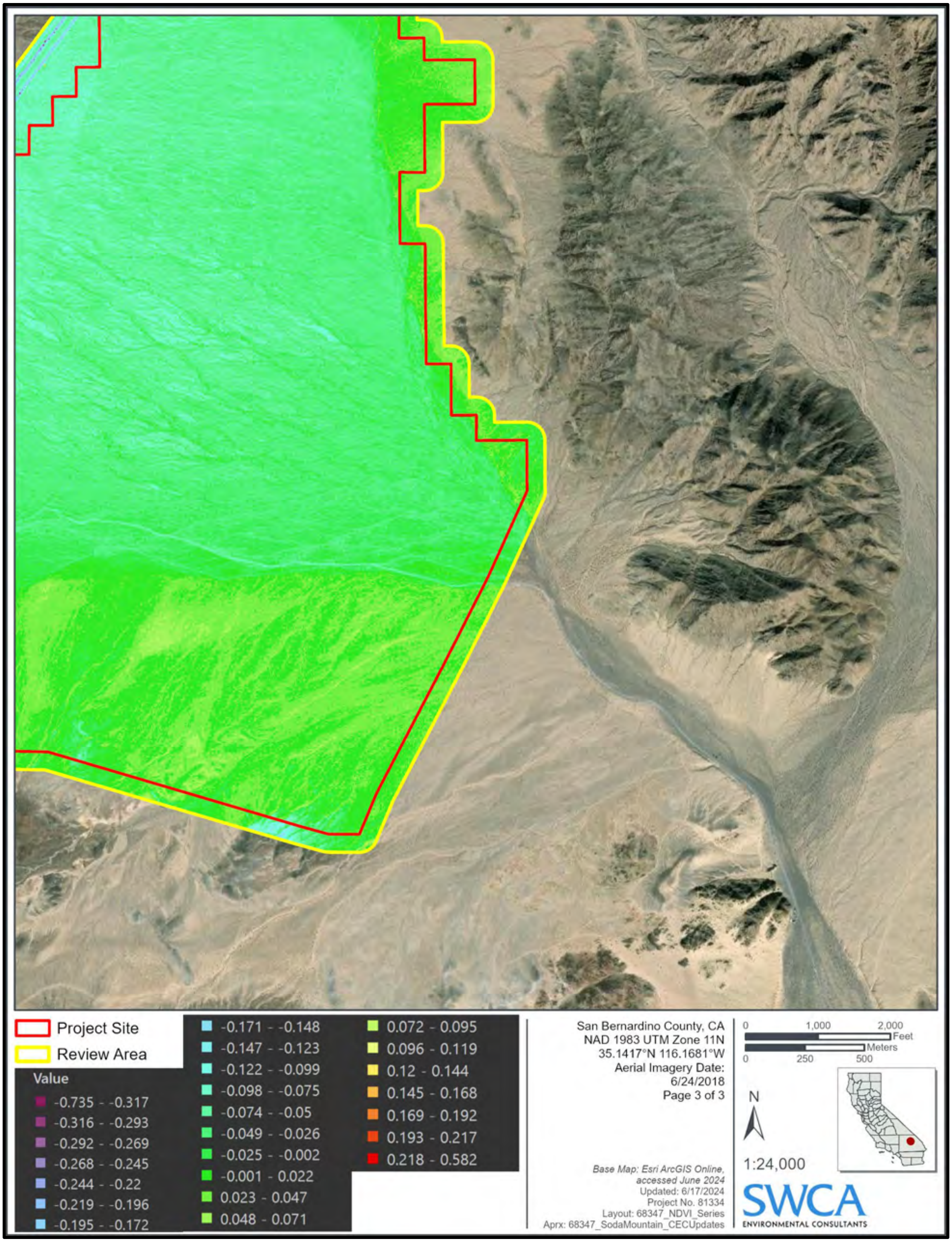


**Figure A-15. CEC subset maps. NDVI showing relative vegetation density on 2018 aerial imagery (3 of 3) (Google Earth Pro).**

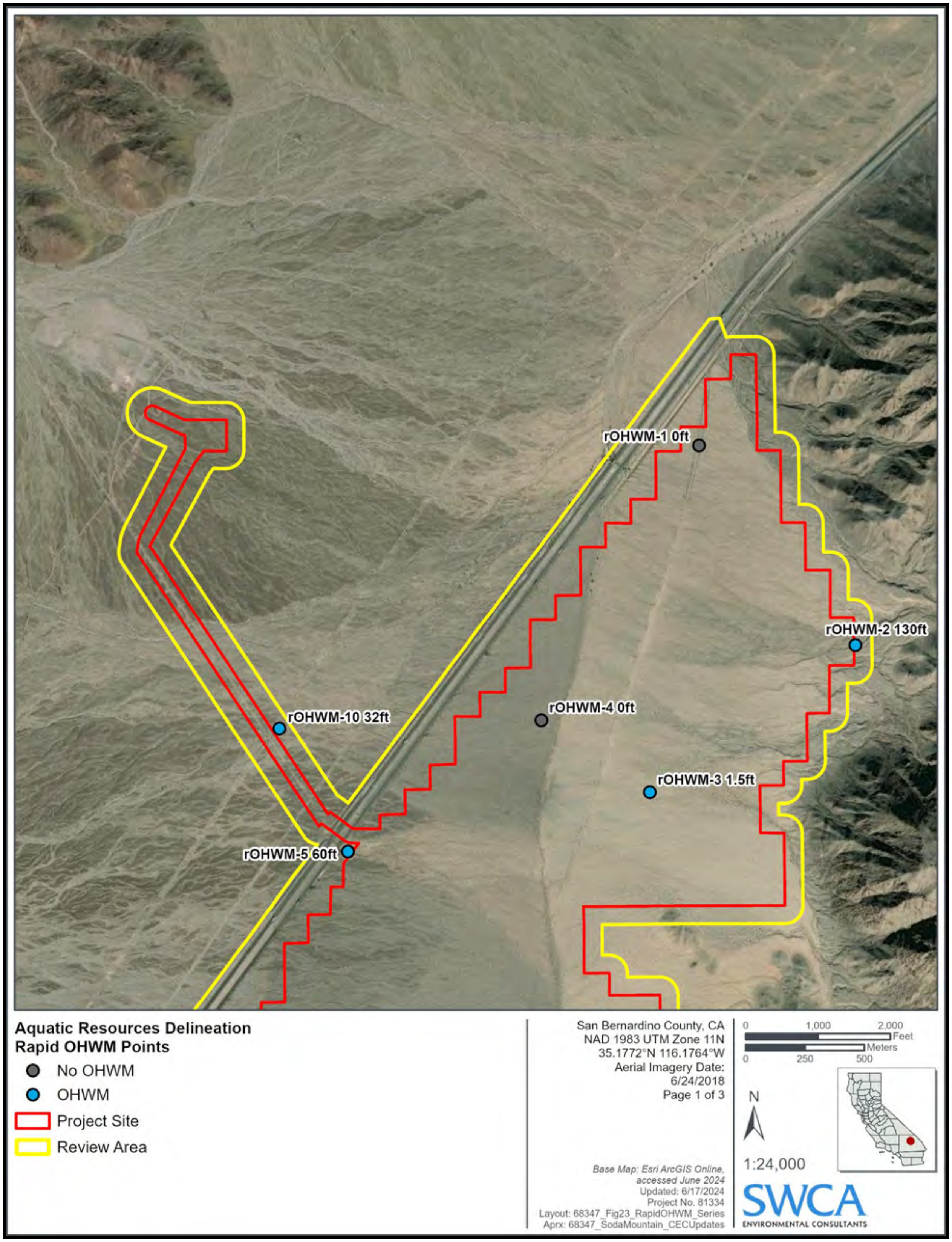


**Figure A-23. CEC subset maps. Rapid OHWM points on 2018 aerial imagery (1 of 3) (Google Earth Pro).**

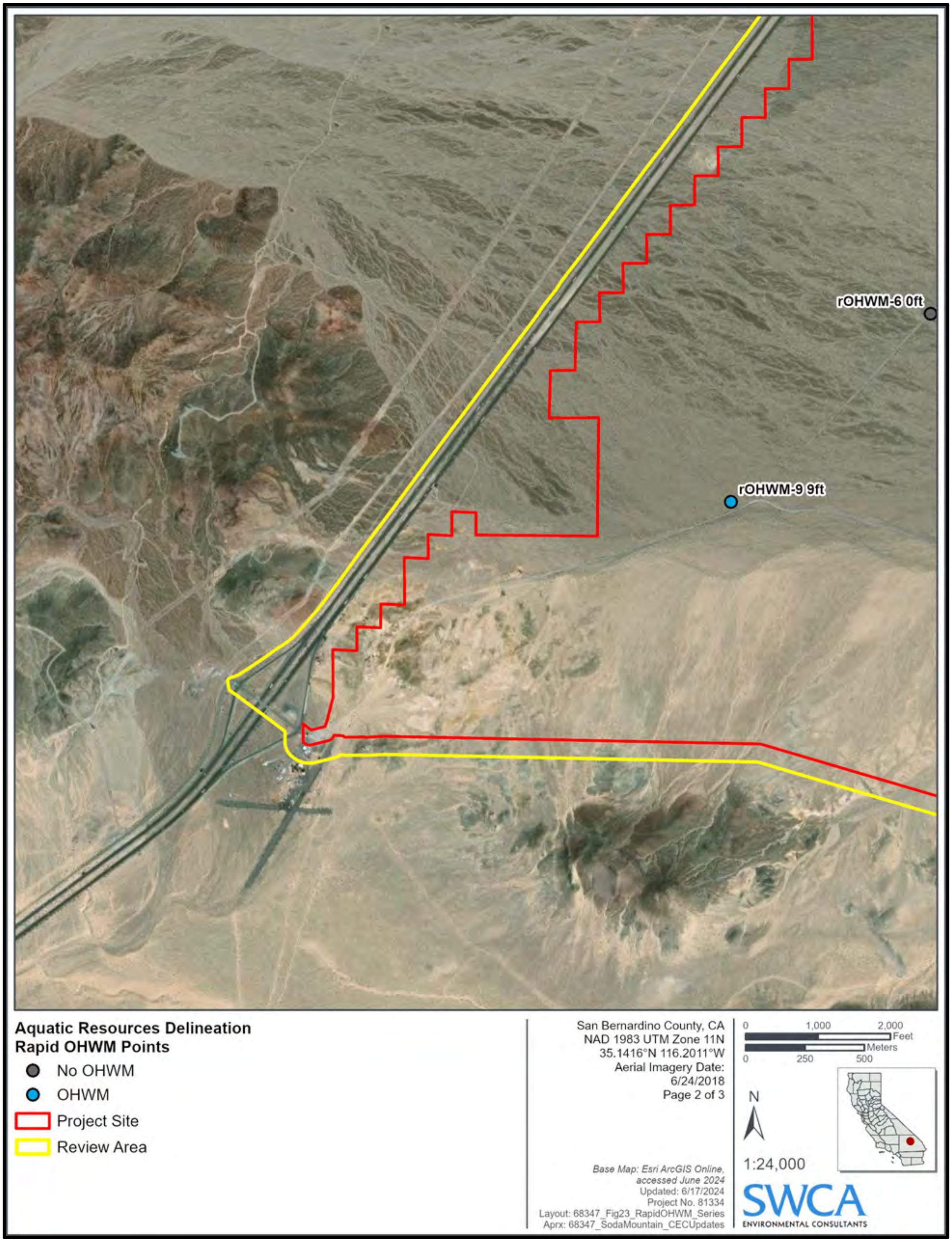


**Figure A-23. CEC subset maps. Rapid OHWM points on 2018 aerial imagery (2 of 3) (Google Earth Pro).**

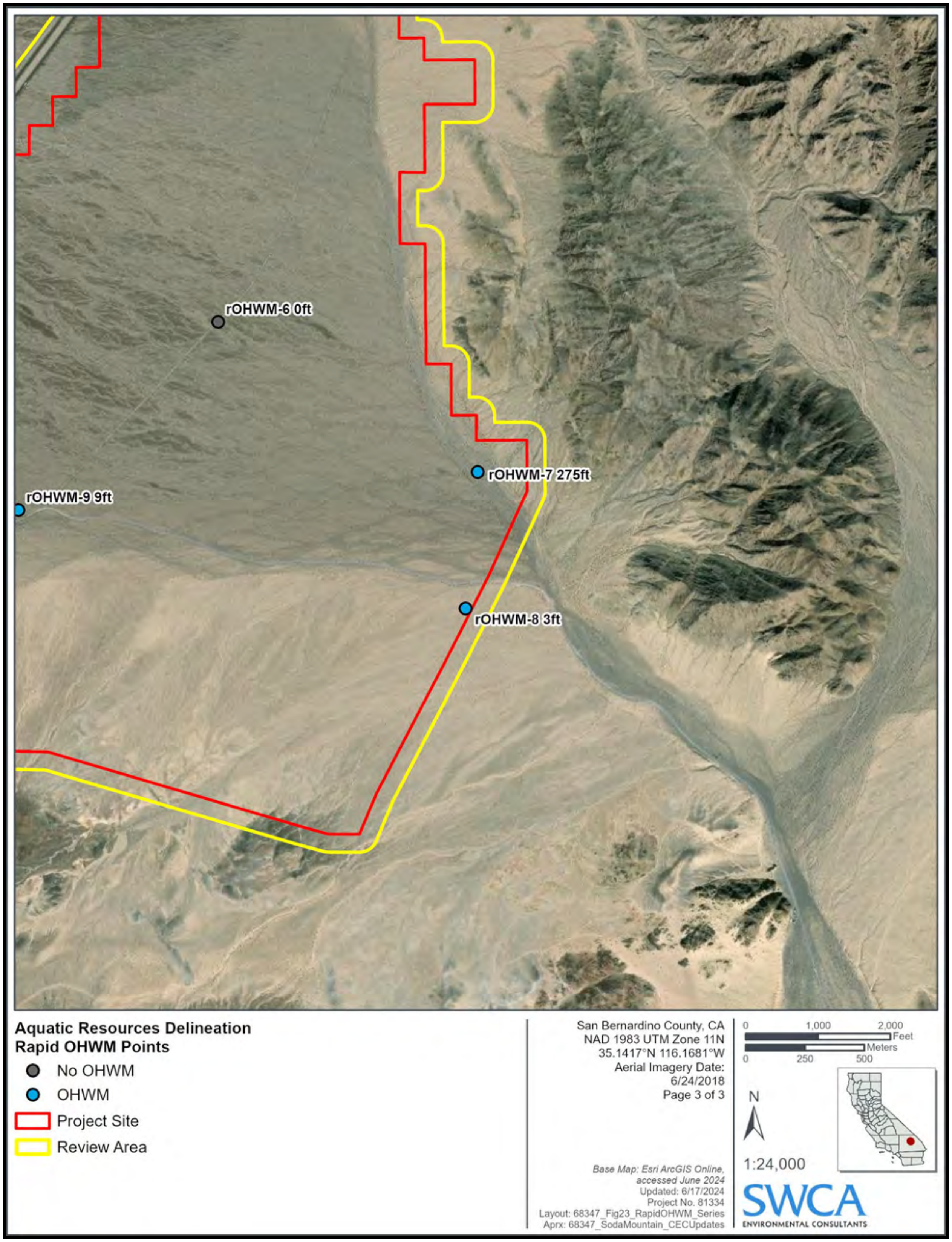


**Figure A-23. CEC subset maps. Rapid OHWM points on 2018 aerial imagery (3 of 3) (Google Earth Pro).**

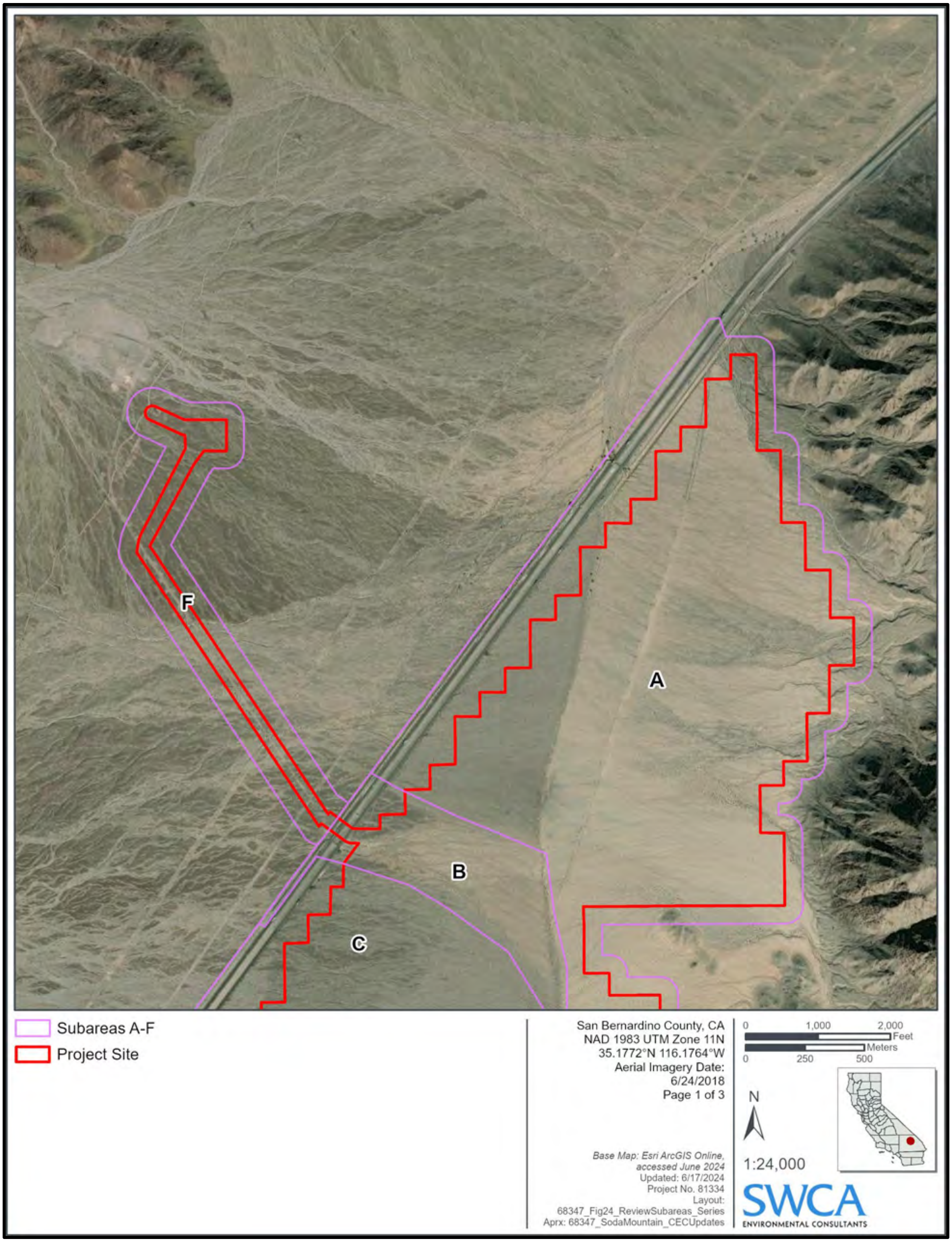


**Figure A-24. CEC subset maps. SubAreas within the review area on 2018 aerial imagery (1 of 3) (Google Earth Pro).**

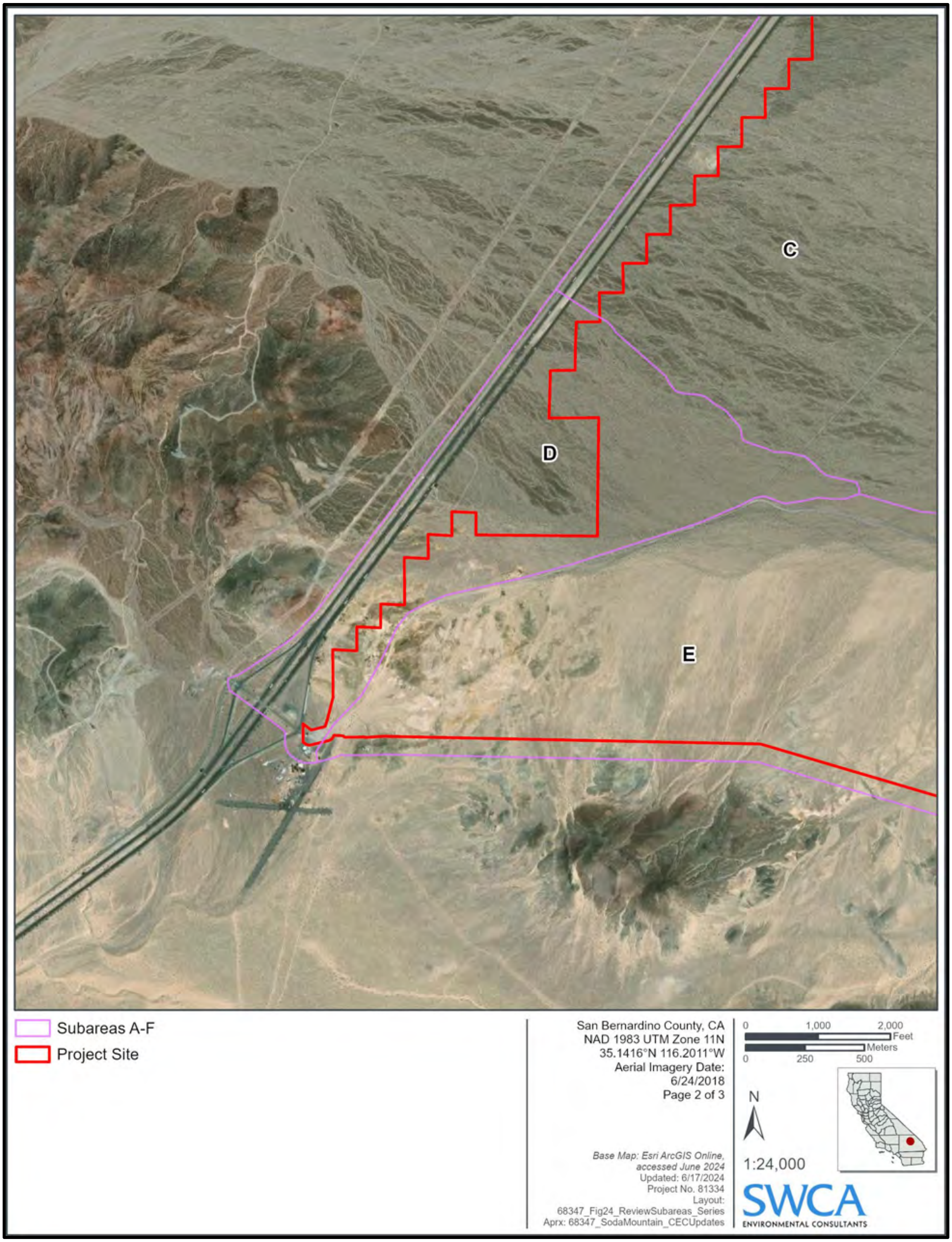


**Figure A-24. CEC subset maps. SubAreas within the review area on 2018 aerial imagery (2 of 3) (Google Earth Pro).**

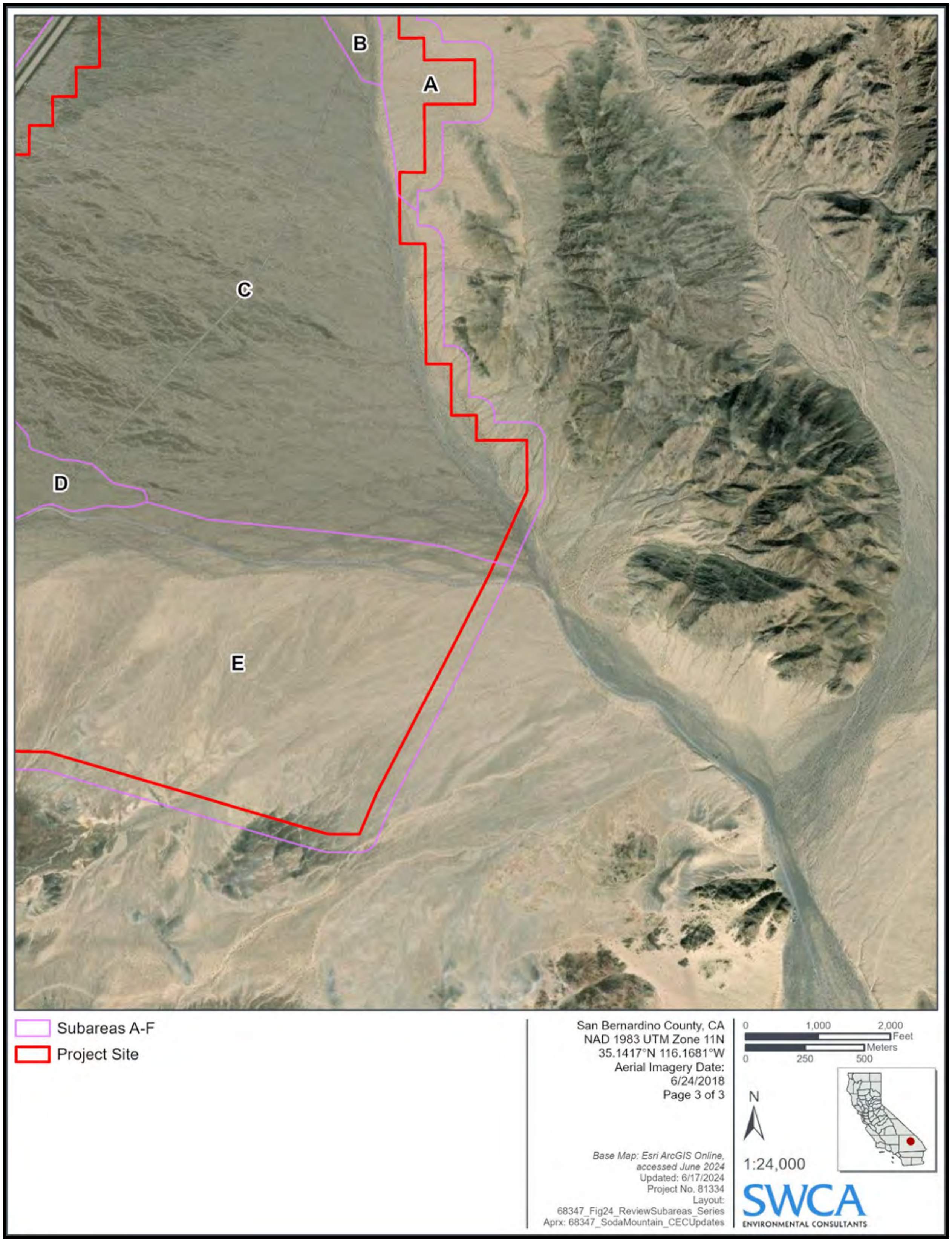


**Figure A-24. CEC subset maps. SubAreas within the review area on 2018 aerial imagery (3 of 3) (Google Earth Pro).**

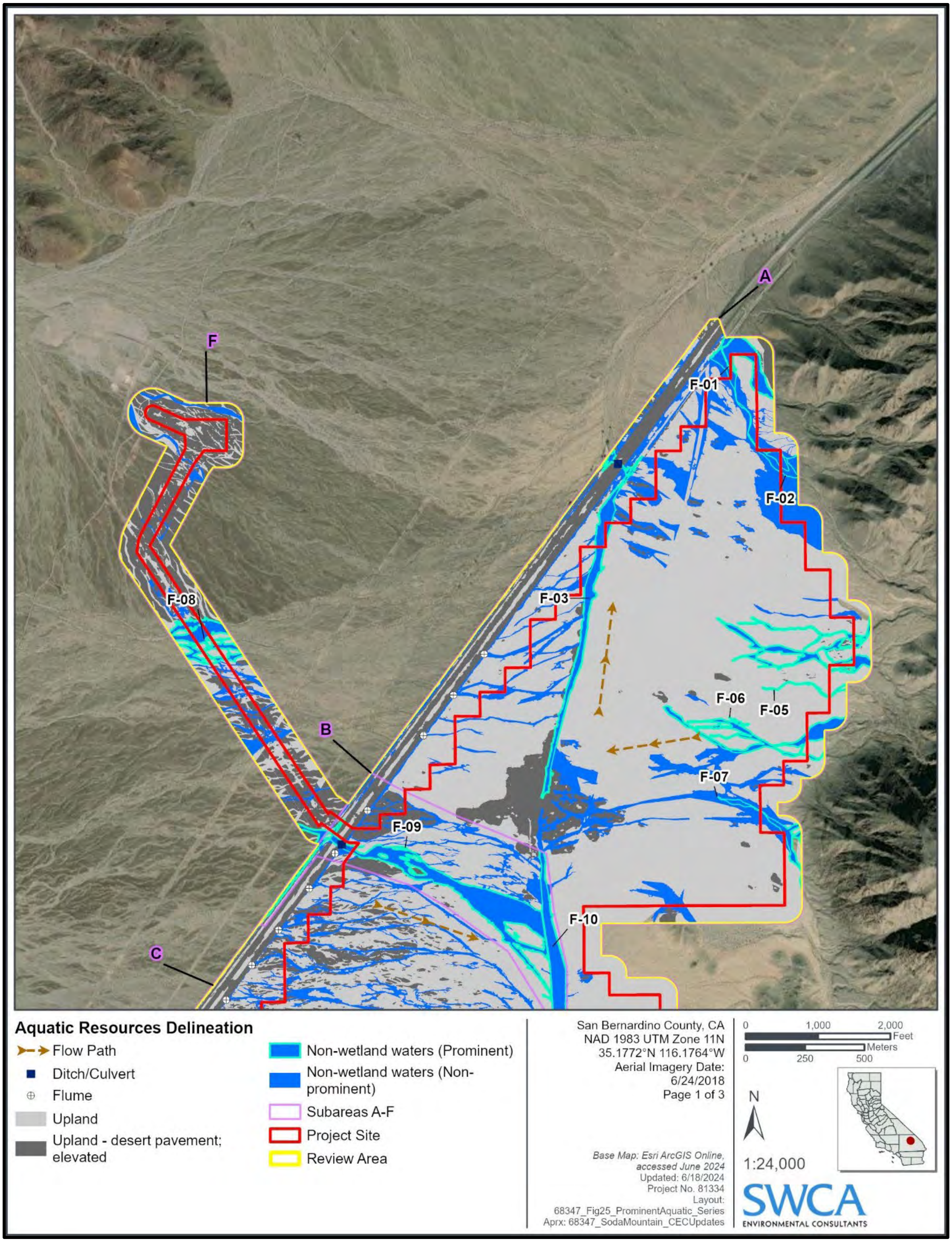


**Figure A-25. CEC subset maps. Prominent and non-prominent channels on 2018 aerial imagery (1 of 3) (Google Earth Pro).**

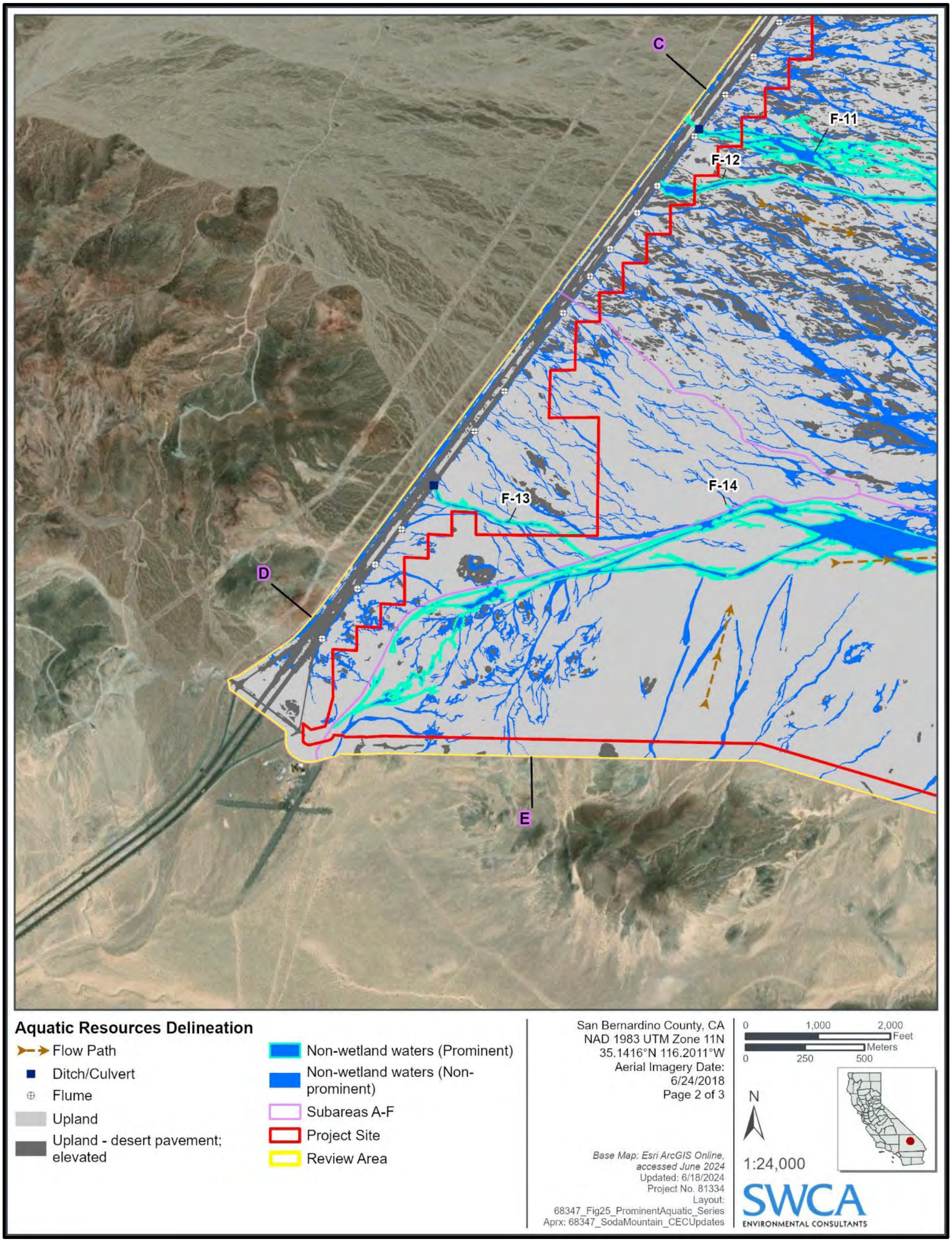


**Figure A-25. CEC subset maps. Prominent and non-prominent channels on 2018 aerial imagery (2 of 3) (Google Earth Pro).**

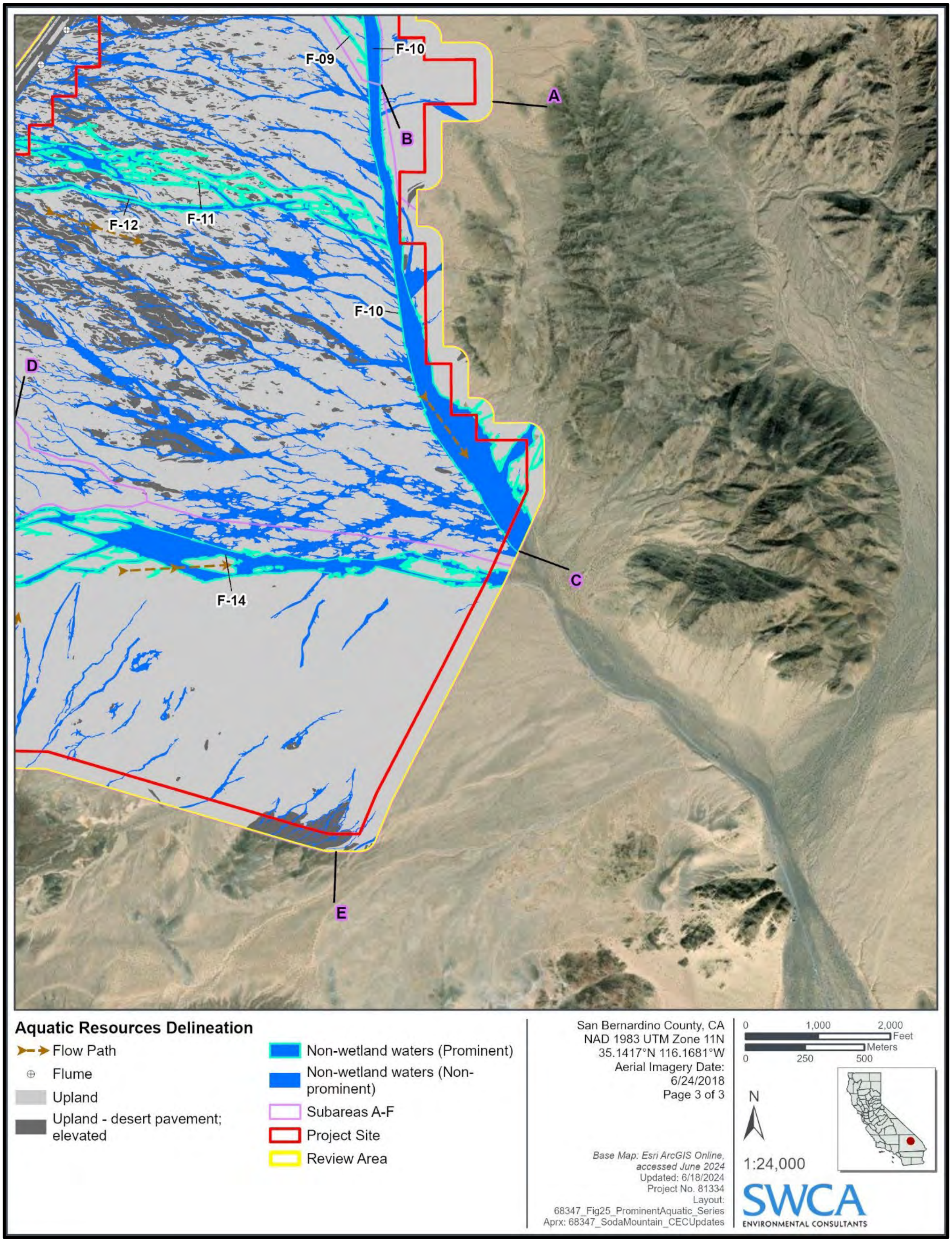


**Figure A-25. CEC subset maps. Prominent and non-prominent channels on 2018 aerial imagery (3 of 3) (Google Earth Pro).**

# APPENDIX B

## HEC-RAS Hydraulics Map

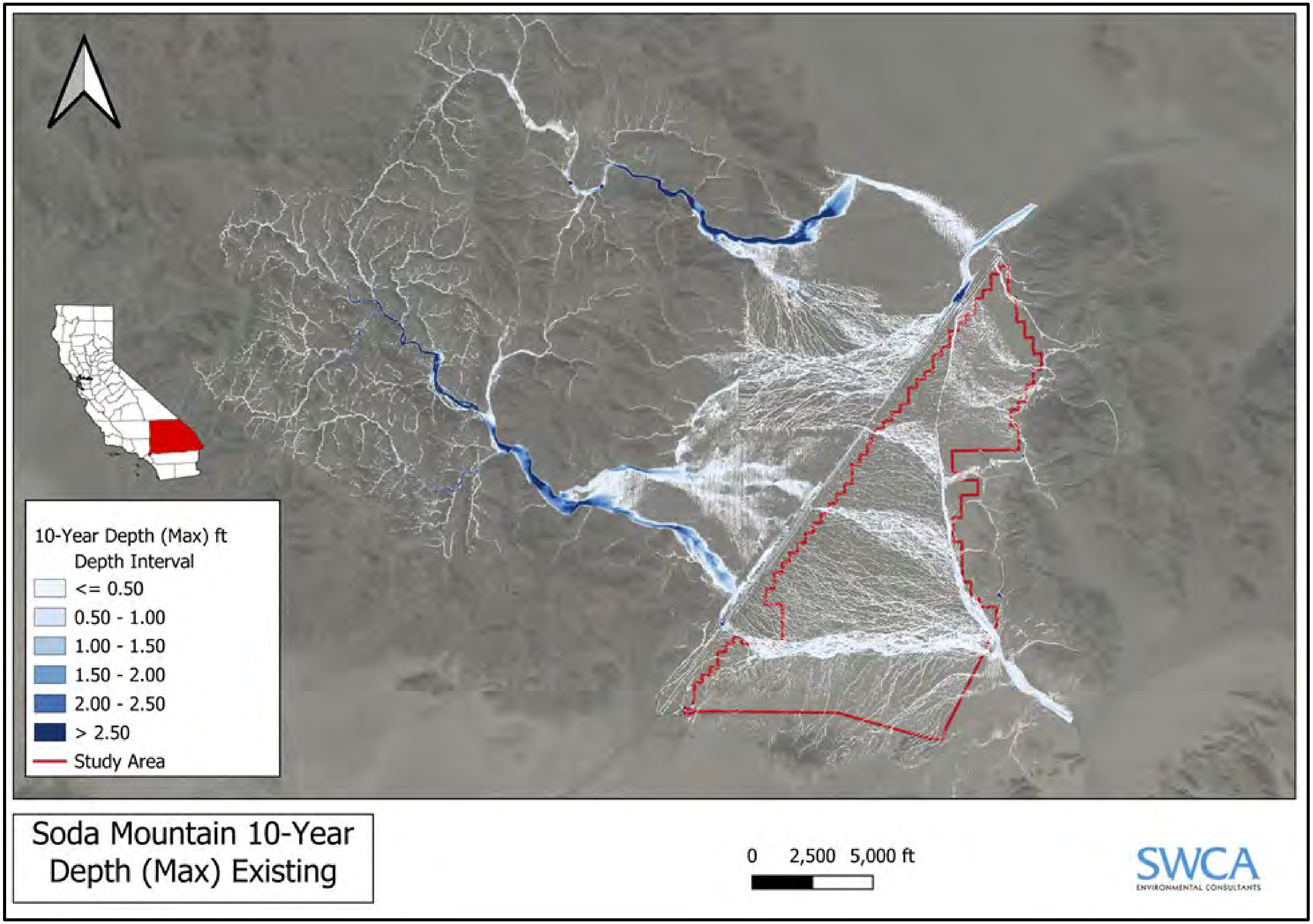


**Figure B-1. Hydrologic Engineering Center's River Analysis System 10-year depth final map.**

# APPENDIX C

# Photographs

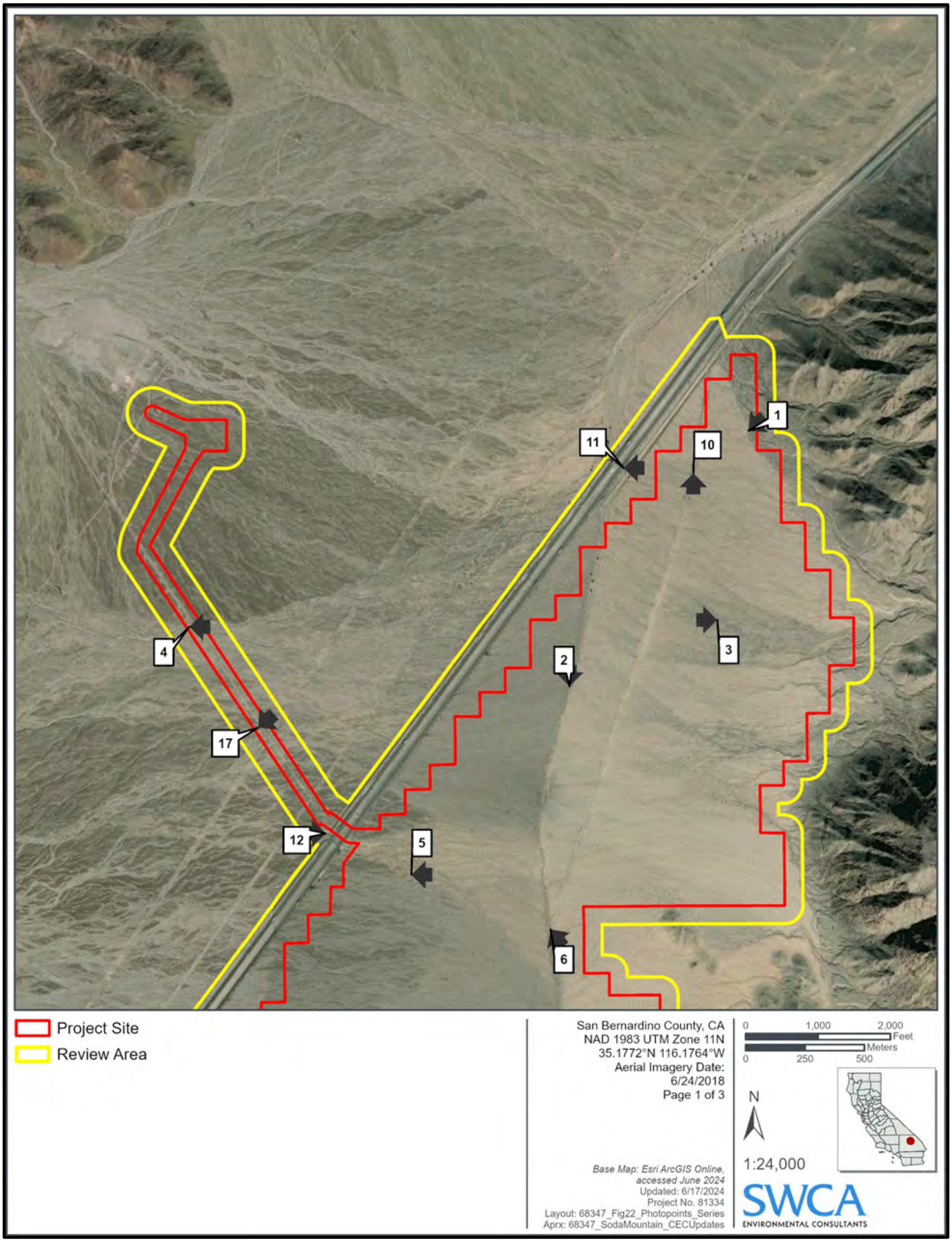


**Figure C-22. Photo-point location map (1 of 3).**

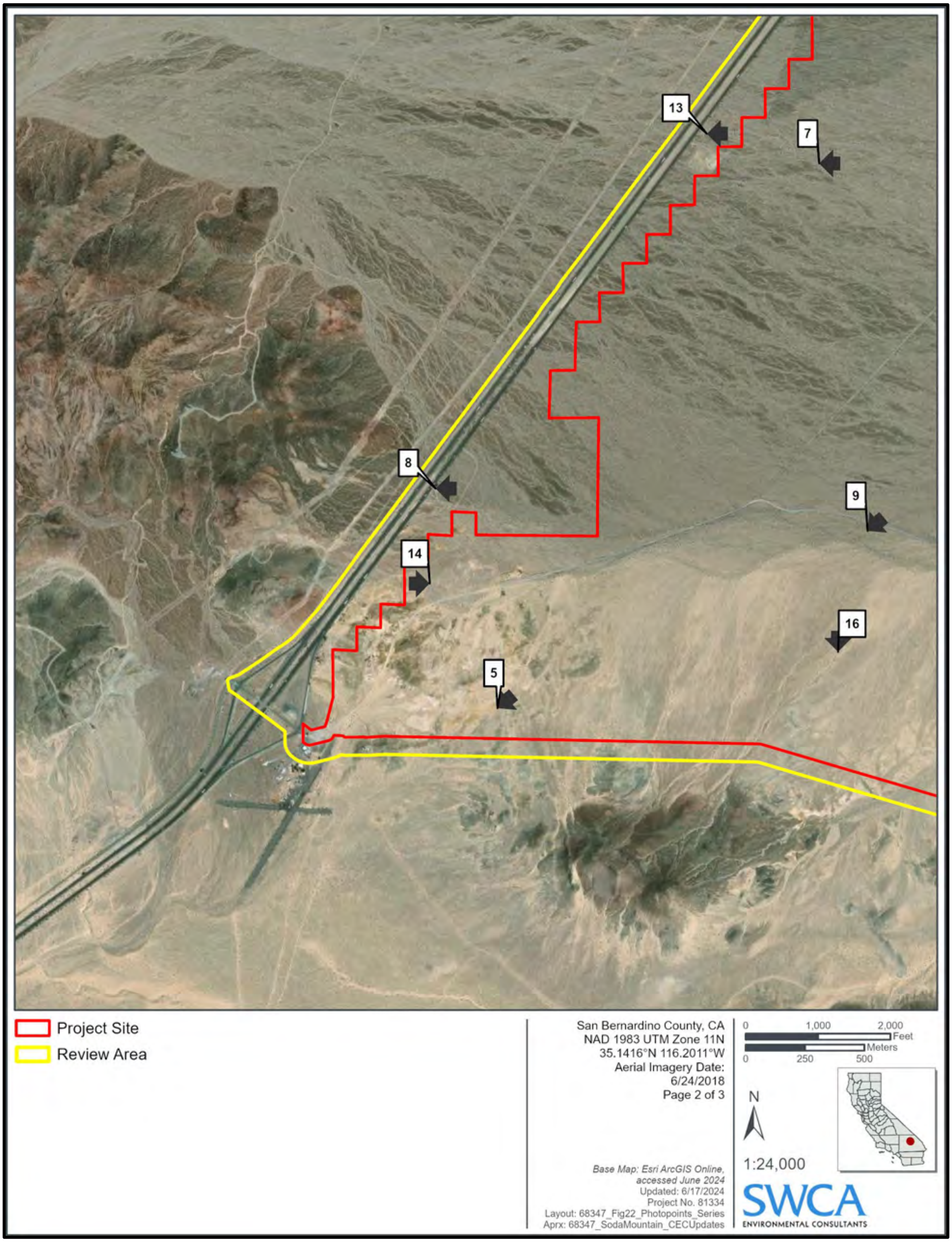


**Figure C-22. Photo-point location map (2 of 3).**

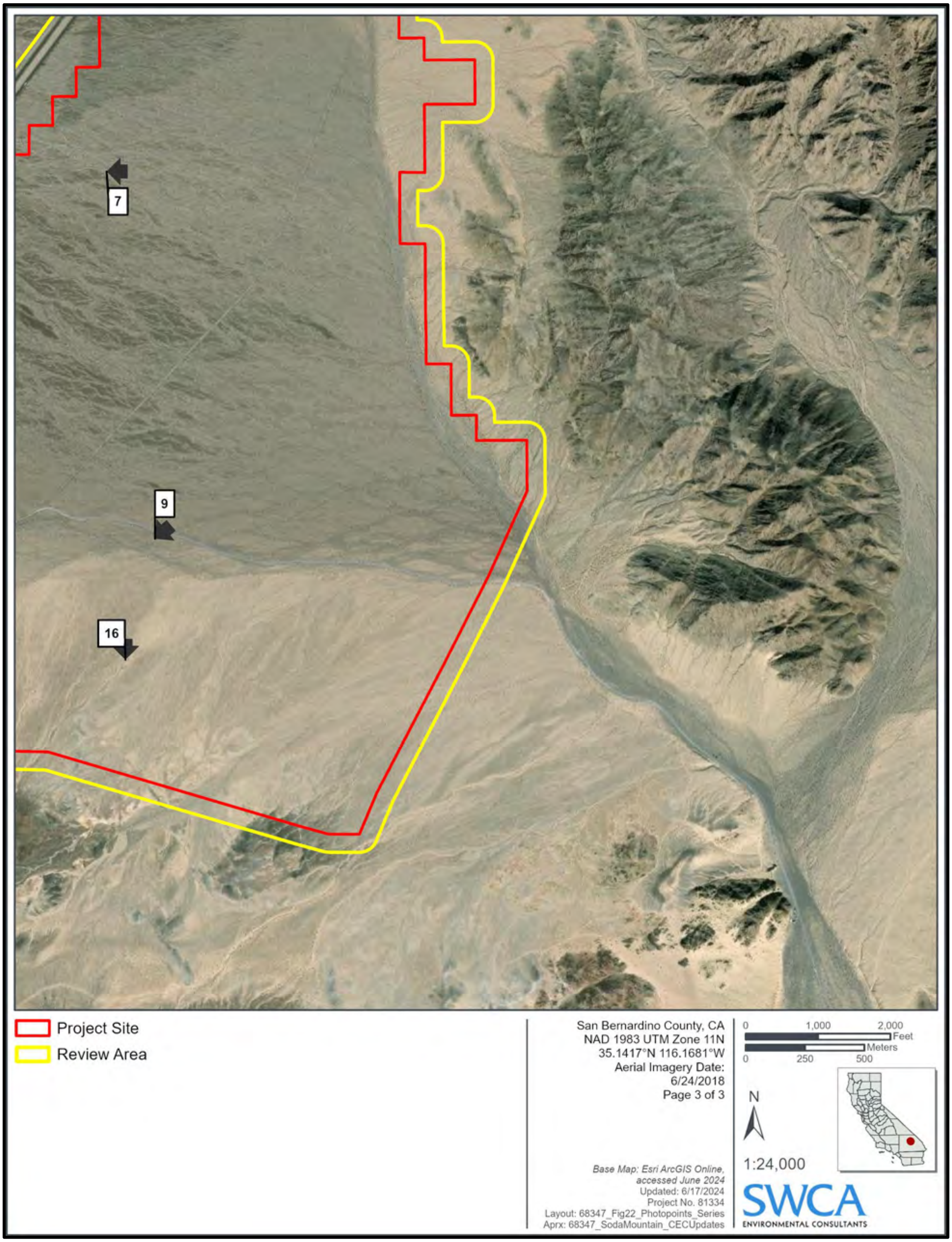


**Figure C-22. Photo-point location map (3 of 3).**

**Photo C-1. SubArea A. 35.180265°, −116.163726°. F-02 showing defined bed and bank.**

**Photo C-2. SubArea A. 35.170610°, −116.172104°. F-03 showing defined flow path.**

**Photo C-3. SubArea A. 35.173090°, −116.165242°. F-06 showing sediment sorting.**

**Photo C-4. SubArea F. 35.172997°, −116.189668°. F-08 showing sediment sorting and vegetation channel alignment.**

**Photo C-5. SubArea B. 35.163505°, −116.179489°. F-09 showing defined flow path and sediment sorting.**

**Photo C-6. SubArea B. 35.161390°, −116.173073°. F-10 Part 1 showing defined flow path, sediment sorting, vegetation channel alignment, and vegetation robustness.**

**Photo C-7. SubArea C. 35.154734°, −116.185109°. F-11 showing flow path, sediment sorting, vegetation channel alignment, and vegetation robustness.**

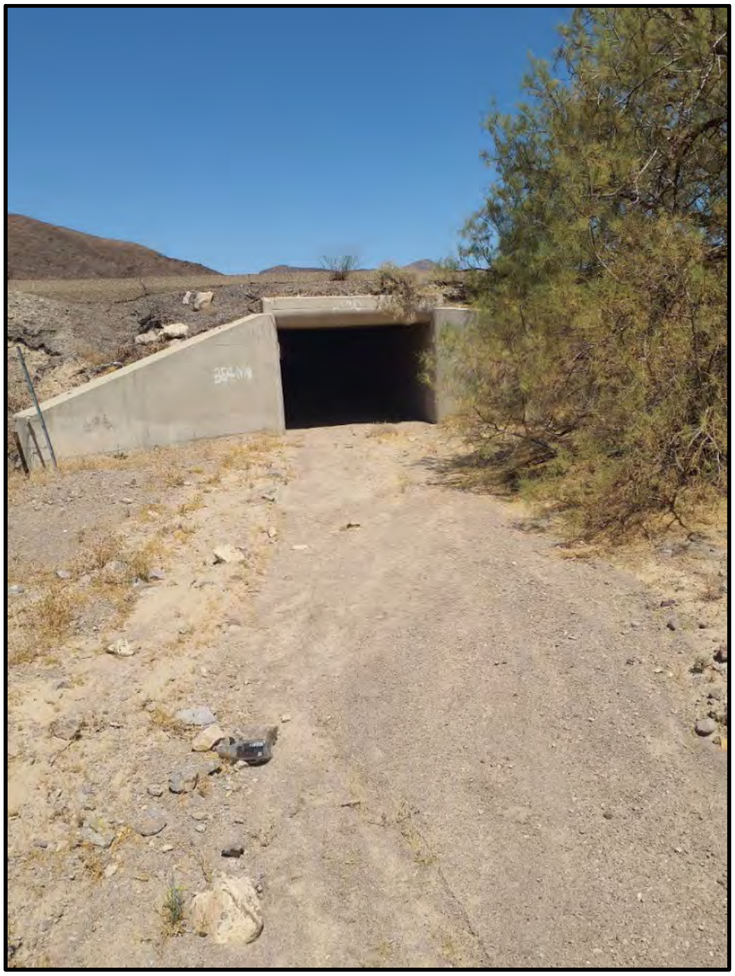

**Photo C-8. SubArea D. 35.142505°, −116.202964°. Unnamed Ditch culvert showing single channel with sediment sorting and support of large tree.**

**Photo C-9. SubArea C. 35.140763°, −116.183009°. F-14 along Rasor Road showing flow path, erosion, and sediment sorting.**

**Photo C-10. SubArea A. 35.178669°, −116.166293°. Degraded paved dirt road lacking hydrologic indicators; indicators present outside road prism.**

**Photo C-11. SubArea A. 35.178891°, −116.169520°. Turtle Ditch culvert single channel showing sediment sorting and supporting vegetation robustness.**

**Photo C-12. SubArea F. 35.165103°, −116.183429°. Opah Ditch culvert on north side of Interstate 15.**

**Photo C-13. SubArea C. 35.155902°, −116.190295°. Marl Ditch; view facing upstream.**

**Photo C-14. SubArea D. 35.138898°, −116.203269°. F-13 showing defined bed and bed, erosion, sediment sorting, and vegetation channel alignment.**

**Photo C-15. SubArea E. 35.134143°, −116.200189°. Non-prominent features showing flow path and sediment sorting.**

**Photo C-16. SubArea E. 35.136178°, −116.184420°. Non-prominent feature showing flow path and sediment sorting.**

**Photo C-17. SubArea F. 35.169139°, −116.186524°. Non-prominent feature showing flow path, erosion, vegetation channel alignment, and vegetation robustness.**

# APPENDIX D

# Datasheets (Rapid OHWM Forms)

U.S. Army Corps of Engineers (USACE)

**RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET**

The proponent agency is Headquarters USACE CECW-CO-R.

*From Approved -*
*OMB No. 0710-0025*
*Expires: 01-31-2025*

**AGENCY DISCLOSURE NOTICE**



| Project ID #: Soda Mtn | Site Name: #01 | Date and Time: 09/06/2023 18:55 |
|---|---|---|

| Location (lat/long): 35.179725, -116.166012 | Investigator(s): Bonnie and Luis |
|---|---|

**Step 1** Site overview from remote and online resources
**Check boxes for online resources used to evaluate site:**

☐ gage data ☑ LiDAR ☑ geologic maps
☑ climatic data ☑ satellite imagery ☑ land use maps
☑ aerial photos ☑ topographic maps ☐ Other:

**Describe land use and flow conditions from online resources.**
Were there any recent extreme events (floods or drought)?
Open space. August 2023 storm.

**Step 2** Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or man-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls etc.

Site Conditions: Highly traveled dirt/degraded paved road and artificial parallel berms.

**Step 3 Check the boxes next to the indicators used to identify the location of the OHWM.**
**OHWM is at a transition point,** therefore some indicators that are used to determine location may be just below and above the OHWM. From the drop-down menu next to each indicator, select the appropriate location of the indicator by selecting either just below 'b', at 'x', or just above 'a' the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and to attach a photo log.

**Geomorphic indicators**

- ☑ **Break in slope:** a
  - ☐ *on the bank:*
  - ☐ *undercut bank:*
  - ☐ *valley bottom:*
  - ☑ Other:Road elevation lower than surround...
- ☐ **Shelving:**
  - ☐ *shelf at top of bank:*
  - ☐ *natural levee:*
  - ☐ *man-made berms or levees:*
  - ☐ *other berms:*
- ☐ **Channel bar:**
  - ☐ shelving (berms) on bar:
  - ☐ unvegetated:
  - ☐ vegetation transition (go to veg. indicators)
  - ☐ sediment transition (go to sed. indicators)
  - ☐ upper limit of deposition on bar:
- ☑ **Instream bedforms and other bedload transport evidence:** b
  - ☐ Deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.)
  - ☐ Bedforms (e.g., pools, riffles, steps, etc.):
- ☐ *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)*
- ☐ **Secondary channels:**

**Sediment Indicators**

- ☐ Soil development
- ☐ Changes in character of soil:
- ☐ Mudcracks:
  - ☑ Changes in particle-sized distribution: b
  - ☑ Transition from Pebble to Cobble
  - ☐ Upper limit of sand-sized particles
- ☐ Silt deposits

**Vegetation Indicators**

- ☑ Change in vegetation type and/or density: x

**Check the appropriate boxes and select the general vegetation change (e.g., graminoids to woody shrubs). Describe the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain.**

- ☐ vegetation absent to:
- ☐ moss to:
- ☐ forbs to:
- ☐ graminoids to:
- ☑ woody shrubs to: WoodyShrubs
- ☐ deciduous trees to:
- ☐ coniferous trees to:
- ☐ **Vegetation matted down and/or bent:**
- ☐ **Exposed roots below intact soil layer:**

**Ancillary Indicators**

- ☐ Wracking/presence of organic litter:
- ☐ Presence of large wood:
- ☐ Leaf litter disturbed or washed away:
- ☐ Water staining:
- ☐ Weathered clasts or bedrock?

**Other observed indicators? Describe:**

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Project ID #: Soda mtn_#01

**Step 4** Is additional information needed to support this determination? ☑ Yes ☐ No If yes, describe and attach information to datasheet:

Remote sensing data.

**Step 5** Describe rationale for location of OHWM

OHWM Rationale: Change in sedimentation, vegetation, and topography.
OHWM width (ft): 51
OHWM depth (ft): 0.5
Dominant vegetation below OHWM: Unvegetated
Dominant vegetation at OHWM: Laurea tridentata, Ambrosia sp.
Dominant vegetation above OHWM: L. tridentata

**Additional observations or notes**

Attach a photo log of the site. Use the table below, or attach separately.

Photo log attached? ☑ Yes ☐ No If no, explain why not

List photographs and include descriptions in the table below.

Number photographs in the order that they are taken. Attach photographs and include annotations of features.

| Photo Number | Photograph description |
|---|---|
| #01 rohwm_ | Road |

**Photos**

#01 rohwm_
Road

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U.S. Army Corps of Engineers (USACE)

**RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET**

The proponent agency is Headquarters USACE CECW-CO-R.

***From Approved -***
***OMB No. 0710-0025***
***Expires: 01-31-2025***

**AGENCY DISCLOSURE NOTICE**



| Project ID #: Soda Mtn | Site Name: #02 | Date and Time: 09/06/2023 21:05 |
|---|---|---|

| Location (lat/long): 35.172081, -116.15887 | Investigator(s): Bonnie and Luis |
|---|---|

**Step 1** Site overview from remote and online resources
**Check boxes for online resources used to evaluate site:**

☐ gage data ☑ LiDAR ☑ geologic maps
☑ climatic data ☑ satellite imagery ☑ land use maps
☑ aerial photos ☑ topographic maps ☐ Other:

**Describe land use and flow conditions from online resources.**
Were there any recent extreme events (floods or drought)?
Open space. August 2023 storm.

**Step 2** Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or man-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls etc.

Site Conditions: Well developed drainage with multiple low flow channels. Vertical banks on s/w side.

**Step 3 Check the boxes next to the indicators used to identify the location of the OHWM.**
**OHWM is at a transition point,** therefore some indicators that are used to determine location may be just below and above the OHWM. From the drop-down menu next to each indicator, select the appropriate location of the indicator by selecting either just below 'b', at 'x', or just above 'a' the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and to attach a photo log.

**Geomorphic Indicators**

- ☑ **Break in slope:** x
  - ☑ *on the bank:* x
  - ☑ *undercut bank:* x
  - ☐ *valley bottom:*
  - ☐ Other:
- ☑ **Shelving:** b
  - ☐ *shelf at top of bank:*
  - ☐ *natural levee:*
  - ☐ *man-made berms or levees:*
  - ☑ *other berms:* On channel bars.
- ☑ **Channel bar:** b
  - ☑ shelving (berms) on bar:
  - ☐ unvegetated:
  - ☑ vegetation transition (go to veg. indicators) x
  - ☑ sediment transition (go to sed. indicators) x
  - ☐ upper limit of deposition on bar:
- ☑ **Instream bedforms and other bedload transport evidence:** b
  - ☐ Deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.)
  - ☐ Bedforms (e.g., pools, riffles, steps, etc.):
- ☑ *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)* b
- ☐ **Secondary channels:**

**Sediment Indicators**

- ☐ Soil development:
- ☑ Changes in character of soil: a
- ☐ Mudcracks:
  - ☑ Changes in particle-sized distribution: a
  - ☑ Transition from Pebble to Cobble
  - ☐ Upper limit of sand-sized particles
- ☐ Silt deposits

**Vegetation Indicators**

☑ Change in vegetation type and/or density: x

Check the appropriate boxes and select the general vegetation change (e.g., graminoids to woody shrubs). **Describe the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain.**

- ☐ Vegetation absent to:
- ☐ moss to:
- ☐ forbs to:
- ☐ graminoids to:
- ☐ woody shrubs to:
- ☐ deciduous trees to:
- ☐ coniferous trees to:
- ☐ **Vegetation matted down and/or bent:**
- ☐ **Exposed roots below intact soil layer:**

**Ancillary Indicators**

- ☑ Wracking/presence of organic litter: b
- ☐ Presence of large wood:
- ☐ Leaf litter disturbed or washed away:
- ☐ Water staining:
- ☐ Weathered clasts or bedrock?

**Other observed indicators? Describe:** More robust vegetation within ohwm.

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Project ID #: Soda mountain_02

**Step 4** Is additional information needed to support this determination? ☑ Yes ☐ No If yes, describe and attach information to datasheet:

Remote sensing.

**Step 5** Describe rationale for location of OHWM

OHWM Rationale: Change in sedimentation, vegetation, and topography.
OHWM width (ft): 130
OHWM depth (ft): 3.5
Dominant vegetation below OHWM: Larrea and Ambrosia
Dominant vegetation at OHWM:
Dominant vegetation above OHWM: Unvegetated

**Additional observations or notes**

Attach a photo log of the site. Use the table below, or attach separately.

Photo log attached? ☑ Yes ☐ No If no, explain why not

List photographs and include descriptions in the table below.

Number photographs in the order that they are taken. Attach photographs and include annotations of features.

| Photo Number | Photograph description |
|---|---|
| 02 | Facing upslope |

**Photos**

02
Facing upslope SE

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U.S. Army Corps of Engineers (USACE)

**RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET**

The proponent agency is Headquarters USACE CECW-CO-R.

*From Approved - OMB No. 0710-0025 Expires: 01-31-2025*

**AGENCY DISCLOSURE NOTICE**



| Project ID #: Soda Mtn | Site Name: #03 | Date and Time: 09/07/2023 17:28 |
|---|---|---|

| Location (lat/long): 35.166557, -116.168432 | Investigator(s): Bonnie and Luis |
|---|---|

**Step 1** Site overview from remote and online resources
**Check boxes for online resources used to evaluate site:**

☐ gage data ☑ LiDAR ☑ geologic maps
☑ climatic data ☑ satellite imagery ☑ land use maps
☑ aerial photos ☑ topographic maps ☐ Other:

**Describe land use and flow conditions from online resources.**
Were there any recent extreme events (floods or drought)?
Open space. August 2023 storm.

**Step 2** Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or man-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls etc.

Site Conditions: Shallow narrow drainage

**Step 3 Check the boxes next to the indicators used to identify the location of the OHWM.**
**OHWM is at a transition point,** therefore some indicators that are used to determine location may be just below and above the OHWM. From the drop-down menu next to each indicator, select the appropriate location of the indicator by selecting either just below 'b', at 'x', or just above 'a' the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and to attach a photo log.

**Geomorphic Indicators**

☑ **Break in slope:** x
- ☑ *on the bank:* x
- ☐ *undercut bank:*
- ☐ *valley bottom:*
- ☐ Other:

☑ **Shelving:** x
- ☑ *shelf at top of bank:* x
- ☐ *natural levee:*
- ☐ *man-made berms or levees:*
- ☐ *other berms:*

☐ **Channel bar:**
- ☐ shelving (berms) on bar:
- ☐ unvegetated:
- ☐ vegetation transition (go to veg. indicators)
- ☐ sediment transition (go to sed. indicators)
- ☐ upper limit of deposition on bar:

☑ **Instream bedforms and other bedload transport evidence:** b
- ☑ Deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.): b
- ☐ Bedforms (e.g., pools, riffles, steps, etc.):

☐ *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)*

☐ **Secondary channels:**

**Sediment Indicators**

- ☐ Soil development:
- ☑ Changes in character of soil: x
- ☐ Mudcracks:
  - ☑ Changes in particle-sized distribution: x
  - ☑ Transition from Coarse Sand to Pebble
  - ☐ Upper limit of sand-sized particles
- ☐ Silt deposits

**Vegetation Indicators**

☑ Change in vegetation type and/or density: x
Check the appropriate boxes and select the general vegetation change (e.g., graminoids to woody shrubs). **Describe the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain.**

- ☑ Vegetation absent to: Woody Shrubs
- ☐ moss to:
- ☐ forbs to:
- ☐ graminoids to:
- ☐ woody shrubs to:
- ☐ deciduous trees to:
- ☐ coniferous trees to:

☐ **Vegetation matted down and/or bent:**
☐ **Exposed roots below intact soil layer:**

**Ancillary Indicators**

- ☑ Wracking/presence of organic litter: b
- ☐ Presence of large wood:
- ☐ Leaf litter disturbed or washed away:
- ☐ Water staining:
- ☐ Weathered clasts or bedrock?

**Other observed indicators? Describe:** Laurea tridentata more robust on bank.

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Project ID #: Soda mtn #3

**Step 4** Is additional information needed to support this determination? ☑ Yes ☐ No If yes, describe and attach information to datasheet:

Remote sensing data.

**Step 5** Describe rationale for location of OHWM

OHWM Rationale: Change in sedimentation, vegetation, and topography.
OHWM width (ft): 1.5
OHWM depth (ft): 0.3
Dominant vegetation below OHWM: Unvegetation
Dominant vegetation at OHWM: Unvegetated
Dominant vegetation above OHWM: Laurea tridentata.

**Additional observations or notes**

Attach a photo log of the site. Use the table below, or attach separately.

Photo log attached? ☑ Yes ☐ No If no, explain why not

List photographs and include descriptions in the table below.

Number photographs in the order that they are taken. Attach photographs and include annotations of features.

| Photo Number | Photograph description |
|---|---|
| #3 | Weak drainage |

**Photos**

#3
Weak drainage W

*ENG FORM 6250, SEP 2022*

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U.S. Army Corps of Engineers (USACE)

**RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET**

The proponent agency is Headquarters USACE CECW-CO-R.

***From Approved - OMB No. 0710-0025 Expires: 01-31-2025***

**AGENCY DISCLOSURE NOTICE**



| Project ID #: Soda Mountain | Site Name: #04 | Date and Time: 09/07/2023 16:39 |
|---|---|---|

| Location (lat/long): 35.169334, -116.173413 | Investigator(s): Bonnie and Luis |
|---|---|

**Step 1** Site overview from remote and online resources
**Check boxes for online resources used to evaluate site:**

- ☐ gage data
- ☑ LiDAR
- ☑ geologic maps
- ☑ climatic data
- ☑ satellite imagery
- ☑ land use maps
- ☑ aerial photos
- ☑ topographic maps
- ☐ Other:

**Describe land use and flow conditions from online resources.**
Were there any recent extreme events (floods or drought)?
Open space. August 2023 storm.

**Step 2** Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or man-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls etc.

Site Conditions: Channel rounding. Poorly developed. No scour.

**Step 3 Check the boxes next to the indicators used to identify the location of the OHWM.**
**OHWM is at a transition point,** therefore some indicators that are used to determine location may be just below and above the OHWM. From the drop-down menu next to each indicator, select the appropriate location of the indicator by selecting either just below 'b', at 'x', or just above 'a' the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and to attach a photo log.

**Geomorphic Indicators**

- ☑ **Break in slope:** x
  - ☐ *on the bank:*
  - ☐ *undercut bank:*
  - ☐ *valley bottom:*
  - ☑ Other:Shallow depth with sediment sorting
- ☐ **Shelving:**
  - ☐ *shelf at top of bank:*
  - ☐ *natural levee:*
  - ☐ *man-made berms or levees:*
  - ☐ *other berms:*
- ☐ **Channel bar:**
  - ☐ shelving (berms) on bar:
  - ☐ unvegetated:
  - ☐ vegetation transition (go to veg. indicators)
  - ☐ sediment transition (go to sed. indicators)
  - ☐ upper limit of deposition on bar:
- ☐ **Instream bedforms and other bedload transport evidence:**
  - ☐ Deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.)
  - ☐ Bedforms (e.g., pools, riffles, steps, etc.):
- ☐ *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)*
- ☐ **Secondary channels:**

**Sediment Indicators**

- ☐ Soil development
- ☐ Changes in character of soil:
- ☐ Mudcracks:
  - ☑ Changes in particle-sized distribution: x
  - ☑ Transition from Granule to Pebble
  - ☐ Upper limit of sand-sized particles
- ☐ Silt deposits

**Vegetation Indicators**

- ☐ Change in vegetation type and/or density:

**Check the appropriate boxes and select the general vegetation change (e.g., graminoids to woody shrubs). Describe the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain.**

- ☐ vegetation absent to:
- ☐ moss to:
- ☐ forbs to:
- ☐ graminoids to:
- ☐ woody shrubs to:
- ☐ deciduous trees to:
- ☐ coniferous trees to:
- ☐ **Vegetation matted down and/or bent:**
- ☐ **Exposed roots below intact soil layer:**

**Ancillary Indicators**

- ☐ Wracking/presence of organic litter:
- ☐ Presence of large wood:
- ☐ Leaf litter disturbed or washed away:
- ☐ Water staining:
- ☐ Weathered clasts or bedrock?

**Other observed indicators? Describe:** None.

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Project ID #: Soda Mountain_04

**Step 4** Is additional information needed to support this determination? ☐ Yes ☑ No If yes, describe and attach information to datasheet:

**Step 5** Describe rationale for location of OHWM
OHWM Rationale: No ohwm present. Lack in strength and reliability of indicators.
OHWM width (ft):
OHWM depth (ft):
Dominant vegetation below OHWM: Na
Dominant vegetation at OHWM: Na
Dominant vegetation above OHWM: Na

**Additional observations or notes**
Location not dostinct from adjacent lanscape.

Attach a photo log of the site. Use the table below, or attach separately.

Photo log attached? ☑ Yes ☐ No If no, explain why not

List photographs and include descriptions in the table below.

Number photographs in the order that they are taken. Attach photographs and include annotations of features.

| Photo Number | Photograph description |
|---|---|
| 04 | Facing upslope. |

**Photos**

04
Facing upslope. NW

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U.S. Army Corps of Engineers (USACE)

**RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET**

The proponent agency is Headquarters USACE CECW-CO-R.

*From Approved -*
*OMB No. 0710-0025*
*Expires: 01-31-2025*

**AGENCY DISCLOSURE NOTICE**



| Project ID #: Soda Mtn | Site Name: #05 | Date and Time: 09/08/2023 16:52 |
|---|---|---|

| Location (lat/long): 35.164413, -116.182409 | Investigator(s): Bonnue and Luis |
|---|---|

**Step 1** Site overview from remote and online resources
**Check boxes for online resources used to evaluate site:**

☐ gage data ☑ LiDAR ☑ geologic maps
☑ climatic data ☑ satellite imagery ☑ land use maps
☑ aerial photos ☑ topographic maps ☐ Other:

**Describe land use and flow conditions from online resources.**
Were there any recent extreme events (floods or drought)?
Open space. August 2023 storm.

**Step 2** Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or man-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls etc.

Site Conditions: Well developed drainage with multiple low flow channels and multiple hydrology indicators

**Step 3 Check the boxes next to the indicators used to identify the location of the OHWM.**
**OHWM is at a transition point,** therefore some indicators that are used to determine location may be just below and above the OHWM. From the drop-down menu next to each indicator, select the appropriate location of the indicator by selecting either just below 'b', at 'x', or just above 'a' the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and to attach a photo log.

**Geomorphic Indicators**

- ☑ **Break in slope:** x
  - ☑ *on the bank:* x
  - ☐ *undercut bank:*
  - ☐ *valley bottom:*
  - ☐ Other:
- ☐ **Shelving:**
  - ☐ *shelf at top of bank:*
  - ☐ *natural levee:*
  - ☐ *man-made berms or levees:*
  - ☐ *other berms:*
- ☑ **Channel bar:** b
  - ☐ shelving (berms) on bar:
  - ☐ unvegetated:
  - ☐ vegetation transition (go to veg. indicators)
  - ☑ sediment transition (go to sed. indicators) x
  - ☐ upper limit of deposition on bar:
- ☑ **Instream bedforms and other bedload transport evidence:** b
  - ☑ Deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.) b
  - ☐ Bedforms (e.g., pools, riffles, steps, etc.):
  - ☑ *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)* b
- ☐ **Secondary channels:**

**Sediment Indicators**

- ☐ Soil development:
- ☐ Changes in character of soil:
- ☐ Mudcracks:
  - ☑ Changes in particle-sized distribution: x
  - ☑ Transition from Coarse Sand to Cobble
  - ☐ Upper limit of sand-sized particles
- ☐ Silt deposits

**Vegetation Indicators**

- ☑ Change in vegetation type and/or density: x

**Check the appropriate boxes and select the general vegetation change (e.g., graminoids to woody shrubs). Describe the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain.**

- ☐ Vegetation absent to:
- ☐ moss to:
- ☐ forbs to:
- ☐ graminoids to:
- ☑ woody shrubs to: WoodyShrubs
- ☐ deciduous trees to:
- ☐ coniferous trees to:
- ☐ **Vegetation matted down and/or bent:**
- ☐ **Exposed roots below intact soil layer:**

**Ancillary Indicators**

- ☑ Wracking/presence of organic litter: b
- ☐ Presence of large wood:
- ☑ Leaf litter disturbed or washed away: x
- ☐ Water staining:
- ☐ Weathered clasts or bedrock?

**Other observed indicators? Describe:**

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Project ID #: Soda Mountain_05

**Step 4** Is additional information needed to support this determination? ☐ Yes ☑ No If yes, describe and attach information to datasheet:

**Step 5** Describe rationale for location of OHWM

OHWM Rationale: Change in sedimentation, vegetation, and topography.
OHWM width (ft): 60
OHWM depth (ft): 3
Dominant vegetation below OHWM: Larrea tridentata and ambrosia salsola
Dominant vegetation at OHWM: Larrea tridentata and ambrosia salsola
Dominant vegetation above OHWM: Larrea tridentata

**Additional observations or notes**

Attach a photo log of the site. Use the table below, or attach separately.

Photo log attached? ☑ Yes ☐ No If no, explain why not

List photographs and include descriptions in the table below.

Number photographs in the order that they are taken. Attach photographs and include annotations of features.

| Photo Number | Photograph description |
|---|---|
| 05 | Image facing downslope |

**Photos**

05
Image facing downslope SE

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U.S. Army Corps of Engineers (USACE)

**RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET**

The proponent agency is Headquarters USACE CECW-CO-R.

*From Approved - OMB No. 0710-0025 Expires: 01-31-2025*

**AGENCY DISCLOSURE NOTICE**

The public reporting burden for this collection of information, 0710-OHWM, is estimated to average 30 **minutes** per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

| Project ID #: Soda Mountain | Site Name: #06 | Date and Time: 09/07/2023 18:15 |
|---|---|---|

| Location (lat/long): 35.148987, -116.180009 | Investigator(s): Bonnie and Luis |
|---|---|

**Step 1** Site overview from remote and online resources
**Check boxes for online resources used to evaluate site:**

- ☐ gage data
- ☑ LiDAR
- ☑ geologic maps
- ☑ climatic data
- ☑ satellite imagery
- ☑ land use maps
- ☑ aerial photos
- ☑ topographic maps
- ☐ Other:

**Describe land use and flow conditions from online resources.**
Were there any recent extreme events (floods or drought)?
Degraded roadbed. Vehicle use. August 2023 storm.

**Step 2** Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or man-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls etc.

Site Conditions: Segment of road immediately paralleled by upland desert pavement

**Step 3 Check the boxes next to the indicators used to identify the location of the OHWM.**
**OHWM is at a transition point,** therefore some indicators that are used to determine location may be just below and above the OHWM. From the drop-down menu next to each indicator, select the appropriate location of the indicator by selecting either just below 'b', at 'x', or just above 'a' the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and to attach a photo log.

**Geomorphic Indicators**

- ☐ **Break in slope:**
  - ☐ *on the bank:*
  - ☐ *undercut bank:*
  - ☐ *valley bottom:*
  - ☐ Other:
- ☐ **Shelving:**
  - ☐ *shelf at top of bank:*
  - ☐ *natural levee:*
  - ☐ *man-made berms or levees:*
  - ☐ *other berms:*
- ☐ **Channel bar:**
  - ☐ shelving (berms) on bar:
  - ☐ unvegetated:
  - ☐ vegetation transition (go to veg. indicators)
  - ☐ sediment transition (go to sed. indicators)
  - ☐ upper limit of deposition on bar:
- ☐ **Instream bedforms and other bedload transport evidence:**
  - ☐ Deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.)
  - ☐ Bedforms (e.g., pools, riffles, steps, etc.):
- ☐ *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)*
- ☐ **Secondary channels:**

**Sediment Indicators**

- ☐ Soil development:
- ☐ Changes in character of soil:
- ☐ Mudcracks:
  - ☐ Changes in particle-sized distribution:
  - ☐ Transition from to
  - ☐ Upper limit of sand-sized particles
- ☐ Silt deposits

**Vegetation Indicators**

- ☐ Change in vegetation type and/or density:

Check the appropriate boxes and select the general vegetation change (e.g., graminoids to woody shrubs). **Describe the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain.**

- ☐ vegetation absent to:
- ☐ moss to:
- ☐ forbs to:
- ☐ graminoids to:
- ☐ woody shrubs to:
- ☐ deciduous trees to:
- ☐ coniferous trees to:
- ☐ **Vegetation matted down and/or bent:**
- ☐ **Exposed roots below intact soil layer:**

**Ancillary Indicators**

- ☐ Wracking/presence of organic litter:
- ☐ Presence of large wood:
- ☐ Leaf litter disturbed or washed away:
- ☐ Water staining:
- ☐ Weathered clasts or bedrock?

**Other observed indicators? Describe:** No ohwm indicators.

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Project ID #: Soda Mountain_06

**Step 4** Is additional information needed to support this determination? ☐ Yes ☑ No If yes, describe and attach information to datasheet:

**Step 5** Describe rationale for location of OHWM
OHWM Rationale: Na
OHWM width (ft):
OHWM depth (ft):
Dominant vegetation below OHWM: Na
Dominant vegetation at OHWM: Na
Dominant vegetation above OHWM: Na

**Additional observations or notes**
Road does not convey parallel flow.

Attach a photo log of the site. Use the table below, or attach separately.

Photo log attached? ☑ Yes ☐ No If no, explain why not:

List photographs and include descriptions in the table below.
Number photographs in the order that they are taken. Attach photographs and include annotations of features.

| Photo Number | Photograph description |
|---|---|
| 06 | Upslope. Photo direction is perpendicular to road. |

**Photos**

06
Upslope. Photo direction is perpendicular to road. NW

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U.S. Army Corps of Engineers (USACE)

**RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET**

The proponent agency is Headquarters USACE CECW-CO-R.

*From Approved - OMB No. 0710-0025 Expires: 01-31-2025*



| Project ID #: Soda Mountain | Site Name: #07 | Date and Time: 09/07/2023 19:49 |
|---|---|---|
| Location (lat/long): 35.143198, -116.168067 | Investigator(s): Bonnie and Luis | |

**Step 1** Site overview from remote and online resources
**Check boxes for online resources used to evaluate site:**

- ☑ gage data ☑ LiDAR ☑ geologic maps
- ☑ climatic data ☑ satellite imagery ☑ land use maps
- ☑ aerial photos ☑ topographic maps ☐ Other:

**Describe land use and flow conditions from online resources.**
Were there any recent extreme events (floods or drought)?
Open space. August 2023 storm.

**Step 2** Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or man-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls etc.

Site Conditions: Broad well defined drainages with multiple lowflow channels

**Step 3 Check the boxes next to the indicators used to identify the location of the OHWM.**
**OHWM is at a transition point,** therefore some indicators that are used to determine location may be just below and above the OHWM. From the drop-down menu next to each indicator, select the appropriate location of the indicator by selecting either just below 'b', at 'x', or just above 'a' the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and to attach a photo log.

**Geomorphic Indicators**

- ☑ **Break in slope:** x
  - ☑ *on the bank:* x
  - ☐ *undercut bank:*
  - ☐ *valley bottom:*
  - ☐ Other:
- ☐ **Shelving:**
  - ☐ *shelf at top of bank:*
  - ☐ *natural levee:*
  - ☐ *man-made berms or levees:*
  - ☐ *other berms:*
- ☑ **Channel bar:** b
  - ☐ shelving (berms) on bar:
  - ☐ unvegetated:
  - ☑ vegetation transition (go to veg. indicators) b
  - ☑ sediment transition (go to sed. indicators) x
  - ☐ upper limit of deposition on bar:
- ☑ **Instream bedforms and other bedload transport evidence:** b
  - ☑ Deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.) b
  - ☐ Bedforms (e.g., pools, riffles, steps, etc.):
- ☑ *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)* x
- ☐ **Secondary channels:**

**Sediment Indicators**

- ☐ Soil development
- ☐ Changes in character of soil:
- ☐ Mudcracks:
  - ☑ Changes in particle-sized distribution: b
  - ☑ Transition from Pebble to Cobble
  - ☐ Upper limit of sand-sized particles
- ☐ Silt deposits

**Vegetation Indicators**

- ☑ Change in vegetation type and/or density: x

**Check the appropriate boxes and select the general vegetation change (e.g., graminoids to woody shrubs). Describe the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain.**

- ☐ Vegetation absent to:
- ☐ moss to:
- ☐ forbs to:
- ☐ graminoids to:
- ☑ woody shrubs to: WoodyShrubs
- ☐ deciduous trees to:
- ☐ coniferous trees to:
- ☐ **Vegetation matted down and/or bent:**
- ☐ **Exposed roots below intact soil layer:**

**Ancillary Indicators**

- ☑ Wracking/presence of organic litter: b
- ☐ Presence of large wood:
- ☐ Leaf litter disturbed or washed away:
- ☐ Water staining:
- ☐ Weathered clasts or bedrock?

**Other observed indicators? Describe:** Laurea tridentata robustness aling ohwm. Ambrosia salsola (cheesebush) below ohwm but not above.

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Project ID #: Soda mtn #7

**Step 4** Is additional information needed to support this determination? ☑ Yes ☐ No If yes, describe and attach information to datasheet:

Remote sensing data.

**Step 5** Describe rationale for location of OHWM

OHWM Rationale: Change in sedimentation, vegetation, and topography.
OHWM width (ft): 275
OHWM depth (ft): 1.5
Dominant vegetation below OHWM: L. tridentata and A. salsola.
Dominant vegetation at OHWM:
Dominant vegetation above OHWM: L. tridentata

**Additional observations or notes**

Attach a photo log of the site. Use the table below, or attach separately.

Photo log attached? ☑ Yes ☐ No If no, explain why not

List photographs and include descriptions in the table below.

Number photographs in the order that they are taken. Attach photographs and include annotations of features.

| Photo Number | Photograph description |
| --- | --- |
| #7 | Portion of ohwm extent |

**Photos**

#7
Portion of ohwm extent W

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U.S. Army Corps of Engineers (USACE)

**RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET**

The proponent agency is Headquarters USACE CECW-CO-R.

*From Approved - OMB No. 0710-0025 Expires: 01-31-2025*

**AGENCY DISCLOSURE NOTICE**



| | | |
|---|---|---|
| Project ID #: Soda Mountain | Site Name: #08 | Date and Time: 09/07/2023 19:14 |
| Location (lat/long): 35.138014, -116.168682 | Investigator(s): Bonnie and Luis | |

**Step 1** Site overview from remote and online resources
**Check boxes for online resources used to evaluate site:**

- ☐ gage data
- ☑ LiDAR
- ☑ geologic maps
- ☑ climatic data
- ☑ satellite imagery
- ☑ land use maps
- ☑ aerial photos
- ☑ topographic maps
- ☐ Other:

**Describe land use and flow conditions from online resources.**
Were there any recent extreme events (floods or drought)?
Open space. August 2023 storm.

**Step 2** Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or man-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls etc.

Site Conditions: Shallow narrow drainage with sediment sorting.

**Step 3 Check the boxes next to the indicators used to identify the location of the OHWM.**
**OHWM is at a transition point,** therefore some indicators that are used to determine location may be just below and above the OHWM. From the drop-down menu next to each indicator, select the appropriate location of the indicator by selecting either just below 'b', at 'x', or just above 'a' the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and to attach a photo log.

**Geomorphic indicators**

- ☑ **Break in slope: x**
  - ☐ *on the bank:*
  - ☐ *undercut bank:*
  - ☐ *valley bottom:*
  - ☑ Other: Rounded banks. Lower elevation than
- ☐ **Shelving:**
  - ☐ *shelf at top of bank:*
  - ☐ *natural levee:*
  - ☐ *man-made berms or levees:*
  - ☐ *other berms:*
- ☐ **Channel bar:**
  - ☐ shelving (berms) on bar:
  - ☐ unvegetated:
  - ☐ vegetation transition (go to veg. indicators)
  - ☐ sediment transition (go to sed. indicators)
  - ☐ upper limit of deposition on bar:
- ☑ **Instream bedforms and other bedload transport evidence: b**
  - ☑ Deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.) b
  - ☐ Bedforms (e.g., pools, riffles, steps, etc.):
  - ☑ *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.) b*
- ☐ **Secondary channels:**

**Sediment Indicators**

- ☐ Soil development
- ☐ Changes in character of soil:
- ☐ Mudcracks:
  - ☑ Changes in particle-sized distribution: a
  - ☑ Transition from Medium Sand to Medium Sand, Pebble
  - ☐ Upper limit of sand-sized particles
- ☐ Silt deposits

**Vegetation Indicators**

- ☑ **Change in vegetation type and/or density: x**
  Check the appropriate boxes and select the general vegetation change (e.g., graminoids to woody shrubs). **Describe the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain.**
  - ☑ vegetation absent to: Woody Shrubs
  - ☐ moss to:
  - ☐ forbs to:
  - ☐ graminoids to:
  - ☐ woody shrubs to:
  - ☐ deciduous trees to:
  - ☐ coniferous trees to:
- ☐ **Vegetation matted down and/or bent:**
- ☐ **Exposed roots below intact soil layer:**

**Ancillary Indicators**

- ☑ Wracking/presence of organic litter: b
- ☐ Presence of large wood:
- ☐ Leaf litter disturbed or washed away:
- ☐ Water staining:
- ☐ Weathered clasts or bedrock?

**Other observed indicators? Describe:** Larrea along feature is more robust than larrea beyond.

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Project ID #: Soda Mountain_08

**Step 4** Is additional information needed to support this determination? ☑ Yes ☐ No If yes, describe and attach information to datasheet:

Remote eensing

**Step 5** Describe rationale for location of OHWM

OHWM Rationale: Change in vegetation, sedimentation, and topography.
OHWM width (ft): 3
OHWM depth (ft): 0.167
Dominant vegetation below OHWM: None
Dominant vegetation at OHWM:
Dominant vegetation above OHWM: Larrea

**Additional observations or notes**

Attach a photo log of the site. Use the table below, or attach separately.

Photo log attached? ☑ Yes ☐ No If no, explain why not

List photographs and include descriptions in the table below.

Number photographs in the order that they are taken. Attach photographs and include annotations of features.

| Photo Number | Photograph description |
|---|---|
| 08 | Downslope |

**Photos**

08
Downslope ESE

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U.S. Army Corps of Engineers (USACE)

**RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET**

The proponent agency is Headquarters USACE CECW-CO-R.

***From Approved -***
***OMB No. 0710-0025***
***Expires: 01-31-2025***



| | | |
|---|---|---|
| Project ID #: Soda Mountain | Site Name: #09 | Date and Time: 09/06/2023 22:37 |

| | |
|---|---|
| Location (lat/long): 35.141901, -116.189309 | Investigator(s): Bonnie and Luis |

**Step 1** Site overview from remote and online resources
**Check boxes for online resources used to evaluate site:**

☐ gage data ☑ LiDAR ☑ geologic maps
☑ climatic data ☑ satellite imagery ☑ land use maps
☑ aerial photos ☑ topographic maps ☐ Other:

**Describe land use and flow conditions from online resources.**
Were there any recent extreme events (floods or drought)?
Open space. August 2023 storm.

**Step 2** Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or man-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls etc.

Site Conditions: Shallow channel 9 ft wide bordered by uplands

**Step 3 Check the boxes next to the indicators used to identify the location of the OHWM.**
**OHWM is at a transition point,** therefore some indicators that are used to determine location may be just below and above the OHWM. From the drop-down menu next to each indicator, select the appropriate location of the indicator by selecting either just below 'b', at 'x', or just above 'a' the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and to attach a photo log.

**Geomorphic indicators**

☑ **Break in slope: x**
- ☐ *on the bank:*
- ☐ *undercut bank:*
- ☐ *valley bottom:*
- ☑ Other:Shallow depth with sedimentation as

☐ **Shelving:**
- ☐ *shelf at top of bank:*
- ☐ *natural levee:*
- ☐ *man-made berms or levees:*
- ☐ *other berms:*

☑ **Channel bar: b**
- ☐ shelving (berms) on bar:
- ☑ unvegetated: b
- ☐ vegetation transition (go to veg. indicators)
- ☐ sediment transition (go to sed. indicators)
- ☐ upper limit of deposition on bar:

☑ **Instream bedforms and other bedload transport evidence: b**
- ☐ Deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.)
- ☐ Bedforms (e.g., pools, riffles, steps, etc.):

☐ *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)*

☐ **Secondary channels:**

**Sediment Indicators**

☐ Soil development:
☑ Changes in character of soil: x
☐ Mudcracks:
- ☑ Changes in particle-sized distribution: x
- ☑ Transition from Pebble to Cobble
- ☐ Upper limit of sand-sized particles

☐ Silt deposits

**Vegetation Indicators**

☑ Change in vegetation type and/or density: x
**Check the appropriate boxes and select the general vegetation change (e.g., graminoids to woody shrubs). Describe the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain.**

- ☑ vegetation absent to: Woody Shrubs
- ☐ moss to:
- ☐ forbs to:
- ☐ graminoids to:
- ☐ woody shrubs to:
- ☐ deciduous trees to:
- ☐ coniferous trees to:

☑ **Vegetation matted down and/or bent: b**
☐ **Exposed roots below intact soil layer:**

**Ancillary Indicators**

☑ Wracking/presence of organic litter: b
☐ Presence of large wood:
☐ Leaf litter disturbed or washed away:
☐ Water staining:
☐ Weathered clasts or bedrock?

**Other observed indicators? Describe:** Water impression marks

Project ID #: Soda mtn #9

**Step 4** Is additional information needed to support this determination? ☑ Yes ☐ No If yes, describe and attach information to datasheet:

Remote sensing data

**Step 5** Describe rationale for location of OHWM

OHWM Rationale: Change in sedimentation, vegetation, and topograohy.
OHWM width (ft): 9
OHWM depth (ft): 0.167
Dominant vegetation below OHWM: Unvegetated
Dominant vegetation at OHWM: Ambrosia sp
Dominant vegetation above OHWM: Laurea tridentata

**Additional observations or notes**

Attach a photo log of the site. Use the table below, or attach separately.

Photo log attached? ☑ Yes ☐ No If no, explain why not

List photographs and include descriptions in the table below.

Number photographs in the order that they are taken. Attach photographs and include annotations of features.

| Photo Number | Photograph description |
|---|---|
| _rohwm#9 | #9 |

**Photos**

_rohwm E

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U.S. Army Corps of Engineers (USACE)

**RAPID ORDINARY HIGH WATER MARK (OHWM) FIELD IDENTIFICATION DATA SHEET**

The proponent agency is Headquarters USACE CECW-CO-R.

*From Approved - OMB No. 0710-0025 Expires: 01-31-2025*

**AGENCY DISCLOSURE NOTICE**



| Project ID #: Soda Mountain | Site Name: #10 | Date and Time: 09/08/2023 16:21 |
|---|---|---|

| Location (lat/long): 35.169095, -116.185545 | Investigator(s): Bonnie and Luis |
|---|---|

**Step 1** Site overview from remote and online resources
**Check boxes for online resources used to evaluate site:**

☑ gage data ☑ LiDAR ☑ geologic maps
☑ climatic data ☑ satellite imagery ☑ land use maps
☑ aerial photos ☑ topographic maps ☐ Other:

**Describe land use and flow conditions from online resources.**
Were there any recent extreme events (floods or drought)?
Open space. August 2023 storm.

**Step 2** Site conditions during field assessment. First look for changes in channel shape, depositional and erosional features, and changes in vegetation and sediment type, size, density, and distribution. Make note of natural or man-made disturbances that would affect flow and channel form, such as bridges, riprap, landslides, rockfalls etc.

Site Conditions: Well defined active drainage with multiple indicators. Dirt utility access road and downstream elevated roadway modifies hydrology.

**Step 3 Check the boxes next to the indicators used to identify the location of the OHWM.**
**OHWM is at a transition point,** therefore some indicators that are used to determine location may be just below and above the OHWM. From the drop-down menu next to each indicator, select the appropriate location of the indicator by selecting either just below 'b', at 'x', or just above 'a' the OHWM.
Go to page 2 to describe overall rationale for location of OHWM, write any additional observations, and to attach a photo log.

**Geomorphic Indicators**

☑ **Break in slope:** x
- ☑ *on the bank:* x
- ☐ *undercut bank:*
- ☐ *valley bottom:*
- ☐ Other:

☐ **Shelving:**
- ☐ *shelf at top of bank:*
- ☐ *natural levee:*
- ☐ *man-made berms or levees:*
- ☐ *other berms:*

☑ **Channel bar:** b
- ☐ shelving (berms) on bar:
- ☐ unvegetated:
- ☐ vegetation transition (go to veg. indicators):
- ☑ sediment transition (go to sed. indicators) x
- ☐ upper limit of deposition on bar:

☑ **Instream bedforms and other bedload transport evidence:** b
- ☑ Deposition bedload indicators (e.g., imbricated clasts, gravel sheets, etc.) b
- ☐ Bedforms (e.g., pools, riffles, steps, etc.):

☑ *erosional bedload indicators (e.g., obstacle marks, scour, smoothing, etc.)* b

☐ **Secondary channels:**

**Sediment Indicators**

☐ Soil development
☑ Changes in character of soil: x
☐ Mudcracks:
- ☑ Changes in particle-sized distribution: x
- ☑ Transition from Very Coarse Sand to Cobble
- ☐ Upper limit of sand-sized particles

☐ Silt deposits

**Vegetation Indicators**

☑ Change in vegetation type and/or density: b

**Check the appropriate boxes and select the general vegetation change (e.g., graminoids to woody shrubs). Describe the vegetation transition looking from the middle of the channel, up the banks, and into the floodplain.**

☐ Vegetation absent to:
☐ moss to:

☐ forbs to:
☐ graminoids to:
☑ woody shrubs to: WoodyShrubs
☐ deciduous trees to:
☐ coniferous trees to:
☐ **Vegetation matted down and/or bent:**
☐ **Exposed roots below intact soil layer:**

**Ancillary Indicators**

☑ Wracking/presence of organic litter: b
☐ Presence of large wood:
☑ Leaf litter disturbed or washed away: b
☐ Water staining:
☐ Weathered clasts or bedrock?

**Other observed indicators? Describe:** Laurea tridentata more robust along channel than surround.

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Project ID #: Soda mtn #10

**Step 4** Is additional information needed to support this determination? ☐ Yes ☑ No If yes, describe and attach information to datasheet:

**Step 5** Describe rationale for location of OHWM
OHWM Rationale:
OHWM width (ft): 32
OHWM depth (ft): 2
Dominant vegetation below OHWM: L. tridentata and Ambrosia sp.
Dominant vegetation at OHWM: L. tridentata
Dominant vegetation above OHWM: L. tridentata.

**Additional observations or notes**

Attach a photo log of the site. Use the table below, or attach separately.

Photo log attached? ☑ Yes ☐ No If no, explain why not

List photographs and include descriptions in the table below.

Number photographs in the order that they are taken. Attach photographs and include annotations of features.

| Photo Number | Photograph description |
|---|---|
| #10 | |

**Photos**

#10 W

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# APPENDIX E

## Aquatics Resources Inventory Delineation Sheets

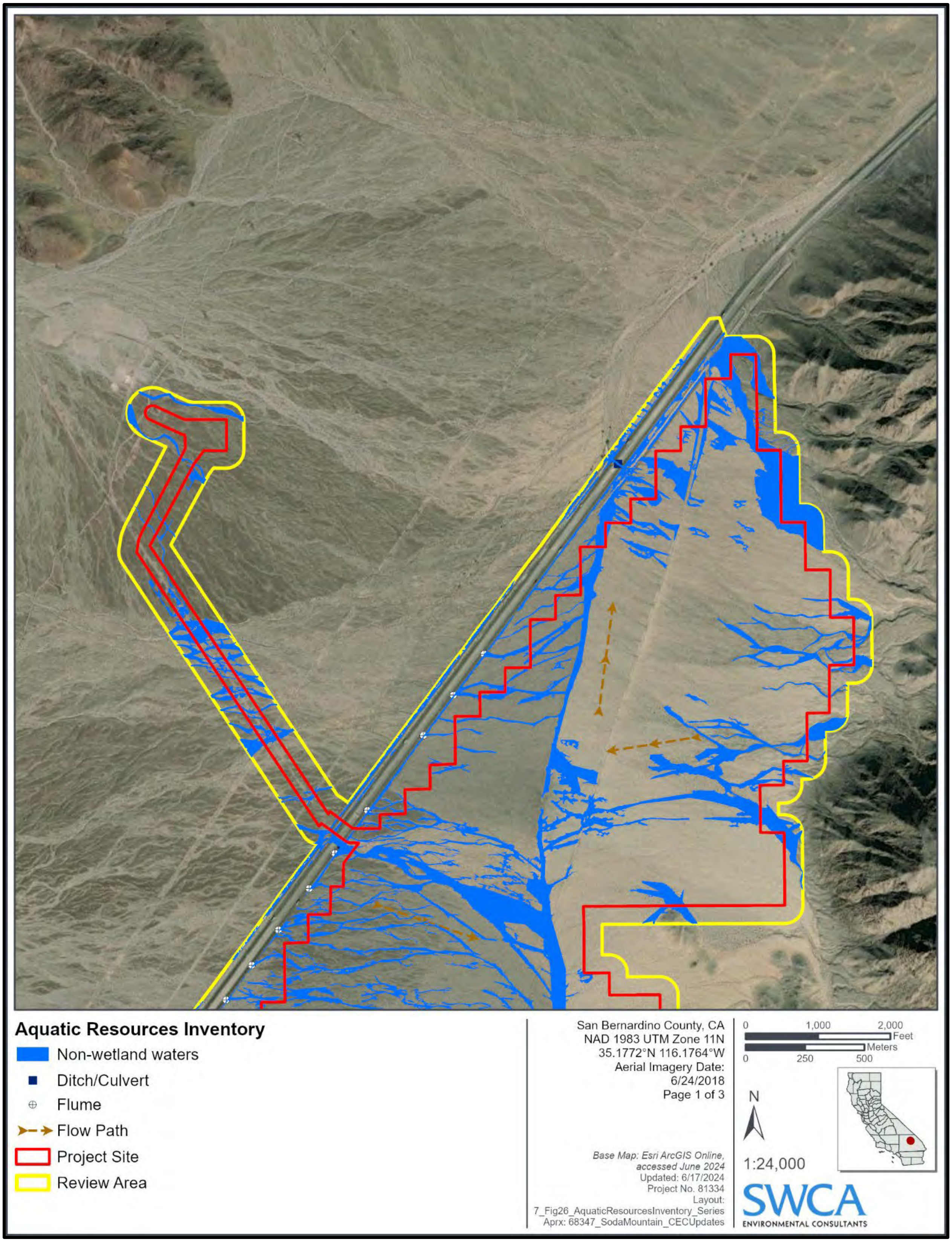


**Figure E-26. Aquatic resources inventory delineation sheet (1 of 3).**

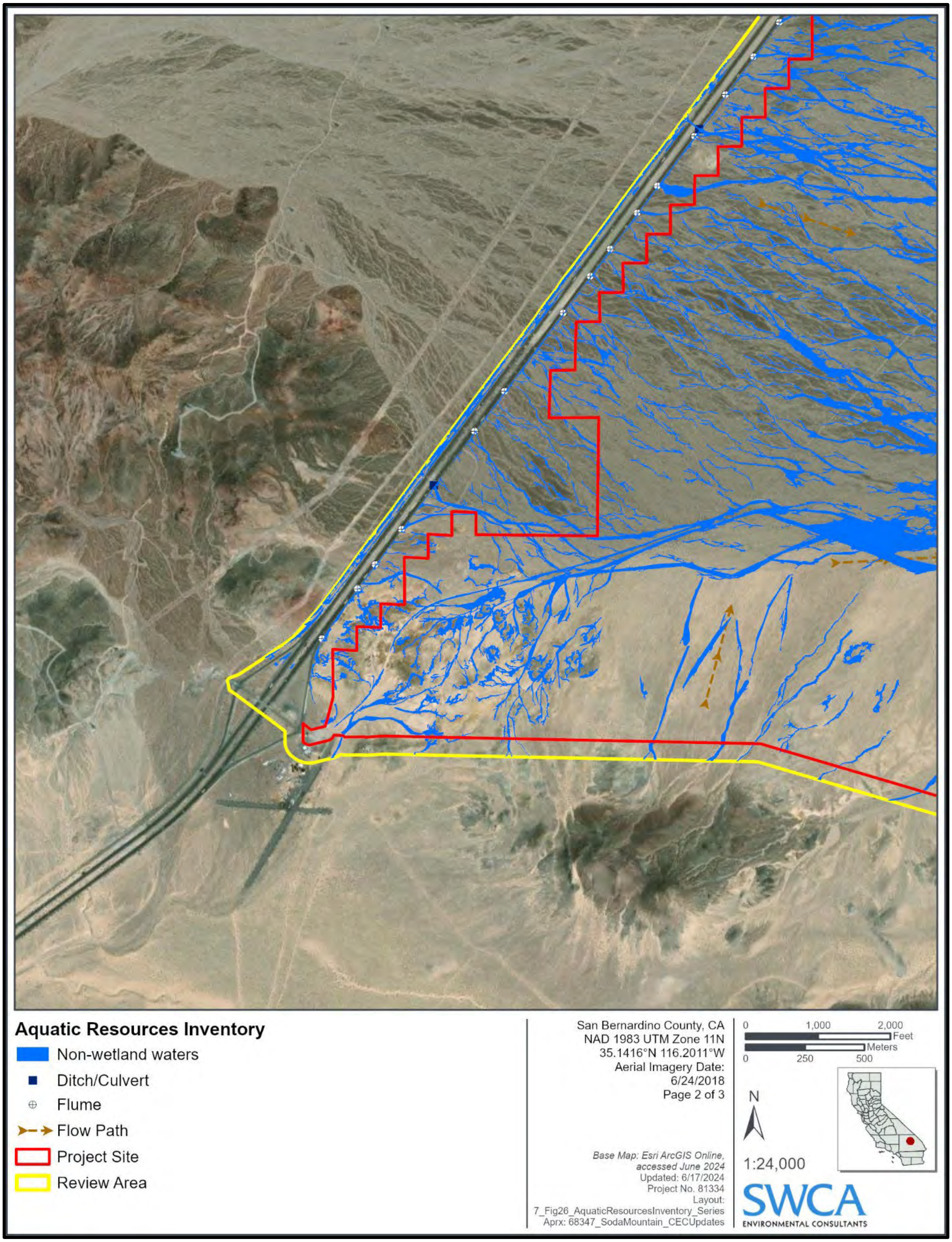


**Figure E-26. Aquatic resources inventory delineation sheet (2 of 3).**

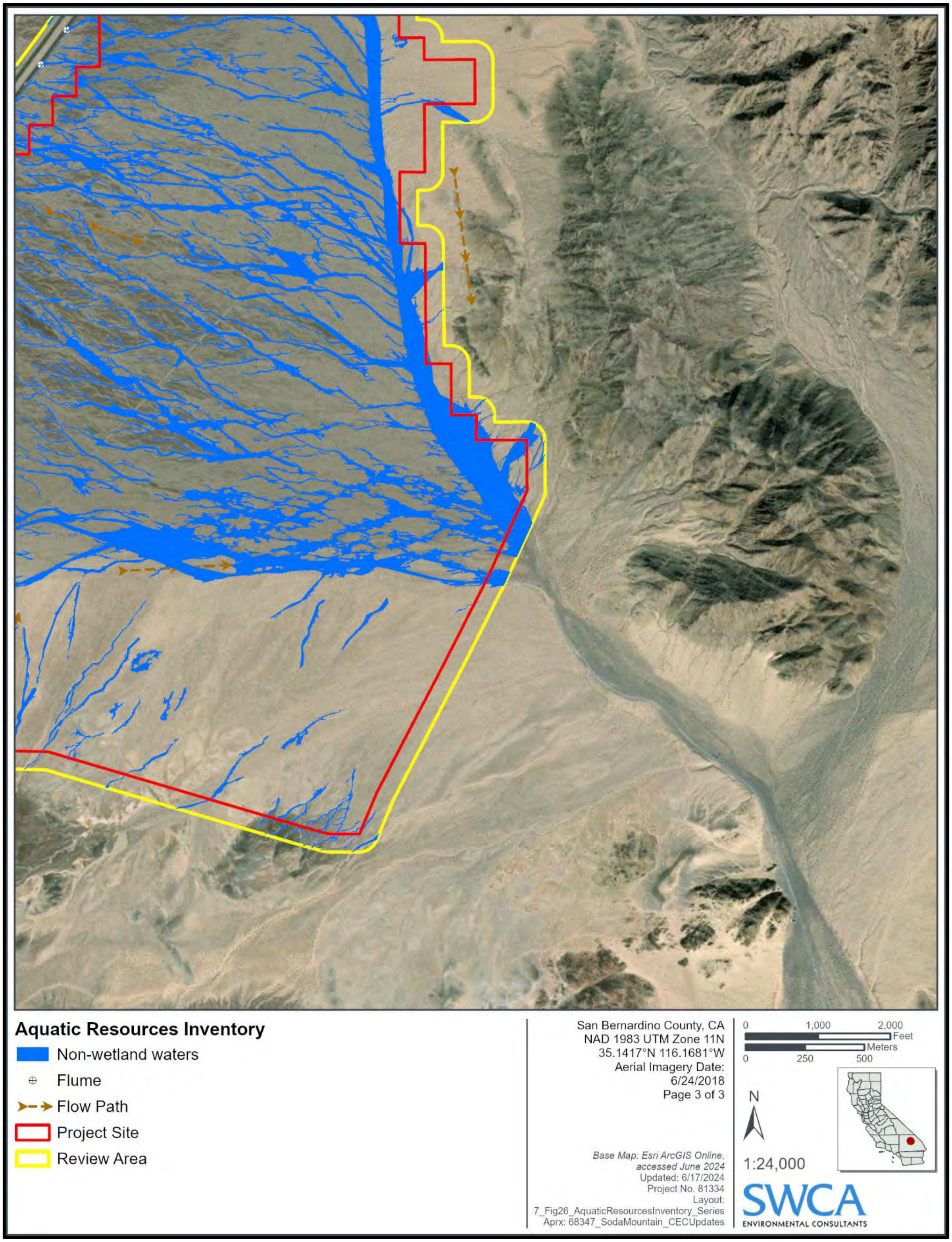


**Figure E-26. Aquatic resources inventory delineation sheet (3 of 3).**