Appendix C

Biological Resources Technical Report

SAN LUIS CANAL GEOTECHNICAL INVESTIGATIONS PROJECT

Biological Resources Technical Report

May 2021

SAN LUIS CANAL GEOTECHNICAL INVESTIGATIONS PROJECT

Biological Resources Technical Report

May 2021

Prepared by
California Department of Water Resources
Division of Engineering

TABLE OF CONTENTS

Biological Resources Technical Report

Appendices

Page

List of Tables

SAN LUIS CANAL GEOTECHNICAL INVESTIGATIONS PROJECT

Biological Resources Technical Report

1.0 Introduction and Purpose

The California Department of Water Resources (DWR) South Central Region Office (SCRO) conducted this assessment of biological resources for the San Luis Canal (SLC) Geotechnical Investigations Project (Project). The primary purpose of the Project is to provide geologic information needed to inform engineering and design plans for elevating the embankments and concrete liner at Pools 17, 18, 20 and 21.

The SLC traverses portions of the San Joaquin Valley (Valley) that have experienced subsidence[1]. Land subsidence in the Valley was first noted near the Delano area in 1935. Since that time, the Valley has undergone several periods of regional aquifer compaction as a result of groundwater extraction, largely for agricultural uses. The resulting land subsidence has reduced the freeboard[2] and capacity of the California Aqueduct system to transport floodwater and deliver irrigation water. The decrease in lined freeboard has decreased or eliminated the potential to store additional water in some Aqueduct pools. The Aqueduct is segmented into pools through a series of check structures, which impound water and offer storage. The reduced storage forces more pumping during expensive periods to meet direct downstream demand.

In June 2017, DWR prepared the California Aqueduct Subsidence Study, which summarized the magnitude, location, and effects of historic and current subsidence on the Aqueduct system. The study determined that in order to maintain delivery capacity, portions of the Aqueduct that have experienced subsidence require retrofitting to extend the concrete liner within the Aqueduct prism to restore storage and conveyance capacity.

In coordination with the US Department of Interior Bureau of Reclamation (Reclamation), DWR is proposing to restore the capacity of Pools 17, 18, 20 and 21 from Aqueduct Milepost (MP) 122 to MP 143 and MP 155 to MP 172 of the SLC in Fresno and Kings Counties (**Figures 1 through 4, located in Appendix A; all Figures referenced in this document are in Appendix A**). Up to 520 geotechnical investigations would occur along the SLC embankments of Pools 17, 18, 20 and 21, within adjacent borrow sites, near utility and irrigation pipelines and specified bridges. Most investigations would occur within the existing DWR/Reclamation right-of-way.

1 Local or regional drop in ground surface elevation

2 Vertical distance between the design water surface and the top of the concrete canal lining

Elevating the embankment would provide the ability to increase the concrete-lined freeboard to mitigate for subsidence-related loss of storage and flow capacity in this segment of the SLC. The Project would:

- Characterize and evaluate the existing soil and subsurface conditions beneath the embankment, bridges, irrigation and utility crossings.
- Evaluate the existing engineered embankment and liner foundation to determine appropriate excavation depths and the requirements for subsidence control measures.
- Evaluate soil composition and chemistry of the potential borrow sites[3] that would provide materials to raise the embankment.
- Evaluate soil for potential contaminants adjacent to abandoned under crossing pipelines.

2.0 Project Description

The Project would use a combination of investigation methods to characterize the foundational soil requirements and soil chemistry properties at up to 520 locations. Investigation methods would be conducted using Cone Penetrometer Testing (CPT), Hollow Stem Auger (HSA), and Hand Auger (HA) drilling methods. HSA and CPT drilling would be completed by drilling contractors, while the HA drilling would be completed by DWR engineering geologists using stainless-steel hand augers. CPTs would involve using a truck-mounted rig to push soil probes into 2.5-inch diameter hand augured holes. HSA methods include rotating the HSA in previously hand augured holes to extract soil cuttings for logging and sampling purposes. All soil cuttings generated by HA or HSA drilling methods would be disposed of at either local landfills or spread on site. Soil cuttings are not generated using CPT drilling methods. Sample location adjustments would be made to avoid the potential to impact biological resources, and in response to observations made in the field during implementation. The number of holes drilled per day would be dependent on the maximum drilling depth and distance between holes. Approximately two to three 15 and 32 foot-holes and one 100-foot hole would be drilled per day. For samples using the HA method, five to six holes would be drilled per day. **Table 1** summarizes approximate sample quantities by exploration area.

TABLE 1
SAMPLE QUANTITIES BY EXPLORATION AREA

Exploration Area	Approximate Number	Maximum Drilling Depth (feet below ground surface)
Embankment Investigations		
CPT	164	100
HSA	57	100
Borrow Area Investigations		
HSA	13	15
HA	110	3-10

[3] A borrow site is an excavated area where material has been dug for use as fill material at another location.

Exploration Area	Approximate Number	Maximum Drilling Depth (feet below ground surface)
Pipeline Area Investigations		
HSA	12	15
Bridge Area Investigations		
HSA	48	100
Irrigation Crossings		
HSA	72	70

3.0 Project Location

The Project investigations would span approximately 41 miles of the SLC. Investigations would occur on both sides of the SLC and adjacent private properties, covering approximately 3,814 acres, though the actual area of impact is focused on the intermittent geotechnical boring locations within the Area of Influence (AOI). The Project footprint as described above is managed by one of DWR's Operation and Maintenance field offices, San Luis Field Division.

4.0 Methods

DWR has collected environmental data in the Project area in conjunction with ongoing maintenance projects. Environmental data recorded within the Project area since 2015 is included and analyzed in this technical report. This includes environmental survey data collected as part of ongoing maintenance projects as well as the proposed Project. A summary of the surveys conducted in the Project area is provided in **Table 2**.

TABLE 2
SURVEYS CONDUCTED WITHIN THE AOI FROM 2015 TO 2020[1]

Project/Activity	Year	Location	Survey Type
Westside Detention Basin Maintenance	2015	Pool 20	Protocol Level Swainson's Hawk
Westside Detention Basin Maintenance	2015	Pool 20	Protocol Level Blunt-nosed Leopard Lizard
Rubber Dam Geotech	2015	Pool 20	Preconstruction Survey
Erosion Repair and Aqueduct Maintenance	2015	Pool 17	Biological Resources Assessment
Erosion Repair and Aqueduct Maintenance	2015	Pool 18	Biological Resources Assessment
Erosion Repair and Aqueduct Maintenance	2015	Pool 20	Biological Resources Assessment
Erosion Repair and Aqueduct Maintenance	2015	Pool 21	Biological Resources Assessment
Access Road Maintenance, Mowing and Grading	2015	Pool 17	Biological Resources Assessment
Access Road Maintenance, Mowing and Grading	2015	Pool 18	Biological Resources Assessment
Access Road Maintenance, Mowing and Grading	2015	Pool 20	Biological Resources Assessment
Access Road Maintenance, Mowing and Grading	2015	Pool 21	Biological Resources Assessment
Westside Detention Basin Maintenance	2016	Pool 20	Protocol Level Swainson's Hawk
Westside Detention Basin Maintenance	2016	Pool 20	Protocol Level Blunt-nosed Leopard Lizard
Cantua Stream Group Improvements Project	2016	Pool 17	Habitat Assessment
Cantua Stream Group Improvements Project	2016	Pool 17	Protocol Level Burrowing Owl

Project/Activity	Year	Location	Survey Type
Cantua Stream Group Improvements Project	2016	Pool 18	Habitat Assessment
Cantua Stream Group Improvements Project	2016	Pool 18	Protocol Level Burrowing Owl
Cantua Stream Group Improvements Project	2016	Pool 17	Burrowing Owl Construction Monitoring
Cantua Stream Group Improvements Project	2016	Pool 18	Burrowing Owl Construction Monitoring
Access Road Maintenance, Mowing and Grading	2016	Pool 17	Biological Resources Assessment
Access Road Maintenance, Mowing and Grading	2016	Pool 18	Biological Resources Assessment
Access Road Maintenance, Mowing and Grading	2016	Pool 20	Biological Resources Assessment
Access Road Maintenance, Mowing and Grading	2016	Pool 21	Biological Resources Assessment
Westside Detention Basin Maintenance	2017	Pool 20	Protocol Level Swainson's Hawk
Westside Detention Basin Maintenance	2017	Pool 20	Protocol Level Blunt-nosed Leopard Lizard
Rubber Dam Repair	2017	Pool 20	Preconstruction Survey
Cantua Stream Group Improvements Project	2017	Pool 17	Burrowing Owl Construction Monitoring
Cantua Stream Group Improvements Project	2017	Pool 18	Burrowing Owl Construction Monitoring
Erosion Repair and Aqueduct Maintenance	2017	Pool 20	Biological Resources Assessment
Erosion Repair and Aqueduct Maintenance	2017	Pool 21	Biological Resources Assessment
Access Road Maintenance, Mowing and Grading	2017	Pool 17	Biological Resources Assessment
Access Road Maintenance, Mowing and Grading	2017	Pool 18	Biological Resources Assessment
Access Road Maintenance, Mowing and Grading	2017	Pool 20	Biological Resources Assessment
Access Road Maintenance, Mowing and Grading	2017	Pool 21	Biological Resources Assessment
Westside Detention Basin Maintenance	2018	Pool 20	Protocol Level Swainson's Hawk
Westside Detention Basin Maintenance	2018	Pool 20	Protocol Level Blunt-nosed Leopard Lizard
Erosion Repair and Aqueduct Maintenance	2018	Pool 17	Biological Resources Assessment
Erosion Repair and Aqueduct Maintenance	2018	Pool 18	Biological Resources Assessment
Westside Detention Basin Maintenance	2019	Pool 20	Protocol Level Swainson's Hawk
Westside Detention Basin Maintenance	2019	Pool 20	Protocol Level Blunt-nosed Leopard Lizard
California Aqueduct Subsidence Program	2019	Pool 20	Reconnaissance Burrowing Owl
California Aqueduct Subsidence Program	2019	Pool 20	Reconnaissance Den and Burrow Survey
California Aqueduct Subsidence Program	2019	Pool 20	Protocol Level Swainson's Hawk
California Aqueduct Subsidence Program	2019	Pool 21	Reconnaissance Burrowing Owl
California Aqueduct Subsidence Program	2019	Pool 21	Reconnaissance Den and Burrow Survey
California Aqueduct Subsidence Program	2019	Pool 21	Protocol Level Swainson's Hawk
Irrigation Crossing Pipe Inspections and Repair Project	2019	Pool 17	Reconnaissance Den and Burrow Survey
Irrigation Crossing Pipe Inspections and Repair Project	2019	Pool 17	Preconstruction Survey
Irrigation Crossing Pipe Inspections and Repair Project	2019	Pool 18	Reconnaissance Den and Burrow Survey
Irrigation Crossing Pipe Inspections and Repair Project	2019	Pool 18	Preconstruction Survey
Irrigation Crossing Pipe Inspections and Repair Project	2019	Pool 20	Reconnaissance Den and Burrow Survey
Irrigation Crossing Pipe Inspections and Repair Project	2019	Pool 20	Preconstruction Survey
Irrigation Crossing Pipe Inspections and Repair Project	2019	Pool 21	Reconnaissance Den and Burrow Survey
Irrigation Crossing Pipe Inspections and Repair Project	2019	Pool 21	Preconstruction Survey
Erosion Repair and Aqueduct Maintenance	2019	Pool 17	Biological Resources Assessment
Erosion Repair and Aqueduct Maintenance	2019	Pool 18	Biological Resources Assessment
Erosion Repair and Aqueduct Maintenance	2019	Pool 20	Biological Resources Assessment

Project/Activity	Year	Location	Survey Type
Erosion Repair and Aqueduct Maintenance	2019	Pool 21	Biological Resources Assessment
Access Road Maintenance, Mowing and Grading	2019	Pool 17	Biological Resources Assessment
Access Road Maintenance, Mowing and Grading	2019	Pool 18	Biological Resources Assessment
Access Road Maintenance, Mowing and Grading	2019	Pool 20	Biological Resources Assessment
Access Road Maintenance, Mowing and Grading	2019	Pool 21	Biological Resources Assessment
Westside Detention Basin Maintenance	2020	Pool 20	Protocol Level Swainson's Hawk
Westside Detention Basin Maintenance	2020	Pool 20	Protocol Level Blunt-nosed Leopard Lizard
Erosion Repair and Aqueduct Maintenance	2020	Pool 17	Biological Resources Assessment
Erosion Repair and Aqueduct Maintenance	2020	Pool 18	Biological Resources Assessment
Erosion Repair and Aqueduct Maintenance	2020	Pool 20	Biological Resources Assessment
Erosion Repair and Aqueduct Maintenance	2020	Pool 21	Biological Resources Assessment
Access Road Maintenance, Mowing and Grading	2020	Pool 17	Biological Resources Assessment
Access Road Maintenance, Mowing and Grading	2020	Pool 18	Biological Resources Assessment
Access Road Maintenance, Mowing and Grading	2020	Pool 20	Biological Resources Assessment
Access Road Maintenance, Mowing and Grading	2020	Pool 21	Biological Resources Assessment
California Aqueduct Subsidence Program	2020	Pool 17	Vegetation Mapping
California Aqueduct Subsidence Program	2020	Pool 18	Vegetation Mapping
California Aqueduct Subsidence Program	2020	Pool 20	Vegetation Mapping
California Aqueduct Subsidence Program	2020	Pool 21	Vegetation Mapping
California Aqueduct Subsidence Program	2020	Pool 17	Land Use Surveys
California Aqueduct Subsidence Program	2020	Pool 18	Land Use Surveys
California Aqueduct Subsidence Program	2020	Pool 20	Land Use Surveys
California Aqueduct Subsidence Program	2020	Pool 21	Land Use Surveys
California Aqueduct Subsidence Program	2020	Pool 17	Reconnaissance Den and Burrow Survey
California Aqueduct Subsidence Program	2020	Pool 18	Reconnaissance Den and Burrow Survey

[1] This table does not include more localized maintenance projects in which special status species observations may have been made but were not detected during a focused survey both in scope or over a large area. However, any species observations collected during these other types of projects not shown in this table have been included in this report.

4.1 Literature Review

Various resources were consulted to generate a thorough list of potential special-status species that could occur within 3 miles of the proposed Project footprint; resources included the California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB) by isolating the occurrences within the search radius using ArcMap (**Appendix B**), the United States Fish and Wildlife Services (USFWS) Information for Planning and Consultation (IPaC) Online System (USFWS, 2020) (**Appendix C**), and Critical Habitat designations (USFWS, 2018).

4.2 Fields Surveys

Field surveys consisted of focused and general evaluations for known and potential special-status species presence. The extent of each survey area was dependent on the presence of suitable

habitat for potential species, the size of the specific maintenance project footprint, and the level of disturbance generated from project activities. All relevant survey data compiled from the last five years in the AOI, which includes the Project footprint and adjacent lands, (**Figures 5 through 8**), is included in this report. Focused surveys were conducted in the AOI for vegetation, land use, and biological resources including burrowing owl (*Athene cunicularia*), canid den and burrows, and Swainson's hawk (*Buteo swainsoni*). General evaluations or biological resource surveys were conducted in localized areas throughout the AOI. Descriptions of the focused surveys and general habitat assessments are provided below.

Land Use Mapping

Land use mapping surveys were conducted in 2020 in the AOI between MP 122 and MP 143 and MP 155 to MP 172. Surveys consisted of driving accessible roads within the SLC right-of-way and stopping when necessary to determine the land use in each parcel. Mapping covered the SLC from the outer boundary of the right-of-way property to the private property parcel boundaries that border the right-of-way. Digitized maps were created by using visible field boundaries based on satellite imagery. Adjacent land use data was recorded using ArcGIS Collector. Land use data recorded included crop type, idle or fallow fields, and native vegetation.

Vegetation and Habitat Mapping

Vegetation and habitat mapping surveys were conducted in 2019 in the AOI between MP 122 and MP 172. Surveys consisted of driving all accessible roads within the SLC right-of-way and stopping when necessary to determine the vegetation alliance present. Mapping covered the SLC right-of-way from the land side edge of the SLC road to the outer boundary of the right-of-way.

Vegetation stands were defined by the dominant species and categorized into vegetation alliances using *A Manual of California Vegetation* (MCV 2009). Each stand identified had both compositional and structural integrity as defined in the CDFW-CNPS Protocol for the Combined Vegetation Rapid Assessment and Relevé Field Form (CDFW-CNPS Protocol 2019). The minimum mapping unit in the CDFW-CNPS Protocol of 1 acre for upland vegetation and 0.5 acre for special stands, including riparian areas and wetlands, was used in the assessments.

Vegetation and habitat data were created or edited using ArcGIS Collector by working with previously digitized maps of delineated vegetation types.

General Habitat Assessment

General habitat assessment surveys have been conducted in various portions of the AOI since 2015 and continue to occur annually for maintenance projects such as erosion repairs and vegetation management. Site-specific surveys were conducted within the AOI at a variety of locations determined by proximity to maintenance projects. During general habitat assessments, all ancillary observations of special-status species and their potential habitat was recorded. These surveys included pedestrian, windshield, or a combination thereof using the SLC access roads, top embankments roads, and toe roads. A species or species' resource was confirmed using a spotting scope or binoculars. In areas of potential interest, such as areas with sensitive or native habitat features, walking surveys were conducted. If vegetation removal was a potential impact

and native habitat was observed, surveys for rare or sensitive plants were conducted. Rare or sensitive plant surveys were conducted on foot by walking transects or using spot sampling within the project footprint. If possible, surveys were conducted during optimal bloom and growth periods, typically April through June.

Blunt-nosed Leopard Lizard

Blunt-nosed leopard lizard (BNLL) surveys have been conducted at the Westside Detention Basin (WDB) annually since 2000. The WDB is located adjacent to the SLC for flood control. Surveys followed the *Approved Survey Methodology for the Blunt-Nosed Leopard Lizard* (CDFW, 2004 and 2019) and were conducted when temperature and weather conditions were consistent with survey protocols. Surveys have been conducted approximately 1-mile upstream and downstream of where the Arroyo Pasajero channel intersects State Route 269 (**Figure 7**). The channel ends over a half-mile west of SLC MP 154 where flood waters disperse within the WDB.

Swainson's Hawk

Swainson's hawk (SWHA) surveys were conducted in 2015 and 2016 in the AOI along the SLC between MP 128 and 141. SWHA surveys have been conducted annually since 2015 where the SLC meets the WDB, MP 153 to MP 158. Additionally, SWHA surveys were conducted between MP 155 and MP 172 in 2019. Surveys were conducted by windshield and methods were consistent with the *Swainson's Hawk Technical Advisory Committee Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley May 31, 2000* (SHTAC 2000). During each survey, an established route was driven slowly to investigate observed raptors or nests. The survey start location alternated with each survey conducted.

Additionally, ancillary observations of nests were documented during annual operation and maintenance environmental clearance assessments between MP 122 to MP 143 and MP 155 to MP 172 since 2015.

Burrowing Owl

Burrowing owl (BUOW) surveys were conducted in various portions of the AOI since 2015 (Table 2). In 2015, a reconnaissance survey was conducted for a flood improvement project. During this reconnaissance survey, all potential BUOW burrow locations between MPs 128.48 to 141.6 were recorded with a Juno global positioning system (GPS) device. In 2016, BUOW surveys were conducted in accordance with the 2012 *Staff Report on Burrowing Owl Mitigation* breeding season survey protocol in Appendix D (CDFW 2012) between the same MPs. The surveys were primarily conducted by windshield in areas where the surrounding area was clearly visible from the vehicle; however, transects were walked where windshield surveys were not adequate to determine presence of BUOW or burrows. Transects were typically spaced 25 to 60 feet apart, depending on topography and vegetation height and density. In 2016 and 2017, additional surveys between MPs 128.48 to 141.6 were conducted to monitor known BUOW occurrences during embankment raises and other related construction activities. More information and maps of surveys can be found in **Appendix D**.

In 2019, all potential BUOW burrow locations between MPs 108.65 to 143.24 and 155.65 to MP 172.40 were recorded and mapped using ArcGIS Collector during proposed geologic activities located at 19 irrigation crossings. The surveys were primarily conducted by windshield in areas where the surrounding landscape was clearly visible from the vehicle; however, transects were walked where windshield surveys were not adequate to determine presence of BUOW or their burrows. Transects were typically spaced 25 to 60 feet apart, depending on topography and vegetation height and density. All potential BUOW burrow locations near various irrigation crossings (DWR 2019) were recorded and mapped using ArcGIS Collector. These burrows were monitored to ensure BUOW did not enter during work to prevent entry into 50-meter buffer zones.

Canid Den and Burrows

Canid den and burrow surveys were conducted in 2019 and 2020 in the AOI on both sides of the SLC from MP 122 to MP 143 and MP 155 to MP 172. Surveys were conducted by windshield and on foot to gain one-hundred percent visual coverage of the Project footprint. Surveyors drove all accessible roads within the Project area and scanned for potential canid dens and medium-sized burrows. In areas where visual coverage could not be obtained by windshield, surveyors walked transects, generally 30 feet wide and in areas with thick vegetation, steep inclines, and in areas where roads were not present. All identified canid dens were mapped using ArcGIS Collector. The condition of the dens and possible species occupying the dens were documented, and photographs were taken.

5.0 Biological Survey Results

5.1 General Setting

The AOI is located in the western San Joaquin Valley. The average temperature ranges from a high of 77 degrees Fahrenheit to a low of 50 degrees Fahrenheit. The average annual precipitation is 8.4 inches (US Climate Data, 2019).

The SLC sits on land alternating between three landforms: floodplain, alluvial fan, and fan skirt (NRCS, 2017). Land in the upper watershed is mainly used for cattle and sheep grazing. Land use on the alluvial fan is dominated by irrigated agriculture.

The Cantua Creek Stream Group (CCSG) watershed is located west of the Project Pools 17 and 18. It originates on the eastern side of the California Coast Range (**Figure 9**). It has a drainage area of 201 square miles. Elevations range from 315 feet near the SLC to over 5,100 feet at Santa Rita Peak. The Cantua Creek Stream watershed consists of five major creeks: Arroyo Hondo, Cantua, Salt, Martinez, and Domengine Creeks. These creeks drain a portion of the Coast Range and generally flow easterly into the western San Joaquin Valley. Presently, floodwaters from these creeks terminate at four locations, or basins, along an approximate 13-mile stretch of the SLC, with Martinez Creek flowing into Salt Creek approximately three miles upstream of the SLC. The large drainage channels can carry significant floodwater and sediment volumes to the basins.

The Arroyo Pasajero Stream Group (APSG) watershed is also located west of the Project, near Pools 20 and 21. It originates on the eastern side of the California Coast Range (**Figure 10**). Elevations range from 325 feet near the SLC to over 5,000 feet to the Diablo Range. The Diablo Range consists mainly of Cretaceous marine rocks such as mudstone, sandstone, and shale. These rock types are known to contain chrysotile asbestos and enter the waterway when erosion occurs. The Arroyo Pasajero and the WDB, which acts as a settling basin, is known to contain the chrysotile asbestos. The APSG watershed consists of four ephemeral creeks that are tributaries to Arroyo Pasajero: Zapato Chino, Los Gatos, Warthan, and Jacalitos Creek. These creeks drain a portion of the Coast Range and generally flow easterly into the western San Joaquin Valley. The large drainage channels can carry significant floodwater and sediment volumes to the Arroyo Pasajero and WDB. The WDB is over 3,500 acres and is where the Arroyo Pasajero channel ends. Features such as a dike, gabion weirs, drain inlets, and a rubber dam were built into the WDB and SLC to control flows, manage sediment and protect adjacent properties.

Additional natural features along the SLC include the Kettleman Hills that border the west. This small range is part of the Coast Range and rise to an elevation of 1,200 feet. The range offers unique geological formations and is composed of marine sedimentary rock and it a source for oil drilling (ArcGIS, 2020).

5.2 Vegetation

Plant diversity along the SLC and adjacent land varies from year to year dependent on many factors. The most influential factors in the AOI are precipitation, natural processes such as erosion or fire, adjacent land use, and maintenance activities. **Table 3** provides a list of plants observed along the SLC and adjacent lands since 2015.

TABLE 3
PLANT SPECIES OBSERVED WITHIN THE AOI

Common Name	Scientific Name
fiddleneck	*Amsinckia menziesii*
ragweed	*Ambrosia psilostachya*
quailbrush	*Atriplex lentiformis*
cattle spinach	*Atriplex polycarpa*
arundo	*Arundo donax*
astragalus	*Astragalus* sp.
slim oat	*Avena barbata*
wild oat	*Avena fatua*
coyote bush	*Baccharis pilularis*
mulefat	*Baccharis salicifolia*
black mustard	*Brassica nigra*
foxtail brome	*Bromus madritensis*
red brome	*Bromus madritensis* ssp. *rubens*
ripgut brome	*Bromus diandrus*

Common Name	Scientific Name
tarweed	*Centromadia* sp.
tocalote	*Centaurea melitensis*
yellow-star thistle	*Centaurea solstitialis*
bindweed	*Convolvulus arvensis*
doveweed	*Croton setigerus*
Jimsonweed	*Datura wrightii*
tarplant	*Deinandra* sp.
Canada horseweed	*Erigeron canadensis*
red-stemmed filaree	*Erodium cicutarium*
heliotrope	*Heliotropium curassavicum*
sunflower	*Helianthus* sp.
foxtail barley	*Hordeum murinum*
prickly lettuce	*Lactuca serriola*
Coulter's horseweed	*Laennecia coulteri*
broadleaved pepperweed	*Lepidium latifolium*
cheeseweed	*Malva parviflora*
common mallow	*Malva neglecta*
horehound	*Marrubium vulgare*
pineapple weed	*Matricaria discoidea*
sweet clover	*Melilotus* sp.
palo verde	*Parkinsonia* sp.
annual bluegrass	*Poa annuua*
mesquite	*Prosopis* sp.
curly dock	*Rumex crispus*
Russian thistle	*Salsola tragus*
London rocket	*Sisymbrium irio*
saltcedar	*Tamarix* sp.
cattails	*Typha* sp.
stinging nettle	*Urtica* sp.

5.3 Land Use

The land use just outside of the right-of-way, within the AOI, is primarily agricultural production. Land not in agricultural production is typically occupied with produce processing plants, equipment storage, fallow fields, rural residences, or homesteads. Pools 17 (MP 122.07 to MP 132.94), 18 (MP 132.95 to MP 143.22), 20 (MP 155.65 to MP 164.71), and 21 (MP 164.72 to MP 172.42) of the SLC are located within the Westlands Water District, which supplies the majority of surface water for agricultural use in their district. A variety of permanent and annual crops are cultivated within the Westlands Water District service area. The largest acreage of crops within the area are permanent crops such as almonds and pistachios. Annual crops include tomatoes,

cotton, melons, beans, lettuce, onions, garlic, and alfalfa. Annual crops optimal for each growing season are planted after the harvest and amendment of the previous crop and soils. This continual working of the land makes it difficult for local native wildlife and plants to establish.

Land use adjacent to Pool 17 in 2020, (**Figure 11**) was primarily almond and pistachio crops. Other permanent crops observed in small acreages were blueberries and grapes. Annual crops that were observed included processing tomatoes and alfalfa. Several idle parcels were also observed adjacent to the SLC.

Land use adjacent to Pool 18 in 2020 (**Figure 12**) was largely observed as idle, which includes lands that have been cropped within the past 3 years or are being prepared for crop production. Idle lands have been used to cultivate annual crops such as lettuce, onions, garlic, tomatoes, and melons. The largest acreage of crops with the AOI at Pool 18 was processing tomatoes. Other annual other crops observed were corn, potatoes, alfalfa, and onions, garlic. Permanent crops included pistachios, almonds, peaches, and grapes.

Land use adjacent to Pool 20 in 2020 (**Figure 13**) was primarily almond and pistachio crops. Other permanent crops observed in small acreages were citrus and grapes. The observed annual crops included processing tomatoes, cotton, onions, garlic, leafy greens, and melons. Several idle parcels were also observed adjacent to the SLC.

Land use adjacent to Pool 21 in 2020 (**Figure 14**) was observed mainly as permanent crops, including almonds, pistachios, peaches, and apricots. Other permanent crops observed in small acreages were citrus and grapes. Idle lands were observed on both sides of the SLC and encompassed less than a quarter of the acreage within the Pool 21 AOI. The largest acreage of crops within the AOI of Pool 21 was almonds. Other annual other crops observed were processing tomatoes, cotton, onions/garlic, melons, and grain.

5.4 Wildlife Movement/Corridors

Wildlife corridors, habitat corridors or green corridors connect populations of wildlife. These areas allow for movement for migration, hunting, to help prevent negative effects of inbreeding and reduced genetic diversity due to the isolation of populations, and for means of escape from events such as fires or disease.

The SLC runs generally north to south along California's Central Valley. The geographically lateral structure can be considered a link of native habitat adjacent to the SLC. However, due to the open water of the SLC, it can also be considered a restriction of movement or barrier for east to west travel of species. On the western side of the Valley, where there are longer stretches of the SLC without road crossings, the SLC and adjacent lands provide movement and migration opportunities for both aquatic and terrestrial species. Where there are overchutes over the SLC, these offer the ability for wildlife to cross from the east or west side safely. Migratory waterfowl and coastal bird species often use the SLC as a resting area.

5.5 Habitats and Natural Communities

After analyzing the vegetation mapping and cross-referencing *A Manual of California Vegetation* (Manual), 21 vegetation alliances were classified within the AOI. From those vegetation alliances, nine habitat types can be distinguished using California Wildlife Habitat Relationships (CWHR) in conjunction with the Manual. Habitat and natural community types present within the AOI include barren, alkali desert scrub, annual grassland, valley foothill riparian, desert riparian, desert scrub, coastal scrub, deciduous orchard, and freshwater emergent wetland (**Table 4**) (CWHR). Discussion of additional land use types, such as cropland, irrigated row crops, and deciduous orchard can be found in the Land Use section. Habitats and Natural Communities within the AOI are depicted in **Figures 15 to 34.**

The three most dominant habitat types in the AOI are barren, desert riparian, and annual grassland. The areas within the AOI that are barren are mainly found on the embankment slopes and the shoulder of the SLC paved roads. Along some of the embankment and SLC road shoulders, where the barren habitat ends, annual grassland can be found. Occurrences of desert riparian consists of mesquite thickets and salt cedar that are found at the toe of the embankment and situated between the agricultural land and the SLC embankment within the right-of-way.

TABLE 4
VEGETATION ALLIANCES AND HABITAT TYPES WITHIN THE AOI.

Vegetation Alliance	Acreage of Vegetation Alliances	Associated CWHR Habitat Type	Acreage of CWHR Habitat Type	Description
fiddleneck- filaree fields	72.65	annual grassland	278.69	Characterized by open grasslands composed of annual grasses and forbs. Often occur as an understory to other habitats. Species diversity and structure depends largely on weather patterns and grazing. Great physical differences are characterized between seasons.
wild oats and annual brome grassland	179.86			
red brome or Mediterranean grass grassland	17.93			
tarplant fields	2.1			
upland mustard and other ruderal forbs*	3.02			
sunflower patches*	5.14			
cheeseweed patches*	0.09			
alkali goldenbush scrub*	1.14	alkali desert scrub	15.96	Characterized by open stands of very low to moderately high (0.25-2.0 m; 0.8-6.6 ft) grayish, spinescent, leptophyllous to microphyllous subshrubs and shrubs, which are physically uniform, widely spaced, and occur on relatively dry soils.
quailbush scrub	1.10			
allscale (*Atriplex*) scrub	13.72			
Fremont cottonwood forest	0.19	valley foothill riparian	1.14	Characterized by sloping alluvial fans, slightly dissected terraces, lower foothills, and coastal plains. They are generally associated with low velocity flows, flood plains, and gentle topography. Valleys provide deep alluvial soils and a high water table. Potential evaporation during the warmest months is often greater than precipitation. Low rainfall and streamflow result in water scarcity in many parts of the area.
Willow thickets	0.95			
mulefat-quailbush*	7.7			

Vegetation Alliance	Acreage of Vegetation Alliances	Associated CWHR Habitat Type	Acreage of CWHR Habitat Type	Description
mesquite thickets*	80.71	desert riparian	89.12	Characterized as dense groves of low shrub like trees. These habitats are found adjacent to permanent surface water (e.g., streams, springs) or in naturally subirrigated areas. Usually an abrupt transition occurs between this and adjacent shorter and more open desert habitats.
Palo verde – mesquite forest*	1.173			
tamarisk thickets	7.24			
coyote brush scrub	0.97	coastal scrub	0.97	Characterized by less exposed sites with low to moderate sized shrubs. Dominated by coyote brush. Different species compositions correspond with available moisture. Common species in the mesic region include black sage and California buckwheat.
bladderpod – mesquite – tree tobacco scrub*	12.77	desert scrub	12.77	Characterized as open, scattered assemblages of broadleaved evergreen or deciduous microphyll shrubs. Canopy cover is generally less than 50 percent, usually much less; bare ground is often between plants.
cattail marshes	3.89	fresh emergent wetland	4.05	Characterized by erect, rooted herbaceous hydrophytes. Dominant vegetation is generally perennial monocots to 2 m (6.6 ft) tall. Are flooded frequently, enough so that anaerobic soil conditions occur.
mulefat thickets	0.16			
bare land	197.21	barren	197.21	Characterized by the absence of vegetation. Any habitat with <2% total vegetation cover by herbaceous, desert, or nonwildland species and <10% cover by tree or shrub species is defined this way. May consist of sparse growth, rock, gravel, and soil.

* Alliances that have sufficient data to propose the vegetation type, but not enough research and regional information to be confident about its status in California's vegetation (California Department of Fish and Wildlife, VegCAMP).

Additional areas on both sides of the SLC contain small patches of alkali desert scrub, desert scrub, and coastal scrub habitat types. The habitat types consist of vegetation alliances with dominant vegetation such as quailbush, allscale, golden bush, coyote brush, and bladder pods (**Figures 15, 16, 18, 22-26, and 29**).

The WDB contains occurrences of valley foothill riparian consisting of cottonwood and willow dominated landscapes (**Figure 27**). As described previously, the WDB is used for sediment management and flood control, receiving ephemeral flows from the Arroyo Pasajero. This has encouraged riparian growth however, the alkaline nature of the area and periodic drought conditions, have allowed for patches of desert scrub to become part of the landscape. In addition, in areas where ponding occurs, freshwater emergent habitat dominated by cattail marshes and mulefat can be observed (**Figures 23, 26 and 27**).

Moving south along both sides of the SLC, portions of the AOI contain small patches of alkali desert scrub, desert scrub, and freshwater emergent wetland habitat types. However, the primary habitat type is annual grassland, dominated by wild oats, annual brome, fiddleneck and filaree (**Figures 15-26 and 28-34**).

As part of a Memorandum of Understanding (MOU) between the State of California (DWR), CDFW, and Reclamation for the development of wildlife habitat on State Water Project lands adjacent to the SLC, a planting effort was conducted in the late 1960s and early 1970s (DFW Excess Lands; **Figures 35-36**). There are eight parcels that constitute MOU lands within the AOI. The northern section contains the following parcels 124, 132, 134, and 139. These parcels span MP 133 to MP 141 and include one or more of the following dominant vegetation types: mesquite, allscale, bladderpods, and coyote brush (**Figures 15-20, Figure 22-26 and Figures 29 and 32**).

The southern section contains the parcels 168, 171, 176, and 180. These parcels span MP 157 to MP 165. Two of these four parcels (Parcels 168 and 171) can be found north of the intersection of Gale Avenue and the SLC (**Figure 15**) and the remaining two (Parcels 176 and 180) can be found along the SLC at MP 162 (**Figure 29**), and at MP 164.5 (**Figures 30 and 31**). The parcels were managed and monitored by CDFW for the term of the agreement. Parcels 168 and 171 did not receive active plantings but because of flood flows and seed dispersal, native vegetation including willow, cottonwood, and atriplex have established naturally. This naturally established native vegetation currently exists in an undisturbed state. These locations are identified valley foothill riparian and desert scrub habitat. Parcels 176 and 180 no longer show any evidence of native plantings or active habitat management and now consist of annual grassland.

Areas where mesquite thickets are recorded, such as the four planted parcels and narrow strips within the SLC right-of-way, were the direct result of the mitigation efforts by CDFW. Mesquite thicket is a provisional alliance since it is dominated by the Chilean mesquite (*Prosopis chilensis*) and not the honey mesquite (*Prosopis glandulosa*) which is ranked as a sensitive community (NatureServe State Rank S3). This habitat type is considered a sensitive natural community if the mesquite present is classified to the *National Vegetation Classification Standard, Version 2*. Natural Vegetation is defined as vegetation where ecological processes primarily determine species and site characteristics; that is, vegetation comprised of a largely spontaneously growing set of plant species that are shaped by both site and biotic processes (Küchler 1969, Westhoff and Van der Maarel 1973). The mesquite thickets that are present within the AOI are not a result of natural, spontaneous processes and are a result of being planted. These thickets more closely follow the definition of Cultural Vegetation, vegetation with a distinctive structure, composition, and development determined by regular human activity, and do not meet the criteria as a sensitive natural community.

Vegetation alliances such as cattail marshes are associated with freshwater emergent wetland habitat, but in the AOI cattails are highly associated with agriculture ponds and canals that are created to hold and transport agriculture water (**Figures 23 through 26**). These ponds and canals are routinely modified, plowed under and re-established. They are also isolated typically by annual grassland, bare ground, or agriculture. Mulefat thickets are in areas of temporary high levels of saturation caused by large rain events (**Figure 27**).

The provisional alliances documented during vegetation mapping are either a result of the mixture of native vegetation and invasive species or relatively small areas where a common native species is dominant and these provisional alliances should not be considered sensitive.

None of the habitat types and associated alliances that exist in the AOI meet the criteria for sensitive natural communities. The lack of species diversity, acreage, and contiguousness are typical obstacles in the AOI and inhibit habitat ecosystems from flourishing or existing in a natural state. All native vegetation patches, including the past artificially established mitigation parcels, exist as remnant native communities. The mitigation parcels have not been maintained and both plantings and native patches receive encroachment from invasive plants and adjacent landowners. Vandalism such as burning, disking, or dumping trash has been a detriment to vegetation stands as well. Habitat types in the AOI associated with native vegetation stands are often isolated by other habitat such as annual grassland or large areas of bare ground.

The habitat types within the AOI are geographically fragmented and persistently regularly disturbed. The highly disturbed nature of the right-of-way within the AOI can be attributed to introduced non-natives and the routine mowing and spraying that is conducted along the SLC. The high intensity of agricultural land use with routine maintenance of the SLC right of way has removed many of the native vegetation stands and species richness that once existed within the AOI.

5.6 General Wildlife

The SLC and adjacent lands also provide a place where many common wildlife species live, breed, and forage. Species diversity in the area is impacted by both natural and human influences such as climate, poaching, habitat encroachment, land use changes, and maintenance activities. **Table 5** lists wildlife observed within the AOI since 2015.

TABLE 5
GENERAL WILDLIFE OBSERVED IN THE AOI.

Common Name	Scientific Name
Reptile and Amphibian	
western toad	*Anaxyrus boreas*
chorus frog	*Pseudacris sierrae*
western side blotch lizard	*Uta stansburiana*
Bird	
grebe	*Podiceps* ssp.
great blue heron	*Ardea herodias*
great white egret	*Ardea alba*
double crested cormorant	*Phalacrocorax auritus*
red-tailed hawk	*Buteo jamaicensis*
Cooper's hawk	*Accipiter cooperii*
turkey vulture	*Cathartes aura*
lesser scaup	*Aythya affinis*
bufflehead	*Bucephala albeola*
mallard	*Anas platyrhynchos*
merlin	*Falco columbarius*

Common Name	Scientific Name
American coot	*Fulica americana*
killdeer	*Charadrius vociferus*
black-necked stilt	*Himantopus mexicanus*
greater yellowlegs	*Tringa melanoleuca*
mourning dove	*Zenaida macroura*
Eurasian collard dove	*Streptopelia decaocto*
barn owl	*Tyto alba*
great horned owl	*Bubo virginianus*
western kingbird	*Tyrannus verticalis*
California scrub jay	*Aphelocoma californica*
common raven	*Corvus corax*
American crow	*Corvus brachyrhynchos*
tree swallow	*Tachycineta bicolor*
cliff swallow	*Petrochelidon pyrrhonota*
barn swallow	*Hirundo rustica*
mockingbird	*Mimus polyglottos*
European starling	*Sturnus vulgaris*
yellow rumped warbler	*Setophaga coronata*
white crowned sparrow	*Zonotrichia leucophrys*
red-winged blackbird	*Agelaius phoeniceus*
western meadow lark	*Sturnella neglecta*
Brewer's blackbird	*Euphagus cyanocephalus*
house finch	*Haemorhous mexicanus*
house sparrow	*Passer domesticus*
Mammal	
cotton tail	*Sylvilagus audubonii*
black tailed jackrabbit	*Lepus californicus*
California ground squirrel	*Otospermophilus beecheyi*
Heermann's kangaroo rat	*Dipodomys heermanni*
California vole	*Microtus californicus*
red fox	*Vulpes vulpes*
gray fox	*Urocyon cinereoargenteus*
coyote	*Canis latrans*
feral pig	*Sus scrofa*
mule deer	*Odocoileus hemionus*

6.0 Special-status Species Results

Special-status species include plants and wildlife that have been designated as special concern, rare, threatened, or endangered under the Federal Endangered Species Act (FESA) or California Endangered Species Act (CESA). Species become listed due to loss of habitat, declining populations, and changes in climate.

Species may also be considered to be rare or endangered under the conditions of Section 15380 of the California Environmental Quality Act Guidelines, such as those identified on lists 1A, 1B, and 2 in the 2019 *Inventory of Rare and Endangered Plants of California* by the California Native Plant Society (CNPS).

Potential to occur for special-status species as assessed as low, medium or high. The low, medium, or high potential for a particular species to occur in the project area is based on the following criteria:

- **None:** The project area and/or immediate vicinity do not provide habitat for a particular species. In addition, the survey area may lie outside the known range for a particular species and/or no known locations of this species occurs within the vicinity of the AOI.
- **Low Potential:** The project area and/or immediate vicinity only provide limited habitat for a particular species. In addition, the survey area may lie outside the known range for a particular species and/or no known locations of this species occurs within the vicinity of the AOI.
- **Medium Potential:** The project area and/or immediate vicinity provide suitable habitat for a particular species and/or known locations of this species occurs within the vicinity of the AOI.
- **High Potential:** The project area and/or immediate vicinity provide high-quality or ideal habitat (i.e., soils, vegetation assemblage, and topography) for a particular species and/or known locations of this species occurs within the vicinity of the AOI.

6.1 Special-status Plants

As discussed in Section 5.5, most of the plants within the right of way are invasive non-natives. The high intensity of agricultural land use and routine maintenance of the SLC right of way has removed many of the habitat types and habitat that once existed within the AOI. No plants found in the literature review have critical habitat designations. The following special status plants in **Table 6** have low to medium probability of occurrence.

TABLE 6
SPECIAL STATUS PLANTS RECORDED NEAR THE AOI; CNDDB, CNPS, AND THE IPAC.

Scientific Name	Common Name	Status	Habitat	Probability of Occurrence
Plants				
Atriplex cordulata	Heartscale	1B.2	Native and endemic to California. Annual herb found in chenopod scrub, meadows and seeps, and valley and foothill grasslands with saline or alkaline soils.	Low. Valley grassland habitat is present, but lacks alkaline soils. No detections of the species during surveys or occurrences recorded on CNDDB with 3 miles of AOI.
Caulanthus californicus	California Jewel Flower	FE/SE/1B.1	Native and endemic to California. Annual herb found in shadscale scrub, valley grassland, pinyon-juniper woodland.	Low. Valley grassland habitat is present. No detections of the species during surveys or occurrences recorded on CNDDB with 3 miles of AOI.
Eryngium spinosepalum	Spiny-sepaled button-celery	1B.2	Native and endemic to California. Annual or perineal herb. Usually found in grassland, riparian wetland, and wetlands, occasionally found in non-wetlands.	Low. Valley grassland habitat is present, but lack available wetlands. No detections of the species during surveys or occurrences recorded on CNDDB with 3 miles of AOI.
Layia munzii	Munz's tidy-tips	1B.2	Native and endemic to California. Usually found in valley grassland, shadscale scrub, and wetland-riparian habitats.	Low. Valley grassland habitat is present, but lack available wetlands. No detections of the species during surveys or occurrences recorded on CNDDB with 3 miles of AOI.
Lepidium jaredii album	Panoche pepper-grass	1B.2	Native and endemic to California. Usually found in valley grassland habitat.	Medium. Valley grassland habitat is present. No detections of the species during surveys or occurrences recorded on CNDDB with 3 miles of AOI.
Monolopia congdonii	San Joaquin woollythreads	1B.2	Native and endemic to California. Usually found in valley grassland, shadscale scrub, and wetland, occasionally non-wetland.	Low. Valley grassland habitat is present, but lack available wetlands. No detections of the species during surveys or occurrences recorded on CNDDB with 3 miles of AOI.

FE = Federally Endangered; SE= California Endangered; FT = Federally Threatened; ST= California Threatened; 1B.1= Plants Seriously Rare or Endangered in California; 1B.2 = Plants Rare, Threatened, or Endangered in California and Elsewhere

6.2 Special-Status Wildlife

Table 7 lists special-status wildlife species that have the potential to occur within the AOI based on literature reviews, field survey observations, or the presence of suitable habitat. Documented occurrences of special-status species are illustrated in **Figures 15 through 34**.

TABLE 7
SPECIAL STATUS WILDLIFE SPECIES RECORDED WITHIN THE AOI; CNDDB AND THE IPAC.

Scientific Name	Common Name	Status	Habitat	Probability of Occurrence
Invertebrates				
Bombus crotchii	Crotch bumble bee	Candidate SE	Found historically across the whole central valley. Can be found foraging in grasslands and pollenating any available blooms. During wintering can be found living underground.	Medium. Suitable habitat is available in the AOI. The species has not been detected during surveys. There is one recorded occurrence within 3 miles on CNDDB.
Branchinecta lynchi	*Vernal pool fairy shrimp	FT	Ephemeral freshwater habitats, including alkaline pools, clay flats, vernal pools, vernal lakes, vernal swales, and other types of seasonal wetlands.	None. Suitable habitat is not present in the AOI. No recorded detections within 3 miles on CNDDB.
Fish				
Hypomesus transpacificus	Delta smelt	FT/SE	The upper Sacramento-San Joaquin Delta of California.	None. Suitable habitat is not present in the AOI. No recorded detections within 3 miles on CNDDB.
Amphibians				
Ambystoma californiense	California tiger salamander	FT/SE	Restricted to grasslands and low foothills with pools or ponds that are necessary for breeding.	None. Although marginal upland habitat is present, no breeding habitat is identified within the AOI. There are no recorded detections of the species within 3 miles on CNDDB.
Spea hammondii	Western spadefoot	SSC	Found in lowland habitats such as washed, floodplains, alluvial fans, and alkali flats. Prefer areas of open vegetation and short grasses in sandy or gravelly soils.	Present. Suitable habitat is present within the AOI. Temporary stands of water from storms or ag runoff is present from year to year. The species has been detected during surveys and there are recorded occurrences within 3 miles on CNDDB.
Rana draytonii	California red-legged frog	FT/SSC	Annual grassland and grassy understory of valley-foothill hardwood habitats in central and northern California. Needs underground refuges and vernal pools or other seasonal water sources.	None. Although marginal grassland habitat is present there is no suitable water sources in the AOI. There are no recorded detections of the species within 3 miles on CNDDB.
Reptiles				
Actinemys marmorata	Western pond turtle	SSC	Found in ponds, marshes, rivers, streams, and irrigation ditches with aquatic vegetation. Requires basking sites and suitable upland habitat for egg-laying. Nest sites most often characterized as having gentle slopes (<15%) with little vegetation or sandy banks.	Low. Suitable habitat is present within the AOI. The species has not been detected during surveys. There are no recorded occurrences documented in CNDDB within 3 miles of the AOI.

Scientific Name	Common Name	Status	Habitat	Probability of Occurrence
Anniella pulchra	Northern California legless lizard	SSC	Found in the San Joaquin Valley in loose soils with moisture. Prefer habitat being coastal suggest they prefer sandy soils.	Low. Sparse marginal habitat is present within the AOI. The species has not been detected during surveys. One recorded occurrence has been documented in CNDDB within 3 miles of the AOI.
Gambelia sila	*Blunt-nosed leopard lizard	FE/SE	Found in semiarid grasslands, alkali flats, and washes. Prefers flat areas with open space for running, avoiding densely vegetated areas.	Low. Marginal habitat is present within the AOI. The species has not been detected during surveys. There are no recorded occurrences post the 1970s documented in the CNDDB within 3 miles of the AOI.
Arizona elegans occidentalis	California glossy snake	SSC	Most common in desert habitats, also found in arid scrub, rocky washes, grasslands, and chaparral. Prefers open areas and areas with loose soils for burrowing. Spends the day and winter in mammal burrows and rock outcrops.	Low. Marginal habitat is present within the AOI. The species has not been detected during surveys. There are no recorded occurrences documented in CNDDB within 3 miles of the AOI.
Coluber flagellum ruddocki	San Joaquin coachwhip	SSC	Open arid grassland and scrub areas.	Present. Suitable habitat is present within the AOI. The species has been detected within the AOI and north of the AOI during surveys. There are no recorded occurrences documented in CNDDB within 3 miles of the AOI.
Birds				
Falco mexicanus	Prairie falcon	BCC	Found in annual grasslands to alpine meadows, but associated primarily with perennial grasslands, savannahs, rangeland, some agricultural fields, and desert scrub areas.	Present. Suitable habitat is present within the AOI. Detections have been made during surveys, however, there are no recorded occurrences within 3 miles on CNDDB.
Falco columbarius	Merlin	BCC	Found in shrubs and trees along rivers and in small groves of deciduous trees. Use grasslands as foraging during migration.	High. Suitable habitat is present within the AOI. This species has been observed during surveys adjacent to the AOI (between Pools 18 and 20) and there are recorded occurrences within 3 miles on CNDDB.
Aquila chrysaetos	*Golden eagle	FP	Found in a variety of habitats including shrublands, grasslands, farmland, and areas along rivers and streams. Prefer partially or completely open country, especially around mountains, hills, and cliffs.	Low. Only foraging habitat is present in the AOI. The species has not been detected during surveys. There are no recorded occurrences documented in CNDDB within 3 miles of the AOI.

Scientific Name	Common Name	Status	Habitat	Probability of Occurrence
Buteo swainsoni	Swainson's hawk	ST	Forages in open and agricultural fields and nests in mature trees usually in riparian corridors.	Present. Foraging and breeding habitat, where suitable nest sites occur, are present within the AOI. This species has been observed during past surveys and documented in the CNDDB.
Elanus leucurus	*White-tailed kite	FP	Found year-round in coastal and valley lowlands; rarely found away from agricultural areas. Inhabits herbaceous and open stages of most habitats mostly in cismontane California.	Present. Suitable habitat is present within the AOI. Historic detections have been made during surveys, however, there are no recorded occurrences within 3 miles on CNDDB.
Circus cyaneus	Northern harrier	SSC	Nests in wet meadows and tall grasslands, forages in grasslands and marshes.	Present. Foraging and breeding habitat are present within the AOI. This species has been observed during past surveys and documented in the CNDDB.
Gymnogyps californianus	California condor	FE	Grassland, chaparral, oak savannah, and coniferous forests. Large trees or cliff faces are required for nesting.	None. Grassland is the only suitable habitat present and there are no nesting opportunities in located in the AOI. There are no recorded occurrences of this species within 3 miles on CNDDB.
Charadrius montanus	Mountain plover	BCC	Found in shortgrass prairies and in high, open, semidesert habitats. It prefers arid areas. Winters in agricultural habitats, prairies, and alkaline flats.	Low. Only wintering habitat is present in the AOI. The species has not been detected during surveys. There are no recorded occurrences documented in CNDDB within 3 miles of the AOI.
Numenius americanus	Long-billed curlew	SSC	Found in lowland areas near agriculture in the interior of California. Central and Imperial valley are important areas for wintering and migrating.	Present. Suitable habitat is present within the AOI. Historic detections have been made during surveys, however, there are no recorded occurrences within 3 miles on CNDDB.
Asio flammeus	Short-eared owl	SSC	Found in prairies, grasslands, meadows and agricultural areas. Prefer large, open areas with low vegetation.	Medium. Suitable habitat is in the AOI, but no detections have been made during surveys. One recorded occurrence was documented in CNDDB approximately 3 miles from the northern end of the area.
Athene cunicularia	Burrowing owl	SSC	Found in open grasslands with low vegetation, golf courses, and disturbed/ruderal habitat in urban areas.	Present. Foraging and breeding habitat are present within the AOI. This species has been observed during past surveys and documented in the CNDDB.
Lanius ludovicianus	Loggerhead shrike	SSC	Inhabits a variety of woodland and open grassland habitats throughout California.	Present. Suitable habitat is present within the AOI. Detections have been made during surveys and there are recorded occurrences within 3 miles on CNDDB.

Scientific Name	Common Name	Status	Habitat	Probability of Occurrence
Eremophila alpestris actia	California horned lark	WL	Found in prairies and heavily grazed pastures. Prefer bare, dry ground and areas of short, sparse vegetation.	Present. Suitable habitat is present within the AOI. This species has been observed during surveys. There are no recorded occurrences within 3 miles on CNDDB.
Agelaius tricolor	Tricolored blackbird	ST	Largely endemic to California, most numerous in the Central Valley and nearby vicinity. Typically requires open water, protected nesting substrate, and foraging grounds within vicinity of the nesting colony. Nests in dense thickets of cattails, tules, willow, blackberry, wild rose, and other tall herbs near fresh water. Also nests in agricultural crops (e.g., silage), where colonies are threatened during harvest.	High. Suitable nesting habitat is sparse for the species. However, this species directly adjacent to the AOI and recorded observations are documented on CNDDB.
Xanthocephalus xanthocephalus	Yellow-headed blackbird	SSC	Nests in shrubs near freshwater marshes or reedy lakes; during migration and winter, prefers open cultivated lands, fields, and pastures.	Present. Suitable nesting habitat is sparse in the AOI. However, historic detections have been made during surveys and recorded on CNDDB.
Mammal				
Ammospermophilus nelsoni	San Joaquin antelope squirrel	ST	Found in relatively arid annual grassland and shrubland communities. Prefer areas with a sparse-to-moderate cover of shrubs such as saltbushes.	None. Marginally suitable habitat is present within the AOI, however this species is considered likely extirpated from the AOI and its current range occurs south of the AOI. Three recorded occurrences from CNDDB pre-date 1952.
Dipodomys nitratoides exilis	Fresno kangaroo rat	FE/SE	Prefer areas of grassland and alkali desert scrub on the San Joaquin Valley floor. Recently they have been found only in alkali sink communities from 200 to 300 feet in elevation.	None. Suitable habitat is not present within the AOI. The species has not been detected during surveys. There are no recorded occurrences documented in CNDDB within 3 miles of the AOI.
Dipodomys ingens	Giant kangaroo rat	FE/SE	Prefers arid, often strongly alkaline, flat plains with sparse vegetation of grasses and alkali forbs.	Low. Although recorded occurrences are documented 3 miles west of the area, suitable habitat is not present within the AOI.
Onychomys torridus	Tulare grasshopper mouse	SSC	Found in arid shrubland communities in hot, arid grassland and shrubland associations, such as saltbush scrub.	None. Suitable habitat is not present within the AOI. The species has not been detected during surveys. There are no recorded occurrences documented in CNDDB within 3 miles of the AOI.

Scientific Name	Common Name	Status	Habitat	Probability of Occurrence
Vulpes macrotis mutica	San Joaquin kit fox	FE/ST	Grassland or grassy open stages with scattered shrubby vegetation; requires loose textured sandy soils for burrowing; requires suitable prey base of small rodents.	Medium. Suitable habitat is present within the AOI. Detections have not been made during surveys but has been documented as a corridor for the species. There are recorded occurrences within 3 miles on CNDDB.
Taxidea taxus	American badger	SSC	Found in dry, open grasslands, fields, and pastures. Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils.	High. Suitable habitat is present within the AOI. This species has been observed north of the AOI and recorded observations are documented on CNDDB.

Special status species observed within the AOI during any of the field include the following: western spadefoot, San Joaquin coachwhip, burrowing owl, Swainson's hawk, northern harrier, prairie falcon, horned lark, white-tailed kite, yellow-headed blackbird and loggerhead shrike, yellow headed blackbird, white-tailed kite, and long- billed curlew.

Western spadefoot has also been documented in the WDB. Tadpoles and adult toads have been observed in puddles during years of high rainfall and where large pooling of water occurs.

Burrowing owl is one of the most consistently observed special status species throughout the Project area. Since 2015, 45 detections have been made in the AOI. Agricultural fields within the AOI provide cover and food for small mammals, providing a prey source for the BUOW. Numerous ground squirrel burrows and canid dens large enough for BUOW occupation exist on the SLC embankment. The owls utilize the SLC embankment and atypical burrows such as irrigation pipes, culverts, etc. for burrowing opportunities. During the 2016 surveys a minimum of 13 occupied burrows were observed within a 13-mile stretch of the AOI associated with Pools 17 and 18. At least four others within the 13-mile stretch had BUOW sign. In 2019, a minimum of six occupied burrows were observed. During February and October 2019 surveys of Pools 20 and 21, three confirmed occupied burrows were observed within the AOI, and six other burrows had BUOW sign.

Northern harrier is also commonly observed throughout this area. Annual grassland provides nesting and foraging habitat for the species, as well as the adjacent agricultural fields and fallowed lands. Approximately 43 sightings have been recorded in the AOI from 2015 through 2019. Nesting sites were not identified due to their inconspicuous placement.

Swainson's hawks can be observed throughout the Central Valley during the spring and summer and are documented within the AOI. The species depends on annual grasslands and agricultural fields for foraging. However, the species requires structures or trees for nesting opportunities. In the AOI there are single or small stands of trees spread amongst the agricultural fields and occasionally a structure or homestead with shade trees to provide nesting. Approximately 22 active nest sites have been detected since 2015 within the AOI. During the course of protocol level surveys, 11 nest sites were documented as successful: offspring were monitored and

recorded until fledged. The additional 11 nest sites are nests that have been observed with parent and offspring during general surveys but were not monitored through fledging to confirm success. Most active nests observed in the AOI have been located in available trees such as eucalyptus and large mesquite stands.

Other special status bird species observed in the area include white-tailed kite, prairie falcon, and loggerhead shrike. Foraging and breeding habitat is available to all three species within the AOI. Approximately four sightings of each of the species has been recorded throughout 2016 to 2020. Other nesting bird species observed within the past five years in the AOI include red-tailed hawk, great horned owl, greater road runner, and American crow.

Canid dens and small mammal burrows have been observed within the AOI and SLC embankment. Although small mammal burrow density surveys have not been conducted, the presence of large clusters or complexes have been observed throughout the AOI. In addition, California ground squirrel are regularly observed and are known to forage in adjacent orchards and this small mammal provides a source of prey for local canids. Den and medium-sized burrow surveys were conducted in 2019 within Pools 20 and 21 and in 2020 within Pools 17 and 18, a total of 42 potential dens were documented (**Table 8**).

TABLE 8
SURVEY RESULTS OF DENS AND BURROW LOCATIONS

Milepost	Den	Pool
123.26 Right (R)	No Sign of Use	17
123.26 R	Canid Scat	17
124.79 R	No Sign of Use	17
126.72 R	No Sign of Use	17
127.28 R	No Sign of Use	17
128.34 R	No Sign of Use	17
128.34 R	Canid Scat	17
129.40 Left (L)	No Sign of Use	17
134.19 R	No Sign of Use	18
136.44 L	No Sign of Use	18
136.91 R	No Sign of Use	18
136.91 R	Canid Scat	18
136.95 R	No Sign of Use	18
137.36 R	No Sign of Use	18
137.47 R	No Sign of Use	18
137.52 L	No Sign of Use	18
137.54 R	BUOW Sign	18
137.54 R	BUOW Sign	18
137.63 R	BUOW Sign	18
137.67 R	BUOW Sign	18
139.95 L	No Sign of Use	18

Milepost	Den	Pool
141.13 R	No Sign of Use	18
141.25 L	No Sign of Use	18
155.69L	Coyote	20
155.70L	Coyote	20
156.56L	Coyote	20
158.77L	Coyote	20
159.08R	Coyote	20
159.20L	Coyote	20
159.40L	Coyote	20
159.81L	Coyote	20
161.68L	Coyote	20
161.69L	Coyote	20
161.95L	Burrowing Owl	20
162.01L	Burrowing Owl	20
162.12L	Coyote	20
162.44L	Coyote	20
162.62L	Burrowing Owl	20
162.73L	Burrowing Owl	20
162.81L	Burrowing Owl	20
162.95L	Burrowing Owl	20
163.04L	Coyote	20
163.23L	Burrowing Owl	20
163.24R	Coyote	20
163.36L	Coyote	20
163.39L	Coyote	20
164.20L	Burrowing Owl	21
166.06R	Burrowing Owl	21
167.93L	Coyote	21
168.23L	Coyote	21

Of those associated with Pools 17 and 18, 18 dens had no signs of use, three dens had canid scat nearby and four dens had signs of burrowing owl use. Of those associated with Pools 20 and 21, some canid dens had signs such as fecal droppings, small mammal remains, paw prints, entrance exceeding 6 inches, a large earthen mound in front of entrance, or claw marks along the sides of the den. Canid scat observed was typical of coyote or dog based on sizing. No other evidence such as prints, scratch marks, or typical San Joaquin kit fox or American badger evidence was observed. Signs of burrowing owl usage can consist of burrowing owl present, whitewash, owl pellets, feathers, and insect parts. Thirteen burrows had evidence of one or more of these signs. See **Figures 37 through 46** for locations of burrows and dens in proximity to geotechnical drill sites.

7.0 Impact Analysis

This section considers potential impacts to sensitive biological resources due to the implementation of the proposed Project. Both potential direct and indirect impacts were analyzed based on the changes to existing conditions by Project actions. It should be noted that a majority of the proposed boring locations occur along the roadways located along the top of the canal, though some boring locations do occur within fallow fields, nut orchards or adjacent to trees and other potential structures suitable to support nesting raptors and other migratory birds. Boring activities are anticipated to be temporary and intermittent, with approximately 6 drill holes to be completed in each day. The duration of each boring activity is anticipated to be hours, rather than days.

7.1 Sensitive Natural Communities

Valley foothill riparian, desert riparian and fresh emergent wetland were identified in the AOI; however, geotechnical boring locations have been located to avoid sensitive natural communities. No sensitive natural communities were located within the area of direct impact and project-related activities will not result in direct adverse impacts.

7.2 Special-status Plants

Although no special-status plants are known to occur within the AOI, special status plants have a potential to occur. These special-status plant species include: heartscale (*Atriplex cordulata*), California Jewel Flower (*Caulanthus californicus*), spiny-sepaled button-celery (*Eryngium spinosepalum*), Munz's tidy-tips (*Layia munzii*), Panoche pepper-grass (*Lepidium jaredii album*), and San Joaquin woollythreads (*Monolopia congdonii*). Project-related activities have the potential to impact special-status plant species if present within the footprint of the geotechnical borings through the removal of plants and their habitat. Project-related activities have the potential to facilitate an increase in the disturbance and abundance of invasive plants by directly transporting invasive seed sources on site (and between sites) via equipment and by creating ideal seed beds through ground disturbance and resulting bare soils. However, the drilling equipment would largely remain on established roads, and the risk of propagation of invasive plant species is low. Implementation of biological monitoring required in **Measures BIO-1** and **BIO-4** will ensure that special status plant species are identified and avoided by the drilling operations.

7.3 Special-status Wildlife

Reptiles, Amphibians, and Invertebrates

Table 7 lists the San Joaquin coachwhip known to occur and other special status reptiles that have the potential to occur within the AOI. Although potential to occur is low for the remaining species, ground disturbance could impact individuals. Implementation of **Measures BIO-1 and BIO-4** would ensure that the activity areas near sensitive resources would be cleared of wildlife prior to project activities each working day, avoiding impacts to reptile species. No permanent loss of habitat would occur.

The WDB has been surveyed annually for BNLL for over 20 years. No BNLL have been detected. Although the species may travel along the channel as a corridor, from upstream habitat in the surrounding hills to the valley portions downstream, the project work areas are not expected to support the species. **Measures BIO-1 and BIO-4** would ensure that any individual lizards are flushed from the work area each morning. As a result, the temporary drilling activities would avoid the potential for impacting BNLL.

Western spadefoot toad and San Joaquin coachwhip are known to occur in the area. The temporary geotechnical activities could encounter individuals. Implementation of **Measures BIO-1 and BIO-4** would ensure that the activity areas including the site access and drilling locations would be cleared of wildlife during Project activities, avoiding impacts to the species.

Since no habitat would be removed as part of the Project, impacts to crotch bumble bee are not anticipated.

Potential indirect impacts to amphibians and reptiles such as trash, vehicular collision with construction equipment between boring locations, nighttime lighting, and wildlife being trapped in open holes will be avoided and minimized with implementation of **Measures BIO-5 through BIO-8.**

Avian Species

Project-related activities have the potential to impact raptors and other nesting birds that may occur in the area including prairie falcon, merlin, Swainson's hawk, northern harrier, white-tailed kite, and golden eagle (foraging). Each of these species is either known to occur within the AOI or has potential based on available habitat. Breeding and nesting behavior may be impacted if nests are located near geotechnical investigation-activities due to noise and equipment traffic (potentially causing adult abandonment of the nest, eggs or young to be crushed, and/or reproductive failure). The nesting season extends from February 15 through September 1 (SHTAC 2000). No occupied nest trees will be removed within the proposed footprint for geotechnical borings or boring activities. Geotechnical investigation activities could also temporarily disturb foraging habitat (e.g., annual and perennial grasslands, cropland). However, due to the limited time that activities would be conducted within foraging areas, impacts to foraging behavior are not expected. Implementation of **Measures BIO-1 and BIO-3** would require that nesting bird surveys are conducted within the work areas prior to project activities. If bird nests are observed, the monitor would establish an appropriate buffer between the raptor nests and the work area. As a result, impacts to nesting raptors would be avoided.

Passerine birds and other special status avian species that may nest in vegetation in close proximity to the geotechnical activities also may be affected. Implementation of **Measure BIO-3** would ensure that potential impacts would be minimized through the establishment of buffer areas.

Burrowing owls are common within the AOI. Project-related activities have the potential to impact occupied burrowing owl burrows. If any active burrows occur in the vicinity of the boring locations nesting behavior could be disturbed as a result of noise and traffic (potentially causing adult abandonment of the nest, eggs or young to be crushed, and/or reproductive failure) or by removing destroying burrows. Since the Project would only involve temporary work activity in the vicinity of habitat, long-term displacement or loss of habitat would not occur. **Measure BIO-1** would require pre-activity surveys of the work areas. If needed, **Measure BIO-3** would ensure each drilling location would be modified by the biological monitor to ensure avoidance of burrowing owl burrows. As a result, impacts to burrowing owls would be avoided.

Potential indirect impacts to birds such as trash, vehicular collision with construction equipment between boring locations, nighttime lighting, and wildlife being trapped in open holes will be avoided and minimized with implementation of **Measures BIO-5 through BIO-8**.

Mammals

Canid dens, medium burrows, and small mammal burrows have been observed within the AOI. Project-related activities have the potential to impact San Joaquin kit fox or American badger's use of the area as a corridor as a result of the geotechnical boring noise and equipment traffic. The potential for special status rodent species to occur in the project area is low. Although there is potential for giant kangaroo rat to be present, no occurrences have been documented within the AOI and no sign of giant kangaroo rat were detected at burrows during previous burrow and den surveys. **Measure BIO-1** would require pre-activity surveys of the work areas to identify sensitive resources and **Measure BIO-4** would require monitoring during drilling near identified sensitive resources. The location of each drilling site would be modified by the biological monitor to ensure avoidance of canid burrows. As a result, impacts to mammals would be avoided.

Potential indirect impacts to mammals such as trash, vehicular collision with construction equipment between boring locations, nighttime lighting, and wildlife being trapped in open holes will be avoided and minimized with implementation of **Measures BIO-5 through BIO-8.**

Within the AOI there are 17 bridges that cross the SLC (**Table 9**). Bridges are known to be possible roosting sites for bats. Although no special status bat species have been documented in the area it does not preclude their presence. Past projects have documented bats roosting in bridges or swallow nests on the bridges. There is the potential for bats to use these bridges as temporary roost as they migrate through. Project-related activities have the potential to impact special status bat species if any roosts occur in the vicinity of the geotechnical borings footprint by disturbing species' behavior as a result of noise and traffic (potentially causing adult abandonment of the roost and/or reproductive failure). Since the bridges would not be directly affected during the geotechnical investigations, potential impacts to bats and swallows would be similar to other activities using the bridge, including normal traffic. As a result, impacts to nesting bats and swallows would be avoided.

TABLE 9
BRIDGES CROSSING SLC WITHIN AOI.

Bridges	Milepost	Pool
San Diego Avenue	121.97	17
Highway 33 Bridge/Derrick Avenue	125.31	17
Clarkson Avenue	128.50	17
San Mateo Avenue	130.81	17
Cerini Avenue	132.77	17
Mt. Whitney Avenue	134.90	18
Excelsior Avenue/Parkhurst Avenue	137.06	18
Jeffrey Avenue	139.35	18
Oakland Avenue	141.57	18
Highway 145/Fresno-Coalinga Avenue	143.12	18
Railroad Bridge	155.78	20
Gale Avenue	158.45	20
Jayne Avenue	161.57	20
Avenal Cutoff Road	164.40	20
Plymouth Avenue	167.36	21
30th Avenue	169.40	21
Quail Avenue	170.42	21

7.4 Critical Habitat

Critical habitat boundaries were retrieved from each species' respective Environmental Conservation Online System (ECOS) species profile page (USFWS, 2018). Of the special-status species identified in **Table 7**, only six had critical habitat designations associated with them and were near enough to the AOI to be identified by IPaC database. Species with critical habitat designations include California condor, California red-legged frog, California tiger salamander, delta smelt, Fresno kangaroo rat, and vernal pool fairy shrimp. The species with the closest designated critical habitat was the Fresno kangaroo rat, at over 10 miles north-east of the AOI, however the area between the Project and critical habitat is dominated by permanent agricultural lands with no connecting wildlife corridors. The next closest species is the vernal pool fairy shrimp, at over 20 miles west of the AOI and also separated by permanent agricultural lands and the geography of the coastal range.

8.0 Avoidance and Minimization Measures

Potential impacts would be avoided and minimized through implementation of recommended measures provided below:

Measure BIO 1 Pre-Activity Surveys: A qualified biologist shall conduct pre-activity surveys of each drilling site and off-road access route within 30 days of initiation of project activities. The

pre-activity assessment surveys of the work area will identify and flag special-status wildlife resources including canid dens, special-status plants, and nesting birds for avoidance.

Prior to initiation of work activities in sensitive resources, the qualified biological monitor shall survey the drilling activity area for any wildlife to ensure individuals are allowed to move out of harm's way No nests or dens will be removed or otherwise affected.

Measure BIO 2 Environmental Awareness Training: Prior to work beginning, a Worker Environmental Awareness Program (WEAP) training will be conducted for construction personnel by a qualified biologist. The WEAP training will focus on special-status resources known to occur within the AOI, as well as measures required to avoid impacts to these resources.

Measure BIO 3 Bird Nest Avoidance: For areas where there are known raptor nests or burrowing owls within 250 feet of the access road and drilling locations, work will be scheduled prior to the nesting season, as feasible.

If project-related activities are scheduled during the nesting season (typically February 1 to August 31), focused nest surveys of affected work areas shall be conducted by a qualified biologist within two weeks prior to the beginning of work activities for ground, canopy or man-made structure nesters. The qualified biologist shall survey the area for nests within a minimum of 250-foot radius around project activities.

If the survey identifies an active nest, the qualified biologist shall flag the location and coordinate with construction personnel to modify boring locations to an area outside of a buffer as determined by the qualified biologist in the field. The buffer shall be delineated and shall be in effect throughout construction (for each boring location this should be less that one day) or until the nest is no longer active (i.e., the young are no longer being fed by their parent(s)). The buffer(s) shall be determined based upon the life history of the individual species, including their sensitivity to noise, vibration, ambient levels of human activity and general disturbance, the current site conditions (screening vegetation, terrain, etc.) and the various project-related activities necessary to implement the project. The qualified biologist shall be onsite during the initiation of project activities and if there is a change in the level of activity (i.e., noise level, etc.) to monitor the nest. The buffer between the construction activities and the active nest will ensure that nesting activities are not interrupted.

If no active nests are found, project activities may proceed without modification.

Measure BIO 4 Drilling Location Survey and Avoidance: During boring activities near sensitive resources, a qualified biological monitor will accompany drilling teams at each drilling location. If dens, burrows, or sensitive vegetation are present within the work area, the qualified biologist will coordinate with construction personnel to modify boring locations or-off road access routes to avoid these features. A buffer between potentially active canid dens or potential special-status small mammal burrows and the active work area shall be no less than 50 feet.

The biological monitor shall have the authority to approve drilling locations and off-road access routes and to halt construction activities if special status species are present. The monitor will maintain an electronic log of survey results and drilling location modifications resulting from monitoring activities.

Measure BIO 5 – Vehicle Speed Limit: Except on Federal, State, or County roadways, work-related vehicles will adhere to a speed limit of 15 miles per hour. Vehicular traffic to and from the project site shall use existing routes of travel. Cross country vehicle and equipment use outside designated work areas shall be prohibited. Access roads that are planned for use during construction shall not extend beyond the planned impact area. All vehicle traffic shall be contained within the planned impact area or in previously disturbed areas.

Measure BIO 6 – Timing of Work: Nighttime work will be avoided to avoid active periods of species such as the San Joaquin kit fox.

Measure BIO 7 – Open Holes: Any unfilled holes that may need to be left overnight will be covered and weighted to prevent animals from becoming trapped inside.

Measure BIO 8 – Trash: Any food scraps or other trash items will be stored in wildlife-proof containers and removed offsite, as needed to avoid attracting any special-status species or their predators (i.e., common ravens, coyotes, or feral dogs) to the work areas.

9.0 Conclusions

Burrowing owl, Swainson's hawk, northern harrier, prairie falcon, and loggerhead shrike were identified in the AOI. No sensitive plants have been identified.

As noted in **Table 7**, the Project footprint may support fourteen additional special status wildlife species that may use the area for foraging, movement, or breeding, including the following: Crotch bumble bee, western spadefoot, San Joaquin coachwhip, long-billed curlew, merlin, short-eared owl, white-tailed kite, California horned lark, tri-colored blackbird, yellow-headed blackbird, Western mastiff bat, pallid bat, San Joaquin kit fox, and American badger. The Project footprint may support three special status plant species: California jewel flower, San Joaquin woolythread, and Panoche pepper-grass.

No sensitive habitat types were identified in the AOI because of the non-natural and poor species richness of the identified communities.

Due to the presence of special-status wildlife resources such as burrowing owl and Swainson's hawk, avoidance and minimization measures will be implemented. Implementation of measures will avoid or minimize potential impacts to special status species.

10.0 References

California Department of Fish and Wildlife and California Native Plant Society. 2019. CDFW-CNPS Protocol for the Combined Vegetation Rapid Assessment and Relevé Field Form. June 2019.

California Department of Fish and Wildlife, California Natural Diversity Database. 2018. Special Animals List. Special Plant and Animal Lists. Periodic publication. Available online at: https://www.dfg.ca.gov/wildlife/nongame/list.html/.

California Department of Fish and Wildlife, Vegetation Classification and Mapping Program (VegCAMP). Natural Communities. September 9, 2020. Available online at: https://www.wildlife.ca.gov/Data/VegCAMP/Natural-Communities

California Department of Fish and Wildlife. 2020. CNDDB electronic database. Available online at: https://www.dfg.ca.gov/biogeodata/cnddb/

California Department of Fish and Game. 2012. Staff Report on Burrowing Owl Mitigation. March 7, 2012

California Department of Fish and Game. 1988. California Resources Agency, A Guide to Wildlife Habitats of California. Edited by Kenneth E. Mayer and William F. Laudenslayer, Jr. Department of Fish and Game Sacramento, CA.

California Department of Water Resources. 2019. Irrigation Crossing Pipe Inspections and Repair Project Survey Findings.

California Native Plant Society (CNPS). A Manual of California Vegetation, Online Edition. http://www.cnps.org/cnps/vegetation/

California Native Plant Society (CNPS). 2019a. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Available online at: http://www.rareplants.cnps.org

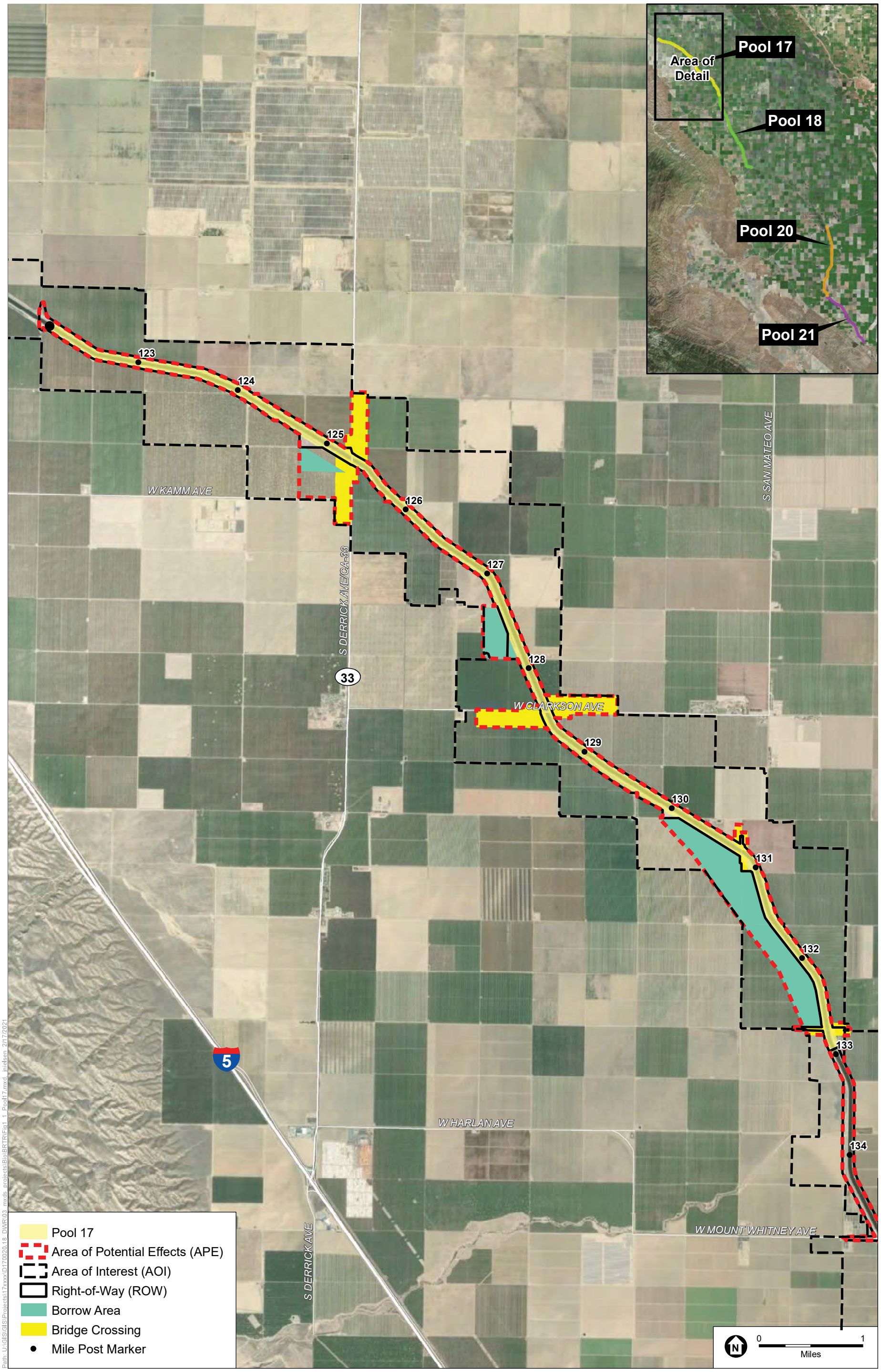
Natural Resources Conservation Service (NRCS). USDA. Geomorphic Description System Version 5. 2017. Available online at: https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051068.pdf

Swainson's Hawk Technical Advisory Committee (SHTAC). 2000. Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley.

United States Fish and Wildlife Service. 2018. Information for Planning and Conservation (IPaC). IPaC electronic database. Available online at: https://ecos.fws.gov/ipac/

United States Fish and Wildlife Service. 2018. Environmental Conservation Online System Species Reports. Available online at: https://ecos.fws.gov/ecp/report/species

Appendix A
Figures

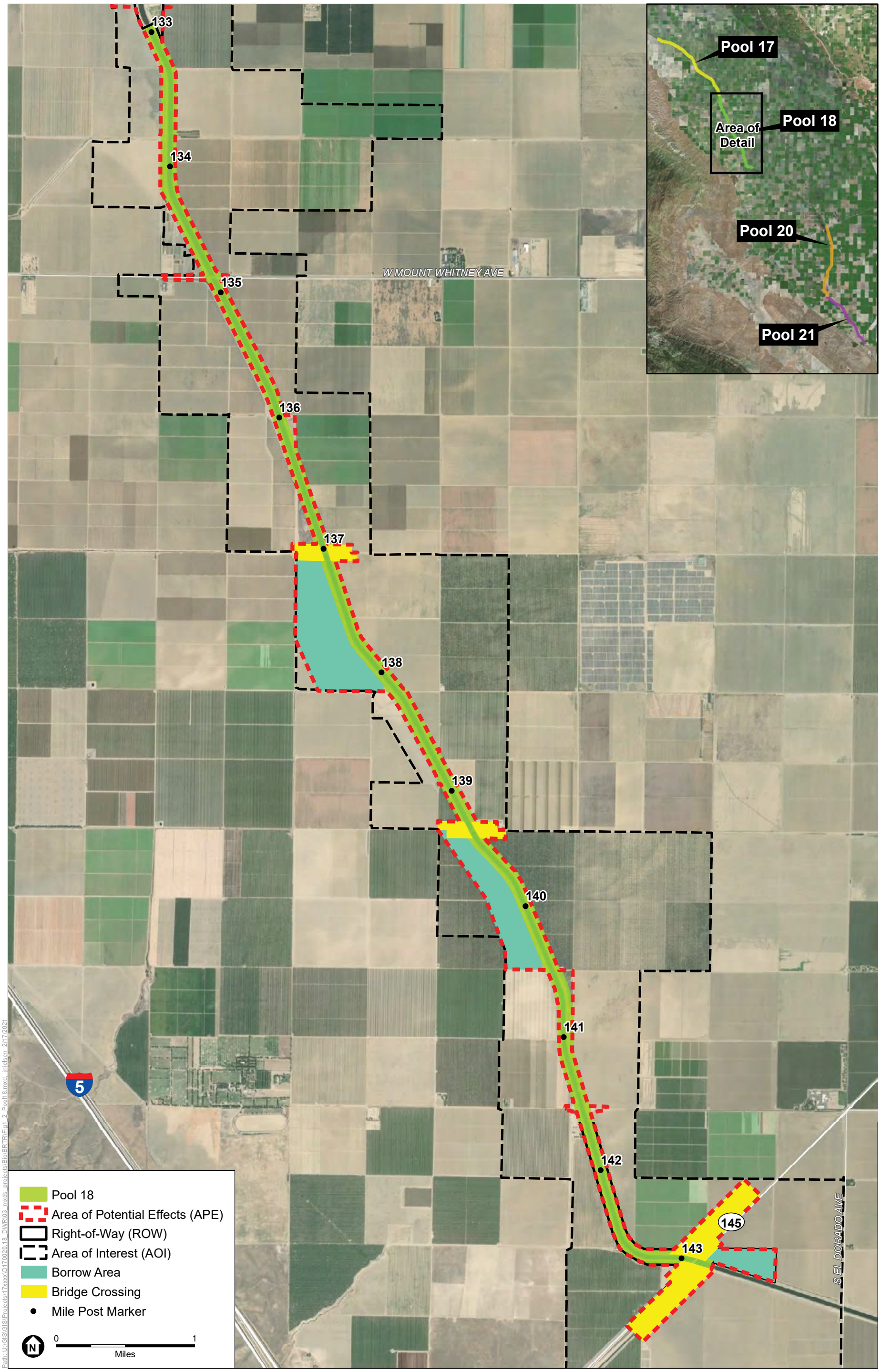


SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 1
Geotechnical Exploration Project Location Pool 17

ESA

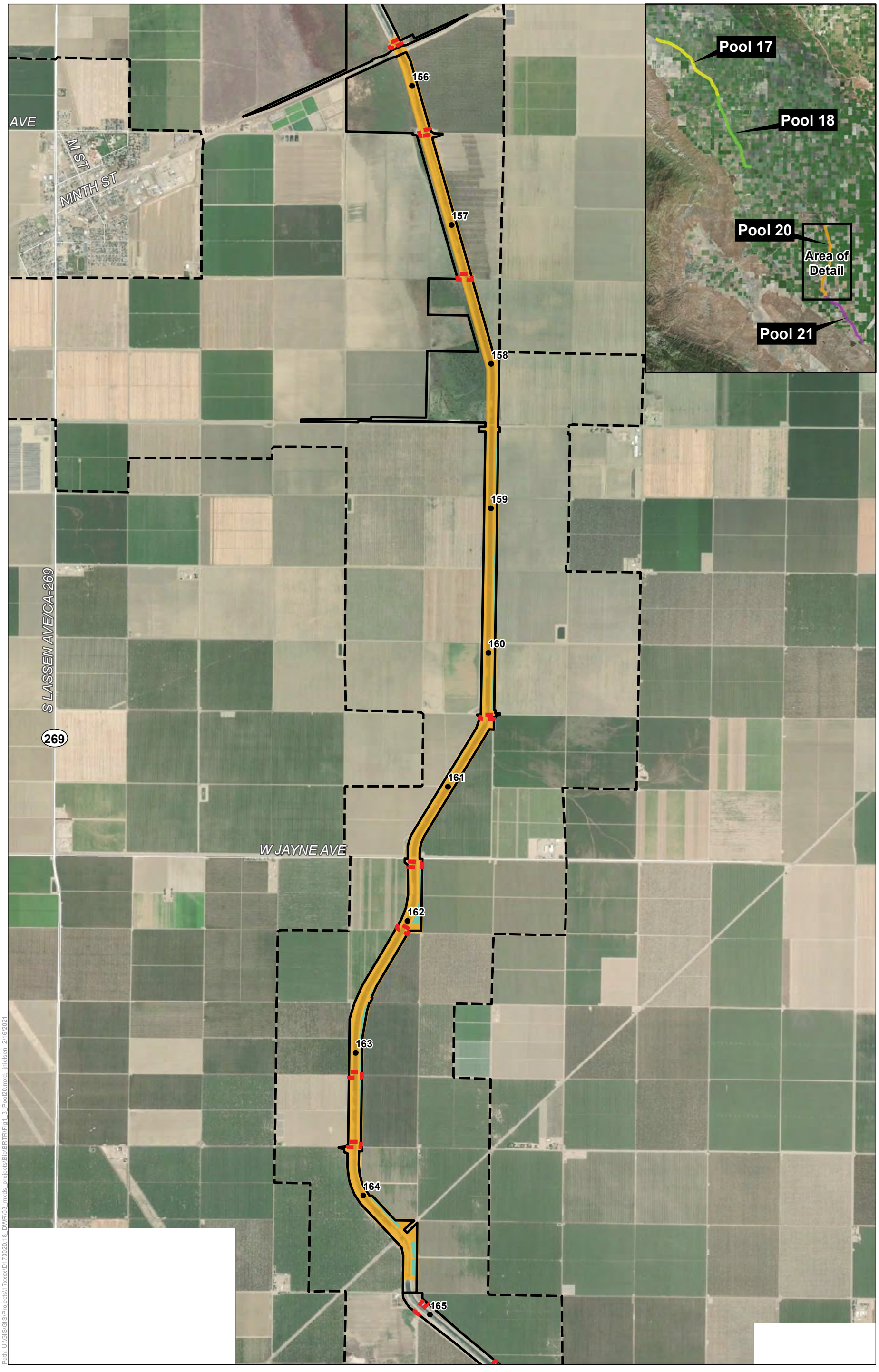


SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 2
Geotechnical Exploration Project Location Pool 18

ESA



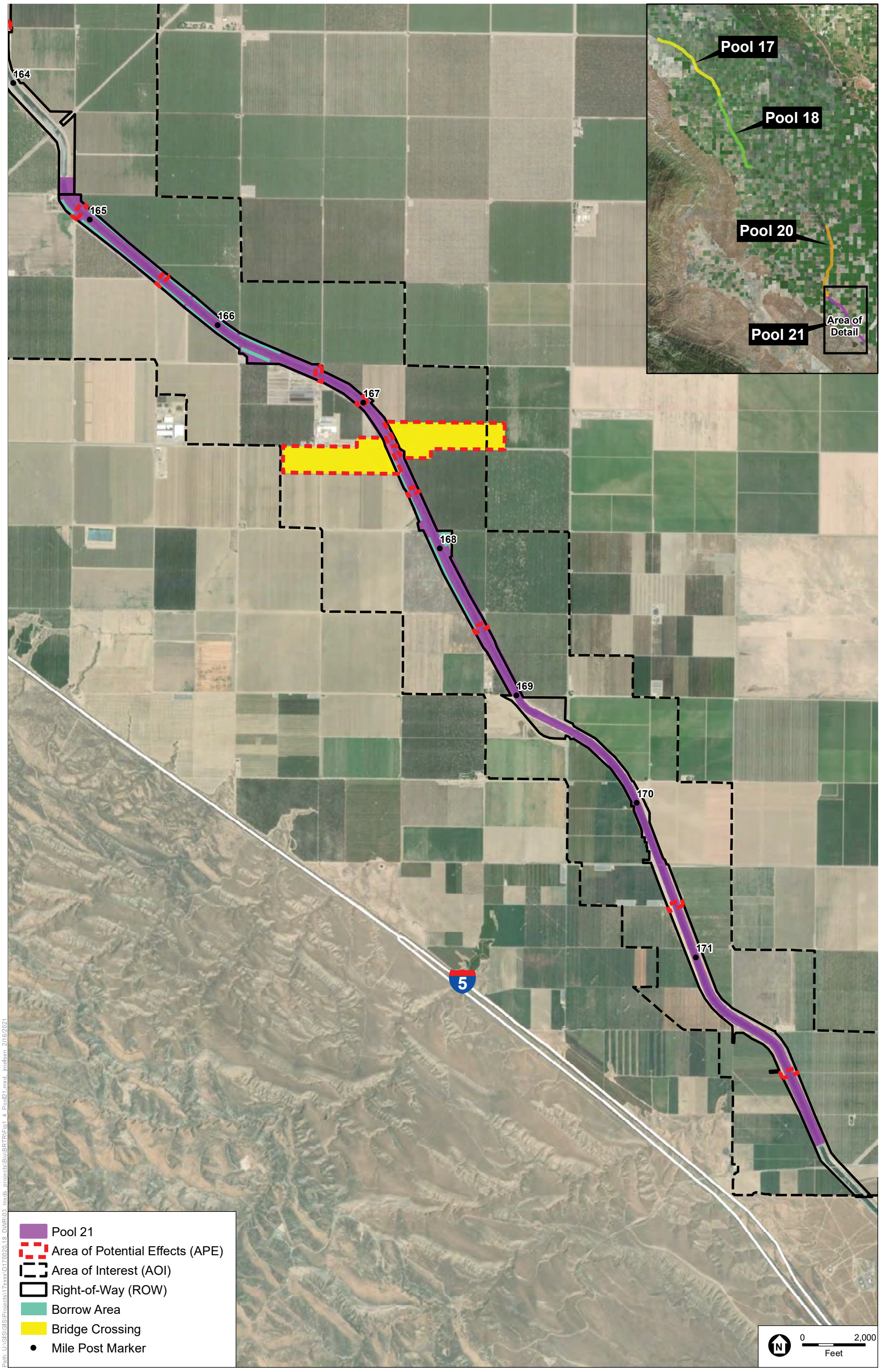
SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 3
Geotechnical Exploration Project Location Pool 20

ESA

Path: U:\GIS\GIS\Projects\17xxxx\D170020.18_DWR\03_mxds_projects\Bio\BRTR\Fig1_3_Pool20.mxd jnielsen 2/16/2021

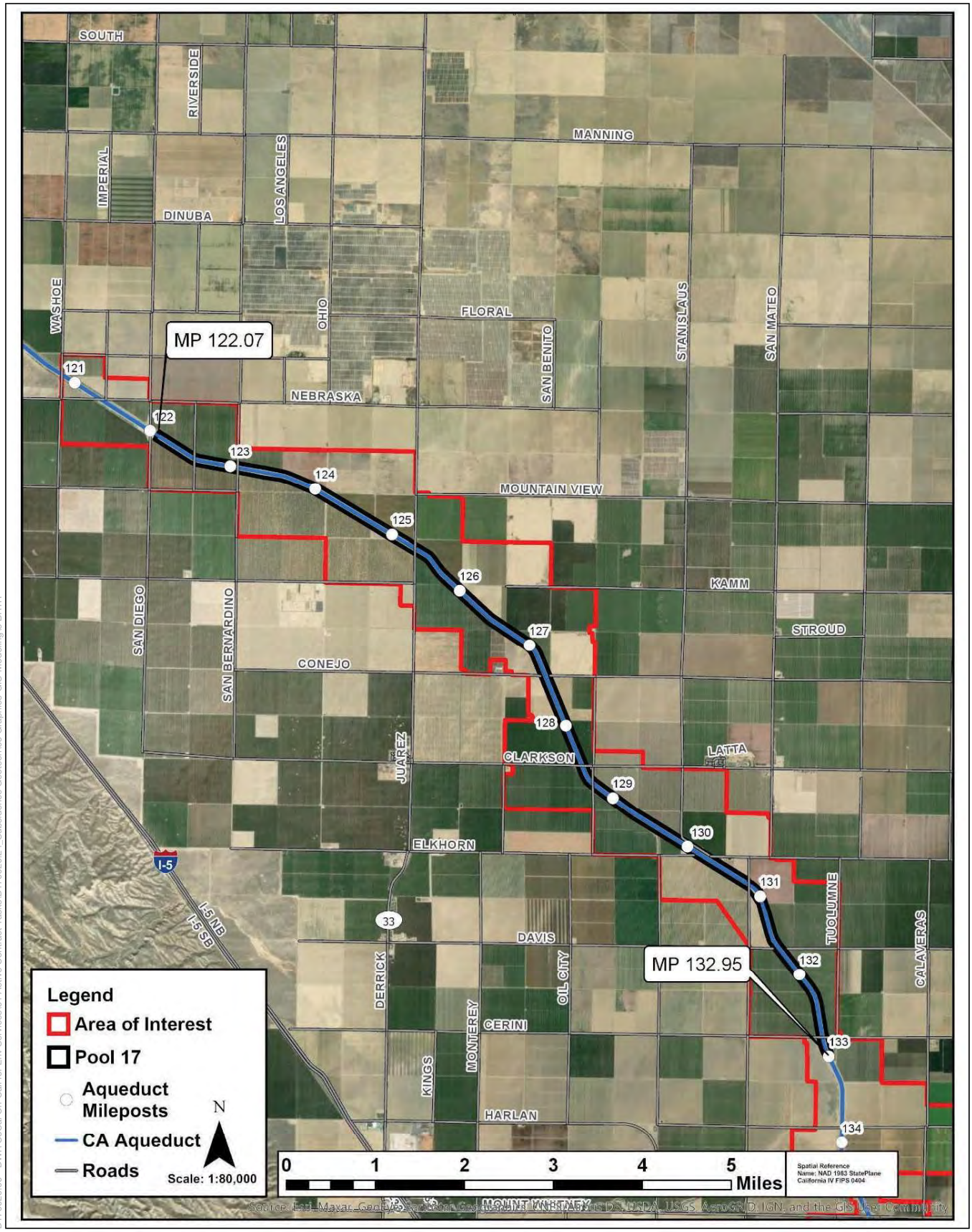


SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 4
Geotechnical Exploration Project Location Pool 21

ESA



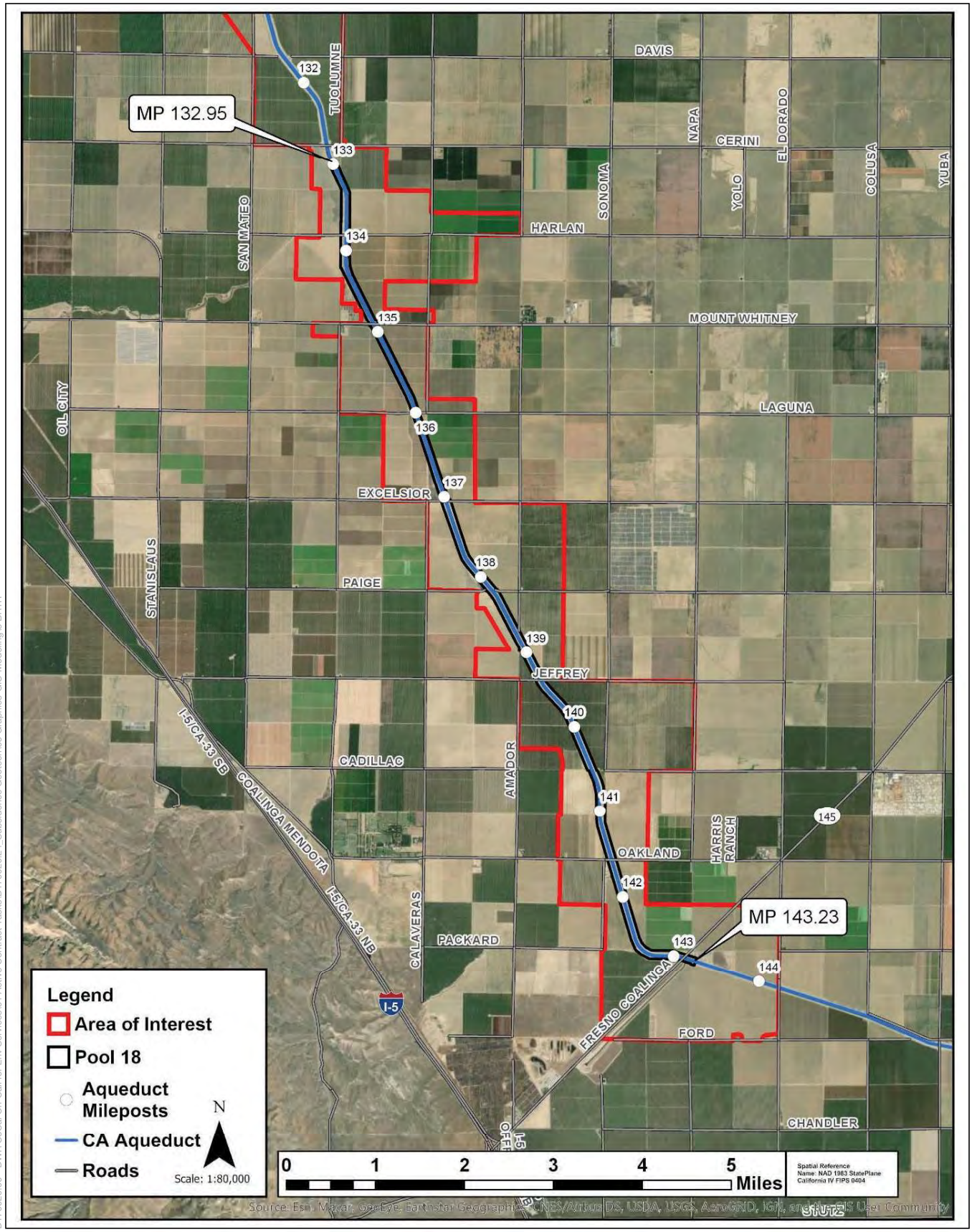
D170020.00 - DWR SoCal On-Call for Env Services\01 Active Contract Tasks\D170020.24 Subsidence Geotech\05 Graphics-GIS-Modeling\3 BRTR

SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 5
Pool 17 Area of Interest Delineation

ESA



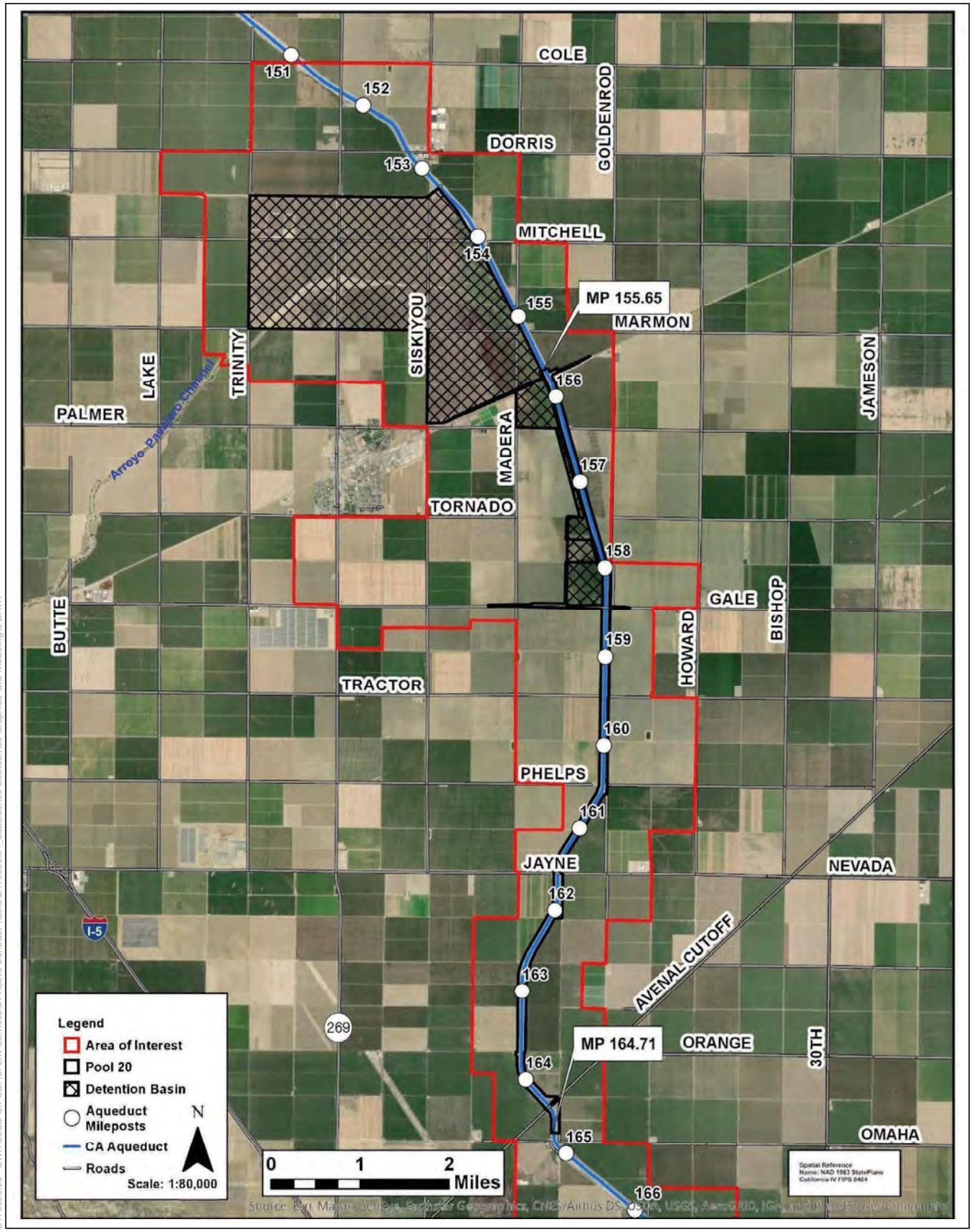
D170020.00 - DWR SoCal On-Call for Env Services\01 Active Contract Tasks\D170020.24 Subsidence Geotech\05 Graphics-GIS-Modeling\3 BRTR

SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 6
Pool 18 Area of Interest Delineation

ESA



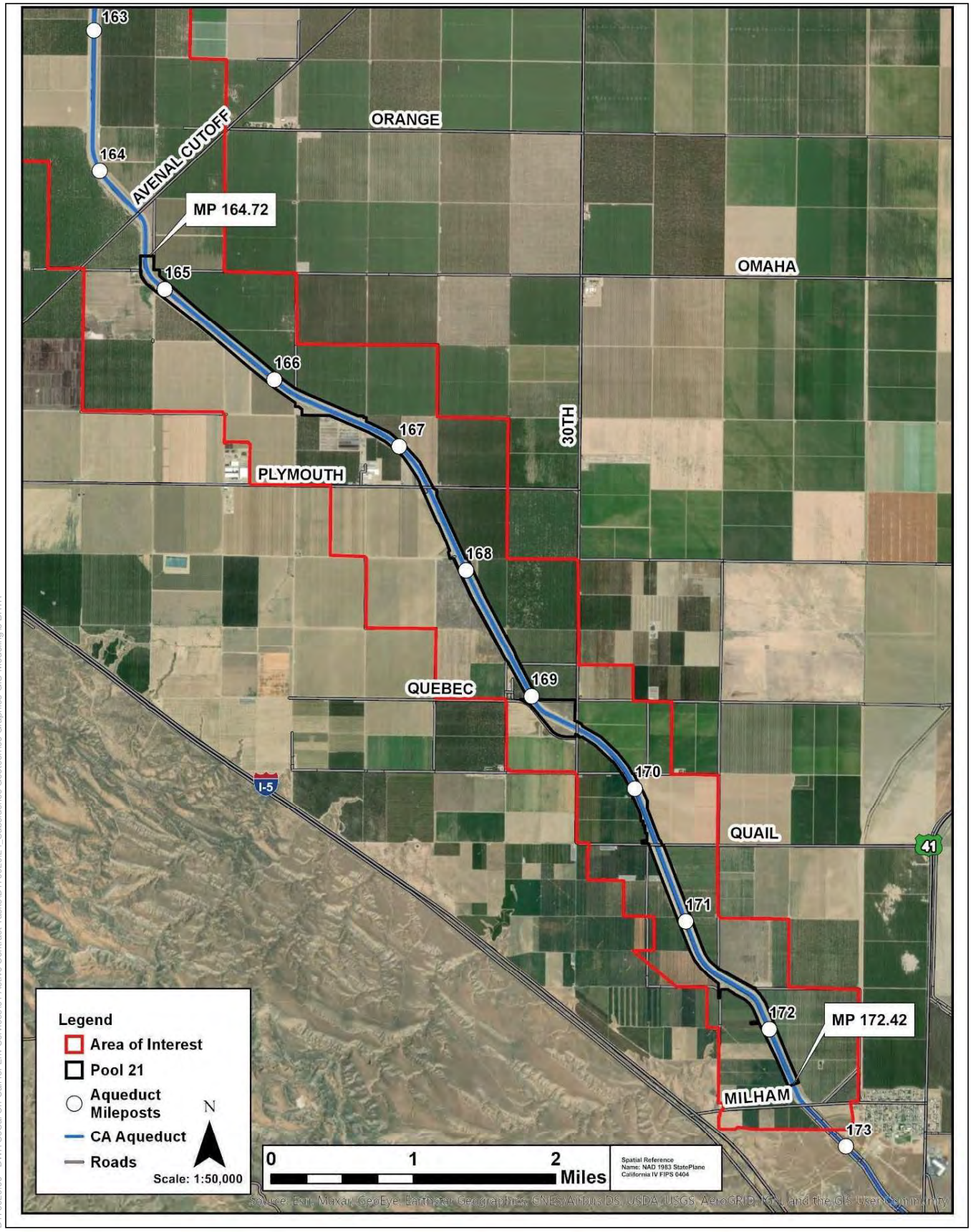
D170020.00 - DWR SoCal On-Call for Env Services\01 Active Contract Tasks\D170020.24 Subsidence Geotech\05 Graphics-GIS-Modeling\3 BRTR

SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 7
Pool 20 Area of Interest Delineation

ESA



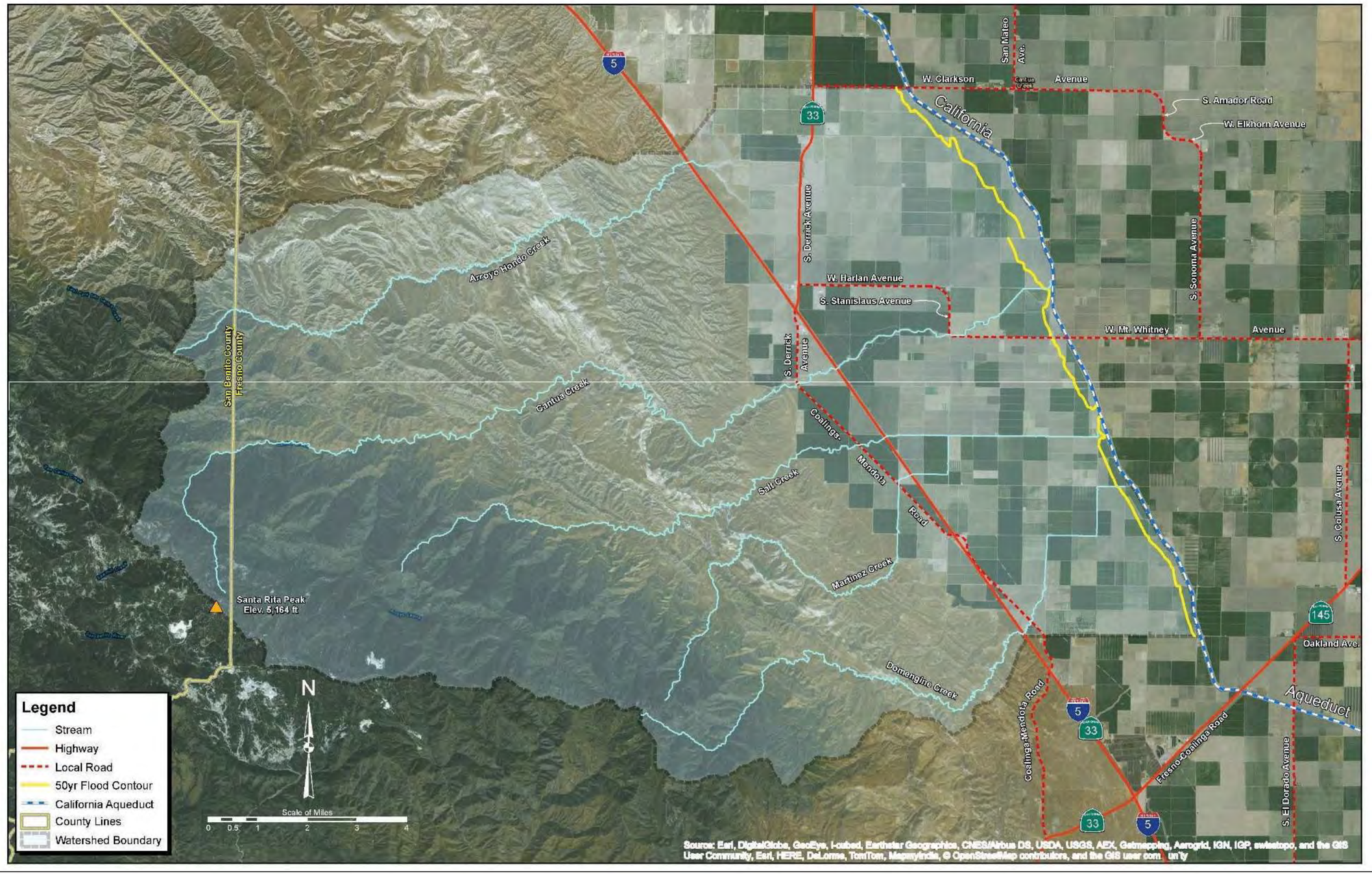
D170020.00 - DWR SoCal On-Call for Env Services\01 Active Contract Tasks\D170020.24 Subsidence Geotech\05 Graphics-GIS-Modeling\3 BRTR

SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 8
Pool 21 Area of Interest Delineation

ESA



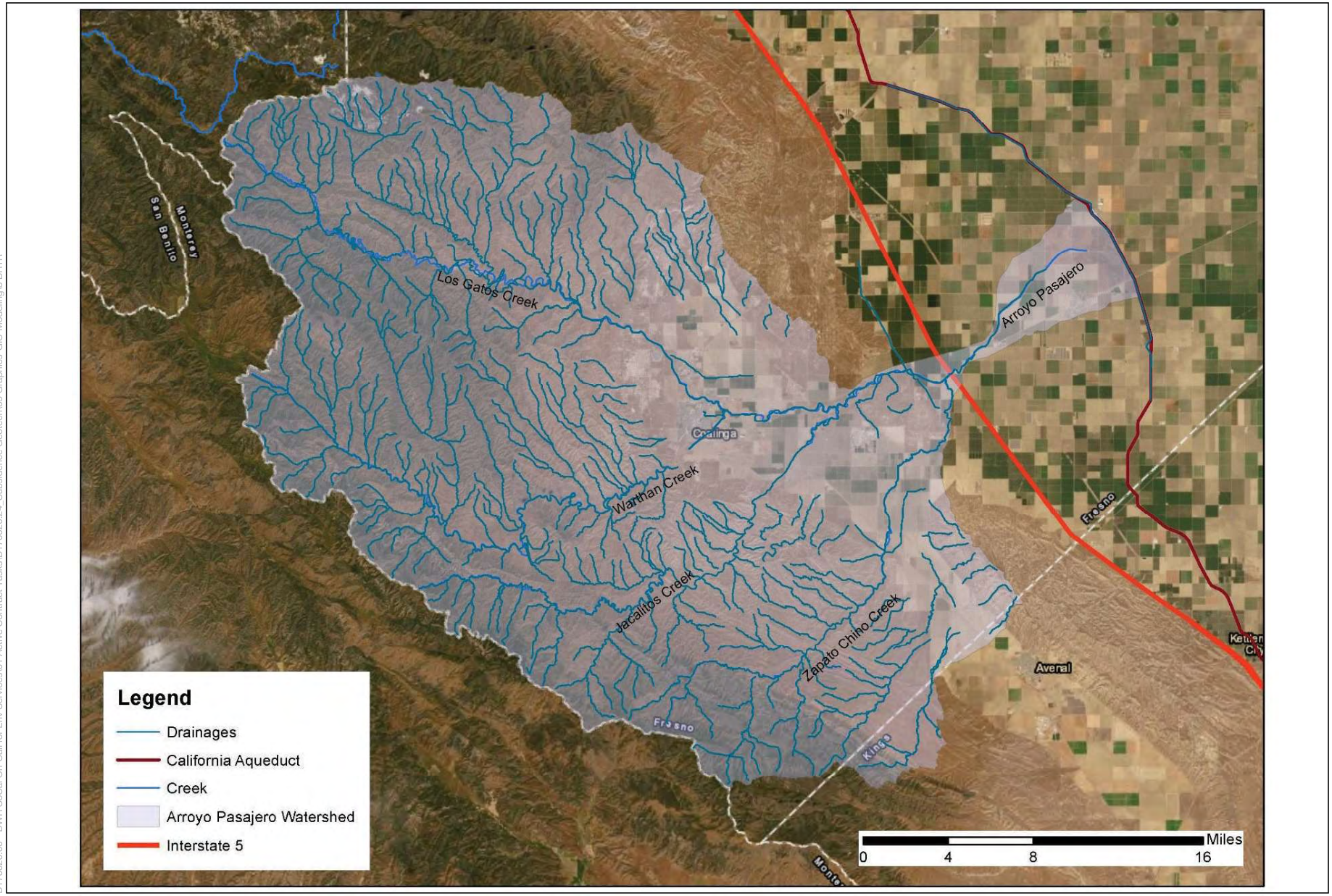
D1700020.00 - DWR SoCal On-Call for Env Services\01 Active Contract Tasks\D1700020.24 Subsidence Geotech\05 Graphics-GIS-Modeling\3 BRTR

SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 9
Cantua Creek Stream Group Watershed Located in Pools 17 and 18

ESA

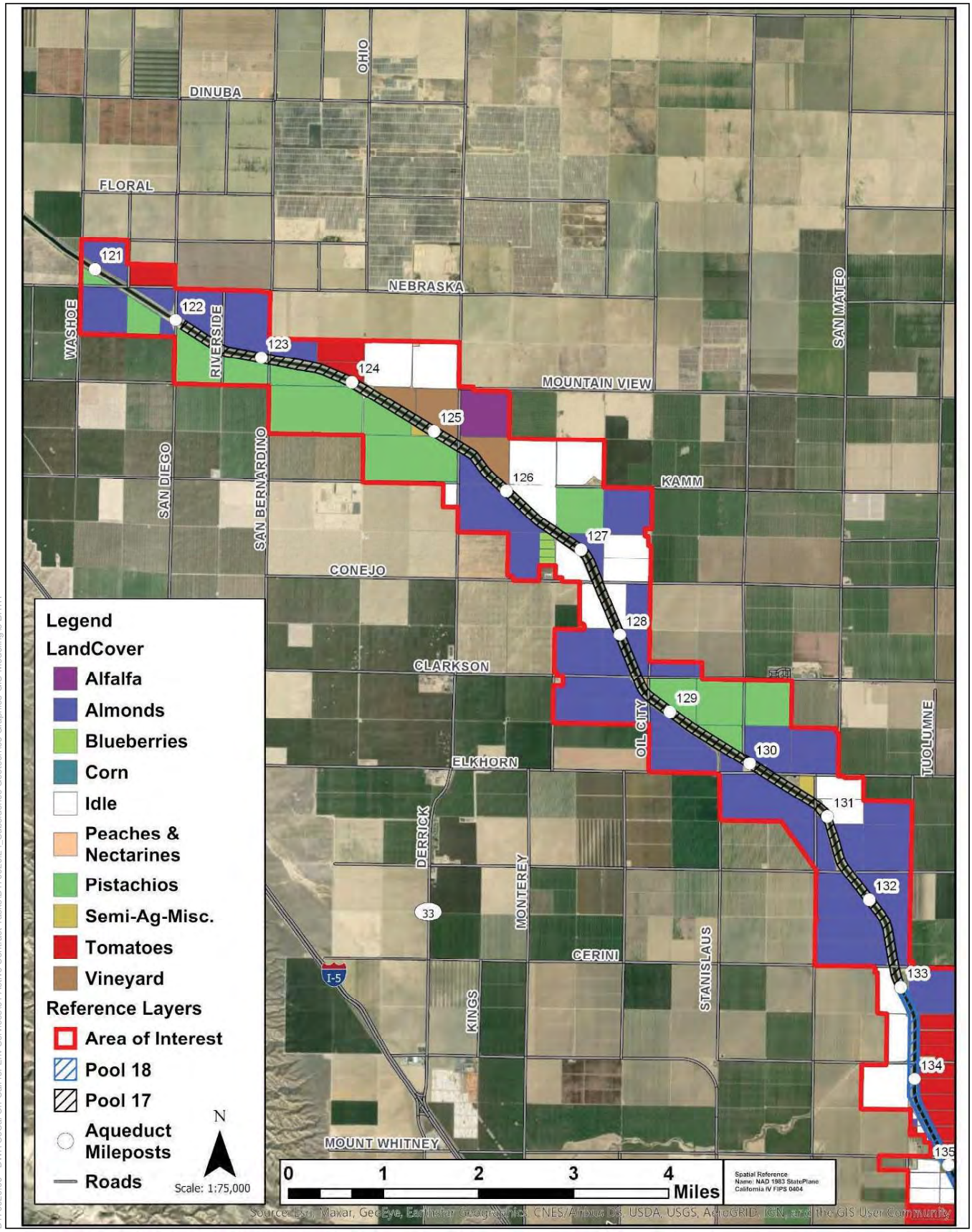


SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 10
Arroyo Pasajero Stream Group Watershed Located in Pools 20 and 21

ESA



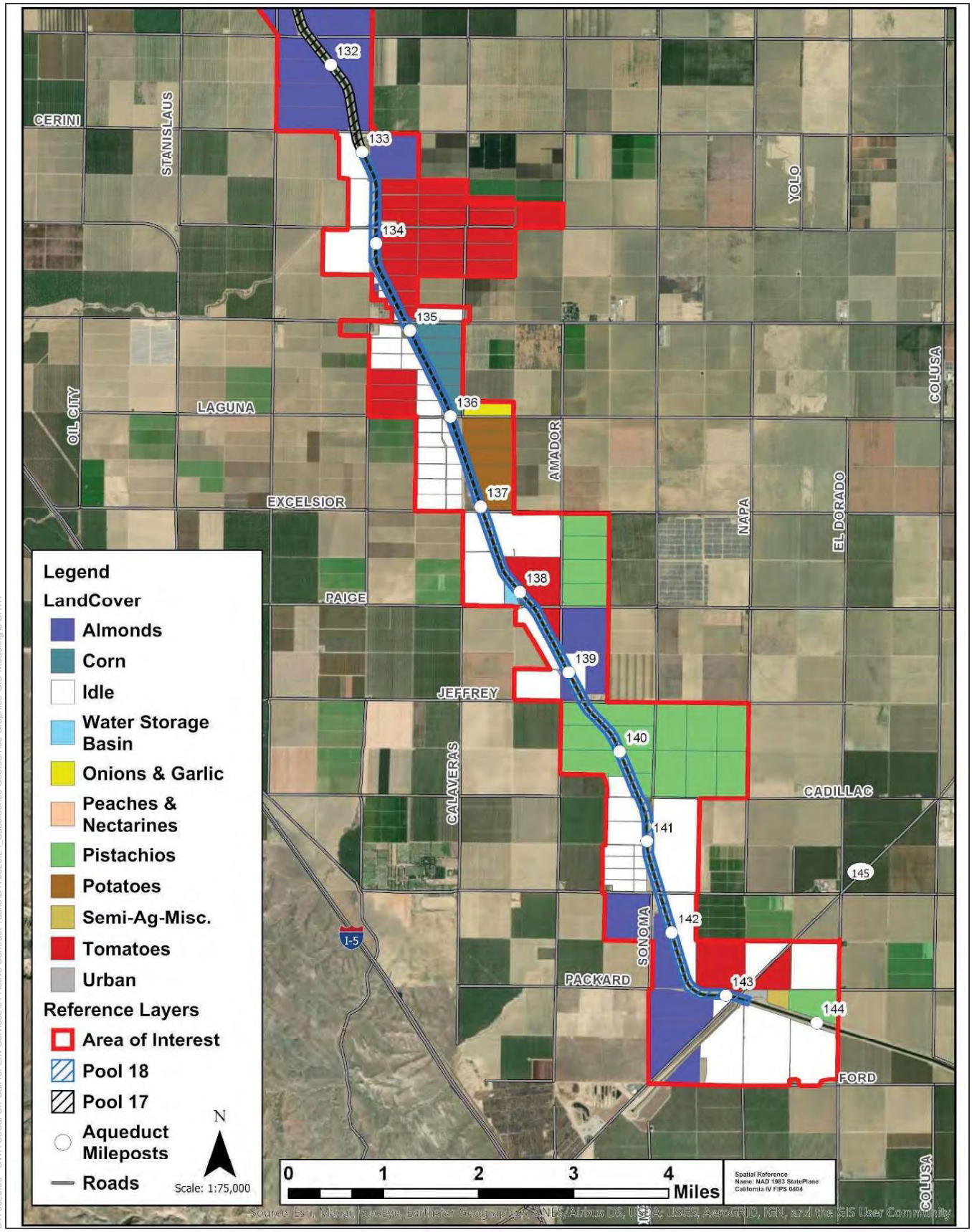
D170020.00 - DWR SoCal On-Call for Env Services\01 Active Contract Tasks\D170020.24 Subsidence Geotech\05 Graphics-GIS-Modeling\3 BRTR

SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 11
Pool 17 Adjacent Land Use Within the AOI

ESA



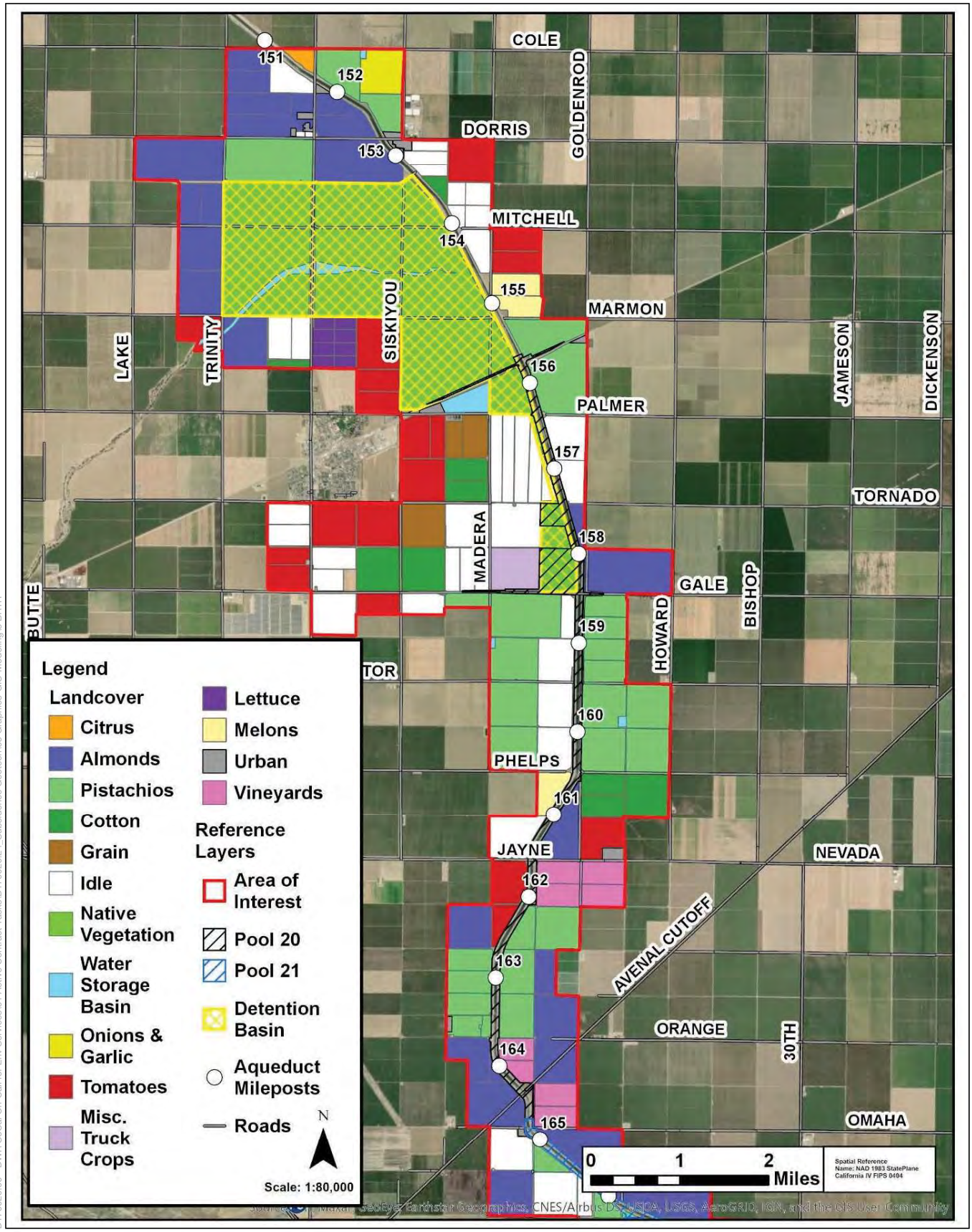
D170020.00 - DWR SoCal On-Call for Env Services\01 Active Contract Tasks\D170020.24_Subsidence Geotech\05 Graphics-GIS-Modeling\3 BRTR

SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 12
Pool 18 Adjacent Land Use Within the AOI

ESA

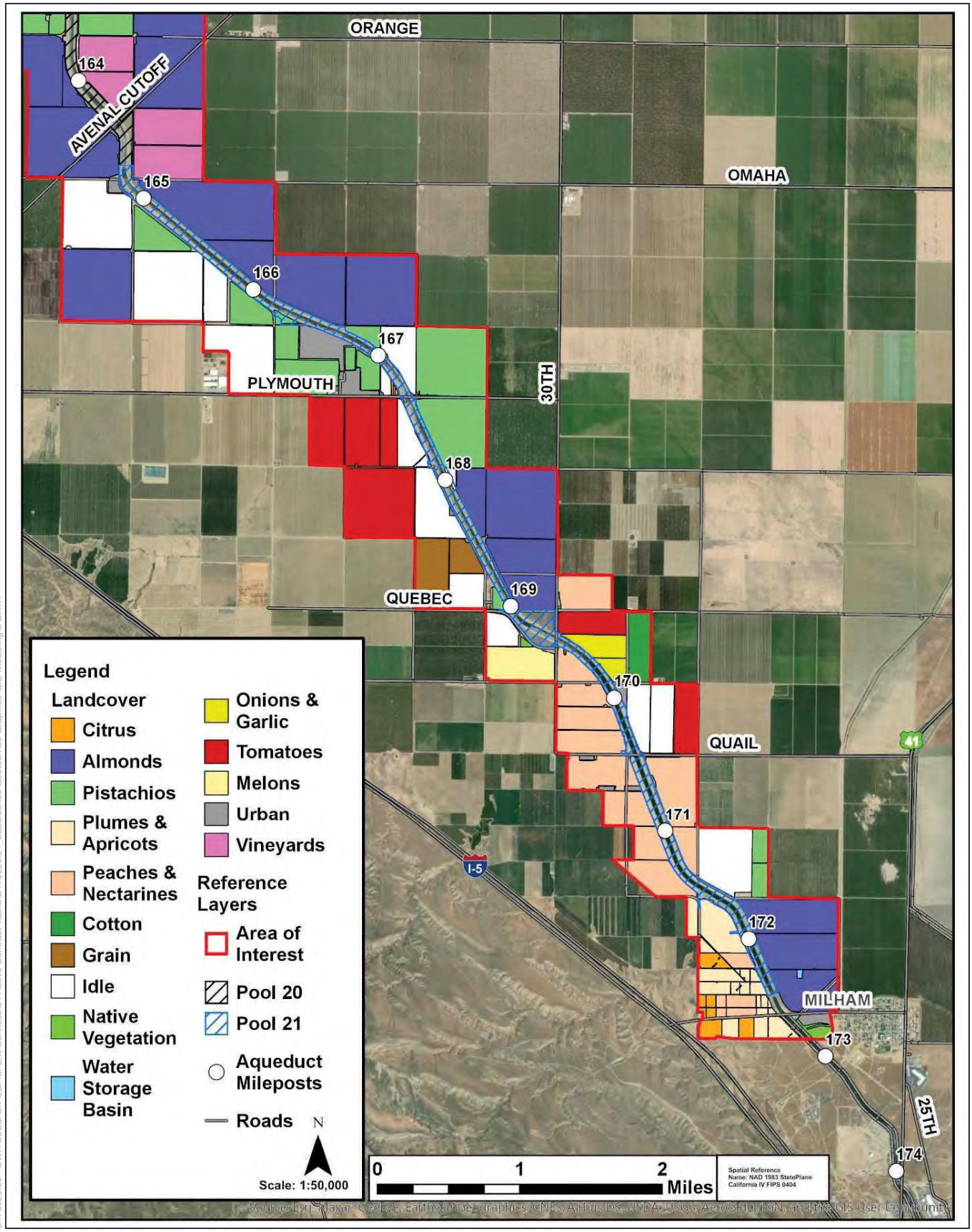


D170020.00 - DWR SoCal On-Call for Env Services\01 Active Contract Tasks\D170020.24_Subsidence Geotech\05 Graphics-GIS-Modeling\3 BRTR

SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 13
Pool 20 Adjacent Land Use Within the AOI



D170020.00 - DWR SoCal On-Call for Env Services\01 Active Contract Tasks\D170020.24 Subsidence Geotech\05 Graphics-GIS-Modeling\3 BRTR

SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

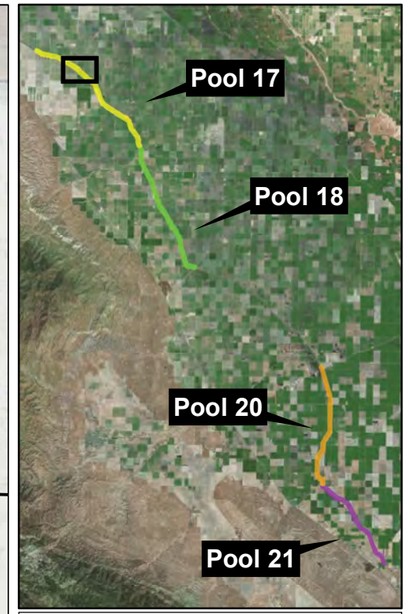
Figure 14
Pool 21 Adjacent Land Use Within the AOI

SOURCE: ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 15
Vegetation Alliance and Special-Status Resource Mapping from MP 122 to MP 124

ESA



Area of Potential Effects (APE)

Project Components
- Milepost
- Area of Interest (AOI)
- Right-of-Way (ROW)
- Borrow Area
- Bridge Crossing

Geotech Explorations
- Embankment CPT
- Proposed Irrigation Crossing Drill Hole
- Embankment Drill Hole
- Borrow Area Hand Auger
- Borrow Area Drill Hole
- Bridge Drill Hole

Species Observation
- Bird
- SJKF Potential Den Location

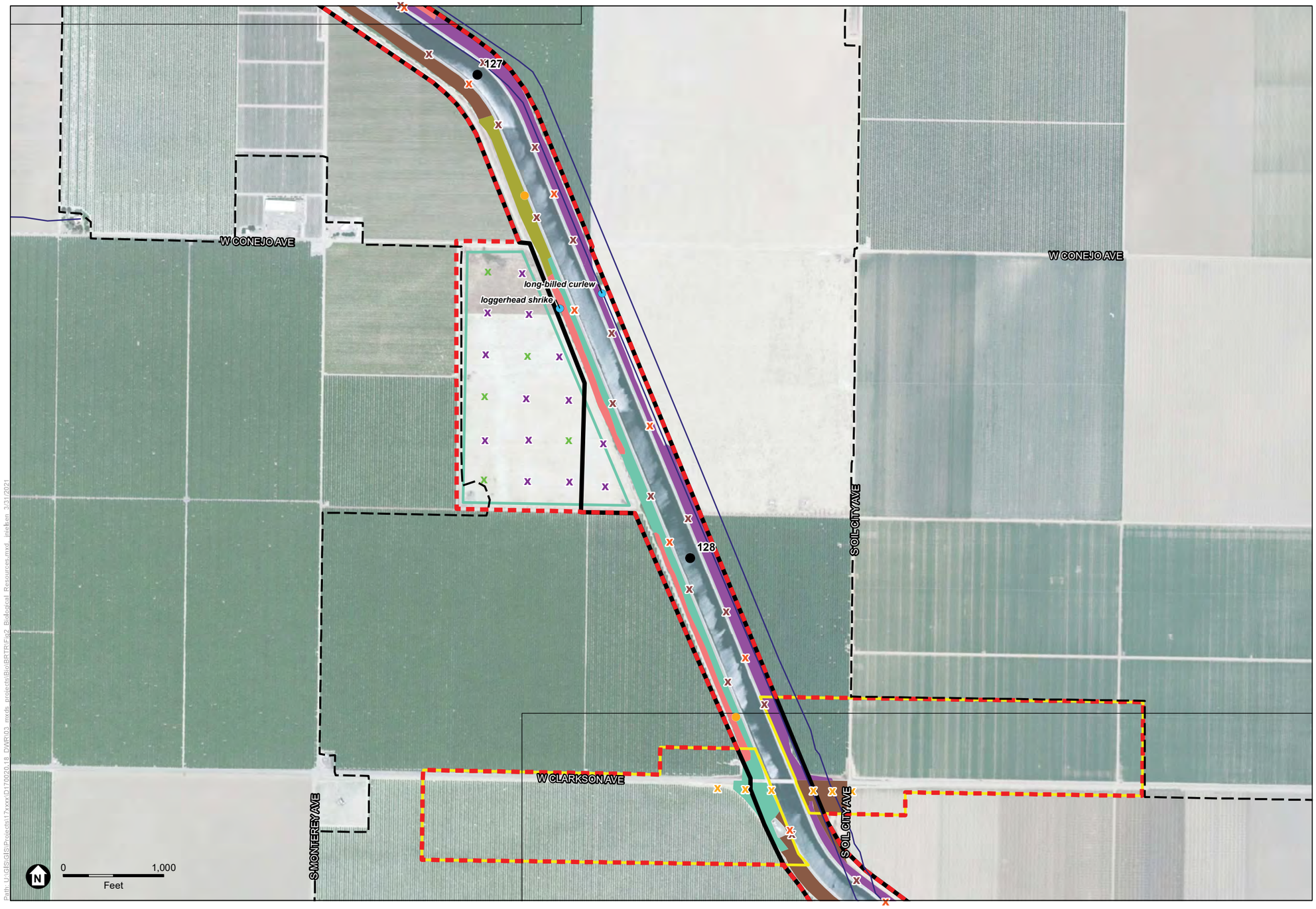
Habitat Types
- Bare Land
- Mesquite thickets
- Palo verde - $_m$ esquite forest provisional alliance
- Quailbush scrub
- Wild oats and annual brome grasslands

SOURCE: ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 16
Vegetation Alliance and Special-Status Resource Mapping from MP 124 to MP 126

ESA



Area of Potential Effects (APE)

Project Components
- Milepost
- Area of Interest (AOI)
- Right-of-Way (ROW)
- Borrow Area
- Bridge Crossing

Geotech Explorations
- Embankment CPT
- Embankment Drill Hole
- Borrow Area Hand Auger
- Borrow Area Drill Hole
- Bridge Drill Hole

Species Observation
- Bird
- SJKF Potential Den Location

Habitat Types
- Bare Land
- Fiddleneck - filaree fields
- Mesquite thickets
- Sunflower patches provisional alliance
- Wild oats and annual brome grasslands

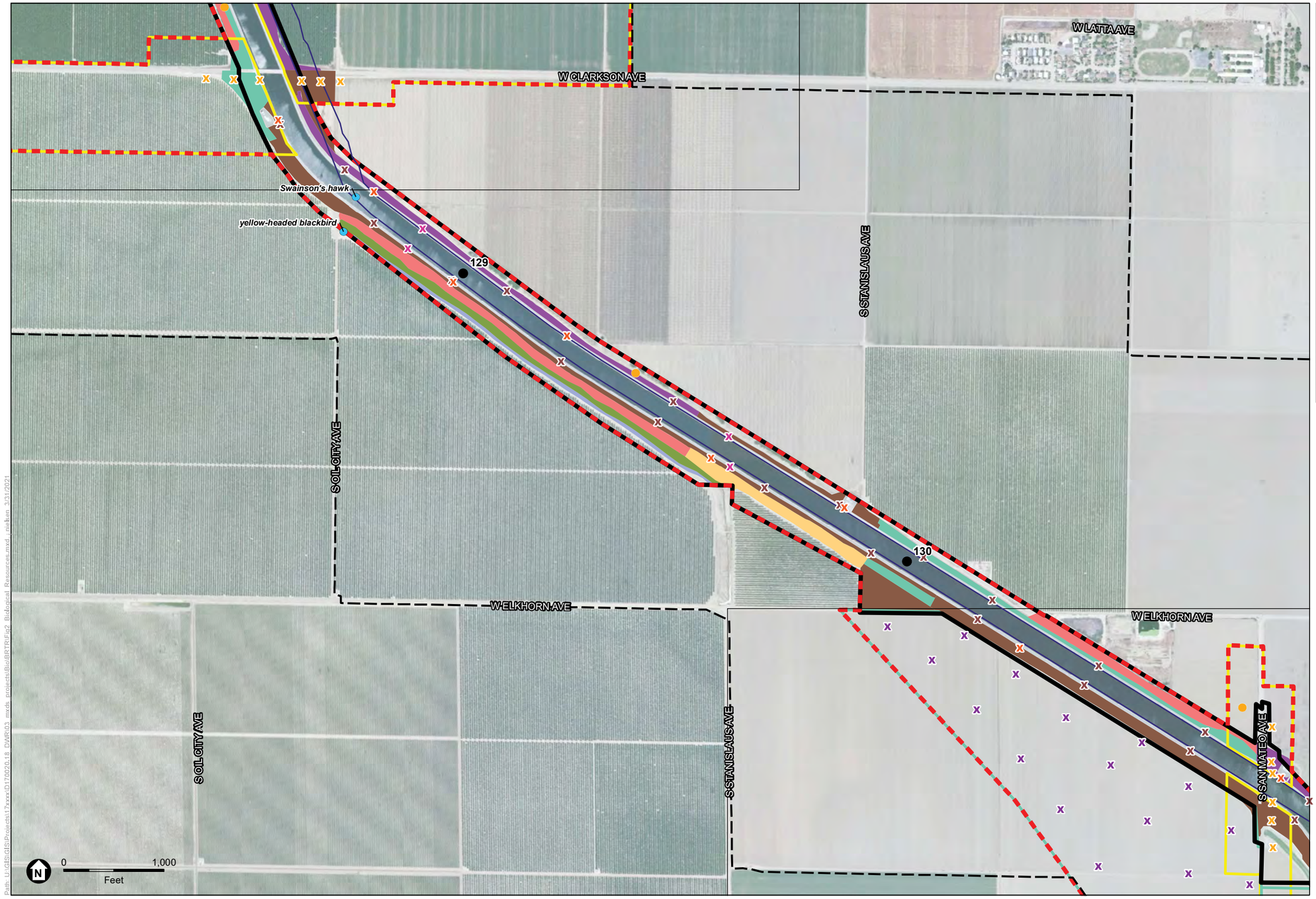
Path: U:\GIS\GIS\Projects\17xxxx\D170020.18_DWR\03_mxds_projects\Bio\BRTR\Fig2_Biological_Resources.mxd_inieken_3/31/2021

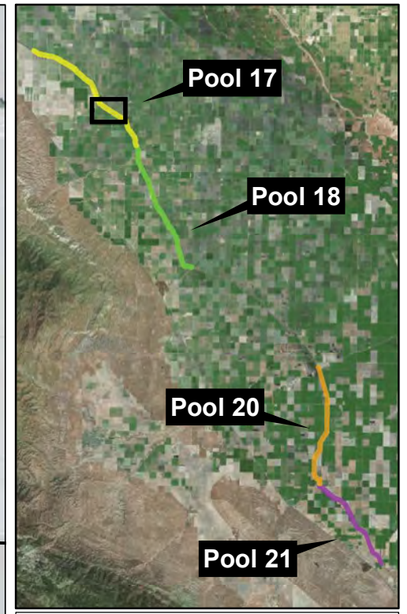
SOURCE: ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 17
Vegetation Alliance and Special-Status Resource Mapping from MP 127 to MP 128

ESA





Area of Potential Effects (APE)

Project Components
- Milepost
- Area of Interest (AOI)
- Right-of-Way (ROW)
- Borrow Area
- Bridge Crossing

Geotech Explorations
- Embankment CPT
- Proposed Irrigation Crossing Drill Hole
- Embankment Drill Hole
- Borrow Area Hand
- Bridge Drill Hole

Species Observation
- Bird
- SJKF Potential Den Location

Habitat Types
- Atriplex scrub
- Bare Land
- Fiddleneck -f ilaree fields
- Mesquite thickets
- Quailbush scrub
- Tamarisk thickets
- Wild oats and annual brome grasslands

Path: U:\GIS\GIS\Projects\17xxxx\D170020.18_DWR\03_mxds_projects\Bio\BRTR\Fig2_Biological_Resources.mxd, nieken 3/31/2021

SOURCE: ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 18
Vegetation Alliance and Special-Status Resource Mapping from MP 129 to MP 130

ESA

Area of Potential Effects (APE)

Project Components
- Milepost
- Area of Interest (AOI)
- Right-of-Way (ROW)
- Borrow Area
- Bridge Crossing

Geotech Explorations
- Embankment CPT
- Proposed Irrigation Crossing Drill Hole
- Embankment Drill Hole
- Borrow Area Hand
- Bridge Drill Hole

Species Observation
- Bird
- SJKF Potential Den Location

Habitat Types
- Bare Land
- Fiddleneck -ƒ ilaree fields
- Mesquite thickets
- Wild oats and annual brome grasslands

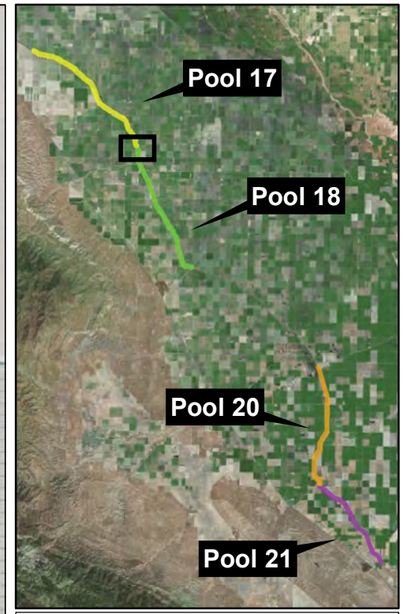
Path: U:\GIS\GIS\Projects\17xxxx\D170020-18_DWR\03_mxds_projects\Bio\BRTR\Fig2_Biological_Resources.mxd, jnielsen 3/31/2021

SOURCE: ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 19
Vegetation Alliance and Special-Status Resource Mapping from MP 131 to MP 132

ESA



Area of Potential Effects (APE)

Project Components

- Milepost
- Area of Interest (AOI)
- Right-of-Way (ROW)
- Borrow Area
- Bridge Crossing

Geotech Explorations

- Embankment CPT
- Penetrometer Testing Borehole
- Hollow Stem Auger Borehole
- Proposed Irrigation Crossing Drill Hole
- Embankment Drill Hole
- Borrow Area Hand
- Bridge Drill Hole

Species Observation

- Bird
- SJKF Potential Den Location

Habitat Types

- Bare Land
- Fiddleneck -f ilaree fields
- Mesquite thickets
- Wild oats and annual brome grasslands

Path: U:\GIS\GIS\Projects\17xxxx\D170020.18 DWR\03 mxds projects\Bio\BRTR\Fig2 Biological Resources.mxd nieken 3/31/2021

SOURCE: ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 20
Vegetation Alliance and Special-Status Resource Mapping from MP 133 to MP 134

ESA

Area of Potential Effects (APE)

Project Components
- Milepost
- Area of Interest (AOI)
- Right-of-Way (ROW)

Geotech Explorations
- Embankment CPT
- Proposed Irrigation Crossing Drill Hole
- Embankment Drill Hole

Species Observation
- Bird
- SJKF Potential Den Location

Habitat Types
- Bare Land
- Fiddleneck -ƒ ilaree fields
- Wild oats and annual brome grasslands

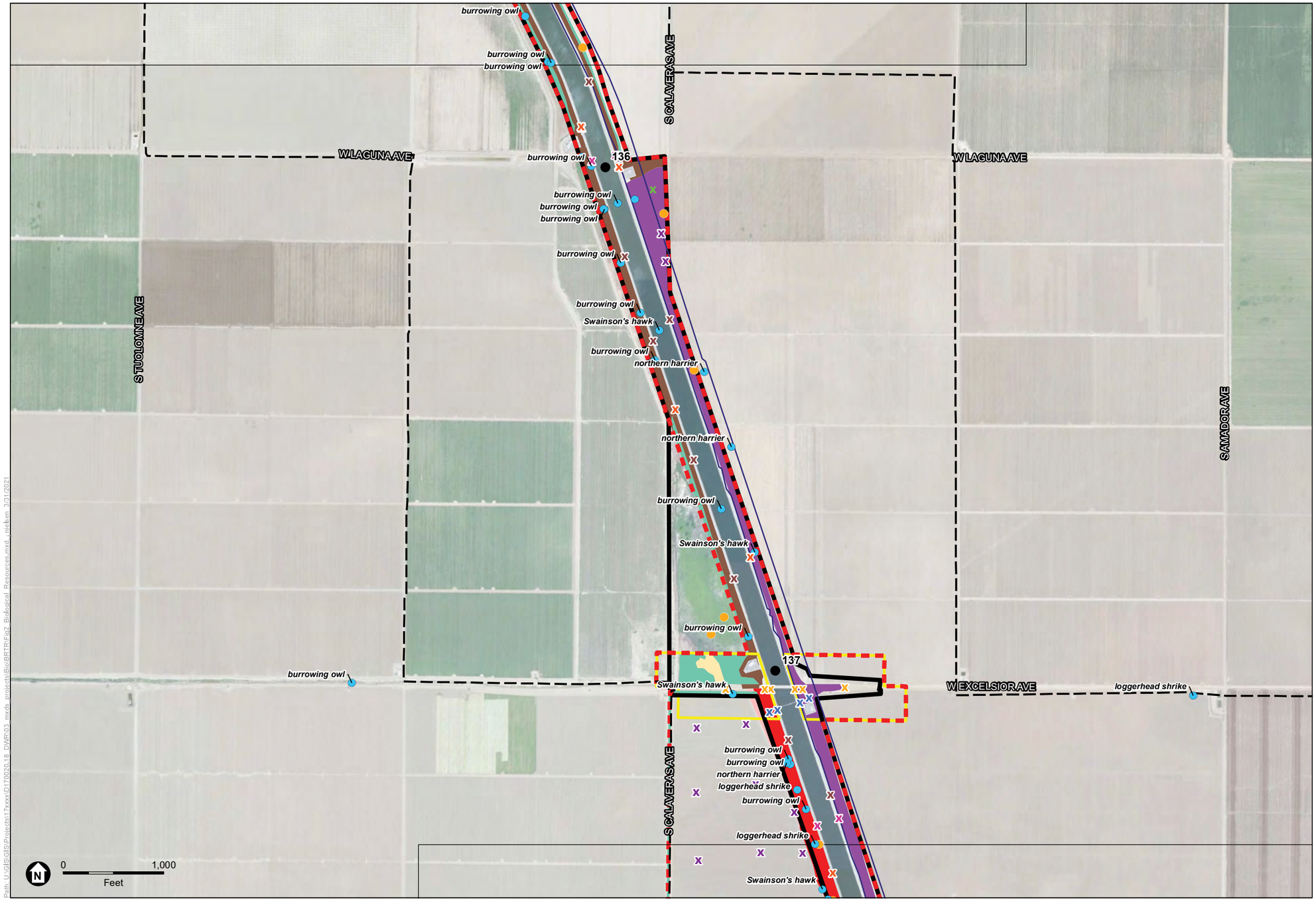
Path: U:\GIS\GIS\Projects\17xxxx\D170020.18_DWR\03_mxds_projects\BioBRTR\Fig2_Biological_Resources.mxd_nielsen 3/31/2021

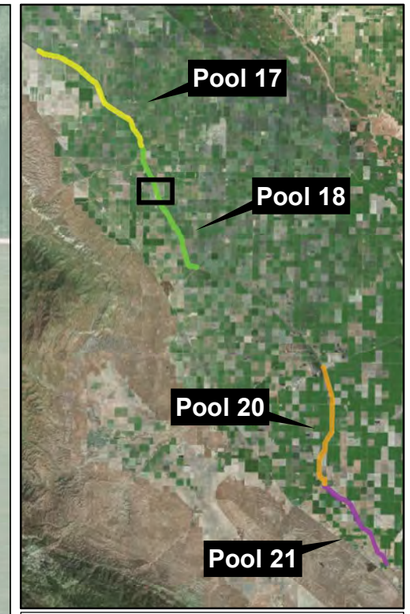
SOURCE: ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 21
Vegetation Alliance and Special-Status Resource Mapping from MP 134 to MP 135

ESA





Area of Potential Effects (APE)

Project Components
- Milepost
- Area of Interest (AOI)
- Right-of-Way (ROW)
- Borrow Area
- Bridge Crossing

Geotech Explorations
- Embankment CPT
- Proposed Irrigation Crossing Drill Hole
- Embankment Drill Hole
- Borrow Area Hand
- Borrow Area Drill Hole
- Pipeline Drill Hole
- Bridge Drill Hole

Species Observation
- Bird
- SJKF Potential Den Location

Habitat Types
- Atriplex scrub
- Bare Land
- Coyote brush scrub
- Fiddleneck -ƒ ilaree fields
- Red brome or Mediterranean grass grasslands
- Upland Mustards and other ruderal forbs
- Wild oats and annual brome grasslands

SOURCE: ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 22
Vegetation Alliance and Special-Status Resource Mapping from MP 136 to MP 137

ESA

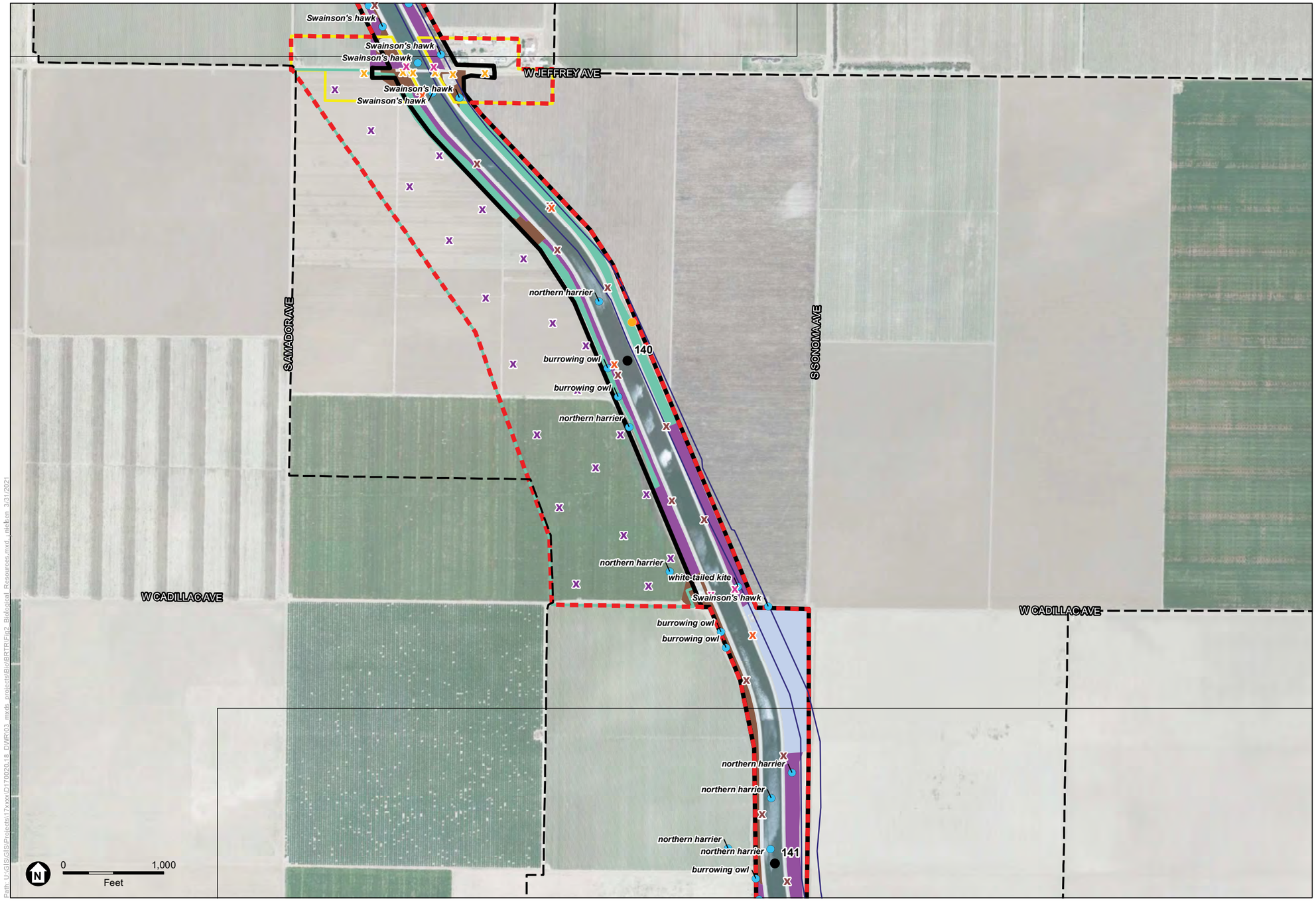
Swainson's hawk
burrowing owl
burrowing owl
burrowing owl
northern harrier
burrowing owl
burrowing owl
138
northern harrier
W PAIGE AVE
S CALAVERAS AVE
S AMADOR AVE
W PAIGE AVE
Swainson's hawk
loggerhead shrike
Swainson's hawk
139
Swainson's hawk
Swainson's hawk
Swainson's hawk
Swainson's hawk
0
1,000
Feet
Pool 17
Pool 18
Pool 20
Pool 21
Area of Potential Effects (APE)
Project Components
Milepost
Area of Interest (AOI)
Right-of-Way (ROW)
Borrow Area
Bridge Crossing
Geotech Explorations
Embankment CPT
Proposed Irrigation Crossing Drill Hole
Embankment Drill Hole
Borrow Area Hand Auger
Species Observation
Bird
SJKF Potential Den Location
Habitat Types
Bare Land
Cattail marshes
Quailbush scrub
Red brome or Mediterranean grass grasslands
Wild oats and annual brome grasslands

SOURCE: ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 23
Vegetation Alliance and Special-Status Resource Mapping from MP 138 to MP 139

ESA



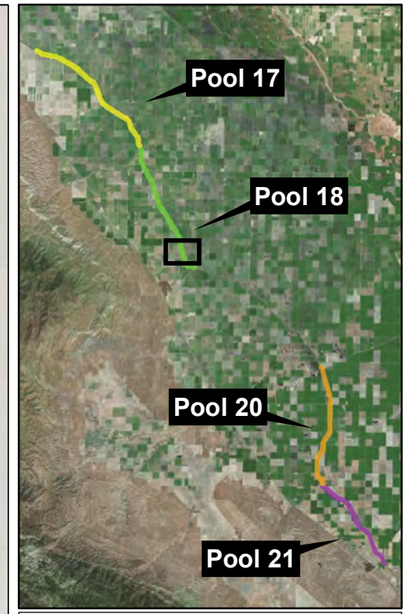
Path: U:\GIS\GIS\Projects\17xxxx\D1700220-18_DWR\03_mxds_projects\Bio\BRTR\Fig2_BioBotanical_Resources.mxd_nielsen_3/31/2021

SOURCE: ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 24
Vegetation Alliance and Special-Status Resource Mapping from MP 140 to MP 141

ESA



Area of Potential Effects (APE)

Project Components

- Milepost
- Area of Interest (AOI)
- Right-of-Way (ROW)
- Bridge Crossing

Geotech Explorations

- Embankment CPT
- Proposed Irrigation Crossing Drill Hole
- Embankment Drill Hole

Species Observation

- Bird
- SJKF Potential Den Location

Habitat Types

- Bare Land
- Bladderpod - mesquite - tree tobacco scrub provisional alliance
- Sunflower patches provisional alliance
- Tamarisk thickets
- Wild oats and annual brome grasslands

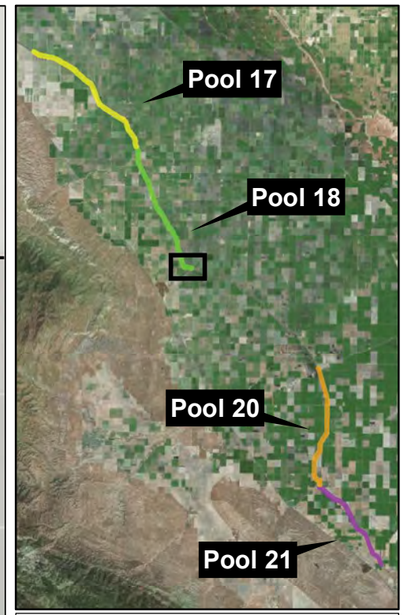
Path: U:\GIS\GISProjects\17xxxx\170220.18_DWR\03_mxds_projects\Bio\BRTRFig2_BirdoptcalI_Resources.mxd_nieken 3/31/2021

SOURCE: ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 25
Vegetation Alliance and Special-Status Resource Mapping from MP 141 to MP 142

ESA



- Area of Potential Effects (APE)

Project Components

- Milepost
- Area of Interest (AOI)
- Right-of-Way (ROW)
- Borrow Area
- Bridge Crossing

Geotech Explorations

- Embankment CPT
- Proposed Irrigation Crossing Drill Hole
- Embankment Drill Hole
- Borrow Area Hand Auger
- Borrow Area Drill Hole
- Pipeline Drill Hole
- Bridge Drill Hole

Species Observation

- Bird
- SJKF Potential Den Location

Habitat Types

- Bare Land
- Cattail marshes
- Fiddleneck -f ilaree fields
- Mesquite thickets
- Quailbush scrub
- Sunflower patches provisional alliance
- Tamarisk thickets
- Upland Mustards and other ruderal forbs
- Wild oats and annual brome grasslands

Path: U:\GIS\GIS\Projects\17xxxx\D170026.18_DWR\03_mxds_projects\Bio\BRTR\Fig2_Biological_Resources.mxd_jnielsen 3/31/2021

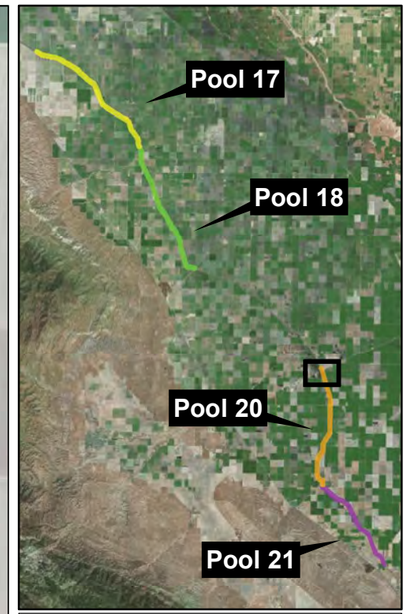
SOURCE: ESA, 2021.

San Luis Canal Geotechnical Investigations Project

Figure 26

Vegetation Alliance and Special-Status Resource Mapping from MP 142 to MP 144

ESA



Area of Potential Effects (APE)

Project Components

- Milepost
- Area of Interest (AOI)
- Right-of-Way (ROW)

Geotech Explorations

- Proposed Irrigation Crossing Drill Hole

Species Observation

- Bird
- SJKF Potential Den Location

Habitat Types

- Fremont cottonwood forest
- Mulefat thickets
- Red brome or Mediterranean grass grasslands
- Sunflower patches provisional alliance
- Wild oats and annual brome grasslands

SOURCE: ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 27
Vegetation Alliance and Special-Status Resource Mapping at MP 156

ESA

Area of Potential Effects (APE)

Project Components

- Milepost
- Area of Interest (AOI)
- Right-of-Way (ROW)

Geotech Explorations

- Proposed Irrigation Crossing Drill Hole

Species Observation

- Amphibian
- Bird
- SJKF Potential Den Location

Habitat Types

- Bare Land
- Willow thickets

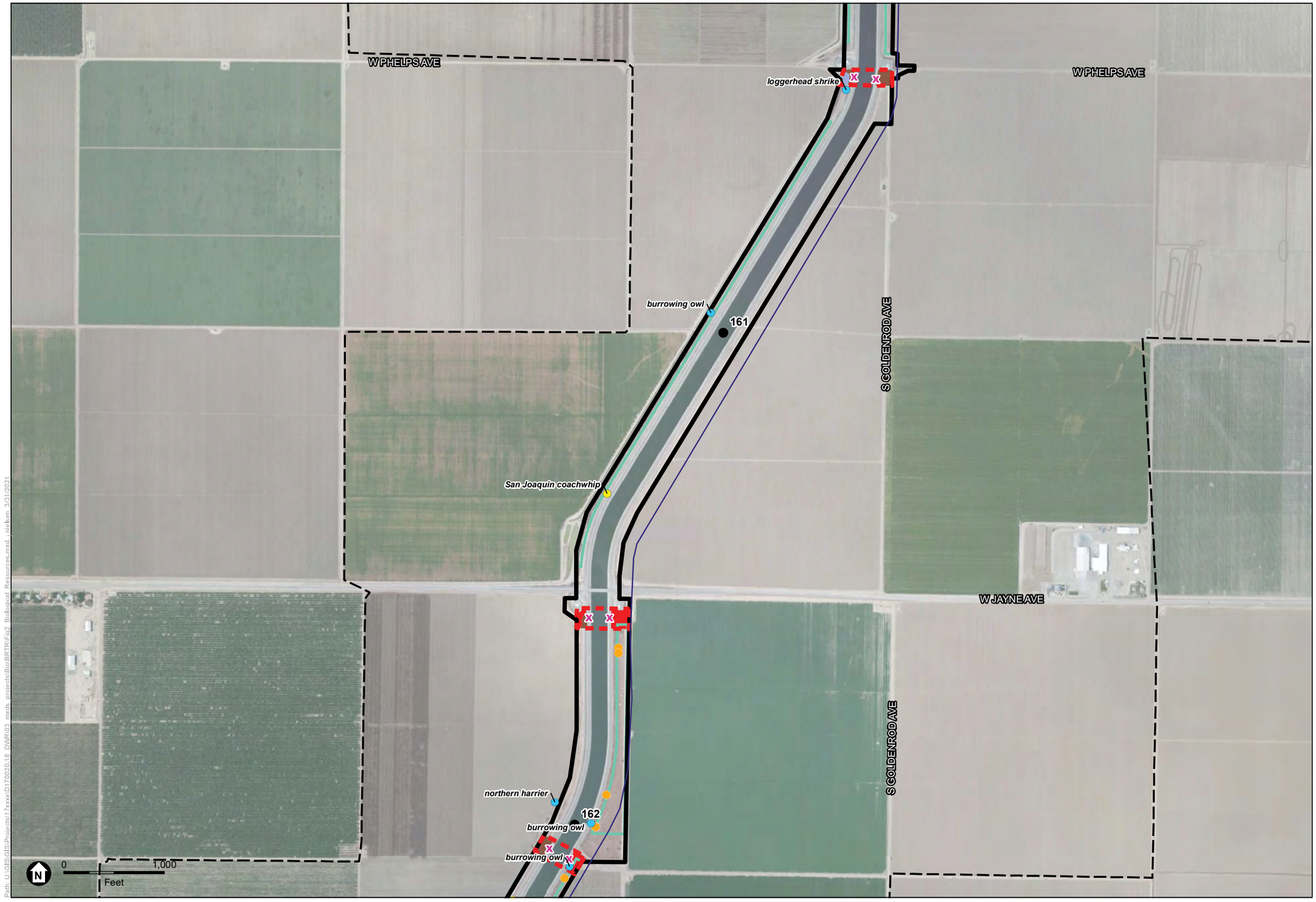
Path: U:\GIS\GIS\Projects\17xxxx\D170020.18_DWR\03_mxds_projects\Bio\BRTR\Fig2_Biological_Resources.mxd_nieken 3/31/2021

SOURCE: ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 28
Vegetation Alliance and Special-Status Resource Mapping From MP 157 to MP 158

ESA



Area of Potential Effects (APE)

Project Components

- Milepost
- Area of Interest (AOI)
- Right-of-Way (ROW)
- Borrow Area

Geotech Explorations

- Proposed Irrigation Crossing Drill Hole

Species Observation

- Bird
- Reptile
- SJKF Potential Den Location

Habitat Types

- Bare Land
- Quailbush scrub
- Red brome or Mediterranean grass grasslands

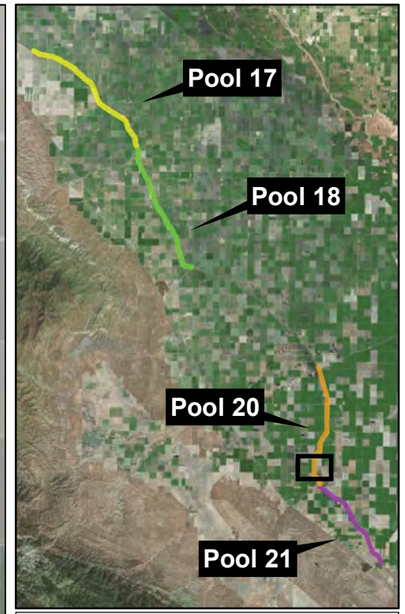
Path: U:\GIS\GIS\Projects\17xxxx\D170020.18_DWR\03_mxds_projects\Bio\BRTR\Fig2_Biological_Resources.mxd_nieken 3/31/2021

SOURCE: ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 29
Vegetation Alliance and Special-Status Resource Mapping From MP 161 to MP 162

ESA



Area of Potential Effects (APE)

Project Components

- Milepost
- Area of Interest (AOI)
- Right-of-Way (ROW)
- Borrow Area

Geotech Explorations

- Proposed Irrigation Crossing Drill Hole
- SJKF Potential Den Location

Habitat Types

- Bare Land
- Red brome or Mediterranean grass grasslands

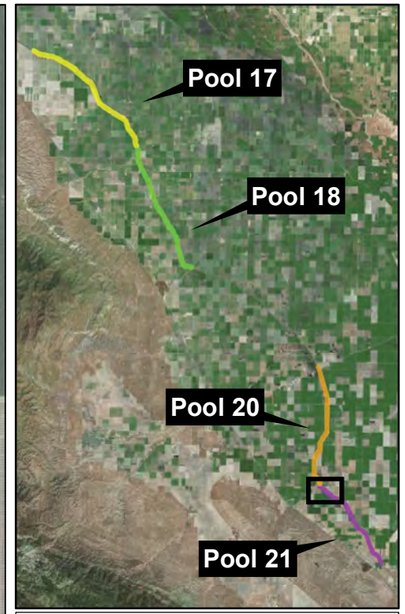
Path: U:\GIS\GIS\Projects\17xxxx\D170020.18_DWR\03_mxds_projects\Bio\BRTR\Fig2_Biological_Resources.mxd_inieken 3/31/2021

SOURCE: ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 30
Vegetation Alliance and Special-Status Resource Mapping From MP 163 to MP 164

ESA



Area of Potential Effects (APE)

Project Components

- Milepost
- Area of Interest (AOI)
- Right-of-Way (ROW)
- Borrow Area

Geotech Explorations

- Proposed Irrigation Crossing Drill Hole

Species Observation

- Bird
- SJKF Potential Den Location

Habitat Types

- Bare Land
- Fiddleneck - filaree fields
- Red brome or Mediterranean grass grasslands
- Wild oats and annual brome grasslands

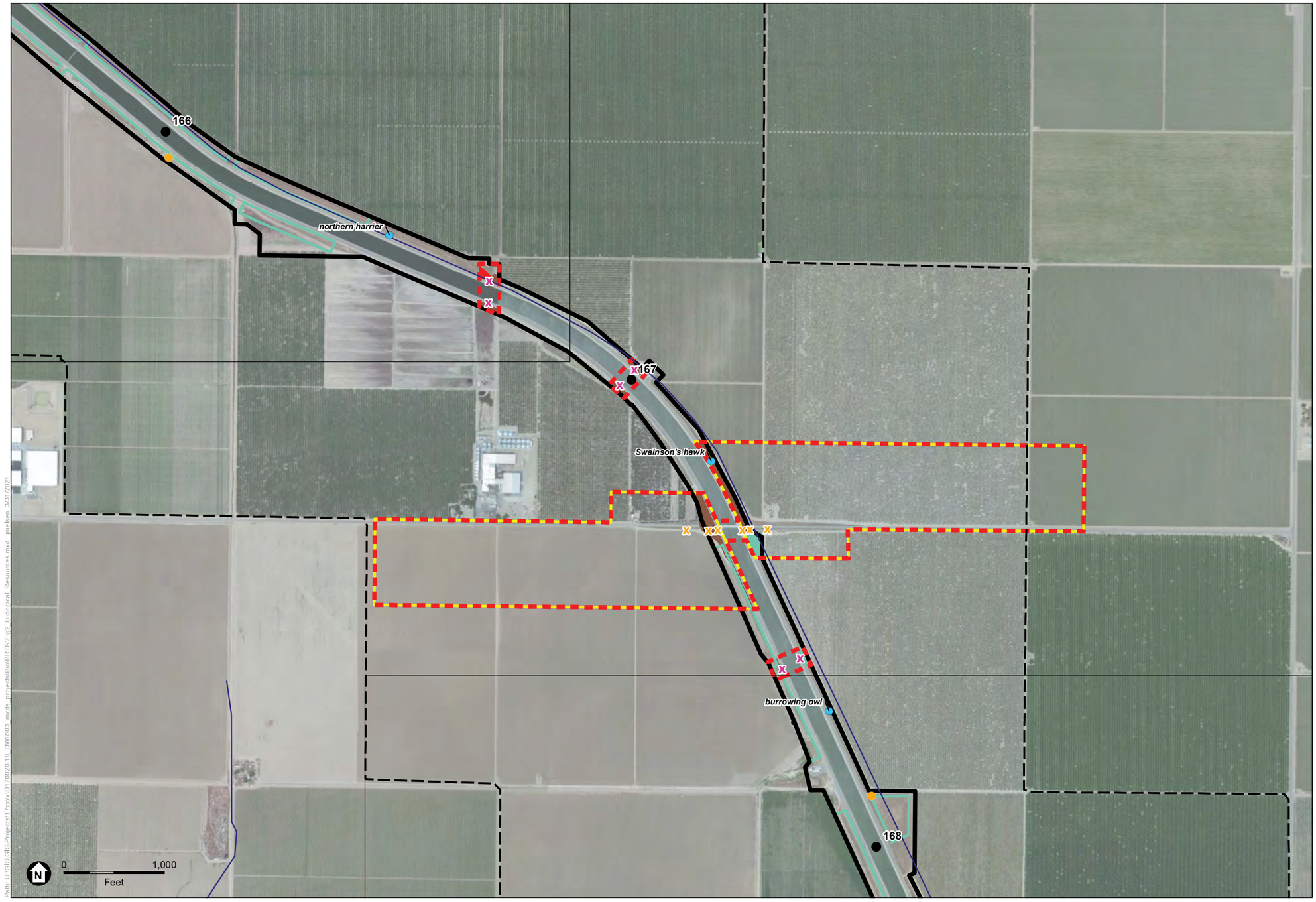
Path: U:\GIS\GIS\Projects\17xxxx\D170026.18_DWR\03_mxds_projects\Bio\BRTRIFig2_Biological_Resources.mxd_ineiken 3/31/2021

SOURCE: ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 31
Vegetation Alliance and Special-Status Resource Mapping From MP 165 to MP 166

ESA



Area of Potential Effects (APE)

Project Components

- Milepost
- Area of Interest (AOI)
- Right-of-Way (ROW)
- Borrow Area
- Bridge Crossing

Geotech Explorations

- Proposed Irrigation Crossing Drill Hole
- Bridge Drill Hole

Species Observation

- Bird
- SJKF Potential Den Location

Habitat Types

- Bare Land
- Red brome or Mediterranean grass grasslands
- Russian thistle fields provisional alliance

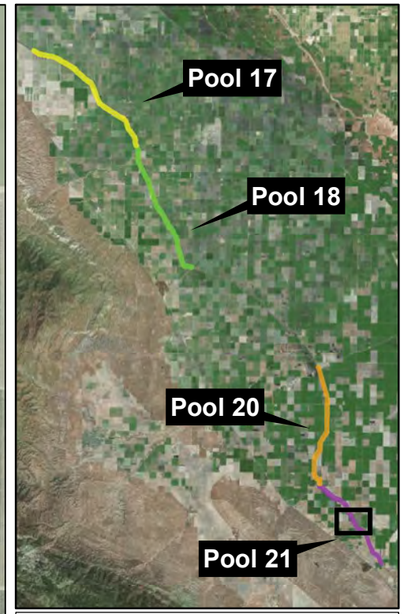
Path: U:\GIS\GIS\Projects\17xxxx\D170020.18_DWR\03_mxds_projects\Bio\BRTR\Fig2_Biological_Resources.mxd_inieken 3/31/2021

SOURCE: ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 32
Vegetation Alliance and Special-Status Resource Mapping From MP 166 to MP 168

ESA



Area of Potential Effects (APE)

Project Components

- Milepost
- Area of Interest (AOI)
- Right-of-Way (ROW)
- Borrow Area

Geotech Explorations

- Proposed Irrigation Crossing Drill Hole

Species Observation

- Bird
- SJKF Potential Den Location

Habitat Types

- Bare Land
- Fiddleneck - filaree fields
- Red brome or Mediterranean grass grasslands

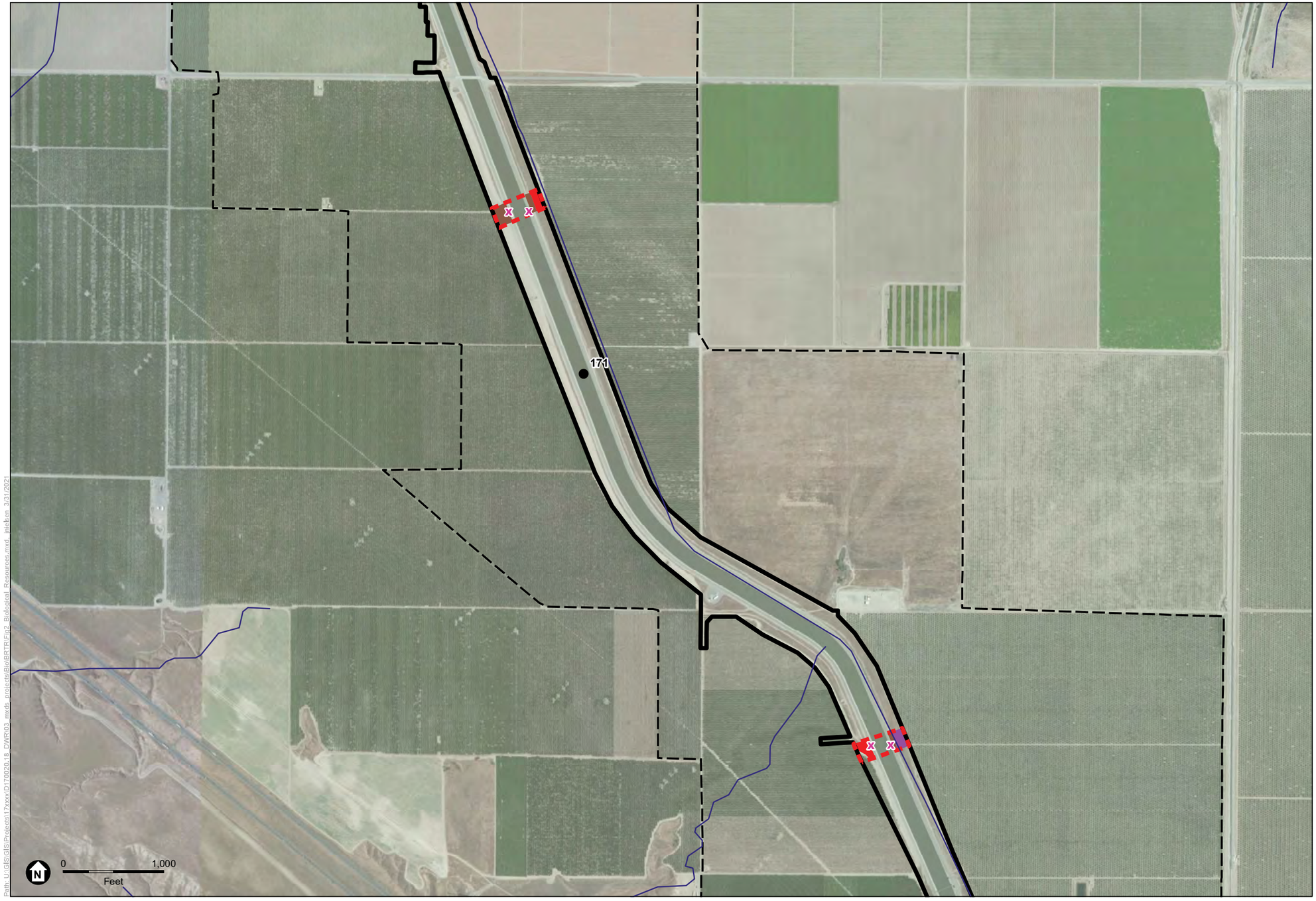
Path: U:\GIS\GIS\Projects\17xxxx\D170020.18_DWR\03_mxds_projects\Bio\BRTR\Fig2_Biological_Resources.mxd_inieken 3/31/2021

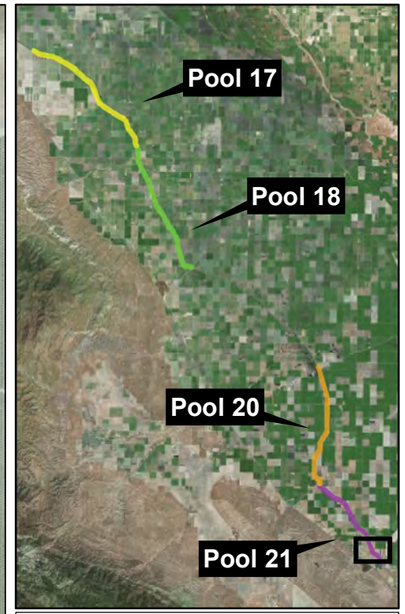
SOURCE: ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 33
Vegetation Alliance and Special-Status Resource Mapping From MP 168 to MP 169

ESA





Area of Potential Effects (APE)

Project Components

Milepost

Area of Interest (AOI)

Right-of-Way (ROW)

Geotech Explorations

Proposed Irrigation Crossing Drill Hole

SJKF Potential Den Location

Habitat Types

Bare Land

Red brome or Mediterranean grass grasslands

Wild oats and annual brome grasslands

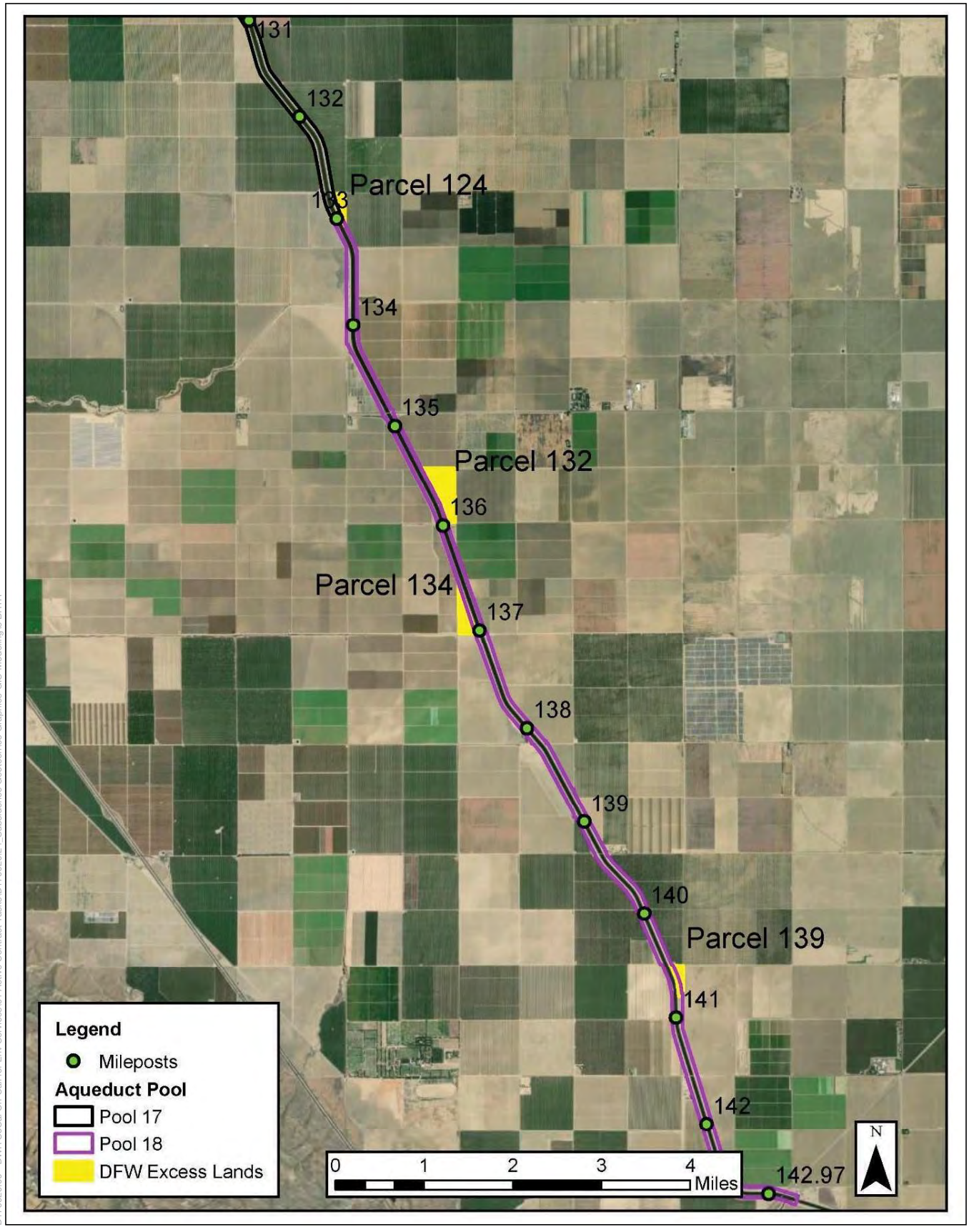
Path: U:\GIS\GIS\Projects\17xxxx\D170020.18_DWR\03_mxds_projects\Bio\BRTR\Fig2_Biological_Resources.mxd_inieken 3/31/2021

SOURCE: ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 34
Vegetation Alliance and Special-Status Resource Mapping At MP 171

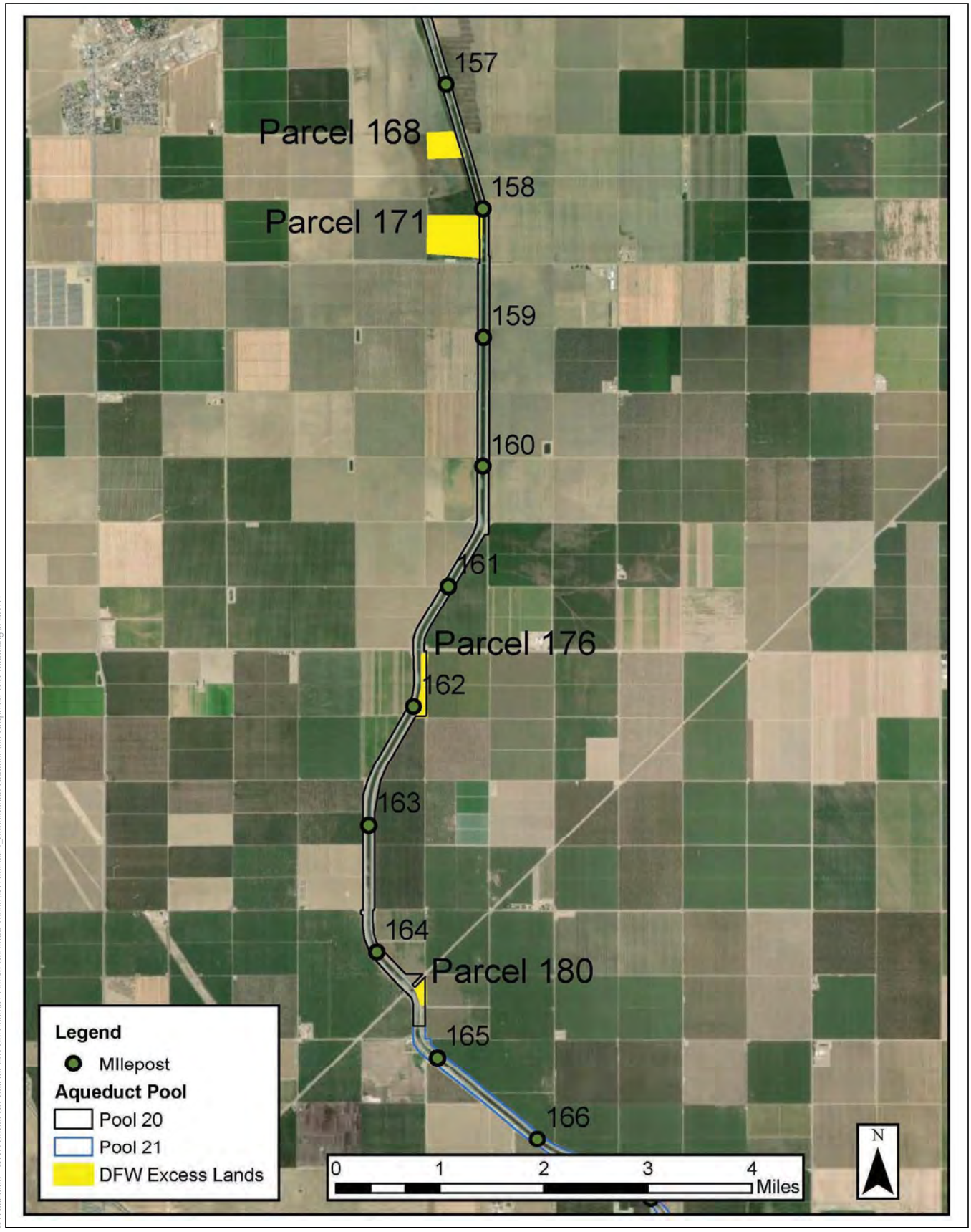
ESA



SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

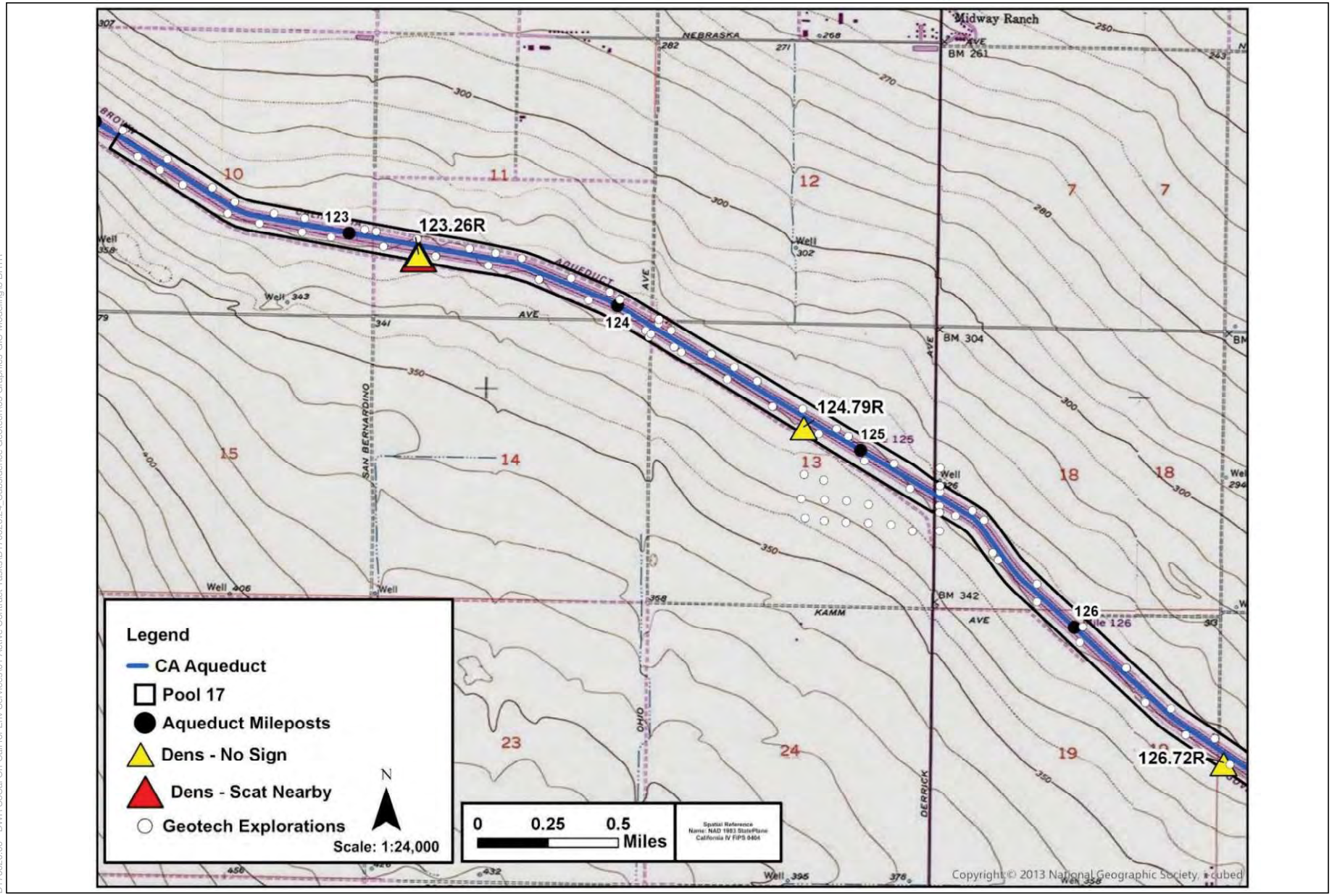
Figure 35
Pools 17 and 18 CDFW Excess Lands Locations



SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 36
Pools 20 and 21 CDFW Excess Lands Locations

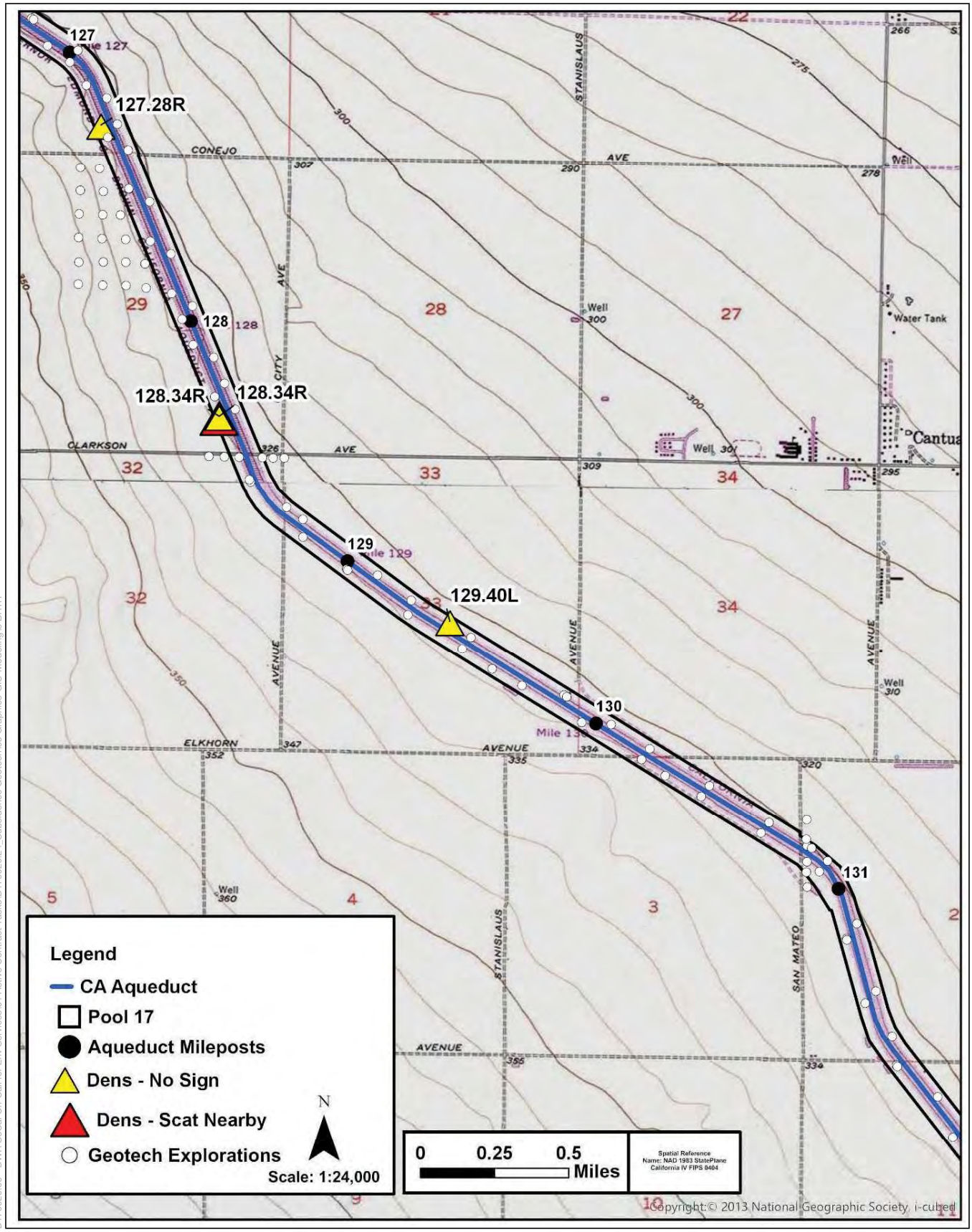


SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 37
2020 Survey Results of Dens and Burrow Locations MP 122 to MP 126.72

ESA



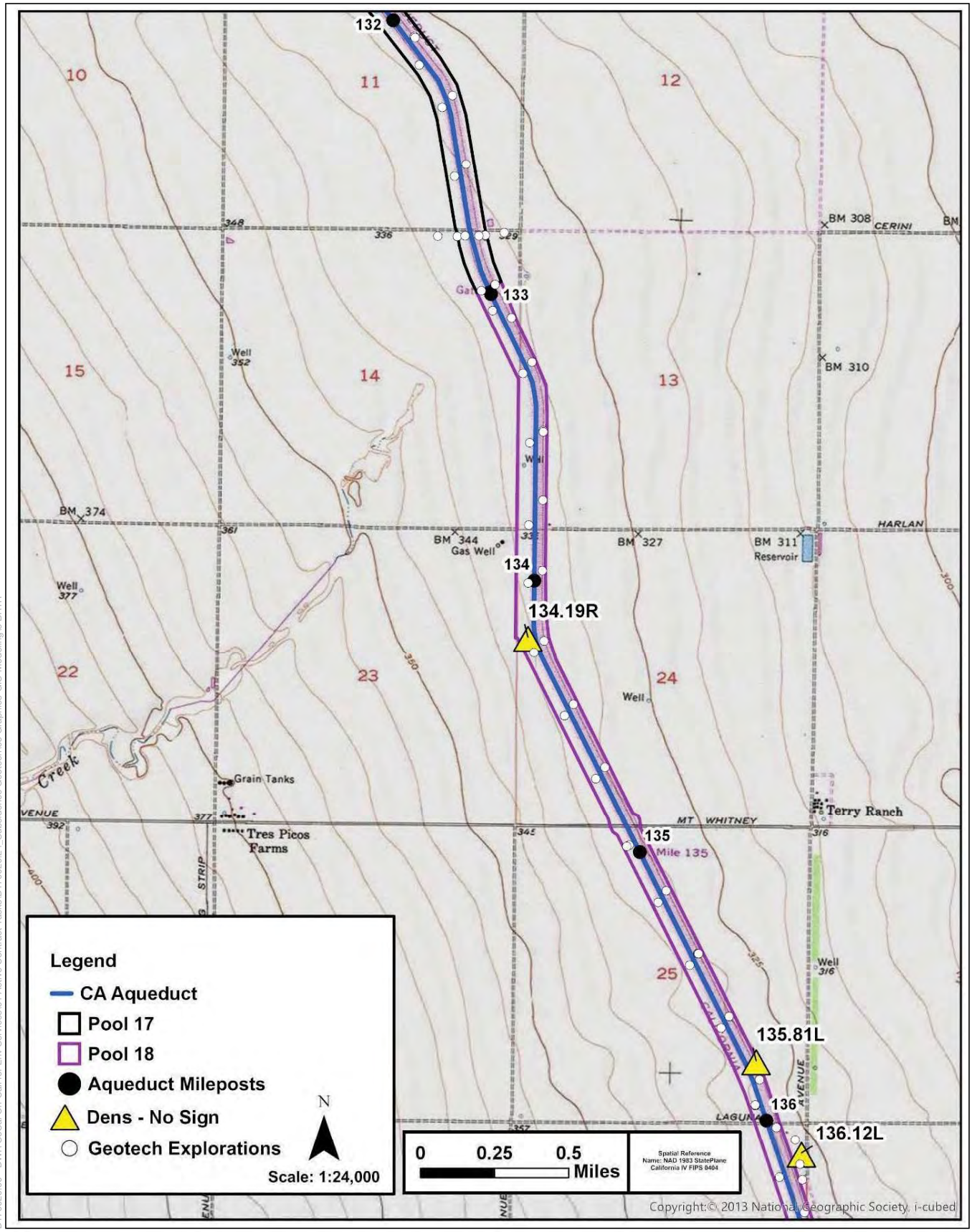
D170020.00 - DWR SoCal On-Call for Env Services\01 Active Contract Tasks\D170020.24_Subsidence Geotech\05 Graphics-GIS-Modeling\3 BRTR

SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 38
2020 Survey Results of Dens and Burrow Locations MP 126.72 to MP 132

ESA

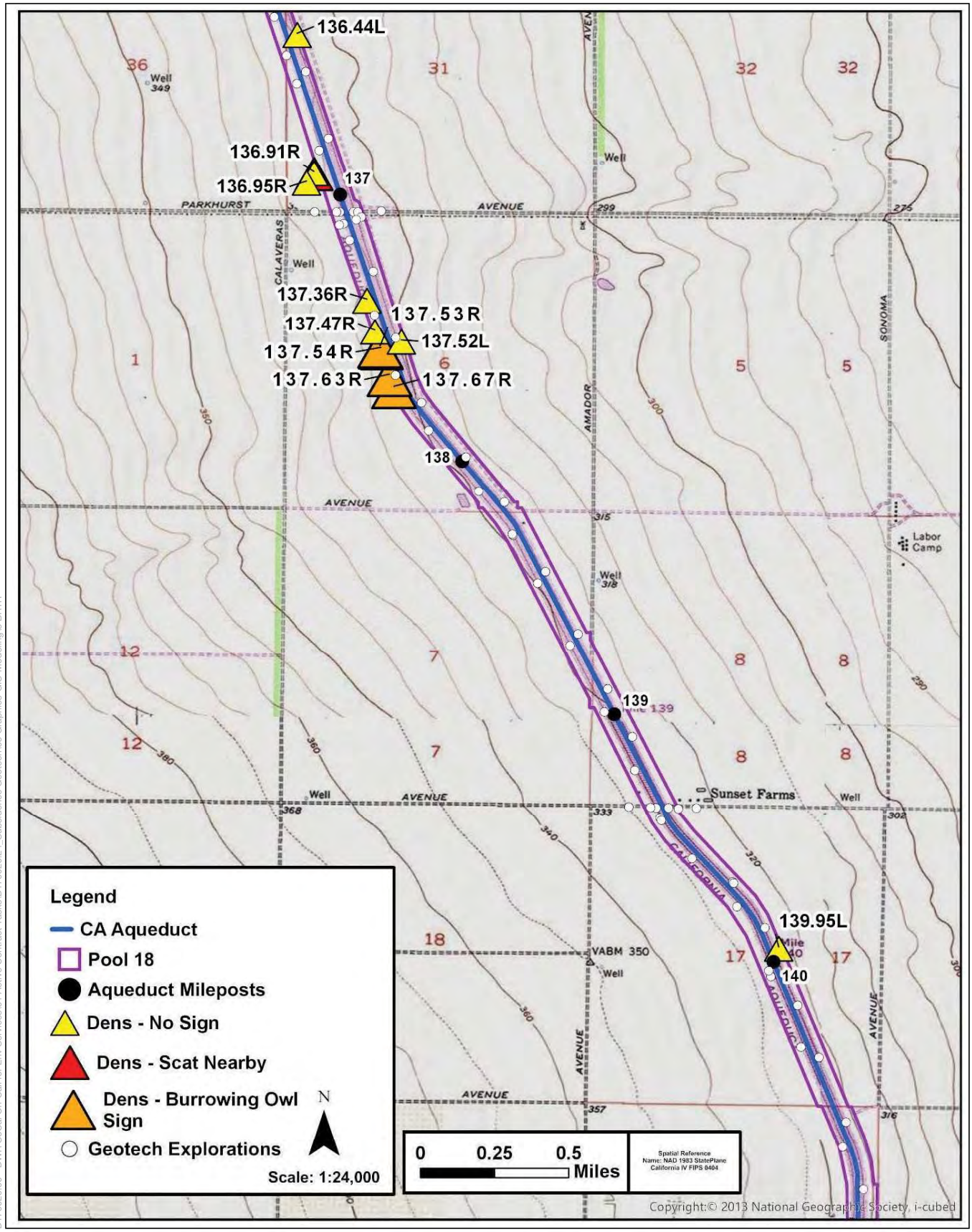


SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 39
2020 Survey Results of Dens and Burrow Locations MP 132 to MP 136

ESA

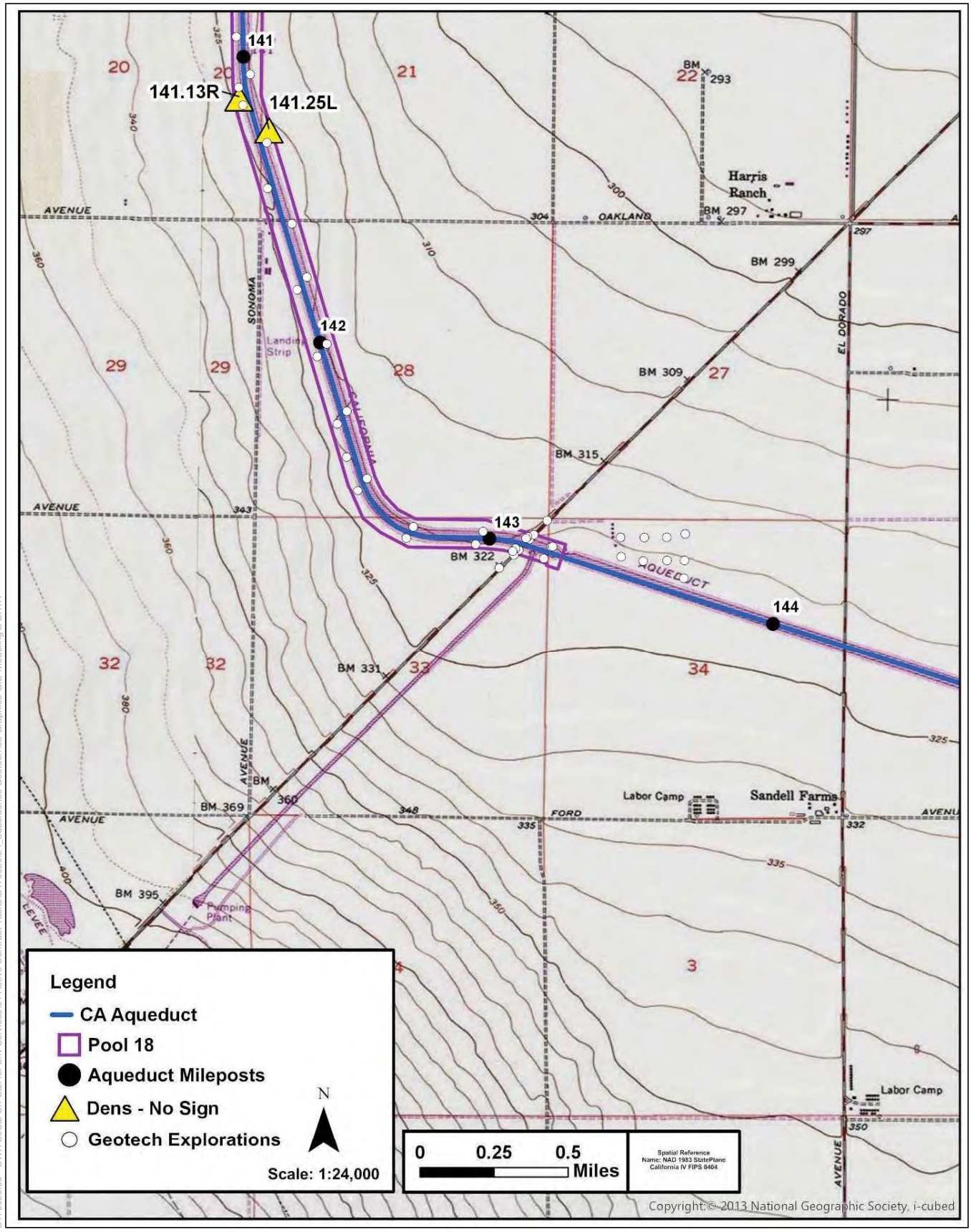


D170020.00 - DWR SoCal On-Call for Env Services\01 Active Contract Tasks\D170020.24_Subsidence Geotech\05 Graphics-GIS-Modeling\3 BRTR

SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 40
2020 Survey Results of Dens and Burrow Locations MP 136.44 to MP 141



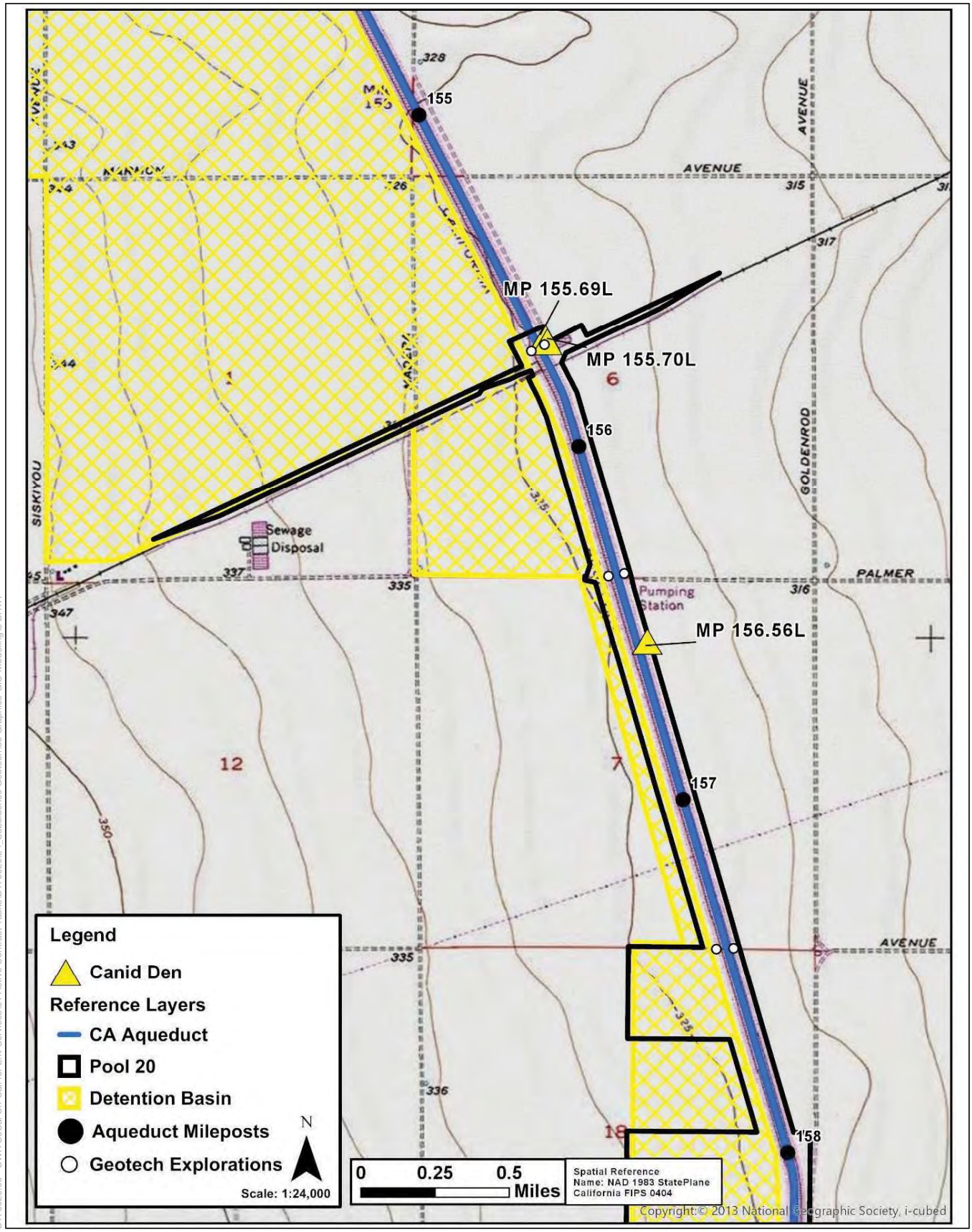
D170020.00 - DWR SoCal On-Call for Env Services\01 Active Contract Tasks\D170020.24_Subsidence Geotech\05 Graphics-GIS-Modeling\3 BRTR

SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 41
2020 Survey Results of Dens and Burrow Locations MP 141 to MP 144

ESA

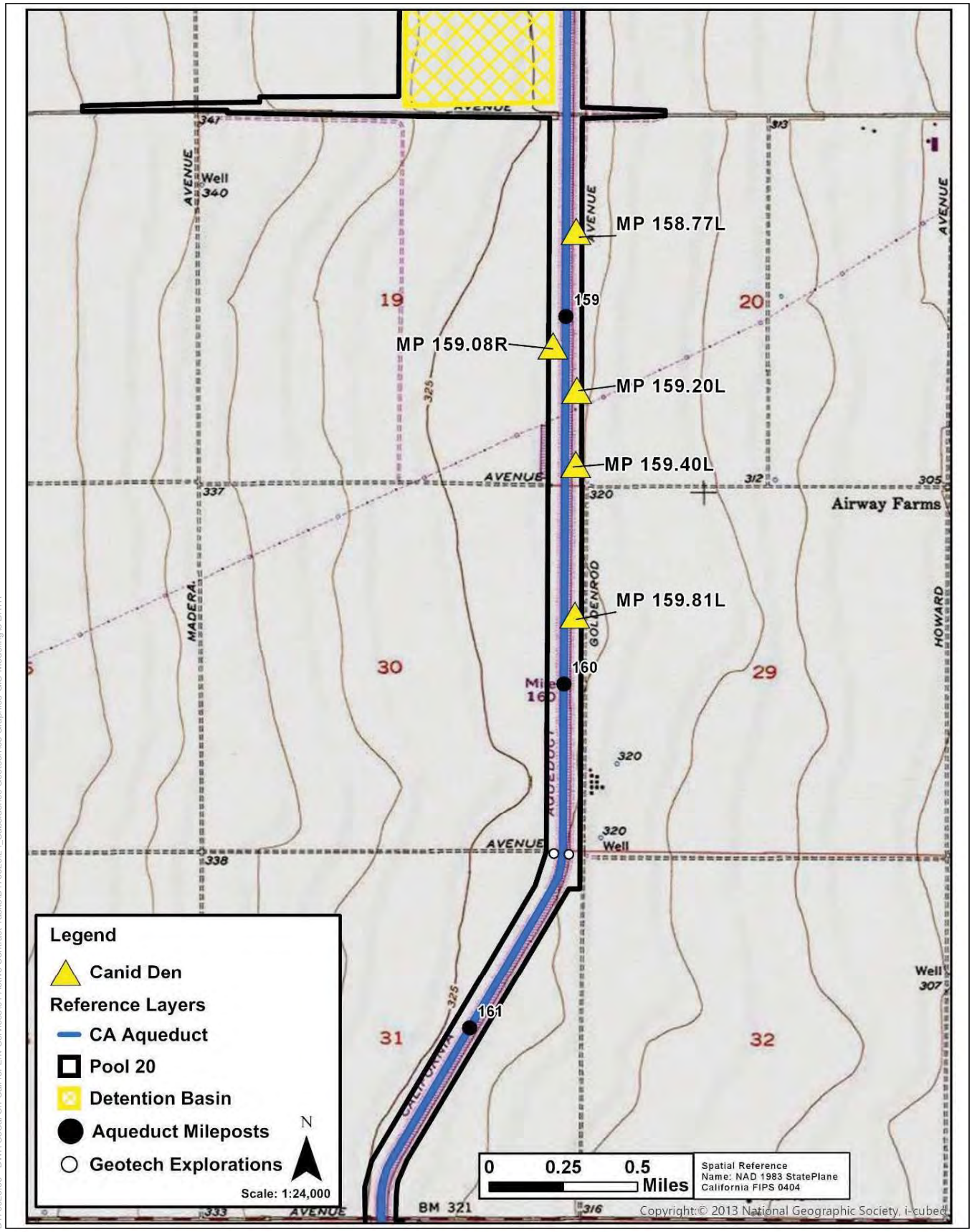


D170020.00 - DWR SoCal On-Call for Env Services\01 Active Contract Tasks\D170020.24_Subsidence Geotech\05 Graphics-GIS-Modeling\3 BRTR

SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

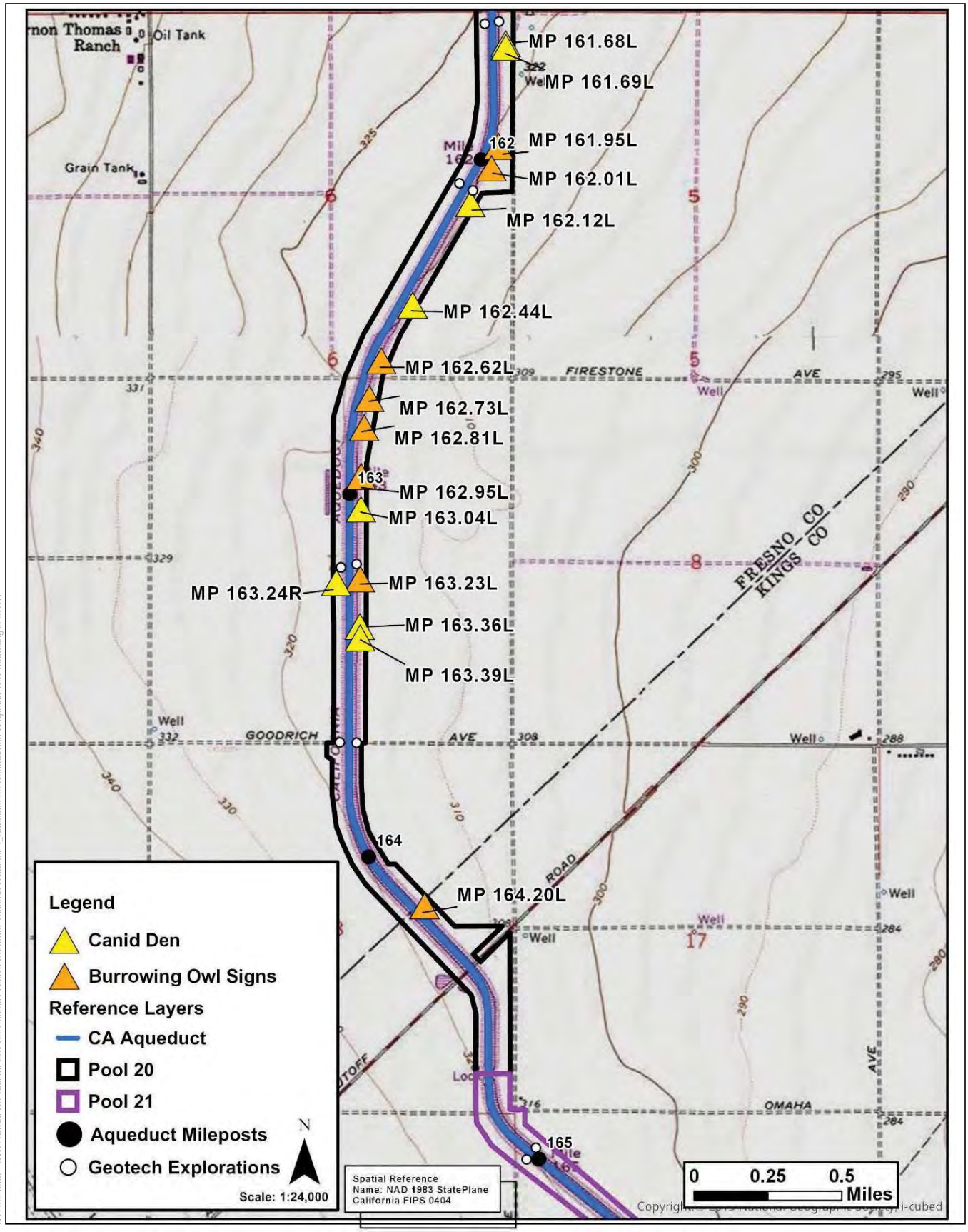
Figure 42
2019 Survey Results of Dens and Burrow Locations MP 154.69 to MP 158.18



SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

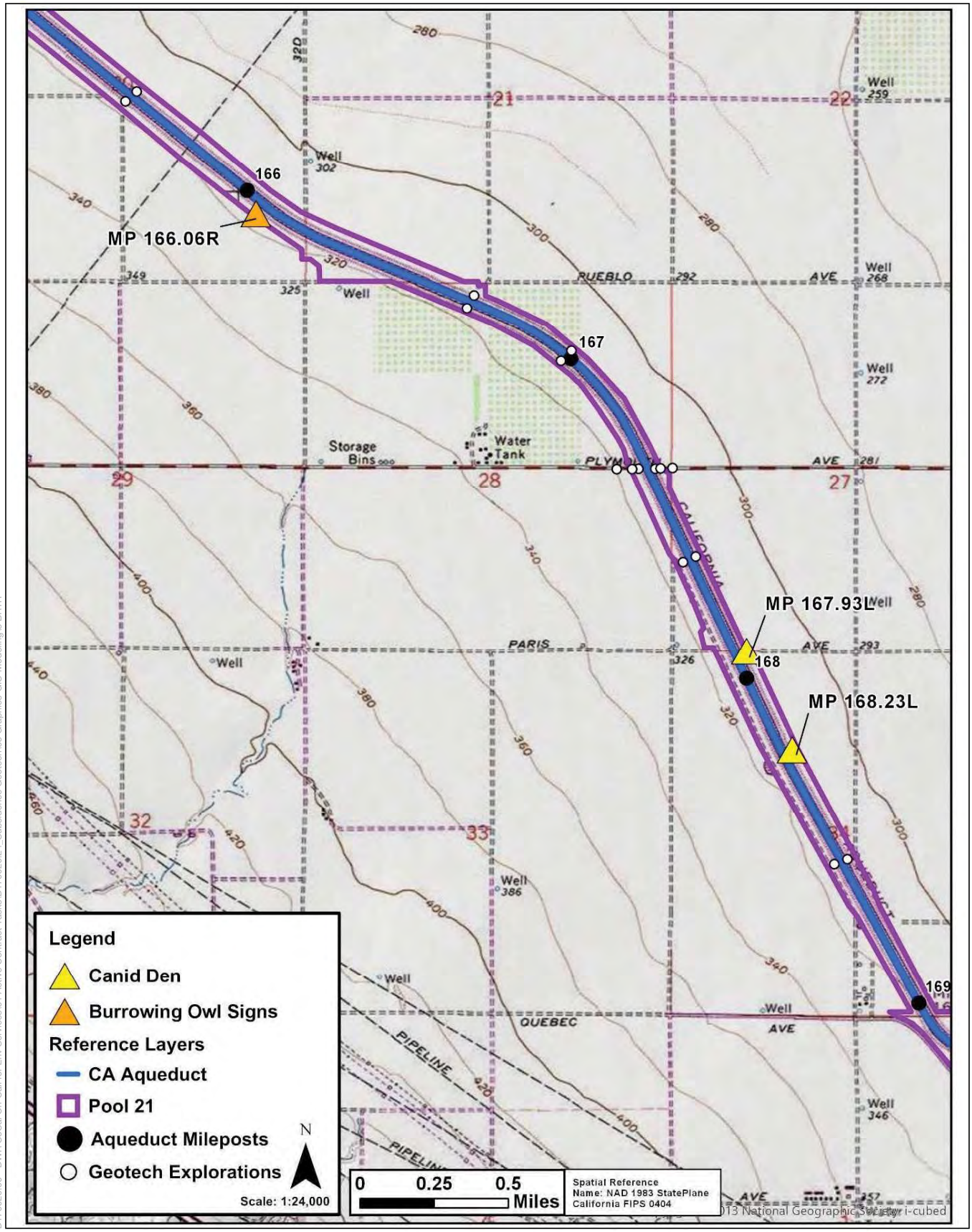
Figure 43
2019 Survey Results of Dens and Burrow Locations MP 158.18 to MP 161.60



SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 44
2020 Survey Results of Dens and Burrow Locations MP 161.60 to MP 165.25

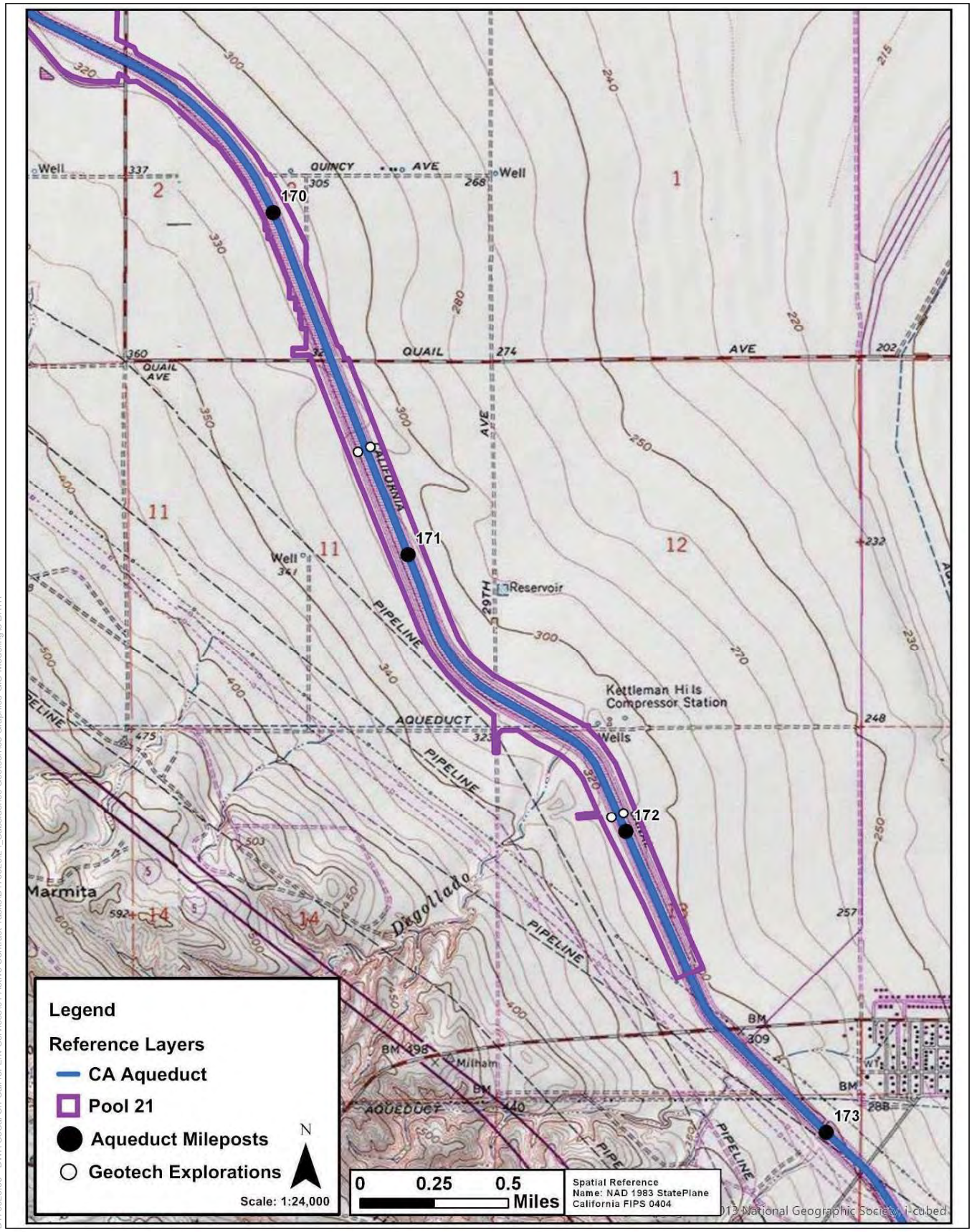


SOURCE: DWR, 2021; ESA, 2021

San Luis Canal Geotechnical Investigations Project

Figure 45
2020 Survey Results of Dens and Burrow Locations MP 165.25 to MP 169.13

ESA



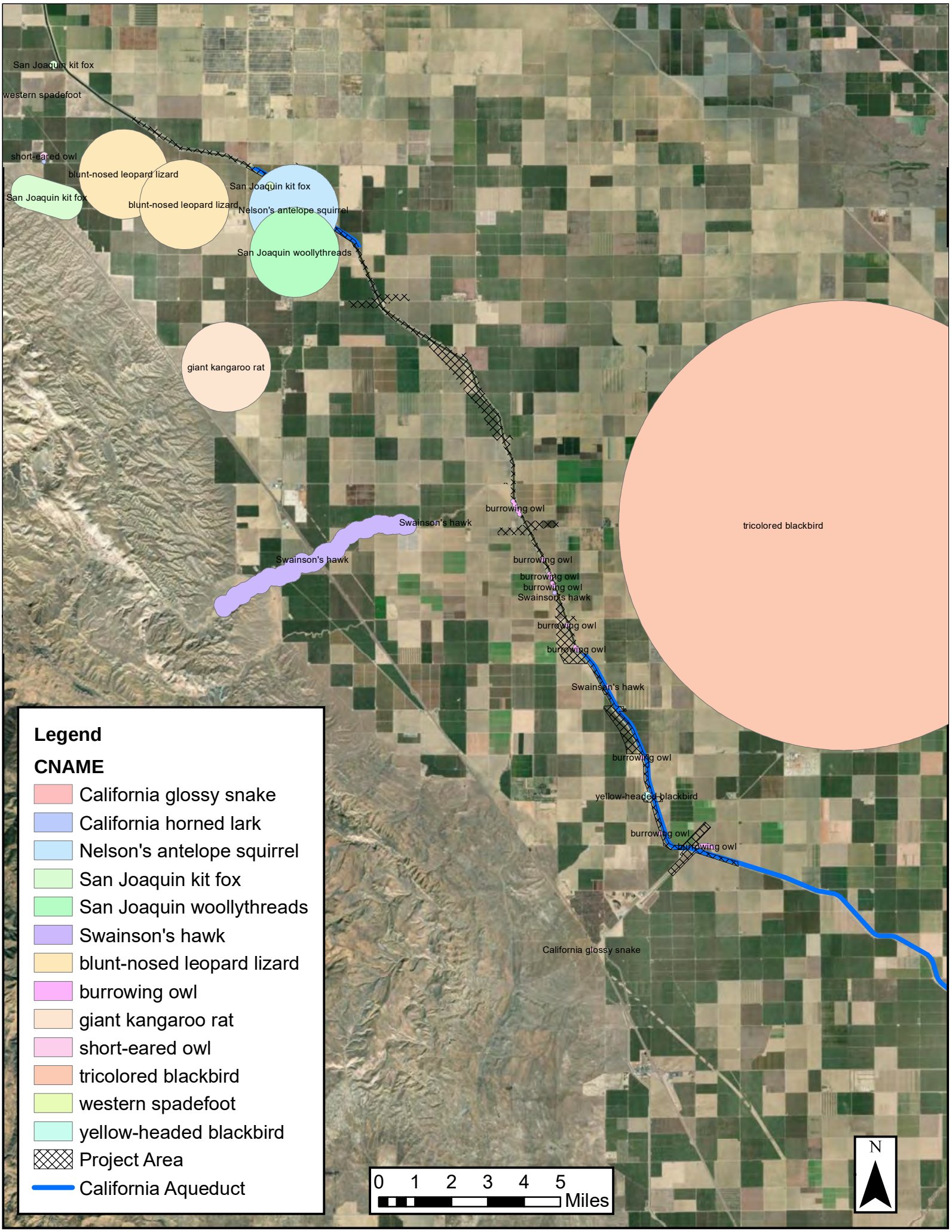
SOURCE: DWR, 2021; ESA, 2021

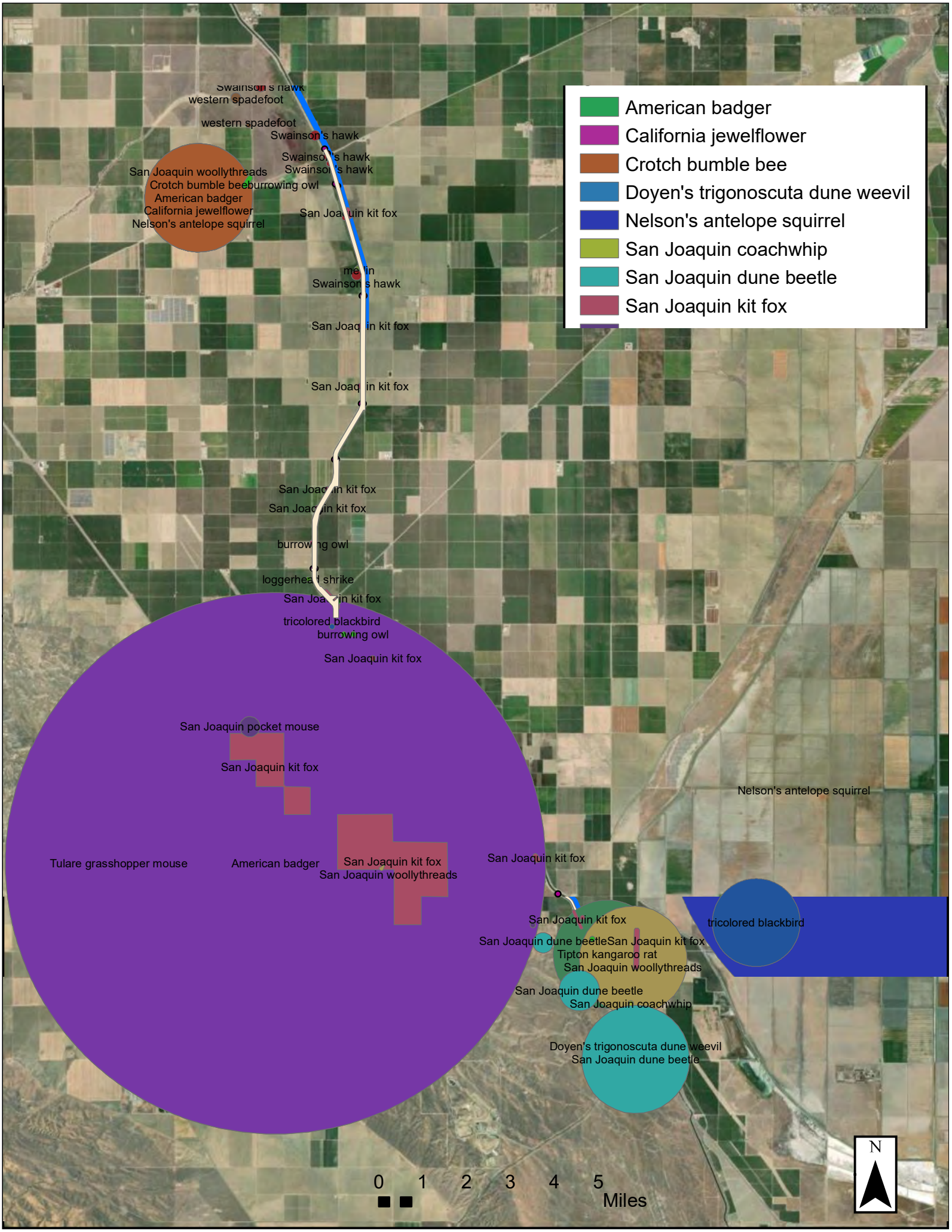
San Luis Canal Geotechnical Investigations Project

Figure 46
2020 Survey Results of Dens and Burrow Locations MP 169.13 to MP 173.30

Appendix B

CNDDB Records Within 3 Miles of the AOI


San Joaquin kit fox
western spadefoot
short-eared owl
blunt-nosed leopard lizard
San Joaquin kit fox
blunt-nosed leopard lizard
San Joaquin kit fox
Nelson's antelope squirrel
San Joaquin woollythreads
giant kangaroo rat
tricolored blackbird
burrowing owl
Swainson's hawk
Swainson's hawk
burrowing owl
burrowing owl
burrowing owl
Swainson's hawk
burrowing owl
burrowing owl
Swainson's hawk
burrowing owl
yellow-headed blackbird
burrowing owl
burrowing owl
California glossy snake
Legend
CNAME
California glossy snake
California horned lark
Nelson's antelope squirrel
San Joaquin kit fox
San Joaquin woollythreads
Swainson's hawk
blunt-nosed leopard lizard
burrowing owl
giant kangaroo rat
short-eared owl
tricolored blackbird
western spadefoot
yellow-headed blackbird
Project Area
California Aqueduct
0 1 2 3 4 5
Miles
N


American badger
California jewelflower
Crotch bumble bee
Doyen's trigonoscuta dune weevil
Nelson's antelope squirrel
San Joaquin coachwhip
San Joaquin dune beetle
San Joaquin kit fox
western spadefoot
Swainson's hawk
San Joaquin woollythreads
Crotch bumble bee
burrowing owl
American badger
California jewelflower
Nelson's antelope squirrel
San Joaquin kit fox
merlin
loggerhead shrike
tricolored blackbird
San Joaquin pocket mouse
Tulare grasshopper mouse
San Joaquin dune beetle
Tipton kangaroo rat
0 1 2 3 4 5
Miles
N

Appendix C

USFWS Listed Species and Sensitive Resources of Considered for Potential Impact

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Fresno County, California

Local office

Sacramento Fish And Wildlife Office

(916) 414-6600
(916) 414-6713

Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

Fresno Kangaroo Rat Dipodomys nitratoides exilis — Endangered
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/5150

Giant Kangaroo Rat Dipodomys ingens — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/6051

San Joaquin Kit Fox Vulpes macrotis mutica — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/2873

Birds

NAME	STATUS
California Condor Gymnogyps californianus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/8193	Endangered

Reptiles

NAME	STATUS
Blunt-nosed Leopard Lizard Gambelia silus No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/625	Endangered
Giant Garter Snake Thamnophis gigas No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4482	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog Rana draytonii There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2891	Threatened
California Tiger Salamander Ambystoma californiense There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2076	Threatened

Fishes

NAME	STATUS
Delta Smelt Hypomesus transpacificus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/321	Threatened

Crustaceans

NAME	STATUS
Vernal Pool Fairy Shrimp Branchinecta lynchi There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/498	Threatened

Flowering Plants

NAME	STATUS
San Joaquin Wooly-threads Monolopia (=Lembertia) congdonii No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/3746	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

MIGRATORY BIRD INFORMATION IS NOT AVAILABLE AT THIS TIME

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my speci ed location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my speci ed location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds

guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize

potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

- PEM1Kx
- PEM1C
- PEM1Ch
- PEM1Ax

FRESHWATER POND

- PUBFx
- PUSAx
- PUSCh

RIVERINE

- R2UBHx
- R2UBF
- R4SBCx

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Fresno and Kings counties, California

Local office

Sacramento Fish And Wildlife Office

(916) 414-6600
(916) 414-6713

Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

Giant Kangaroo Rat Dipodomys ingens — Endangered
Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/6051

San Joaquin Kit Fox Vulpes macrotis mutica — Endangered
Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/2873

Tipton Kangaroo Rat Dipodomys nitratoides nitratoides — Endangered
Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/7247

Reptiles

NAME	STATUS

Blunt-nosed Leopard Lizard Gambelia silus — Endangered
Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/625

Giant Garter Snake Thamnophis gigas — Threatened
Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/4482

Amphibians

NAME	STATUS

California Red-legged Frog Rana draytonii — Threatened
Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/2891

California Tiger Salamander Ambystoma californiense — Threatened
There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/2076

Fishes

NAME	STATUS

Delta Smelt Hypomesus transpacificus — Threatened
Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/321

Crustaceans

NAME	STATUS
Vernal Pool Fairy Shrimp Branchinecta lynchi	Threatened

Wherever found
There is **final** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/498

Flowering Plants

NAME	STATUS
California Jewelflower Caulanthus californicus	Endangered

Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/4599

San Joaquin Wooly-threads Monolopia (=Lembertia) congdonii — Endangered
Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/3746

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Golden Eagle Aquila chrysaetos This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31

Lawrence's Goldfinch Carduelis lawrencei — Breeds Mar 20 to Sep 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9464

Mountain Plover Charadrius montanus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3638

Tricolored Blackbird Agelaius tricolor — Breeds Mar 15 to Aug 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3910

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence ( )

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season ( )

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ( )
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data ( )
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my speci ed location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my speci ed location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting

point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

PEM1Cx

FRESHWATER POND

PUBKx

RIVERINE

R2UBHx

R4SBCx
R5UBF
R4SBC

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Appendix D
Focused Survey Results

Western Burrowing Owl Survey Report

for the

Cantua Creek Stream Group Improvements Project
Cantua Creek Sediment Removal Project—
Notification No. 1600-2015-0069-R4

August 2016

Project Description

The California Department of Water Resources' (DWR) proposed Cantua Creek Stream Group Improvements Project (Project) is located on the west side of the California Aqueduct (Aqueduct) along an approximate 13-mile stretch in western Fresno County between Clarkson Avenue and Oakland Avenue. It is approximately 18 miles north of the City of Coalinga and 36 miles southwest of Fresno (Figure 1). The Project area consists of 165 acres that are divided into four floodwater basins between Aqueduct mileposts (MP) 128.48 and 141.60. Project features include flood easement acquisition and raising portions of the Aqueduct embankment and raising some roads; the construction features proposed in each basin are depicted in Figure 2 through Figure 5. Most of the work will be done in approximately eight miles of the southern portion of the Project area.

Project details are described in the *Cantua Creek Stream Group Improvements Project Final Initial Study/Mitigated Negative Declaration* (MND) (State Clearinghouse Number 2014091063) and in the September 8, 2015 Stream Alteration Agreement for the Cantua Creek Sediment Removal Project (SAA) (Notification No. 1600-2015-0069-R4).

The Project will begin in September 2016 and is expected to be completed by the end of January 2017. All work will take place during daylight hours, beginning after 0600 and ending by 1730 each day.

Vegetation

According to *A Manual of California Vegetation* (Sawyer et al. 2009), the overall Project area can most closely be described as California annual grassland. This classification is dominated by annual grasses and herbs. According to the description, this series is composed of many non-native and native annual species, and composition varies among stands. Photos of typical habitat in the Project area are in Appendix A.

Habitat within the narrow Aqueduct right-of-way in the Project area has disturbed soils and is mostly ruderal with scattered areas containing non-native grasses, barren areas, or marginal quail bush scrub habitat. The ruderal habitat present on the western Aqueduct embankment is composed primarily of foxtail brome (*Bromus madritensis*), ripgut (*Bromus diandrus*), Russian thistle (*Salsola tragus*), fiddleneck (*Amsinckia sp.*), and heron's bill (*Erodium spp.*), with localized, dense thickets of quail bush (*Atriplex lentiformis*) (dead and alive) and mulefat (*Baccharis salicifolia*). Thickets of cattails (*Typha spp.*) are present where adjacent farmland ponds have encroached.

In areas where California annual grassland is present on the embankments, vegetation is typically 0 to 12 inches in height. Mowing, grading, and herbicide application occur annually on the embankments.

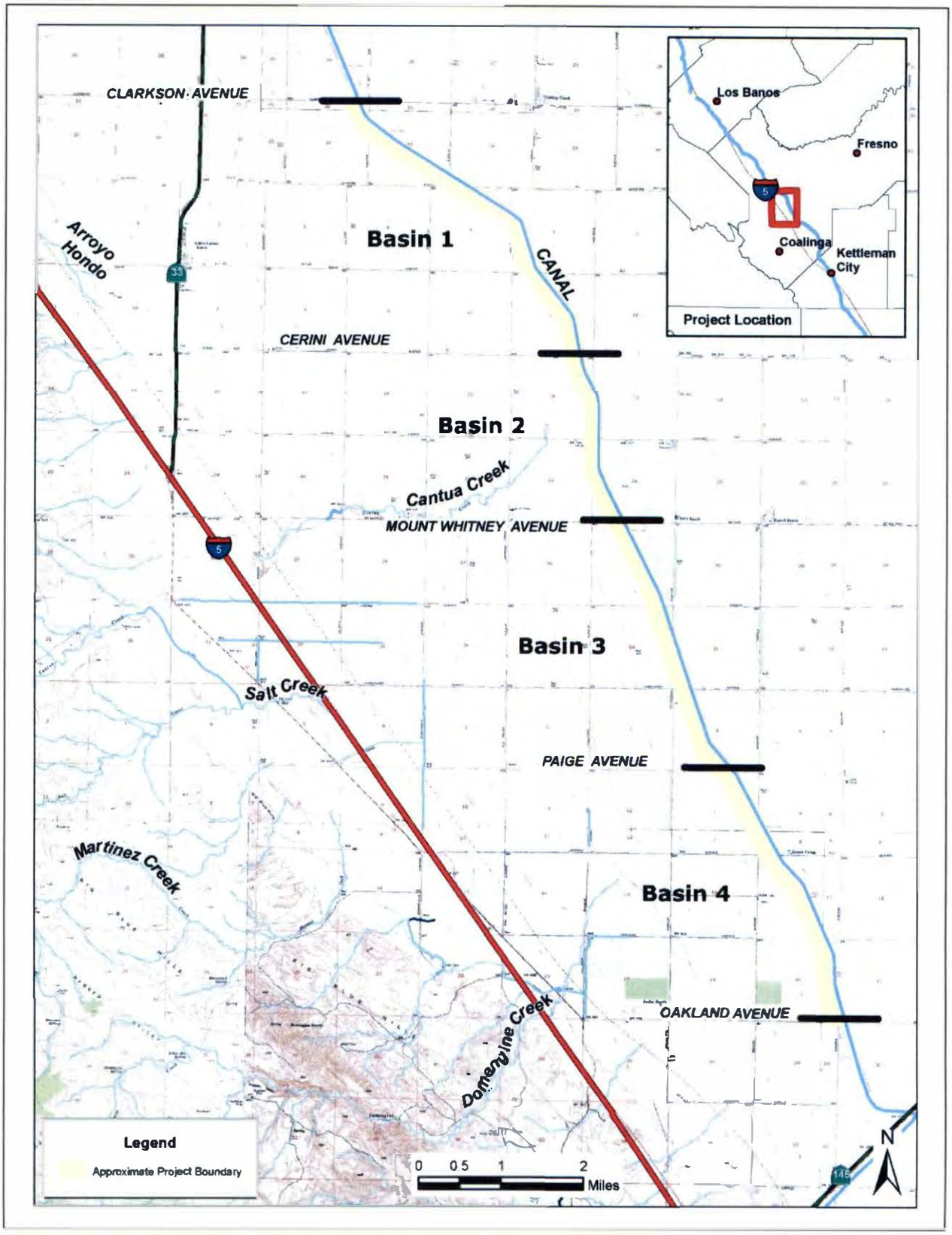


Figure 1. Project Location and Basins

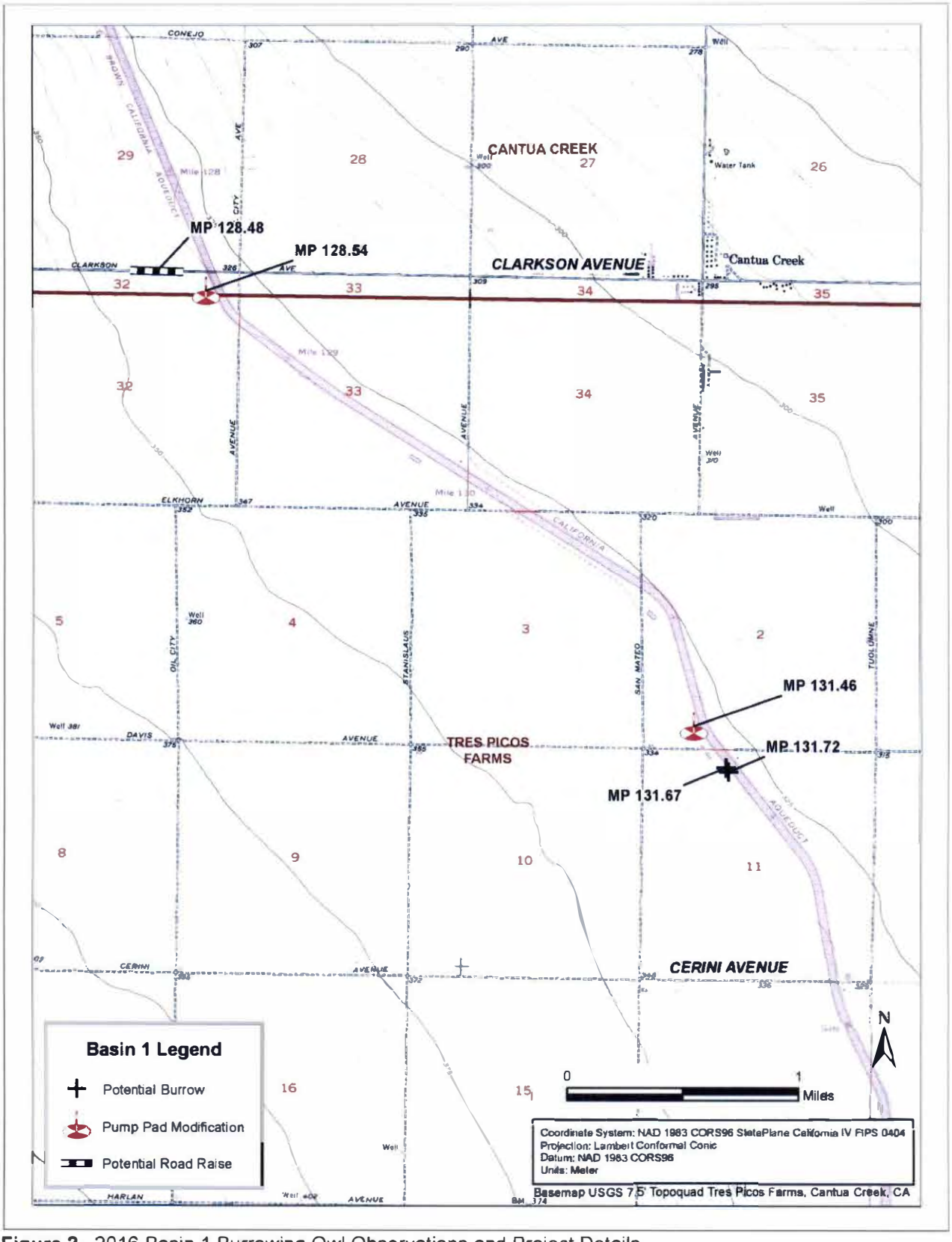


Figure 2. 2016 Basin 1 Burrowing Owl Observations and Project Details

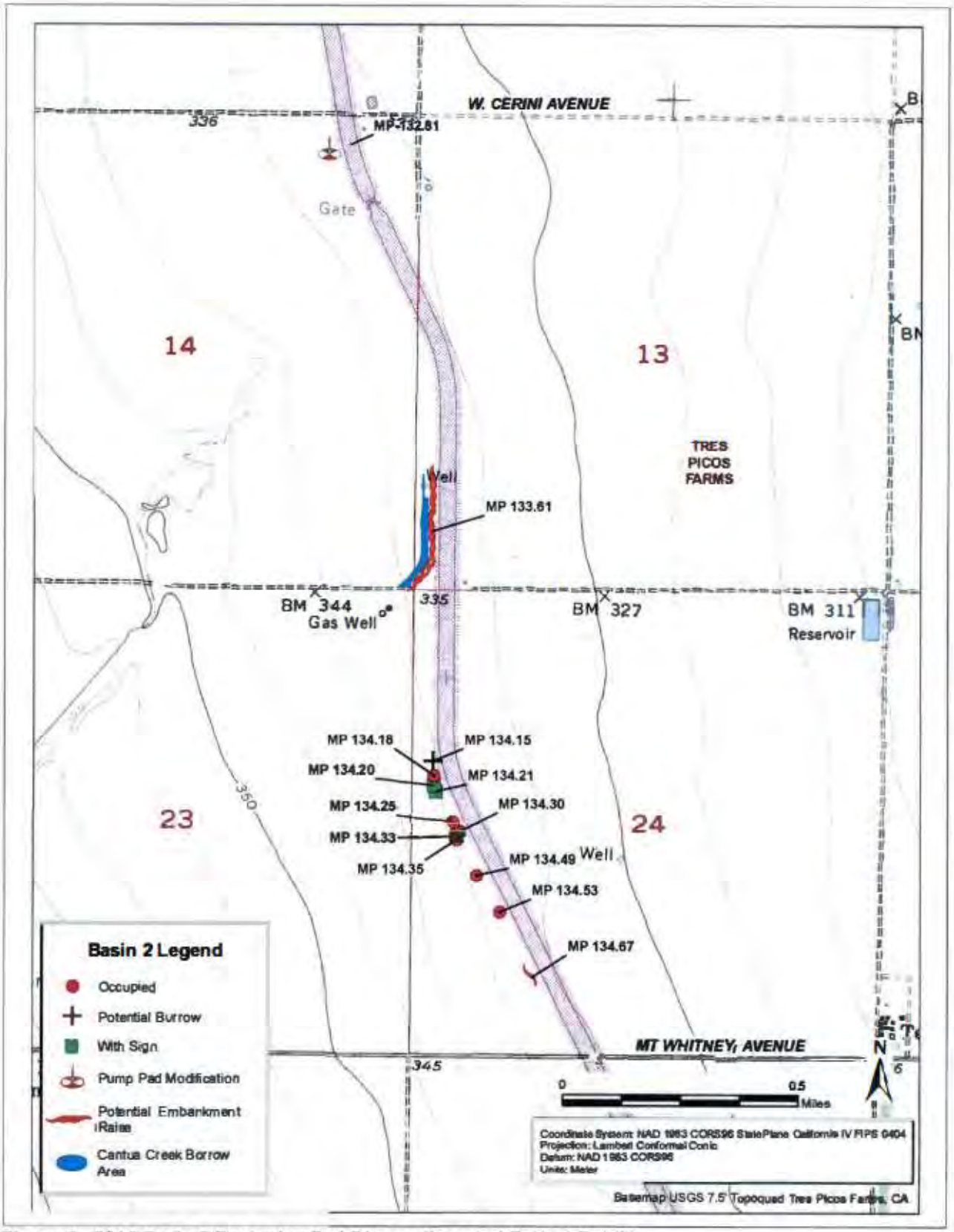


Figure 3. 2016 Basin 2 Burrowing Owl Observations and Project Details

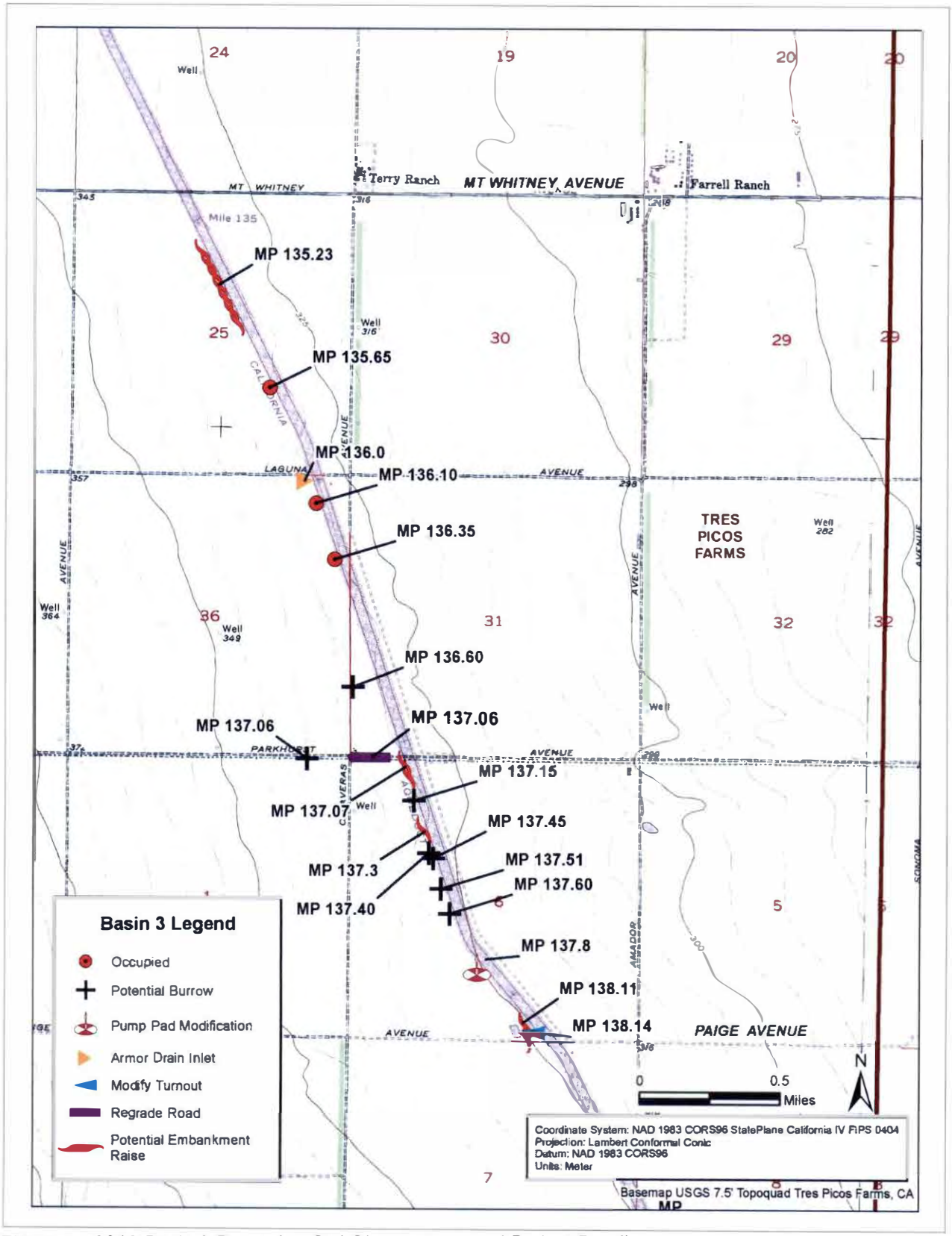


Figure 4. 2016 Basin 3 Burrowing Owl Observations and Project Details

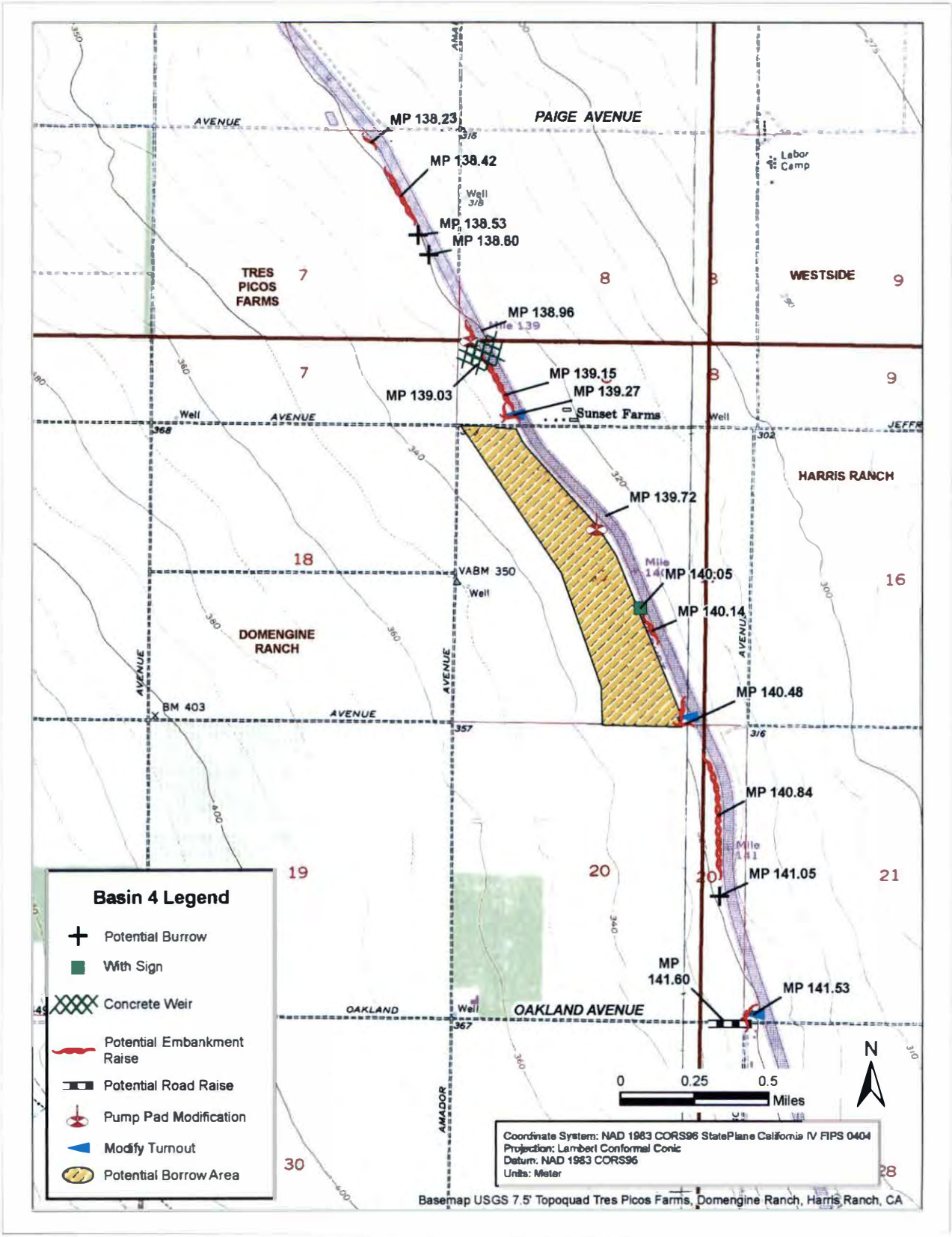


Figure 5. 2016 Basin 4 Burrowing Owl Observations and Project Details

Wildlife

Wildlife species observed in this area include Western burrowing owl (*Athene cunicularia;* BUOW), California ground squirrel (*Spermophilus beecheyi*), desert cottontail (*Sylvilagus audubonii*), coyote (*Canis latrans*), Swainson's hawk (*Buteo swainsoni)*, red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), great horned owl (*Bubo virginianus*), barn owl (*Tyto alba*), black necked stilts (*Himantopus mexicanus*), killdeer (*Charadrius vociferous*), corvids (*Corvus sp.*), multiple species of songbirds (*Passeriformes*), garter snake (*Thamnophis sp.*), as well as evidence of pocket gophers (*Geomyidae*) and other small mammal species.

Of these species, the hawks, owls, coyotes, and snakes are considered natural predators of the BUOW. The greatest threats to the owls are likely agricultural pesticides, herbicides, and potential strike from passing vehicles and equipment.

Historical Use and Occupancy of BUOW in the Project Area

Adjacent agricultural fields provide cover and food for small mammals and a food source for BUOW. Large ground squirrel burrows are present on the Aqueduct embankments, creating potential shelter for BUOW. Ground squirrel burrows, badger burrows, and canid dens are generally less abundant in the northern portion of the Project area.

Roads along the Aqueduct and on top of the embankments are frequently used by an assortment of entities including public agencies, private land owners, fishermen, and trespassers. Even though burrows may be located within 5 to 15 feet of the roads, BUOW have adapted to daily vehicle traffic on them.

According to the DFW California Natural Communities Database (CNDDB, June 2016), BUOW have been observed using various burrows in the embankments on the west side of the Aqueduct between W. Mount Whitney Avenue and W. Oakland Avenue. One BUOW was observed in this area in January 2001, seven were observed in September 2002, and three were observed between May and June of 2005.

From 2012 to 2015, DWR Environmental Scientists (ES) observed BUOW in the Project area along the west side of the Aqueduct during informal BUOW surveys and during site visits to the area for unrelated projects (Table 1). For the purposes of this report, informal observations are defined as observations that occurred on days when protocol level BUOW surveys were not being performed. The CNDDB Field Survey Forms have been submitted to DFW, and are included in Appendix B.

Table 1. 2012 to 2015 Informal BUOW Observations

Date	BUOW Individuals	BUOW Adult Pair	Basin (Figure 1)
November 2, 2012	1 Adult		2
March 7, 2013	2 Adults		2
March 7, 2013	1 Adult		4
October 8, 2013	1 Adult		3
February 2, 2014	1 Adult		3
March 2, 2015		1	3
October 22, 2015	1 Adult		1 (the only sighting on east side of Aqueduct; no burrow.)
October 23, 2015	3 Adults		1
October 29, 2015	2 Adults		4
October 29, 2015	1 Adult		0.25 miles south of Basin 4*
December 15, 2015		1	3
December 15, 2015	2 Adult		3
December 16, 2015	1 Adult		1
December 16, 2015	2 Adults		2

*This burrow is outside the Project area.

2016 BUOW Survey Methods and Results

Methods

Surveys were conducted in accordance with the 2012 *Staff Report on Burrowing Owl Mitigation* (Staff Report) breeding season survey protocol in Appendix D (DFW 2012); this report was written in compliance with the reporting requirements. All surveys were conducted between civil morning twilight and 1000 or between two hours before sunset and civil evening twilight.

On March 8, 2016, a reconnaissance survey was performed prior to conducting the breeding season surveys to assist in identifying occupied burrows, potential burrows, and any signs associated with them. When potential burrows were found, a stake was placed on the top of the embankment where it could easily be detected from the main road. An approximate milepost location was written on the stakes to keep location identification consistent for data collection; each burrow location was recorded with a Trimble® Juno® Global Positioning System unit.

Surveys were conducted from March 10 to June 23; four protocol level BUOW surveys were conducted in the Project area (Table 2). All surveys were limited to the west side of the Aqueduct embankments and toe roads where construction and site access will occur (between MP127.83 and MP 143.12). Surveys also occurred along Clarkson, Parkhurst, and Oakland Avenues where road raises or grading would occur (see Figure 2 through Figure 5). A survey of the entire Project area took 3 to 5 days to complete (Table 2).

Table 2. Survey Distribution

Date	Survey No.	Time	Basin Surveyed	Surveyor
March 10, 2016	1	0610 - 0957	Part of 4	DWR ES Christa Collin and DWR Scientific Aid Jennifer Bohling
March 21, 2016	1	1711 - 1934	Part of 3 and Remainder of 4	DWR ES Laura Castro and DWR Senior ES Terry Ely
March 22, 2016	1	1714 - 1937	Part of 2 and Remainder of 3	DWR ES Laura Castro and DWR Senior ES Terry Ely
March 23, 2016	1	1739 - 1918	Part of 1 and Remainder of 2	DWR ES Laura Castro and DWR Senior ES Terry Ely
March 24, 2016	1	1758 - 1840	Remainder of 1	DWR ES Laura Castro and DWR Senior ES Terry Ely
April 25, 2016	2	1740 - 2008	All of 1	DWR ES Laura Castro and DWR Senior ES Terry Ely
April 26, 2016	2	0630 - 1004	All of 2 and Part of 3	DWR ES Laura Castro and DWR Senior ES Terry Ely
April 26, 2016	2	1756 - 1957	Remainder of 3	DWR ES Laura Castro and DWR Senior ES Terry Ely
April 27, 2016	2	0658 - 1000	All of 4	DWR ES Laura Castro and DWR Senior ES Terry Ely
May 23, 2016	3	1819 - 2005	Part of 4	DWR ES Laura Castro and DWR Senior ES Terry Ely
May 24, 2016	3	0659 - 0956	Part of 3 and Remainder of 4	DWR ES Laura Castro and DWR Senior ES Terry Ely
May 24, 2016	3	1810 - 2018	Part of 2 and Remainder of 3	DWR ES Laura Castro and DWR Senior ES Terry Ely
May 25, 2016	3	0732 - 0925	All of 1 and Remainder of 2	DWR ES Laura Castro and DWR Senior ES Terry Ely
June 21, 2016	4	1838 - 2036	All of 1 and Part of 2	DWR ES Laura Castro and DWR Senior ES Terry Ely
June 22, 2016	4	0738 - 0959	Remainder of 2 and Part of 3	DWR ES Laura Castro and DWR Senior ES Terry Ely
June 22, 2016	4	1839 - 2039	Remainder of 3 and Part of 4	DWR ES Laura Castro and DWR Senior ES Terry Ely
June 23, 2016	4	0737 - 0949	Remainder of 4	DWR ES Laura Castro and DWR Senior ES Terry Ely

Windshield surveys were primarily conducted; however, windshield surveys were only done in areas where the surrounding area was clearly visible from the vehicle. Transects were performed where windshield surveys were not adequate to determine presence of BUOW or burrows; transects were spaced 25 to 60 feet apart, depending on topography and vegetation height and density.

The MP, signs of BUOW heard or observed, number of BUOW present, life stage, behavior, description of habitat, vegetation height, surrounding land use, position of burrow on the embankment, transect spacing, predators observed, and any notes were recorded on data sheets (Appendix C).

Results

In 2016, several informal observations of BUOW were documented during protocol level Swainson's hawk (SWHA) surveys. Observations were also documented during the reconnaissance survey on March 8, 2016 and during other site visits (Table 3). During the reconnaissance survey, BUOW were observed at two locations, both in Basin 3 (Table 3, Figure 4). BUOW were perched at the burrow entrance.

Four informal BUOW observations occurred in early April 2016 during SWHA surveys. One observation was in Basin 1, the second was in Basin 2, and the two others were in Basin 3 (Table 3, Figures 2, 3, and 4). Most BUOW were either perched on a stake or perched at the burrow; however, on April 5, 2016, a BUOW was observed standing on the ground on the east side of the Aqueduct at MP 132.51. This BUOW was on an embankment where no burrow was present. The BUOW was observed from a distance and it was difficult to tell if it was an adult or juvenile. It possibly had downy feathers.

Table 3. 2016 Informal BUOW Observations

Date	BUOW Individuals	BUOW Adult Pair	Basin (Figure 1)	MP	Activity
March 8, 2016	1		3	135.65	reconnaissance
	1		3	136.10	reconnaissance
April 5, 2016	1 Juvenile(?)*		1	132.51	SWHA survey
April 6, 2016	1 Adult		2	134.30	SWHA survey
April 12, 2016	1 Adult		3	135.65	SWHA survey
	1 Adult		3	136.35	SWHA survey
May 5, 2016	1 Adult		3	136.10	SWHA survey
May 10, 2016	1 Adult		3	136.10	SWHA survey
June 1, 2016		1	3	136.10	site visit
June 6, 2016	1 Adult		3	136.10	SWHA survey
July 7, 2016	2 Nestlings	1	3	135.65	SWHA survey
July 19, 2016	3 Nestlings	1	3	135.65	SWHA survey
July 22, 2016	3 Nestlings	1	3	135.65	SWHA survey
August 2, 2016	1 Adult, 3 Nestlings		3	135.65	SWHA survey
August 17 and 18, 2016	1 Adult, 2 Juveniles		3	135.65	preconstruction survey
August 17 and 18, 2016	1 Adult, 1 Juvenile		3	136.10	preconstruction survey

*BUOW was observed from a distance and possibly had downy feathers.

During 2016 protocol surveys, BUOW were observed in Basin 2 and Basin 3. Table 4 summarizes BUOW data gathered in Basin 2 during the 2016 breeding season protocol level surveys. Observations that occurred on the day of a survey, but occurred before the recorded start time or after the recorded survey end time, are noted. No BUOW were observed in Basin 2 during surveys 2, 3, and 4. Table 5 summarizes BUOW data gathered in Basin 3. No BUOW were observed in Basin 3 during survey 1.

Table 4. 2016 BUOW Protocol Survey Basin 2 Results

Burrow Location (MP)	Survey No. and Date	Time of Observation (morning/evening)
134.18	Survey No.1	
	March 22, 2016	morning**
	March 22, 2016	evening
	March 23, 2016	evening**
	March 24, 2016	evening**
134.25	Survey No.1	
	March 22, 2016	morning**
	March 24, 2016	evening**
134.35	Survey No.1	
	March 22, 2016	evening
	March 23, 2016	evening**
134.49	Survey No.1	
	March 22, 2016	evening
134.53	Survey No.1	
	March 22, 2016	morning**
	March 23, 2016	evening**
	March 24, 2016	evening**

** BUOW observed outside of the designated survey period.

Table 5. 2016 BUOW Protocol Survey Basin 3 Results

Burrow Location (MP)	Survey No. and Date	Time of Observation (morning/evening)
136.10	**Survey No.2**	
	April 26, 2016	morning
	Survey No.3	
	May 24, 2016	evening
	Survey No.4	
	June 22, 2016	morning
	June 22, 2016	evening**

** BUOW observed outside of the designated survey period.

Protocol level BUOW breeding season surveys and informal observations in 2016 resulted in the detection of 13 potential burrows that had no signs of BUOW use, 4 burrows with signs of use but with no BUOW, and 9 burrow locations where BUOW were observed or were within 115 feet of a burrow. Twenty-six locations had burrows that could have provided suitable shelter for BUOW.

No evidence of predation or vehicle strikes of BUOW was observed during informal observations or during protocol level surveys; however two burrows, located at MP 134.33 and MP 138.53, were found completely caved in during the fourth survey. A burrow at MP 131.95 that was occupied in spring of2015 could no longer be found in the winter of 2015. Project area burrow observation results are depicted in Table 6. The 2016 protocol level survey results are depicted on Figure 2 through Figure 5.

During Survey 1, BUOW were observed at five different locations all in Basin 2 (Table 4, Figure 3). BUOWs were typically perched at the burrow entrance. At 4 of the locations, a BUOW fled from the burrow entrance when we approached. One BUOW was observed perched on the embankment approximately 105 feet from its burrow.

One sighting occurred during Survey 2; the observation was in Basin 3 (Table 5, Figure 4). This BUOW was perched on the stake above the burrow.

BUOW were observed once during Survey 3. The BUOW was at MP 136.10 (Table 5, Figure 4). However, informal observations of a single owl occurred at MP 136.10 on two other occasions in May 2016 during SWHA surveys (Table 3). During these observations, the BUOW was perched on the stake above the burrow. Although one bird was seen at a time, a pair was suspected since separate individual sightings at the same location indicated a dark colored BUOW and a light colored BUOW.

Table 6. Project Area Burrow Observation Results

Burrow Location (MP)	Potential Burrow	Burrow with Sign	Burrow Occupied by BUOW	Occupied at least once from 2013-2015
131.67	X			X
131.72	X			X
131.95				X*
134.15	X			
134.18			X	X
134.20		X		
134.21		X		X
134.25			X	
134.30			X	
134.33		X‡		X
134.35			X	X
134.49			X	X
134.53			X	X
135.65			X	X
136.10			X	X
136.35			X	
136.60	X			
137.06	X			
137.15	X			
137.40	X			X
137.45	X			
137.51	X			
137.60	X			
138.53	X‡			
138.60	X			
140.05		X		X
141.05	X			
TOTAL	13	4	9	13

*Burrow was no longer present in winter 2015.

‡Burrow found caved in during the June 2016 survey; burrow no longer supports BUOW occupancy.

Confirmation of the adult pair at MP 136.10 occurred on June 1, 2016 at 1515. Neither BUOW nor SWHA surveys were conducted on that date. An informal observation was also made on June 6 at this site of a single BUOW during SWHA surveys (Table 3).

On June 22, during Survey 4, a second sighting of the pair at MP 136.10 occurred at approximately 1830 while driving on the east side of the Aqueduct en route to the BUOW survey start point; however, this observation was made outside the designated survey period. Only one owl was observed on that day during the recorded protocol survey period. BUOW were not observed at any other location in June (Table 3 and 5, Figure 4).

On July 7, 2016 during a SWHA survey, DWR Environmental Scientists noticed that the BUOW pair at MP 136.10 had moved to a burrow north at MP 135.65. Two nestlings were observed at the burrow entrance between the hours of 1130 and 1230. Although nestlings were not observed at MP 136.10, the size of the nestlings and the mere two week lapse in time indicate that the adults moved to MP 135.65 with their young (Tables 3 and 5). The burrow at MP 135.65 was unoccupied in May and June. The move to a different burrow may have been triggered by non-DWR work that was occurring in the DWR right-of-way approximately 328 feet from the original burrow.

The BUOW were observed again at MP 135.65 during SWHA surveys on July 19, and 22, 2016 and on August 2, 2016 (Table 3). On July 19, a third nestling was observed. The pair and the three nestlings were observed between 0830 and 1100; one of the nestlings hopped on top of the embankment with its wings fluttering. On July 22, the three nestlings and one adult were observed at approximately 0905 from the east side of the Aqueduct. A second adult flew to the burrow from the agricultural field approximately 5 minutes later. Adults were sounding alarm calls because farm and other vehicles were consistently driving on top of the embankment above the burrow. The upper embankment road was subsequently closed off to equipment and vehicles by DWR San Luis Field Division staff because the vehicles were not supposed to use that road. On August 2, the three nestlings and one adult were observed at approximately 0905 while the Environmental Scientists were driving past the burrow. The adult was perched on the stake, one nestling was perched below the stake and the other two were on the back slope of the embankment, hiding with only their heads visible. The nestlings later hopped around and went in and out of the burrow. No calls were heard. At this point, nestlings were nearing adult size and downy feathers were not observed.

A preconstruction survey was conducted on August 17 and 18, 2016. BUOW were observed on both days at MP 135.65 and at MP 136.10 (Table 3). One adult and two juveniles were at the top of the embankment by the stake, on the stake, or at the burrow entrance at MP 135.65 on both days. One adult and one juvenile were observed at MP 136.10. No other BUOW were observed within the Project area during the preconstruction survey. No construction is expected to occur within 500 feet of the burrow at MP 135.65. Construction is expected to occur approximately 450 feet north of MP 136.10.

Photos of BUOW locations are located in Appendix A and copies of the Protocol Survey Data Sheets are in Appendix C.

Sixteen burrows that have been occupied at least once in the last three years are located in the Project area. None of the burrows recorded in the Project area are located within 150 feet of proposed construction activities; in accordance with the Staff Report, all burrows that have been occupied within the last three years must be presumed occupied. All of the burrows are near frequently used roads.

Minimization Measures

Project construction has been scheduled to occur after the beginning of September 2016 and will be completed by the end of January 2017. This construction schedule was selected to reduce potential impacts to sensitive species, including BUOW.

To avoid potential impacts to BUOW and burrows, the following measures will be implemented:

- Preconstruction surveys will be conducted to determine if nesting BUOWs are still present.

- All work will take place during daylight hours, beginning after 0600 and ending by 1730 each day. Work at night will not be allowed unless DFW concurs.

- Environmental tailgates will be given to all construction personnel before the start of their first work day. The tailgate will cover identification of sensitive species and its habitat, conditions to minimize impacts, and the phone numbers of Environmental Scientists to call in the event sensitive species are seen or impacted.

- Vehicles and equipment will remain on existing roads.

- Between MP 135.63 and MP 136.13 where there are known occupied burrows, the speed limit will be restricted to 15 miles per hour. This area will be clearly marked. In all other areas, the speed limit will be restricted to 25 miles per hour.

- In compliance with the SAA, a minimum 150-foot radius buffer will be staked and maintained around all occupied burrows. Monitoring of BUOW burrows will occur during construction by a qualified biologist to determine the status of the BUOW at those locations. If other BUOW move into the project area, buffers will also be maintained around those burrows.

- Since work will occur during the non-breeding season and the Aqueduct is approximately 246 feet wide, the Aqueduct will provide an adequate disturbance buffer for any burrows located on the east side.

- If a qualified biologist determines that the established 150-foot radius buffer is not effective, or if construction requires a reduction in the buffer, a shelter-in-place will be

used if required by DFW to minimize impacts to BUOW. Installation would occur only from August through January.

- Shelter-in-place would consist of stacking hay bales, or another type of material such as fencing slats, at least 5 feet from the occupied burrow to create a visual and auditory barrier between construction and the burrow.

- Hay bales, if used, will be certified as weed-free and installation will be monitored by a qualified biologist.

- Increased monitoring will occur in areas where a shelter-in-place is used to determine its effectiveness. If impacts to the BUOW continue, adjustments would be made by a qualified biologist at the direction of DFW to further reduce impacts to the BUOW.

- Photographs of the shelter-in-place locations and construction occurring in the vicinity will be taken and submitted to DFW.

- The Environmental Scientist will be immediately notified if any burrow is damaged or destroyed.

- If avoidance of occupied burrows is infeasible during construction, DWR will immediately contact DFW. No burrows will be disturbed until DFW recommendations are in place.

APPENDIX A

Environmental Training Booklet

Department of Water Resources

Cantua Creek Stream Group Improvements Project Environmental Training

September 2016

Cantua Creek Stream Group Improvements
Project Environmental Training

California Department of Water Resources

Contact info: Environmental Scientist
Laura Castro: (559) 230-3350 office
Cell: (559) 905-6382

Senior Environmental Scientist
Charyce Hatler: (559) 230-3323 office
Cell: (559) 978-8514

Prepared by DWR South Central Region Office

September 2016

ENVIRONMENTAL TRAINING MEETING

Biological Resources

Section 2080 of the California Fish and Game Code prohibits "take" of any State endangered or threatened species.

- The State definition of "take" under the California Endangered Species Act is to "hunt, pursue, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill" an endangered or threatened species. State penalties include up to $10,000 and up to 1 year in prison, and civil penalties which include full restitution of damages.

Section 9 of the Federal Endangered Species Act prohibits the "take" of any federally listed endangered species by any person.

- The federal definition of "take" is to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct, including actions that damage or destroy endangered species habitat. Federal penalties include up to $50,000 and up to 1 year in prison, and civil penalties which include full restitution of damages.

The Cantua Creek Stream Group Improvements Project has no permit for "take" of any federal- or State-listed threatened or endangered species, or State fully protected species. Therefore, restrictions to prevent "take" and other impacts are required.

There will be no “take” or other environmental impacts, if personnel follow these restrictions:

- All personnel on site will participate in an environmental education tailgate prior to commencing their work, including those participating in mobilization and demobilization, and will keep this pamphlet with them while working in the project area.
- Personnel, equipment, and vehicles will remain off the embankments, except where work is required.
- A 15 mile per hour speed limit will be maintained between MP 135.64 and 136.20 and on all unpaved roads.
- A 25 mile per hour speed limit will be maintained in all areas of the project, including haul routes and project access routes, except where slower speeds are required.
- Because of sensitive resources, staging and parking will not occur within the Cantua or Salt Creek channels or on top of any embankment.
- Turn around and park only in existing paved or graveled areas.
- Open pits or holes deeper than 2 feet must have an escape ramp (slope 2:1 or less) constructed of earthen fill or sandbags every 150 feet to allow animals to escape. These must be checked by the Inspector and in place at the end of each work day. Otherwise, the open areas must be completely covered before nightfall.
- All open pipes have to be capped or covered by the end of the day to avoid entrapping wildlife.
- Check for wildlife under vehicles and equipment before use.

- Concrete and grout can only be used in specified locations away from habitat and waterways (coordinate with the Environmental Scientist).
- Other than what is in the specifications, do not remove or damage any vegetation without environmental approval.
- A 150-foot buffer will be maintained around burrowing owl burrows, which are marked with yellow painted stakes (see photo).
- A 50-foot buffer will be maintained around burrows marked with blue painted stakes (see photo).
- Do not remove any stakes or other exclusion markers.
- Work will only occur during daylight hours.
- Employees are not allowed at the project site during nonworking hours.
- No pets, camping, firearms, or any other use of the right of way area is allowed.
- All trash will be contained and covered.
- Food-related trash, such as wrappers, cans, bottles, and scraps will be placed in closed containers and removed daily from work sites.
- If wildlife is encountered during work activity, it will be allowed to leave the area unharmed.
- An Environmental Scientist will be contacted immediately if a special status species is seen, trapped, injured, or killed. (see the following Species Photos and Accounts).

Species Photos and Accounts

Western Burrowing Owl (*Athene cunicularia*)

Santa Cruz Predatory Bird Research Group

Status: Federal Bird of Conservation Concern and State Species of Special Concern

Identifying Characteristics:

They are approximately 7 to 9 inches in height, and are often seen in the daytime, standing on the ground or on a post.

They have distinguishable white eyebrows and a white chin.

Habitat: Habitat typically includes low-growing vegetation.

Burrowing owls typically use old ground squirrel or other small mammal burrows, although they may excavate burrows in areas of soft soil. In locations where burrows are scarce, burrowing owls may also use man-made structures such as culverts.

They may use several burrows in an area for cover and nesting. Burrowing owls are known to move to different burrows or in and out of an area.

San Joaquin kit fox (*Vulpes macrotis mutica*)

ESRP, CSU Stanislaus

CDFW

Status: Federally Endangered and State Threatened

Identifying Characteristics:

They weigh an average of 5 pounds and are similar in size to a small dog or large cat, and are distinguished from other members of the canid (dog) family by their large ears, long legs, and long bushy tail.

San Joaquin kit fox are primarily nocturnal, but they are sometimes seen during the day.

Habitat: Kit fox were historically found in semi-arid regions of California's Central Valley and adjacent foothills. Due to reductions in available habitat, they are now primarily found in the southern San Joaquin Valley.

A mated kit fox pair may use up to 39 dens within a year. Kit fox either dig these dens themselves or enlarge existing squirrel or badger dens.

Natal (pupping) dens are generally the largest and most complex type of den and may be constructed over a period of several years. Kit fox are also known to use manmade structures such as small-diameter culverts.

Giant Kangaroo Rat (*Dipodomys ingens)*

Mark A. Chappell

Status: Federally and California Endangered

Identifying Characteristics:

The giant kangaroo rat is the largest of the kangaroo rats, measuring about 15 cm (6 in.) in length, not including its long, tufted tail.

They are tan or brown in color. They have a large head and large eyes, and long, strong hind legs with which it can hop at high speeds. Giant kangaroo rats have 5 toes.

Habitat: The giant kangaroo rat lives on dry, sandy grasslands and digs burrows in loose soil.

Only two percent of the original range remains. They can now only be found in isolated areas typically west of the San Joaquin Valley.

Short-nosed Kangaroo Rat (*Dipodomys nitratoides brevinasus*)

unknown photographer

Status: State Species of Special Concern

Identifying Characteristics:

The short-nosed kangaroo rat has a body length of 10-11 centimeters (4 in.), not including its long tufted tail.

The coat is buff-colored with a white belly, white hip stripe, and white stripe along each side of the tail. Short-nosed kangaroo rats only have 4 toes.

Habitat: Short-nosed kangaroo rats can be found on flat or gently rolling terrain in grassland and desert-shrub vegetation, and it digs burrows in loose soil.

Swainson's Hawk (*Buteo swainsoni*)

Audubon

John C. Avise

Status: Federal Bird of Conservation Concern and State Threatened

Identifying Characteristics:

They are slimmer and slightly smaller than most other large hawks, such as red-tailed hawk, but have longer wings.

Most have light colored bellies with a dark reddish or dark brown chest. They have white wing linings with blackish flight feathers (see picture above).

Habitat: They tend to nest in tall trees that are in grasslands or near agriculture fields.

Northern Harrier (*Circus cyaneus*)

Jan Sevcik *Female* *Male*

Status: State Species of Special Concern

Identifying Characteristics:

The northern harrier is slim, has long wings, and has a long tail with a noticeable white patch on the rump.

Up close they have an almost owlish face. Adult males are typically grey and white with black wing tips, while females are larger and brown.

Habitat: Harriers nest on the ground. They are usually observed flying low over grassland, marshes, and agricultural fields.

San Joaquin coachwhip (*Coluber flagellum ruddocki*)

California Herps

Status: State Species of Special Concern

Identifying Characteristics:

San Joaquin coachwhips are 3-5 feet long with a large head and a thick neck.

Coachwhips have a long, thin tail and large scales above the eyes. They can have coloration of tan, olive brown, or yellowish brown.

Habitat: Coachwhips can be found in open, dry, treeless areas.

They take refuge in rodent burrows in grassland or saltbush scrub. They can also be found under shaded vegetation or surface objects.

A 150-foot radius buffer must be maintained around all stakes that are marked with yellow paint.

A 50-foot radius buffer must be maintained around all stakes marked with blue paint.

APPENDIX A

Photographs of Habitat and BUOW Locations in the Project Area

This page is intentionally left blank

Photographs of Project Activity Sites

The Aqueduct embankments typically look similar; however, vegetation height may be sparser or denser depending on location. The following are photographs of typical embankment habitat in the Project area.

MP 137.30—Habitat facing downstream at an embankment that will be raised.

MP 139.27—Habitat facing downstream towards a turnout that will be modified.

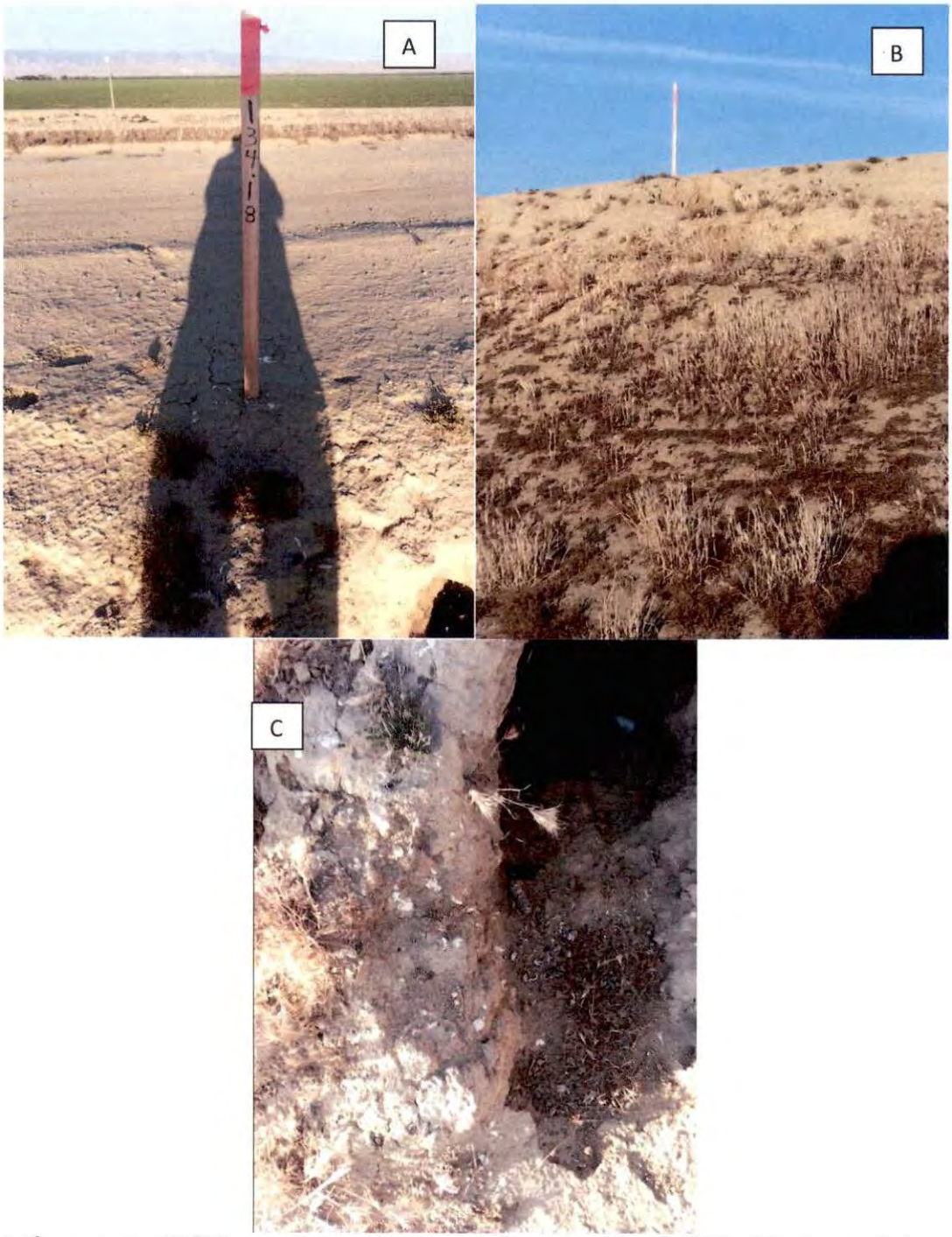
MP 139.27—Habitat facing upstream of an embankment that will be raised.

MP 137.80—Habitat facing downstream west towards a pump pad modification site.

MP 133.61—Habitat facing downstream at the terminus of Cantua Creek where a borrow site will be located.

Photographs of 2016 BUOW Locations

Not all burrow locations are depicted in the following photographs. These are photos of some of the observed burrows.



MP 134.18—A single BUOW was observed at this location only in March 2016. The burrow is located on the east side of the Aqueduct embankment. Photo A was taken facing west toward an agricultural field at a location close to the top of embankment, and shows whitewash and a pellet. Photo B is an example of the stakes at the top of the embankments that mark each burrow. Photo C shows the burrow entrance with whitewash, pellets, and a feather.

MP 134.25—A single BUOW was observed at this location only in March 2016. The burrow is located on the Aqueduct side of the embankment.

MP 134.35—A single BUOW was observed at this location only in March 2016. The burrow is located on the west side of the Aqueduct embankment.

MP 136.10—A single BUOW was observed at this location from April through May, 2016. A color difference was noticed during the individual observations of the single owls. On some occasions the adult was light colored an on other occasions a darker colored adult was seen, but a BUOW pair was observed at this location on June 1, 2016. This pair relocated its nestlings to MP 135.65 (see below). Photo A shows the lighter colored adult BUOW. The photo was taken facing in a westerly direction from a vehicle while passing the burrow. Photo B is the same burrow. The photo was taken facing upstream on the Aqueduct side of the embankment.

MP 135.65—A BUOW pair was observed at this location on July 7, 2016. The adult pair moved to this location from MP 136.10; three nestlings were present. The burrow is located on the Aqueduct side of the embankment. The photo was taken facing west.

Remaining document appendices available upon request.

Post-Construction
Western Burrowing Owl Report

for the

Cantua Creek Stream Group Improvements Project
and Cantua Creek Sediment Removal Project

August 2019

Project Description and Location

The California Department of Water Resources' (DWR) Cantua Creek Stream Group

Improvements Project (Project) began on September 16, 2016 and was completed on May 11, 2017. Project features included flood easement acquisition; raising portions of the California Aqueduct (Aqueduct) embankment; creating a channel to direct flood flows; raising pump pads, turnouts, and sections of asphalt and dirt roads; constructing a new weir; and removing sediment from Cantua Creek. Additional work, such as maintenance to an existing weir and an asphalt road repair along the Aqueduct, was later added to the Project scope.

The *Cantua Creek Stream Group Improvements Project Final Initial Study/Mitigated Negative Declaration* was filed with the State Clearinghouse (SCH) on December 12, 2014 (SCH Number 2014091063). A Lake and Streambed Alteration Agreement (SAA) was signed on September 8, 2015 (Notification No. 1600-2015-0069-R4).

In September 2016, prior to the start of construction, DWR submitted the *Western Burrowing Owl Survey Report for the Cantua Creek Stream Group Improvements Project/Cantua Creek Sediment Removal Project* (Pre-Project report) to the California Department of Fish and Wildlife (DFW). The Pre-Project report identified the locations of all known and potential burrowing owls (*Athene cunicularia*) (BUOW) and burrows in the Project area. The following report is the post-construction summary of the BUOW observations that occurred during, and at the completion of, construction.

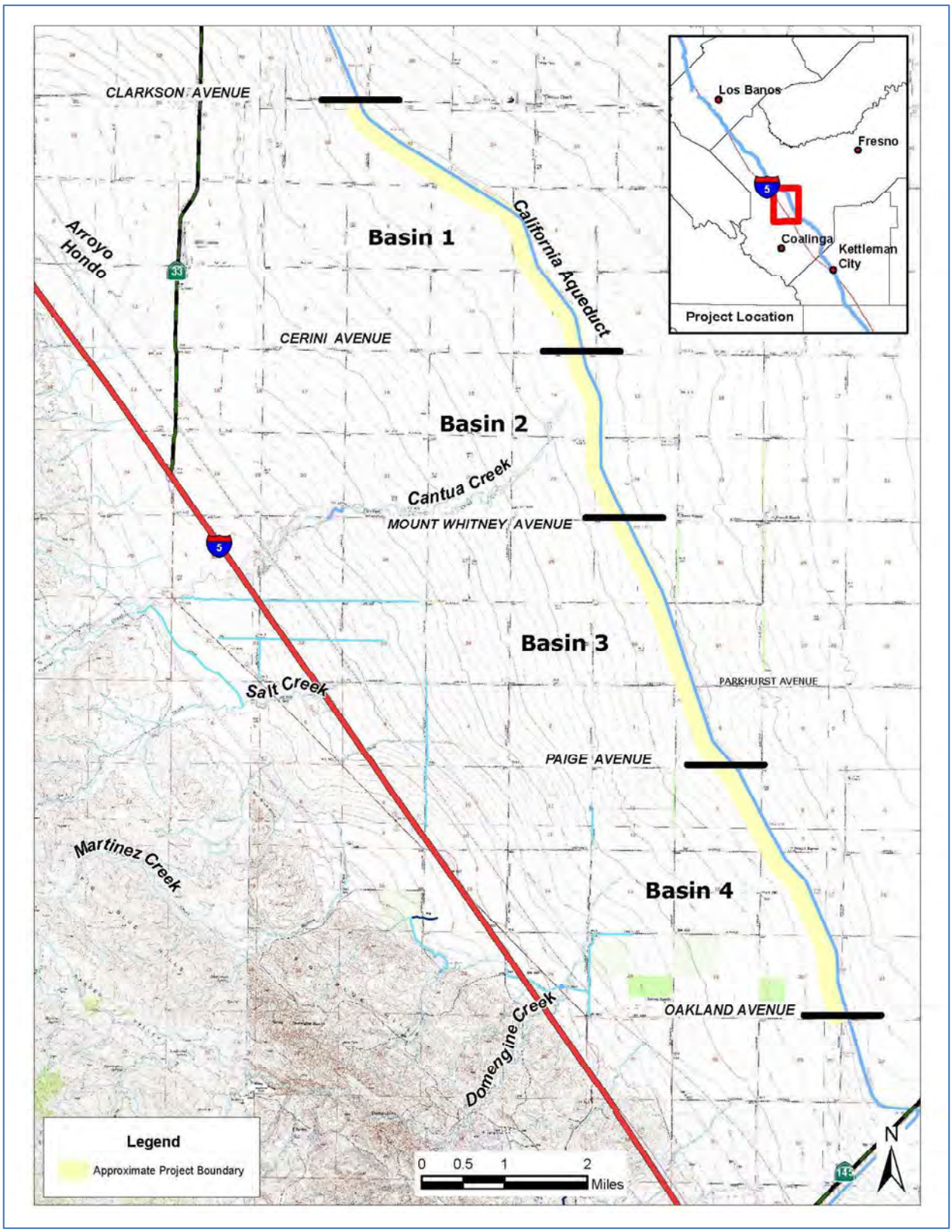
The Project was located on the west, or right (R), side of the Aqueduct along an approximate 13-mile stretch in western Fresno County between Clarkson Avenue and Oakland Avenue. The site was approximately 18 miles north of the City of Coalinga and 36 miles southwest of the City of Fresno (**Figure 1**). The Project consisted of 165 acres divided into four floodwater basins (**Figure 1**), between Aqueduct mileposts (MP) 128.48R and 141.60R. Most of the Project was in the DWR right-of-way (ROW), but work also occurred on DFW property and private property adjacent to the ROW.

Biological Setting

Habitat

Habitat in the Project area consisted of disturbed soils and was mostly ruderal with scattered non-native grasses, barren areas, or marginal quail bush scrub habitat. Vegetation was composed primarily of foxtail brome (*Bromus madritensis*), ripgut (*Bromus diandrus*), Russian thistle (*Salsola spp.*), fiddleneck (*Amsinckia sp.),* and heron's bill (*Erodium spp*.), with localized, dense thickets of quail bush (*Atriplex lentiformis*), and mulefat (*Baccharis salicifolia*). Thickets of cattails (*Typha spp*.) were in Basin 3 where adjacent landowners let farm ponds encroach on the DWR ROW.

Figure 1. Location of Project and Basins



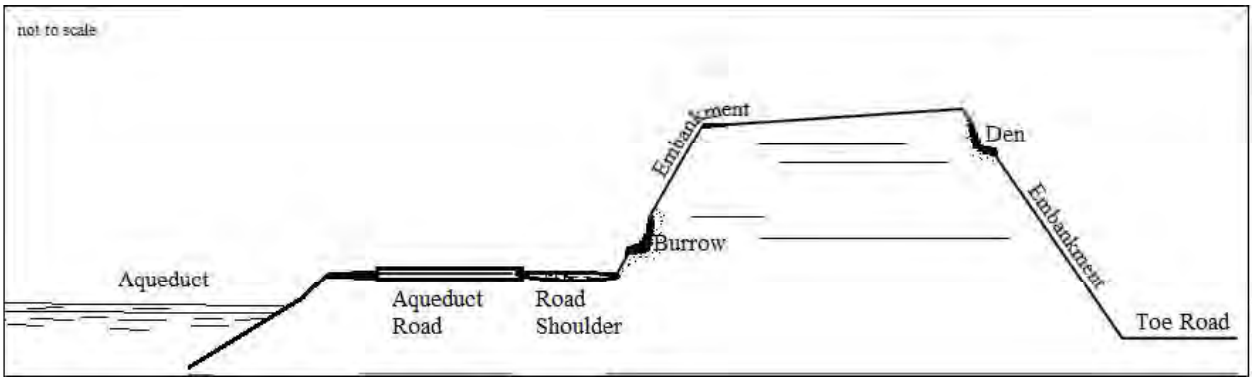
Wildlife

Wildlife species observed during the Project are listed in **Table 1.** Evidence of pocket gophers (*Geomyidae*), kangaroo rats (*Dipodomys* sp.), and other small mammal species such as mice were also observed.

Habitat Suitability for BUOW

Agricultural fields adjacent to the Project area provide cover and food for small mammals and a food source for BUOW. Numerous ground squirrel burrows and canid dens large enough for BUOW occupation exist on the Aqueduct embankment (**Figure 2**). Burrow and den elevation on the embankment varies.

Figure 2. Representative Cross Section of Aqueduct Roads, Embankment, and Location of Dens and Burrows



These burrows and dens were less abundant in the Project area north of Cantua Creek; only two burrows large enough for BUOW use were in this area. In the Project area south of Cantua Creek, at least 20 burrows large enough for BUOW were present. Conditions north and south of Cantua Creek are consistent with those described in the pre-Project report.

Agricultural vehicle traffic has been observed in the ROW on the right side of the Aqueduct since 2012 (when pre-Project site visits began), especially between Cantua Creek and Parkhurst Avenue, but BUOW continue to occupy the area.

Table 1. Species Observed During Construction

Scientific Name	Common Name	Federal	State
Canis latrans	coyote		
Mus musculus	house mouse		
Peromyscus maniculatus	deer mouse		
Reithrodontomys megalotis	western harvest mouse		
Spermophilus beecheyi	California ground squirrel		
Sylvilagus audubonii	desert cottontail		
Agelaius phoeniceus	red-winged blackbird		
Athene cunicularia	burrowing owl	BCC	SSC
Bubo virginianus	great horned owl		
Buteo jamaicensis	red-tailed hawk		
Buteo swainsoni	Swainson's hawk	BCC	T
Cathartes aura	turkey vulture		
Charadrius vociferous	killdeer		
Circus cyaneus	norther harrier		SSC
Corvus sp.	corvids		
Falco sparverius	American kestrel		
Haemorhouse mexicanus	house finch		
Himantopus mexicanus	black-necked stilt		
Hirundo rustica	barn swallow		
Melospiza lincolnii	Lincoln's sparrow		
Melospiza melocia	song sparrow		
Sayornis nigricans	black phoebe		
Passer domesticus	house sparrow		
Petrochelidon pyrrhonota	cliff swallow		
Tachycineta bicolor	tree swallow		
Tyto alba	barn owl		
Zonotrichia leucophyrs	white-crowned sparrow		
Anaxyrus boreas	western toad		
Masticophis flagellum ruddocki	San Joaquin coachwhip (part of carcass)		SSC
Pituophis catenifer	gopher snake		
Uta stansburiana	side-blotched lizard		

T = Threatened; BCC = Bird of Conservation Concern; SSC = Species of Special Concern

Pre-construction Measures

Consistent with the pre-Project report, burrows were categorized using the following criteria:

- A burrow was considered a "burrow with sign" if fresh signs of BUOW activity were present at the burrow, but no BUOW had been observed during Project monitoring.
- A burrow was considered "occupied" if at any time during the monitoring period, a BUOW was observed at or near a burrow with sign.
- As defined in the 2012 DFW *Staff Report on Burrowing Owl Mitigation,* burrows were "presumed occupied" if a BUOW had been recorded at the burrow within the last three years, but no BUOW or fresh signs of BUOW use, such as whitewash, feathers, or pellets, were present at the burrow during Project monitoring.
- A burrow was considered a "potential burrow" if a BUOW, or signs of BUOW use, had never been recorded at the burrow, but the burrow was still considered large enough for a BUOW to occupy.

Only occupied burrows and burrows with sign were considered "active" burrows. Presumed occupied burrows and potential burrows were considered "inactive."

On August 24, 2016, before mobilization, four-foot-long wooden stakes were used to mark areas where burrows were located. Stakes for burrows with sign, occupied burrows, and burrows that were presumed occupied were painted yellow; stakes associated with potential burrows were painted blue. All stakes were inserted at the top of the Aqueduct embankment where they could easily be seen from the Aqueduct road but were at least 1 foot away from the burrows. Stakes were placed where they would not interfere with BUOW flying to and from burrows. Each burrow location was recorded with a Trimble Juno Global Positioning System unit.

Minimization Measures

The following minimization measures described in the pre-Project report were used as originally proposed, or were modified to fit Project needs:

- Preconstruction surveys were conducted on August 17–18, 2016 to determine if BUOW were present.

- Work typically took place during daylight hours, beginning after 0600 and ending by 1730 each day.

- Environmental training was given to all construction personnel before the start of their first work day. The training included identification of special-status species and their habitat, conditions to minimize impacts, and the phone numbers of Environmental Scientists in the event special-status species were seen or impacted (**Appendix A**).

- Vehicles and equipment remained on existing roads; the road shoulder was not used near BUOW burrows.

- The speed limit was restricted to 15 miles per hour (mph) where occupied burrows were present (MP 134.10R and MP 134.60R and between MP 135.63R and MP 136.13R), personnel were notified of the speed limit, and the area was monitored. In all other areas, the speed limit was restricted to 25 mph.

- In compliance with the SAA, a minimum 150-foot-radius buffer was maintained around all active burrows and all active burrows were monitored during construction by a DWR Environmental Scientist.

- If access was limited around active burrows, buffers were marked with stakes and the burrows were monitored while vehicles drove by. Instead of using hay bales or a shelter-in-place, a line of stakes with attached pink flagging was placed on the road shoulder. The flagged stakes were used because they had a smaller footprint and did not interfere with BUOW access to their burrows. The areas marked with a line of stakes were monitored when the DWR Inspector knew construction vehicles had to drive in the area. Photographs of the line of stakes and the construction occurring near them are in **Appendix B.**

- After January 31, 2017, buffers around all active burrows increased to 500 feet, in compliance with the SAA, and all active burrows were monitored by a DWR Environmental Scientist.

- When vehicles had to drive within 500 feet of the burrows, construction vehicles were escorted in and out of the area by an Environmental Scientist monitor driving another vehicle.

- The approximately 256-feet width of the Aqueduct continued to provide an adequate disturbance buffer for any burrows located on its east (or left) side.

Construction Monitoring Methods

BUOW monitoring period began August 24, 2016, when a pre-construction site visit was made to check burrows before mobilization. Monitoring ended May 11, 2017, when the last piece of equipment was demobilized.

BUOW monitoring is defined as the surveillance of all active burrows, as well as the periodic check of potential burrows and those presumed occupied. Monitoring consisted of observing the burrow during all work occurring in an area, whereas periodic burrow checks consisted of only briefly checking a burrow by using binoculars or by walking to it to see if the BUOW, or BUOW signs, were still present.

The monitoring protocol consisted of the following:

1) Six Environmental Scientists were assigned to a monitoring schedule, assuring that a monitor would be available on all construction days. On days when multiple construction activities were expected to occur near active burrows, more than one monitor was assigned.

2) The DWR Inspector coordinated daily with the monitors to ensure that a monitor was present where needed. Before the end of every work day, the DWR Inspector was contacted by an Environmental Scientist to determine where work would occur the next day, where construction personnel were expected to access the work site, and the time work would start. The monitors scheduled to work the next day were then contacted and told about the next day's construction plans.

3) If construction was scheduled in an area with active burrows, a monitor arrived onsite to assess the area before work began. Monitors were required to park at least 150-feet away from active burrows during the non-breeding season and at least 500-feet away during the breeding season.

4) The date and time of observations, monitor's name, burrow location, presence or absence of a BUOW, and the behavior of any burrowing owls present were documented during monitoring and burrow checks. The datasheets and related field notes are available upon request.

5) The DWR Inspector was immediately told about potential impacts or violations.

6) From September 16, 2016 to January 31, 2017, where access was limited, active burrows were monitored when vehicles had to drive within 150 feet of them.

7) From February 1, 2017 to May 11, 2017, the buffer size around active burrows increased to 500 feet; work occurring within 500 feet of active burrows was monitored.

8) Periodic checks of both active and inactive burrows in other areas of the Project were performed in advance of scheduled work to determine whether burrow conditions had changed.

9) An Environmental Scientist attended weekly Project meetings to assess the status of the project, upcoming work locations, and any environmental concerns.

The number of times an active burrow was monitored depended on how long it took to complete work near it. The location of active burrows in relation to the Project features are shown in **Figure 3 through Figure 6**.

The monitoring period in each basin depended on when construction occurred there.

- In Basin 1, burrows were monitored between October 13, 2016 and May 5, 2017.
- In Basin 2, burrows were monitored between August 24, 2016 and April 24, 2017.
- In Basin 3, burrows were monitored between August 24, 2016 and May 11, 2017.
- In Basin 4, burrows were monitored between October 11, 2016 and April 28, 2017.

Monitoring was conducted at the following locations:

The burrows from MP 131.67R to MP 131.72R (Basin 1); MP 134.18R to MP 134.53R (Basin 2); and MP137.51R to MP 137.60R (Basin 3) were monitored while work was conducted on the pump pads.

The burrows from MP 134.18R to MP 134.53R (Basin 2); MP 135.65R to MP 136.35R (Basin 3); and MP 141.01R to MP 141.02R (Basin 4) were monitored because construction traffic drove within 150 feet of them.

The burrows at MP 134.53R (Basin 2), MP 135.56R (Basin 3), and MP 140.05R (Basin 4) were monitored because embankments were raised near them.

A burrow at MP 134.95R (Basin 3) was monitored while maintenance was conducted on an existing weir south of Mount Whitney Avenue.

The burrows in Basin 3 at MP 135.65R, MP 136.10R, and MP 136.35R were monitored because asphalt repairs were made on Parkhurst Avenue.

Figure 3. Basin 1 Burrowing Owl Observations and Project Features

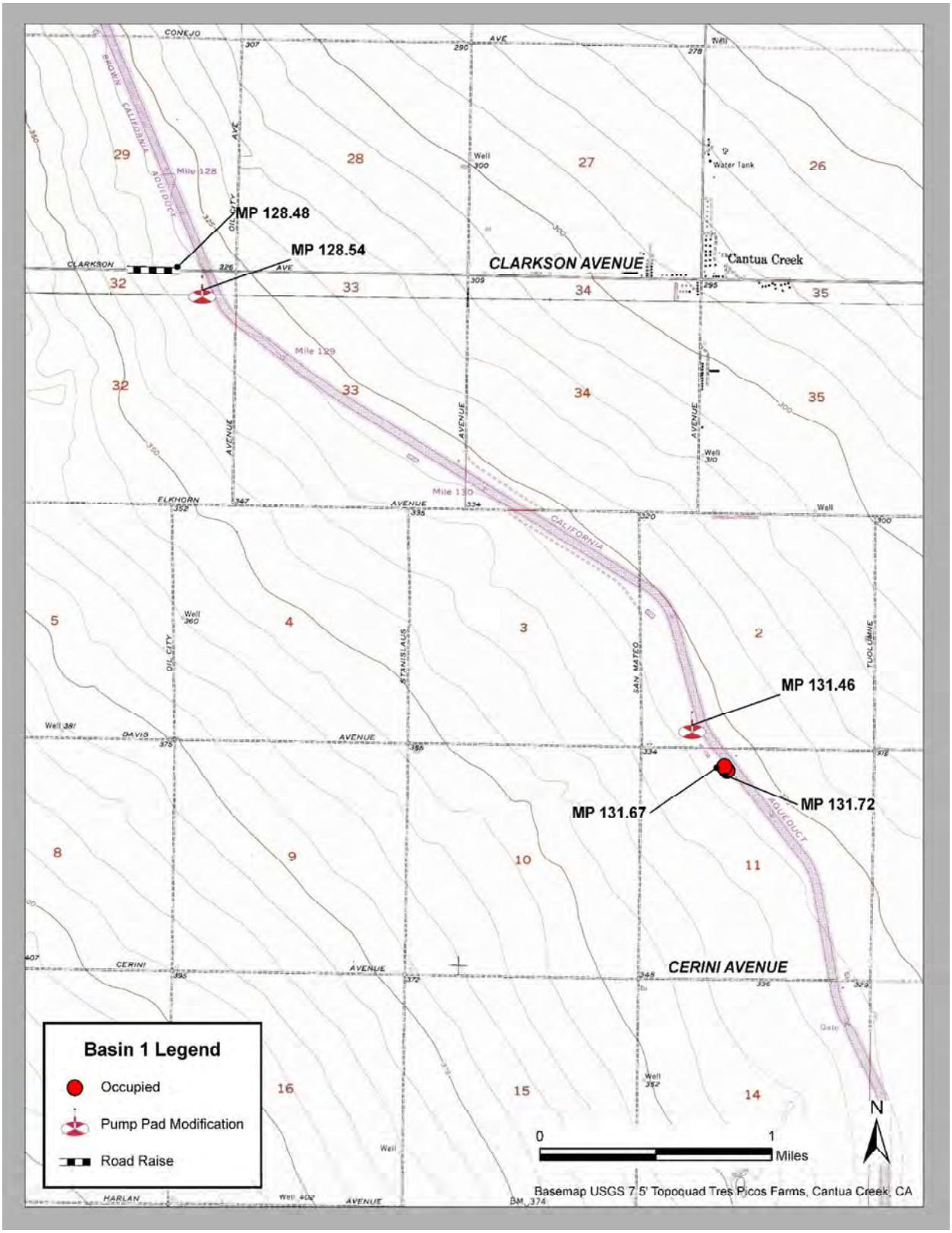


Figure 4. Basin 2 Burrowing Owl Observations and Project Features

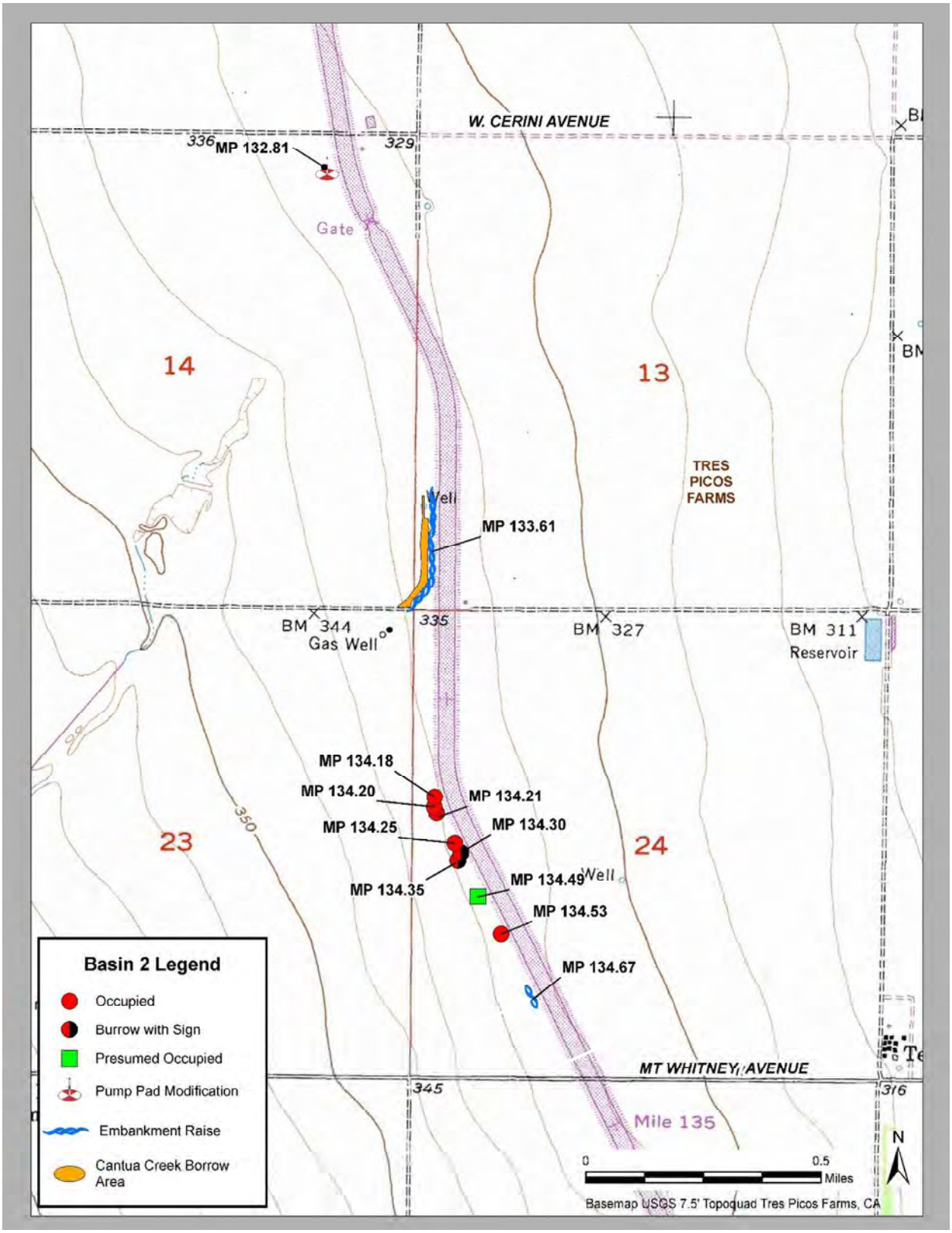


Figure 5. Basin 3 Burrowing Owl Observations and Project Features

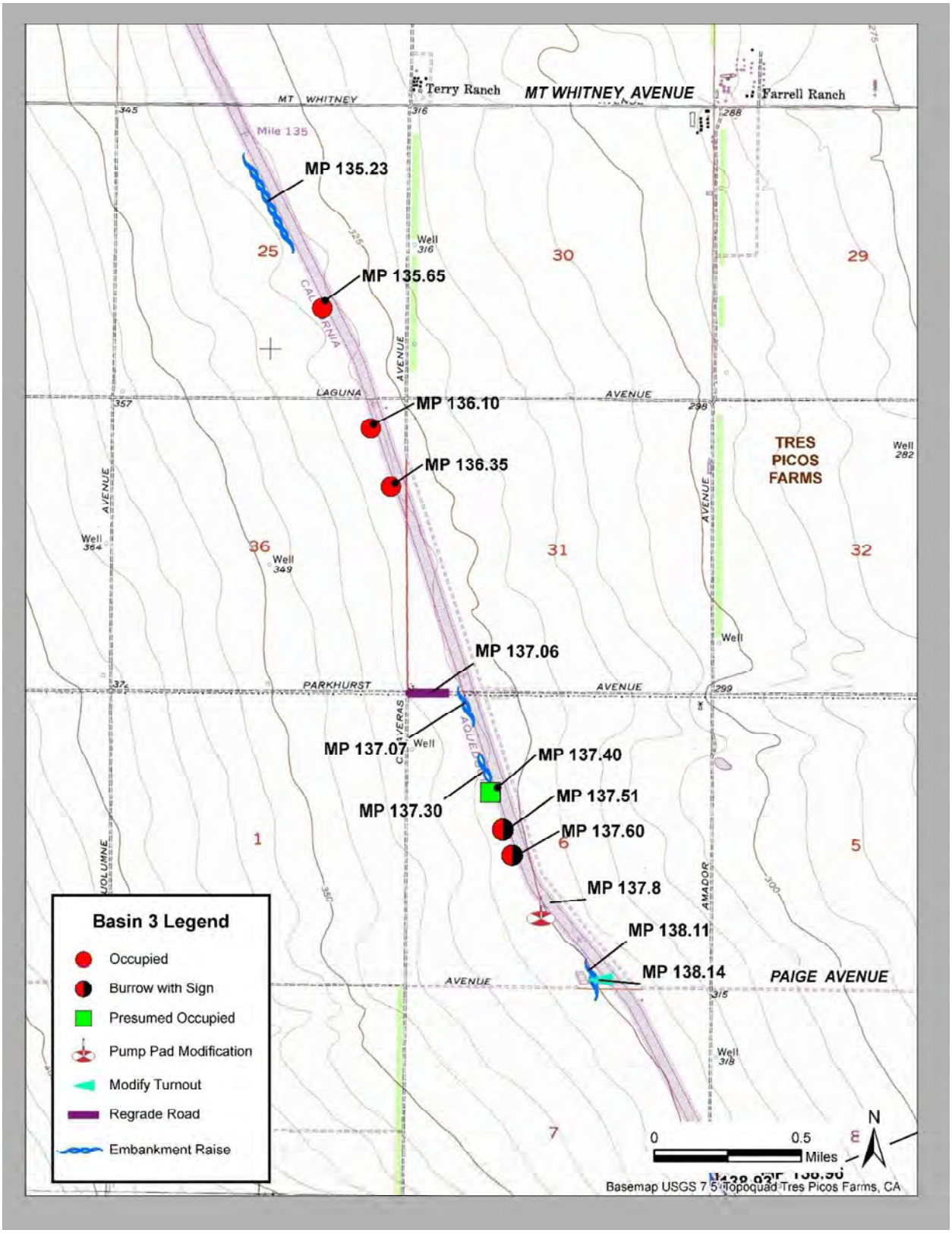
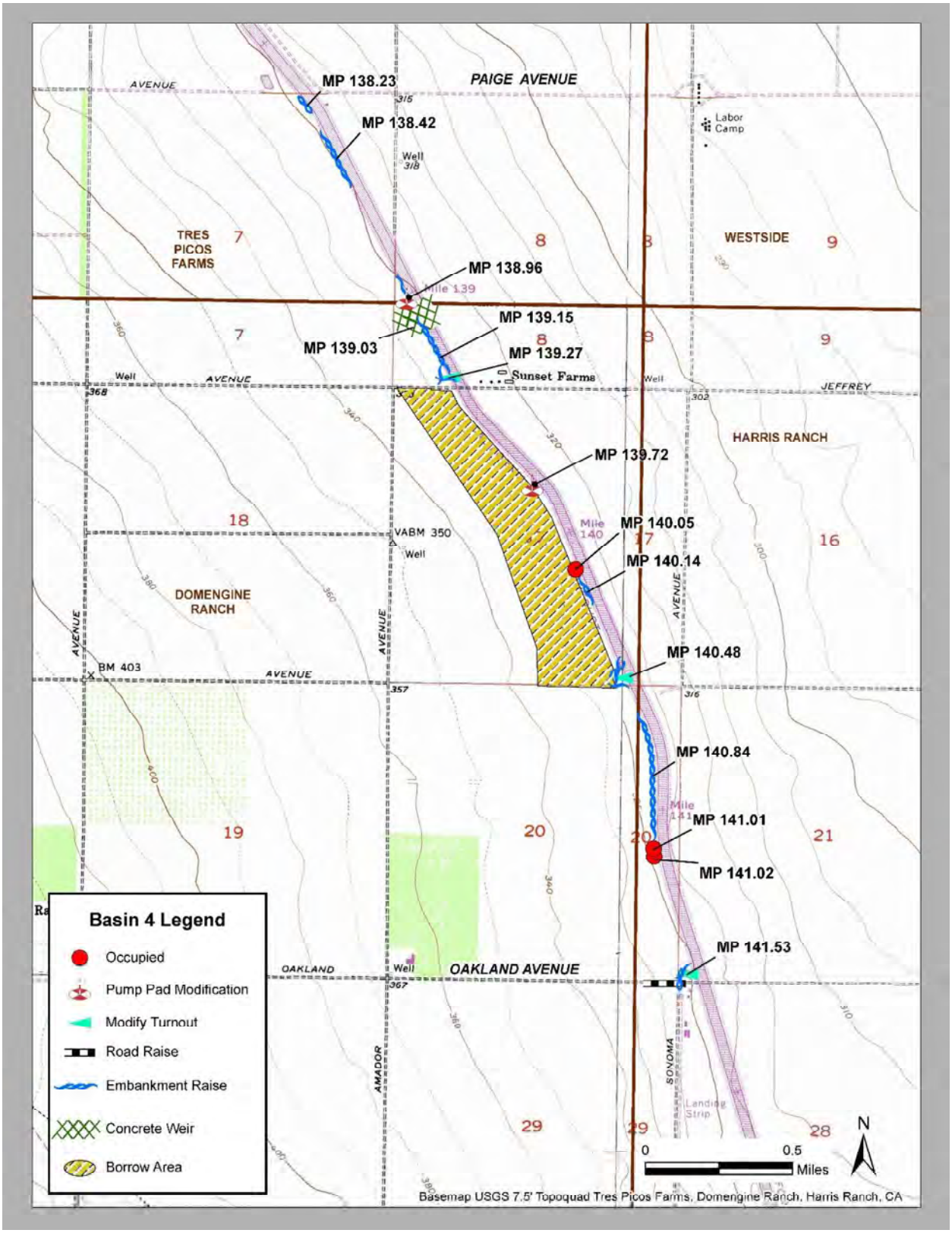


Figure 6. Basin 4 Burrowing Owl Observations and Project Features



Between January and May 2017, only intermittent construction occurred. Close coordination continued with the DWR Inspector to ensure monitors were onsite when needed.

Results and Discussion

Minimization Measures Evaluation

The following is an evaluation of some of the more protective minimization measures that were implemented.

Until January 31, 2017, a minimum 150-foot-radius buffer was maintained around all active burrows; after January 31, 2017, the buffer was increased to 500 feet. These buffers were strictly observed except where limited access required vehicles to drive closer to burrows. Implementation of this measure effectively protected BUOW and burrows.

All active burrows were monitored during construction. No evidence of construction-related impacts to BUOW was observed. Implementation of this measure effectively protected BUOW and burrows.

Construction typically occurred 600 feet or more from the nearest burrow. At the borrow site, work occurred 500 feet from an active burrow during the breeding season, and one of the embankment raises was 150-feet away from an active burrow during the non-breeding season. No evidence of construction-related impacts to BUOW was observed.

Because of a communication line break, which required an emergency repair, work was conducted one night in an area that was approximately 0.4 miles away from the nearest active or inactive burrow. Work also occurred after dark to repair an existing weir; the nearest active or inactive burrow was about 0.4 miles away. An Environmental Scientist monitor was present at both work sites, and all access routes near burrows were avoided.

During construction, vehicles and equipment remained on existing roads, as required. The Aqueduct road shoulder was used only as necessary when construction vehicles had to pass each other. Use of the road shoulder was restricted near BUOW burrows. Implementation of this measure protected BUOW and burrows. There were no situations during construction where the avoidance of occupied burrows was considered infeasible.

The speed limit was restricted to 15 mph between MP 134.10R and MP 134.60R and between MP 135.63R and MP 136.37R. In all other areas, the speed limit was restricted to 25 mph. Implementation of this measure effectively prevented vehicle strikes to BUOW.

A DWR Environmental Scientist was immediately notified whenever an environmental concern arose so appropriate corrective action could be taken. The ability for the Environmental Scientist to assess the concern and implement a solution effectively prevented impacts to BUOW and burrows.

Twenty-four burrows were identified during the August 2016 pre-construction surveys. During construction, five burrows completely collapsed or filled with sediment due to rain. However, in Basin 4, two new occupied burrows were found during construction; one of these new burrows was a culvert under a toe road. Twenty-one burrows were identified post-construction.

During the pre-construction surveys conducted in August 2016, only two burrows were considered occupied. By the beginning of construction on September 16, 2016, the same two burrows were occupied; these were the only occupied burrows.

Pairs of BUOW were observed at MP 134.20R, MP 134.21R, MP 136.35R, and MP 136.10R during construction. A breeding pair was seen at MP 135.65R throughout construction; the other BUOW were all single birds.

The pair at MP 135.65R successfully bred three offspring, which were first seen July 7, 2016, prior to construction. One of these birds was confirmed to be a juvenile during the August 2016 pre-construction site visit. By the time construction began, it was difficult to distinguish the juveniles from the adults.

The number of occupied burrows varied throughout construction. Typically, one to three BUOW burrows would be recorded as occupied on any given day, but on occasion more were recorded as occupied. For instance, on October 13, 2016, six burrows were recorded as occupied by BUOW; on January 31, 2017, five burrows were the recorded as occupied; and on March 20, 2017, four burrows were recorded as occupied.

Nine occupied burrows were recorded in October 2016. Although there was a reduction of occupied burrows in March, April, and May 2017, the remaining BUOW were predominantly in the areas of the heaviest construction traffic, including the breeding pair at MP 135.65R. This seems to indicate that construction activities did not cause the reduction in occupied burrows. As construction activities decreased and work became more concentrated in specific areas, less monitoring was required. Since burrows were considered occupied only if a monitor observed a BUOW at or near the burrow, the reduction in recorded occupancy may partially have been caused by the reduction in monitoring throughout the Project area. There was no evidence of vehicle strikes, injury, or any-construction-related impacts to BUOW during the Project.

Completed *CNDDB Online Field Survey Form Reports* are in **Appendix C**.

APPENDIX B

Post-construction Photographs

MP 131.46R - Modified pump pad facing downstream next to agricultural land. Nearest occupied burrow location is downstream at MP 131.67R (January 14, 2017, Laura Castro).

MP 131.67R - BUOW observed at burrow entrance (November 10, 2017, Laura Castro).

MP 134.67R - Raised embankment facing upstream next to Aqueduct road. Nearest occupied burrow location is upstream at MP 134.53R (January 14, 2017, Laura Castro).

MP 134.53R - BUOW observed on top of embankment (January 17, 2017, Laura Castro).

MP 135.23R - Raised embankment facing downstream next to agricultural land. Nearest occupied burrow location is MP 135.65R (January 14, 2017, Laura Castro).

MP 135.65R - Facing downstream at Aqueduct road toward occupied burrow where a line of stakes was installed to prevent trucks from passing each other near burrow (October 6, 2016, Laura Castro).

MP 137.30R - Raised embankment facing downstream beside Aqueduct road. Nearest presumed occupied burrow location was downstream at MP 137.40R (January 14, 2017, Laura Castro).

MP 137.40R - Presumed occupied burrow
(January 27, 2017, Laura Castro).

MP 137.80R - Modified pump pad facing upstream next to Aqueduct road. Nearest burrow with sign location was at MP 137.60R (January 14, 2017, Laura Castro).

MP 137.60R - Burrow with sign on agricultural side of embankment (January 17, 2017, Laura Castro).

MP 140.14R - Raised embankment facing downstream. Nearest occupied burrow location is MP 140.05R (January 14, 2017, Laura Castro).

MP 140.05R - Occupied burrow with whitewash on top of embankment (October 17, 2016, Laura Castro).

APPENDIX C

CNDDB Online Field Survey Form Reports

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code xxxx
Quad code 3612043
Occ. no.
EO index no.
Map index no.

Scientific name: *Athene cunicularia*

Common name: burrowing owl

Date of field work (mm-dd-yyyy): 10-13-2016

Comment about field work date(s): 02/15/2017

OBSERVER INFORMATION

Observer: Laura Castro

Affiliation: DWR

Address: 3374 E. Shields Ave. , Fresno, CA 93726

Email: laura.castro@water.ca.gov

Phone: (559) 230-3350

Other observers: Shane Emerson, Hollund Rudolph, Kaitlin Bushell, Jennifer Bohling, Luis Avila, and Lida Shoeyb

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Identified by Dept. of Water Resources Environment Scientist

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Burrowing owl construction monitoring

Total number of individuals: 1

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
1				

Age class comment:

Birds ite use:

☐ **Nesting** ☐ **Rookery** ☐ **Nesting colony** ☐ **Burrowsite** ☐ **Lek**

☑ **Nonbreeding (over-wintering)** ☐ **Communal roost** ☐ **Other**

Site use description:

What was the observed behavior? Observed at burrow and flying in vicinity of burrow

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: Disturbed ruderal embankment next to CA Aqueduct road.

Slope: **Land owner/manager:** Department of Water Resources

Aspect:

Site condition + population viability: Good

Immediate & surrounding land use: Orchard and CA Aqueduct

Visible disturbances: Agriculture, dirt road, Aqueduct road, and owl box

Threats: Predation, degradation of habitat, agriculture, vehicle strikes

General comments: Degradation of habitat - Maintenance and agricultural activity, including burning of agricultural materials, could impact or alter the stability of the burrow. Agricultural spraying could cause decline or contamination of food source.

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTME NAD83	UTMN NAD83	UTM Zone
	Fresno	Tres Picos Farms	331	36.470925	-120.314	740661	4039538	10
1	**Public Land Survey**	**Feature Comment**						
	MT17S R15E el 1							

The mapped feature is accurate within: 5 m

Source of mapped feature: GPS

Mapping notes: Trimble Juno

Location/directions comments:

Attachment(s): 20161110_MP 131.67 BUOW.jpg; 20161110_MP 131e67 habitat.jpg; 20170214_MP 131.67 burrow.jpg

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code xxxx
Quad code 3612043
Occ. no.
EO index no.
Map index no.

Scientific name: *Athene cunicularia*

Common name: burrowing owl

Date of field work (mm-dd-yyyy): 10-31-2016

Comment about field work date(s): 12/06/2016

OBSERVER INFORMATION

Observer: Laura Castro

Affiliation: DWR

Address: 3374 E. Shields Ave. , Fresno, CA 93726

Email: laura.castro@water.ca.gov

Phone: (559) 230-3350

Other observers: Shane Emerson, Hollund Rudolph, Kaitlin Bushell, Jennifer Bohling, Luis Avila, and Lida Shoeyb

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Identified by Dept. of Water Resources Environmental Scientist

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Burrowing owl construction monitoring

Total number of individuals: 1

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
1				

Age class comment:

Birds ite use:

☐ Nesting ☐ Rookery ☐ Nesting colony ☐ Burrowsite ☐ Lek

☑ Nonbreeding (over-wintering) ☐ Communal roost ☐ Other

Site use description:

What was the observed behavior? Perched at burrow entrance

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: Disturbed ruderal embankment next to CA Aqueduct road.

Slope: Land owner/manager: Department of Water Resources

Aspect:

Site condition + population viability: Fair

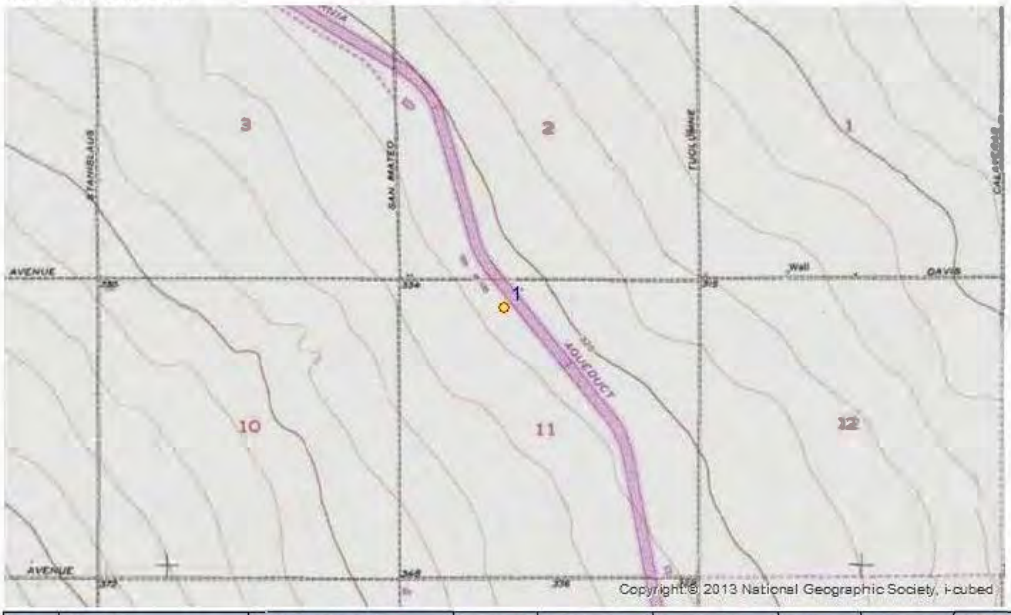
Immediate & surrounding land use: Orchard and CA Aqueduct

Visible disturbances: Agriculture, dirt road, Aqueduct road, owl box

Threats: Predation, degradation of habitat, agriculture, vehicle strikes

General comments: Burrow is filling in with sediment. Degradation of habitate Maintenance and agricultural activity, including burning off agricultural materials, could impact or alter the stability of the burrow. Agricultural spraying could cause decline or contamination of food source.

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTME NAD83	UTMN NAD83	UTM Zone
	Fresno	Tres Picos Farms	331	36.470629	-120.314	740662	4039511	10
1	Public Land Survey	Feature Comment						
	M T17S R15E 11							

The mapped feature is accurate within: 5 m

Source of mapped feature: GPS

Mapping notes: Trimble Juno

Location/directions comments:

Attachment(s): 20161107_MP 131.72 burrow.jpg; 20161107_MP 131.72 habitat.jpg; 20161213_MP 131.72 BUOW.jpg

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code xxxx
Quad code 3612043
Occ. no.
EO index no.
Map index no.

Scientific name: *Athene cunicularia*

Common name: burrowing owl

Date of field work (mm-dd-yyyy): 12-13-2016

Comment about field work date(s): 2/16/2017

OBSERVER INFORMATION

Observer: Laura Castro

Affiliation: DWR

Address: 3374 E. Shields Ave. , Fresno, CA 93726

Email: laura.castro@water.ca.gov

Phone: (559) 223-3350

Other observers: Shane Emerson, Hollund Rudolph, Kaitlin Bushell, Jennifer Bohling, Luis Avila, and Lida Shoeyb

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Identified by Dept. of Water Resources Environmental Scientist

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Burrowing owl construction monitoring

Total number of individuals: 1

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
1				

Age class comment:

Bird site use:

☐ Nesting ☐ Rookery ☐ Nesting colony ☑ Burrowsite ☐ Lek

☑ Nonbreeding (over-wintering) ☐ Communal roost ☐ Other

Site use description:

What was the observed behavior? Perched at burrow entrance

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: Disturbed non-native grassland on embankment next to CA Aqueduct road.

Slope: Land owner/manager: Department of Water Resources

Aspect:

Site condition + population viability: Good

Immediate & surrounding land use: Agriculture and CA Aqueduct

Visible disturbances: Agriculture and dirt road

Threats: Predation, degradation of habitat, and agriculture.

General comments: Degradation of habitat - Equipment could impact or alter the stability of the burrow. Agricultural spraying could cause decline or contamination of food source.

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTME NAD83	UTMN NAD83	UTM Zone
	Fresno	Tres Picos Farms	338	36.437252	-120.301439	741892	4035833	10
1	**Public Land Survey**	**Feature Comment**						
	M T17S R15E 24							

The mapped feature is accurate within: 5 m

Source of mapped feature: Trimble Juno

Mapping notes:

Location/directions comments:

Attachment(s): 20161107_MP 134.18 burrows.jpg, 20170107_MP 134.18 habitat.JPG

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code xxxx
Quad code 3612043
Occ. no.
EO index no.
Map index no.

Scientific name: *Athene cunicularia*

Common name: burrowing owl

Date of field work (mm-dd-yyyy): 11-07-2016

Comment about field work date(s): 11/11/2016

OBSERVER INFORMATION

Observer: Laura Castro

Affiliation: DWR

Address: 3374 E. Shields Ave. , Fresno, CA 93726

Email: laura.castro@water.ca.gov

Phone: (559) 230-3350

Other observers: Shane Emerson, Hollund Rudolph, Kaitlin Bushell, Jennifer Bohling, Luis Avila, and Lida Shoeyb

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Identified by Dept. of Water Resources Environmental Scientist

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Burrowing owl construction monitoring

Total number of individuals: 2

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
2				

Age class comment:

Birds ite use:

☐ Nesting ☐ Rookery ☐ Nesting colony ☑ Burrowsite ☐ Lek

☐ Nonbreeding (over-wintering) ☐ Communal roost ☐ Other

Site use description:

What was the observed behavior? Hunkered down at burrow entrance

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: Disturbed ruderal embankment next to CA Aqueduct road.

Slope: Land owner/manager: Department of Water Resources

Aspect:

Site condition + population viability: Fair

Immediate & surrounding land use: Agriculture and CA Aqueduct

Visible disturbances: Agriculture, dirt road, Aqueduct road

Threats: Predation, degradation of habitat, agriculture, vehicle strikes

General comments: Degradation of habitat - Maintenance and agricultural activity could impact or alter the stability of the burrow. Agricultural spraying could cause decline or contamination of food source.

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTME NAD83	UTMN NAD83	UTM Zone
	Fresno	Tres Picos Farms	338	36.43696	-120.381	741932	4035881	10
1	**Public Land Survey**	**Feature Comment**						
	M T17S R15E 24							

The mapped feature is accurate within: 5 m

Source of mapped feature: GPS

Mapping notes: Trimble Juno

Location/directions comments:

Attachment(s): 20161107_MP 134.20 BUOW in habitat.jpg; 20170114_MP 134.20 burrow.JPG

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

Source code xxxx
Quad code 3612043
Occ. no.
EO index no.
Map index no.

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Scientific name: *Athene cunicularia*

Common name: burrowing owl

Date of field work (mm-dd-yyyy): 10-13-2016

Comment about field work date(s):

OBSERVER INFORMATION

Observer: Laura Castro

Affiliation: DWR

Address: 3374 E. Shields Ave. , Fresno, CA 93726

Email: laura.castro@water.ca.gov

Phone: (559) 230-3350

Other observers: Shane Emerson, Hollund Rudolph, Kaitlin Bushell, Jennifer Bohling, Luis Avila, and Lida Shoeyb

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Identified by Dept. of Water Resources Environment Scientist

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Burrowing owl construction monitoring

Total number of individuals: 2

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
2				

Age class comment:

Birds ite use:

☐ **Nesting** ☐ **Rookery** ☐ **Nesting colony** ☑ **Burrowsite** ☐ **Lek**

☐ **Nonbreeding (over-wintering)** ☐ **Communal roost** ☐ **Other**

Site use description:

What was the observed behavior? Flying from vicinity of burrow

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: Disturbed ruderal embankment next to CA Aqueduct road.

Slope: Land owner/manager: Department of Water Resources

Aspect:

Site condition + population viability: Poor

Immediate & surrounding land use: Agriculture and CA Aqueduct

Visible disturbances: Agriculture and dirt road

Threats: Predation, degradation of habitat, agriculture, and vehicle strikes

General comments: Degradation of habitat - Maintenance and agricultural activity could impact or alter the stability of the burrow. Agricultural spraying could cause decline or contamination of food source.

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTME NAD83	UTMN NAD83	UTM Zone
	Fresno	Tres Picos Farms	337	36.43772	-120.381	741930	4035886	10
1	**Public Land Survey**	**Feature Comment**						
	M T17S R15E 24							

The mapped feature is accurate within: 5 m

Source of mapped feature: GPS

Mapping notes: Trimble Juno

Location/directions comments:

Attachment(s): 20161107_MP 134.21 burrow.jpg

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

Source code xxxx
Quad code 3612043
Occ. no.
EO index no.
Map index no.

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Scientific name: *Athene cunicularia*

Common name: burrowing owl

Date of field work (mm-dd-yyyy): 02-16-2017

Comment about field work date(s): 03/20/2017

OBSERVER INFORMATION

Observer: Laura Castro

Affiliation: DWR

Address: 3374 E. Shields Ave. , Fresno, CA 93726

Email: laura.castro@water.ca.gov

Phone: (559) 230-3350

Other observers: Shane Emerson, Hollund Rudolph, Kaitlin Bushell, Jennifer Bohling, Luis Avila, and Lida Shoeyb

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Identified by Dept. of Water Resources Environment Scientist

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Burrowing owl construction monitoring

Total number of individuals: 1

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
1				

Age class comment:

Birds ite use:

☐ Nesting ☐ Rookery ☐ Nesting colony ☑ Burrowsite ☐ Lek

☐ Nonbreeding (over-wintering) ☐ Communal roost ☐ Other

Site use description:

What was the observed behavior? Perched at burrow entrance

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: Disturbed non-native grassland on embankment next to CA Aqueduct road.

Slope: **Land owner/manager:** Department of Water Resources

Aspect:

Site condition + population viability: Fair

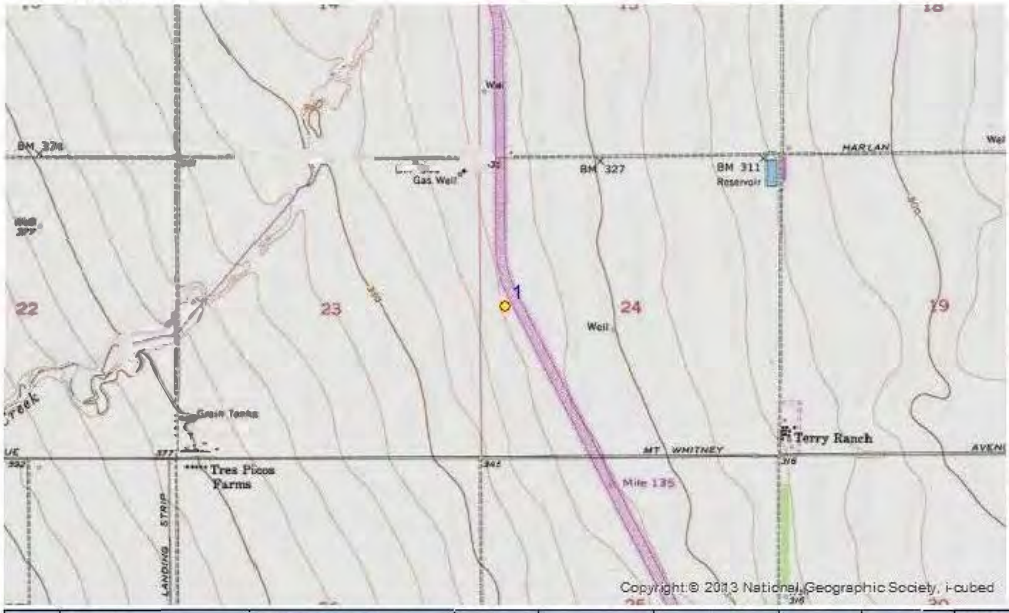
Immediate & surrounding land use: Agriculture and CA Aqueduct

Visible disturbances: Agriculture and dirt road

Threats: Predation, degradation of habitat, and agriculture

General comments: Degradation of habitat - Equipment could impact or alter the stability of the burrow. Agricultural spraying could cause decline or contamination of food source.

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTME NAD83	UTMN NAD83	UTM Zone
	Fresno	Tres Picos Farms	337	36.435868	-120.300649	741967	4035681	10
1	**Public Land Survey**	**Feature Comment**						
	M T17S R15E 24							

The mapped feature is accurate within: 5 m

Source of mapped feature: GPS

Mapping notes: Trimble Juno

Location/directions comments:

Attachment(s): 20161107_MP 134.25 burrow.jpg

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code xxxx
Quad code 3612043
Occ. no.
EO index no.
Map index no.

Scientific name: *Athene cunicularia*

Common name: burrowing owl

Date of field work (mm-dd-yyyy): 10-11-2016

Comment about field work date(s): 02/16/2017

OBSERVER INFORMATION

Observer: Laura Castro

Affiliation: DWR

Address: 3374 E. Shields Ave. , Fresno, CA 93726

Email: laura.castro@water.ca.gov

Phone: (559) 230-3350

Other observers: Shane Emerson, Hollund Rudolph, Kaitlin Bushell, Jennifer Bohling, Luis Avila, and Lida Shoeyb

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Identified by Dept. of Water Resources Environmental Scientist

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Burrowing owl construction monitoring

Total number of individuals: 1

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
1				

Age class comment:

Bird site use:

☐ Nesting ☐ Rookery ☐ Nesting colony ☑ Burrowsite ☐ Lek
☐ Nonbreeding (over-wintering) ☐ Communal roost ☐ Other

Site use description:

What was the observed behavior? Perched at burrow entrance

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: Disturbed non-native grassland on embankment next to CA Aqueduct road

Slope: Land owner/manager: Department of Water Resources

Aspect:

Site condition + population viability: Excellent

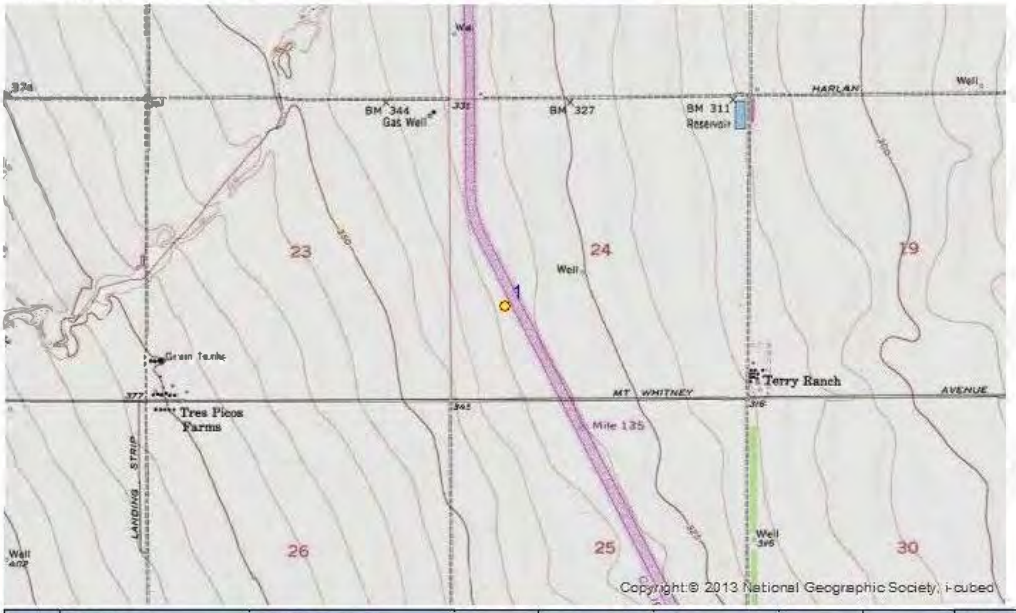
Immediate & surrounding land use: Agriculture and CA Aqueduct

Visible disturbances: Agriculture and dirt road

Threats: Predation, degradation of habitat, and agriculture

General comments: Degradation of habitat - Equipment could impact or alter the stability of the burrow. Agricultural spraying could cause decline or contamination of food source.

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTME NAD83	UTMN NAD83	UTM Zone
	Fresno	Tres Picos Farms	337	36.433083	-120.298822	742139	4035377	10
1	**Public Land Survey**	**Feature Comment**						
	MT T17S R15E 24							

The mapped feature is accurate within: 5 m

Source of mapped feature: GPS

Mapping notes: Trimble Juno

Location/directions comments:

Attachment(s): 20161213_MP 134.53 burrow.jpg

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code xxxx
Quad code 3612043
Occ. no.
EO index no.
Map index no.

Scientific name: *Athene cunicularia*

Common name: burrowing owl

Date of field work (mm-dd-yyyy): 08-18-2016

Comment about field work date(s): 04/26/2017

OBSERVER INFORMATION

Observer: Laura Castro

Affiliation: DWR

Address: 3374 E. Shields Ave. , Fresno, CA 93726

Email: laura.castro@water.ca.gov

Phone: (559) 230-3350

Other observers: Shane Emerson, Hollund Rudolph, Kaitlin Bushell, Jennifer Bohling, Luis Avila, and Lida Shoeyb

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Identified by Dept. of Water Resources Environmental Scientist

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Burrowing owl construction monitoring

Total number of individuals: 4

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
2	2			

Age class comment:

Bird site use:

☐ Nesting ☐ Rookery ☐ Nesting colony ☑ Burrowsite ☐ Lek

☑ Nonbreeding (over-wintering) ☐ Communal roost ☐ Other

Site use description:

What was the observed behavior? Perched on top of embankment near burrow

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: Disturbed non-native grassland on embankment next to CA Aqueduct road.

Slope: Land owner/manager: Department of Water Resources

Aspect:

Site condition + population viability: Excellent

Immediate & surrounding land use: Agriculture and CA Aqueduct

Visible disturbances: Agriculture and dirt road

Threats: Predation, degradation of habitat, and agriculture

General comments: Degradation of habitat - Equipment could impact or alter the stability of the burrow. Agricultural spraying could cause decline or contamination of food source.

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTME NAD83	UTMN NAD83	UTM Zone
	Fresno	Tres Picos Farms	335	36.418677	-120.289589	743012	4033801	10
1	**Public Land Survey**	**Feature Comment**						
	M T17S R15E 25							

The mapped feature is accurate within: 5 m

Source of mapped feature: GPS

Mapping notes: Trimble Juno

Location/directions comments:

Attachment(s): 20161103_MP 135.65 burrow.jpg

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code xxxx
Quad code 3612043
Occ. no.
EO index no.
Map index no.

Scientific name: *Athene cunicularia*

Common name: burrowing owl

Date of field work (mm-dd-yyyy): 08-17-2016

Comment about field work date(s): 05/05/2017

OBSERVER INFORMATION

Observer: Laura Castro

Affiliation: DWR

Address: 3374 E. Shields Ave. , Fresno, CA 93726

Email: laura.castro@water.ca.gov

Phone: (559) 230-3350

Other observers: Shane Emerson, Hollund Rudolph, Kaitlin Bushell, Jennifer Bohling, Luis Avila, and Lida Shoeyb

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Identified by Dept. of Water Resources Environmental Scientist

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Burrowing owl construction monitoring

Total number of individuals: 2

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
1	1			

Age class comment:

Birds ite use:

☐ Nesting ☐ Rookery ☐ Nesting colony ☑ Burrowsite ☐ Lek

☐ Nontreading (over-wintering) ☐ Communal roost ☐ Other

Site use description:

What was the observed behavior? Perched at burrow entrance

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: Disturbed non-native grassland on embankment next to CA Aqueduct road.

Slope: Land owner/manager: Department of Water Resources

Aspect:

Site condition + population viability: Excellent

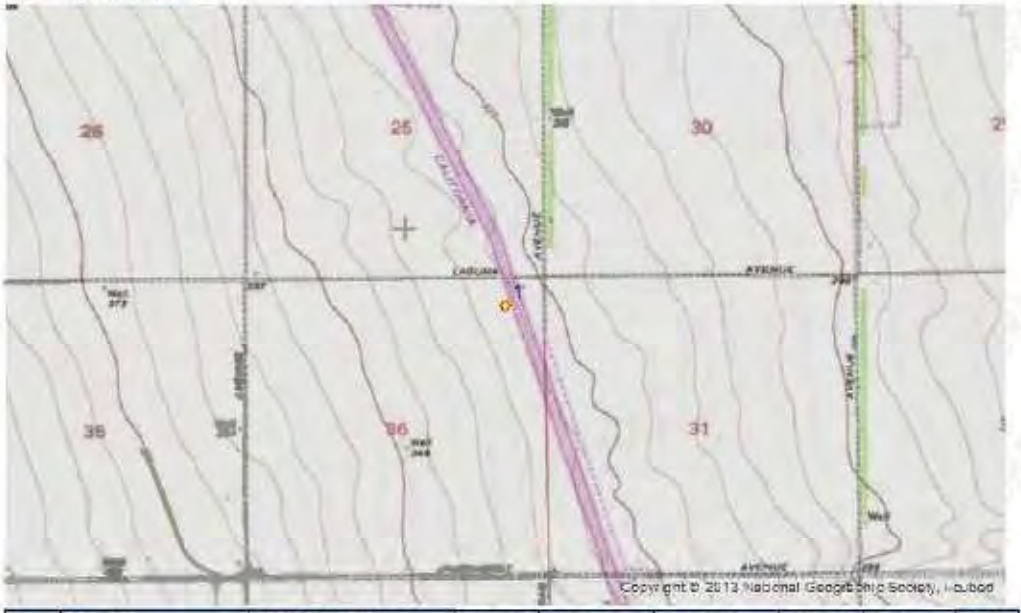
Immediate & surrounding land use: Agriculture and CA Aqueduct

Visible disturbances: Agriculture and dirt road

Threats: Predation, degradation of habitat, and agriculture

General comments: Degradation of habitat- Equipment could impact or alter the stability of the burrow. Agricultural spraying could cause decline or contamination of food source.

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTME NAD83	UTMN NAD83	UTM Zone
	Fresno	Tres Picos Farms	334	36.412759	-120.286513	743306	4033152	10
	Public Land Survey	**Feature Comment**						
1	M T17S R15E 36							

The mapped feature is accurate within: 5 m

Source of mapped feature: GPS

Mapping notes: Trimble Juno

Location/directions comments:

Attachment(s): 20161006_MP 136.10 BUOW_.jpg,20170320_MP 136.10 BUOW_.jpg

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

Source code xxxx
Quad code 3612043
Occ. no.
EO index no.
Map index no.

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Scientific name: *Athene cunicularia*

Common name: burrowing owl

Date of field work (mm-dd-yyyy): 10-06-2016

Comment about field work date(s): 04/28/2017

OBSERVER INFORMATION

Observer: Laura Castro

Affiliation: DWR

Address: 3374 E. Shields Ave. , Fresno, CA 93726

Email: laura.castro@water.ca.gov

Phone: (559) 230-3350

Other observers: Shane Emerson, Hollund Rudolph, Kaitlin Bushell, Jennifer Bohling, Luis Avila, and Lida Shoeyb

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Identified by Dept. of Water Resources Environmental Scientist

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Burrowing owl construction monitoring

Total number of individuals: 1

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
1				

Age class comment:

Birds ite use:

☐ Nesting ☐ Rookery ☐ Nesting colony ☑ Burrowsite ☐ Lek

☑ Nonbreeding (over-wintering) ☐ Communal roost ☐ Other

Site use description:

What was the observed behavior? Perched at burrow entrance.

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: Disturbed non-native grassland on embankment next to CA Aqueduct road.

Slope: Land owner/manager: Department of Water Resources

Aspect:

Site condition + population viability: Good

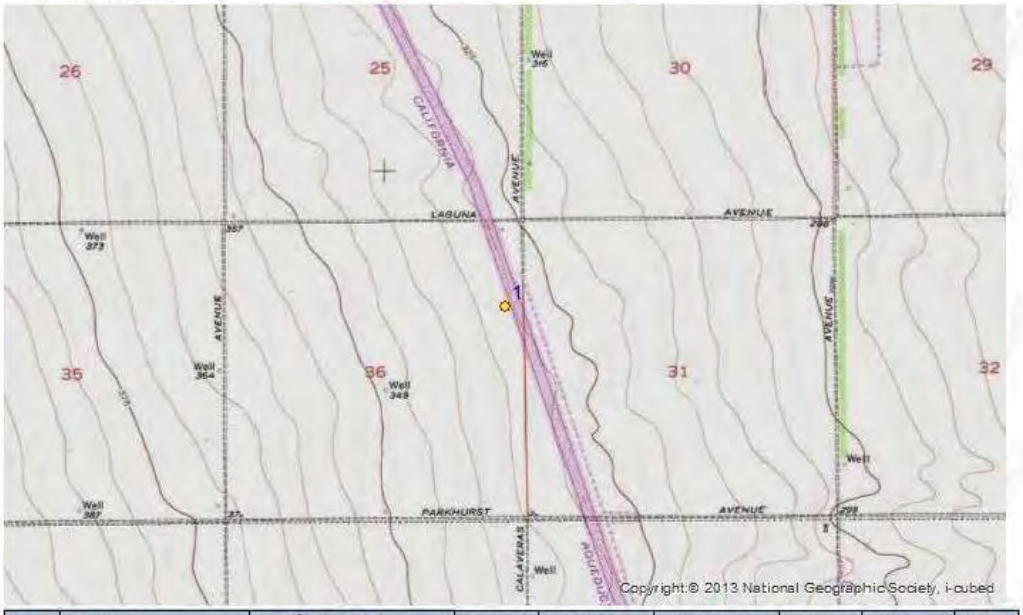
Immediate & surrounding land use: Agriculture and CA Aqueduct

Visible disturbances: Agriculture and dirt road

Threats: Predation, degradation of habitat, and agriculture

General comments: Degradation of habitat - Equipment could impact or alter the stability of the burrow. Agricultural spraying could cause decline or contamination of food source.

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTME NAD83	UTMN NAD83	UTM Zone
	Fresno	Tres Picos Farms	334	36.409939	-120.285251	743428	4032843	10
1	**Public Land Survey**	**Feature Comment**						
	M T17S R15E 36							

The mapped feature is accurate within: 5 m

Source of mapped feature: GPS

Mapping notes: Trimble Juno

Location/directions comments:

Attachment(s): 20170320_MP 136.35 burrow.jpg

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code CAS16F0023
Quad code 3612033
Occ. no.
EO index no.
Map index no.

Scientific name: *Athene cunicularia*

Common name: burrowing owl

Date of field work (mm-dd-yyyy): 10-31-2016

Comment about field work date(s): last observed 11/7/2016

OBSERVER INFORMATION

Observer: Laura Castro

Affiliation: Department of Water Resources

Address: 3374 E. Shields Avenue , Fresno, CA 93726

Email: laura.castro@water.ca.gov

Phone: (559) 230-3350

Other observers: Shane Emerson, Hollund Rudolph, Luis Avila, Jennifer Bohling, Kaitlin Bushell, Lida Shoeyb

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Identified by Dept. of Water Resources Environmental Scientist

Identification explanation:

Identification confidence: Not very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Burrowing owl construction monitoring

Total number of individuals: 1

Collection? **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
1				

Age class comment:

Bird site use:

☐ Nesting ☐ Rookery ☐ Nesting colony ☑ Burrowsite ☐ Lek

☐ Nonbreeding (over-wintering) ☐ Communal roost ☐ Other

Site use description:

What was the observed behavior? BUOW perched above burrow. BUOW was observed again November 7, 2016 perched on upper lip outside burrow entrance.

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: Disturbed ruderal embankment next to CA Aqueduct road.

Slope: 3% **Land owner/manager:** Dept. of Water Resources

Aspect: west side of embank

Site condition + population viability: Poor

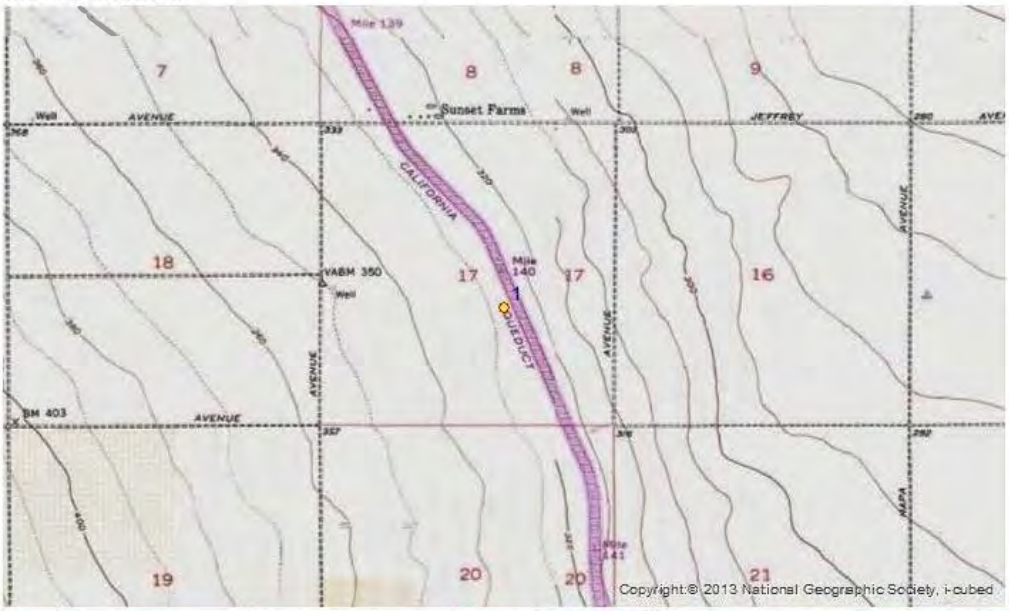
Immediate & surrounding land use: orchard, fallow field, and CA Aqueduct

Visible disturbances: Agriculture and embankment road

Threats: predation, degradation of habitat, agriculture, vehicle strikes

General comments: Degradation of habitat - Maintenance and agricultural activity could impact or alter the stability of the burrow. Agricultural spraying could cause decline or contamination of food source.

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTME NAD83	UTMN NAD83	UTM Zone
	Fresno	Domengine Ranch	330	36.36197	-120.25400	746383	4027600	10
1	**Public Land Survey**	**Feature Comment**						
	M T18S R16E 17							

The mapped feature is accurate within: 5 m

Source of mapped feature: GPS

Mapping notes: CA Aqueduct MP 141.05

Location/directions comments:

Attachment(s): 20161017_MP 140.05 burrow.jpg; 20161017_MP 140.05 habitat.jpg

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

Source code CAS17F0006
Quad code 3612032
Occ. no.
EO index no.
Map index no.

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Scientific name: *Athene cunicularia*

Common name: burrowing owl

Date of field work (mm-dd-yyyy): 03-20-2017

Comment about field work date(s): only observed once

OBSERVER INFORMATION

Observer: Laura Castro

Affiliation: Dept of Water Resources

Address: 3374 E. Shields Avenue , Fresno, CA 93726

Email: laura.castro@water.ca.gov

Phone: (559) 230-3350

Other observers: Shane Emerson and Luis Avila

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Identified by Dept. of Water Resources Environmental Scientist

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Burrowing owl construction monitoring

Total number of individuals: 1

Collection? **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
1				

Age class comment:

Bird site use:

☐ Nesting ☐ Rookery ☐ Nesting colony ☑ Burrowsite ☐ Lek

☐ Nonbreeding (over-wintering) ☐ Communal roost ☐ Other

Site use description: It is suspected that BUOW at this location is also using burrow at MP 141.02, based on the close proximity of the burrows.

What was the observed behavior? Adult flew out of culvert to edge of agricultural field.

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: Disturbed ruderal embankment next to CA Aqueduct road.

Slope: 2% Land owner/manager: CA Dept. of Water Resources

Aspect:

Site condition + population viability: Poor

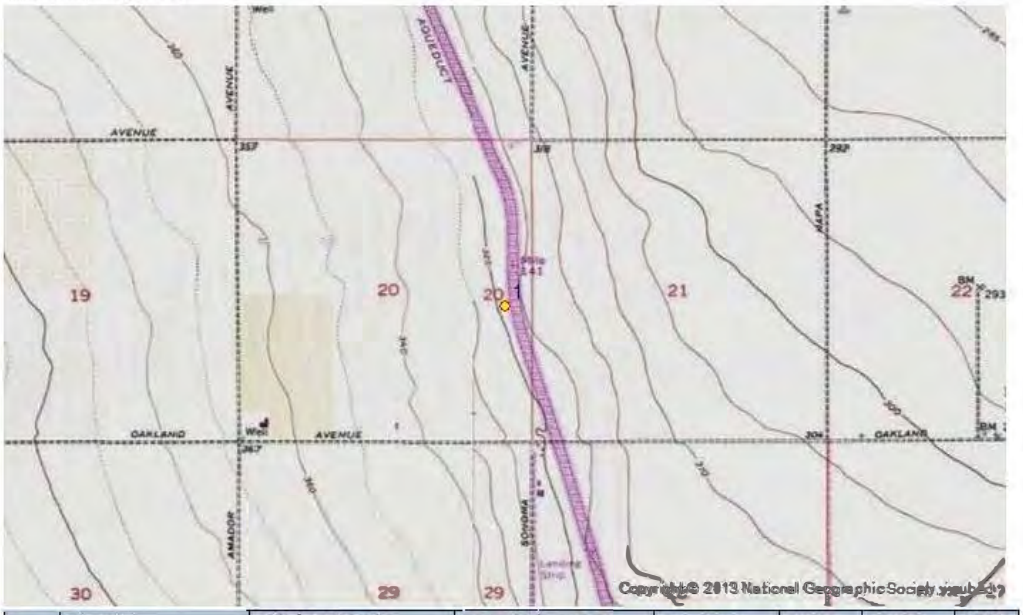
Immediate & surrounding land use: Agriculture and CA Aqueduct

Visible disturbances: Agriculture and toe road

Threats: Predation, degradation of habitat, agriculture, vehicle strikes

General comments: Degradation of habitat - Maintenance and agricultural activity could impact or alter the stability of the burrow. Agricultural spraying could cause decline or contamination of food source.

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTME NAD83	UTMN NAD83	UTM Zone
	Fresno	Harris Ranch	327	36.34827	-120.24900	746875	4026092	10
1	**Public Land Survey**	**Feature Comment**						
	M T13S R16E 20	MP 141.01 of the CA Aqueduct						

The mapped feature is accurate within: 5 m

Source of mapped feature: GIS

Mapping notes: MP 141.02 of CA Aqueduct. BUOW in culvert under dirt toe road.

Location/directions comments:

Attachment(s): 20170309_MP 141.01 habitat.jpg

CNDDB Online Field Survey Form Report

California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/

This data has been reported to the CNDDB, but may not have been evaluated by the CNDDB staff

Source code CAS17F0007
Quad code 3612032
Occ. no.
EO index no.
Map index no.

Scientific name: *Athene cunicularia*

Common name: burrowing owl

Date of field work (mm-dd-yyyy): 04-06-2017

Comment about field work date(s): First observed 02-16-2017

OBSERVER INFORMATION

Observer: Laura Castro

Affiliation: CA Dept. of Water Resources

Address: 3374 E. Shields Avenue , Fresno, CA 93726

Email: laura.castro@water.ca.gov

Phone: (559) 230-3350

Other observers: Luis Avila, Shane Emerson

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Identified by Dept. of Water Resources Environmental Scientist

Identification explanation:

Identification confidence: Very confident

Species found: Yes **If not found, why not?**

Level of survey effort: Burrowing owl construction monitoring

Total number of individuals: 1

Collection? No **Collection number:**

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

adults	juveniles	larvae	egg mass	unknown
1				

Age class comment:

Bird site use:

☐ **Nesting** ☐ **Rookery** ☐ **Nesting colony** ☑ **Burrow site** ☐ **Lek**
☐ **Non-breeding (over-wintering)** ☐ **Communal roost** ☐ **Other**

Site use description: Three burrows side by side at this location.

What was the observed behavior? flew out of burrow and then back in

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: Disturbed non-native grassland on embankment next to CA Aqueduct road.

Slope: 25 degrees

Land owner/manager: Department of Water Resources

Aspect: west

Site condition + population viability: Fair

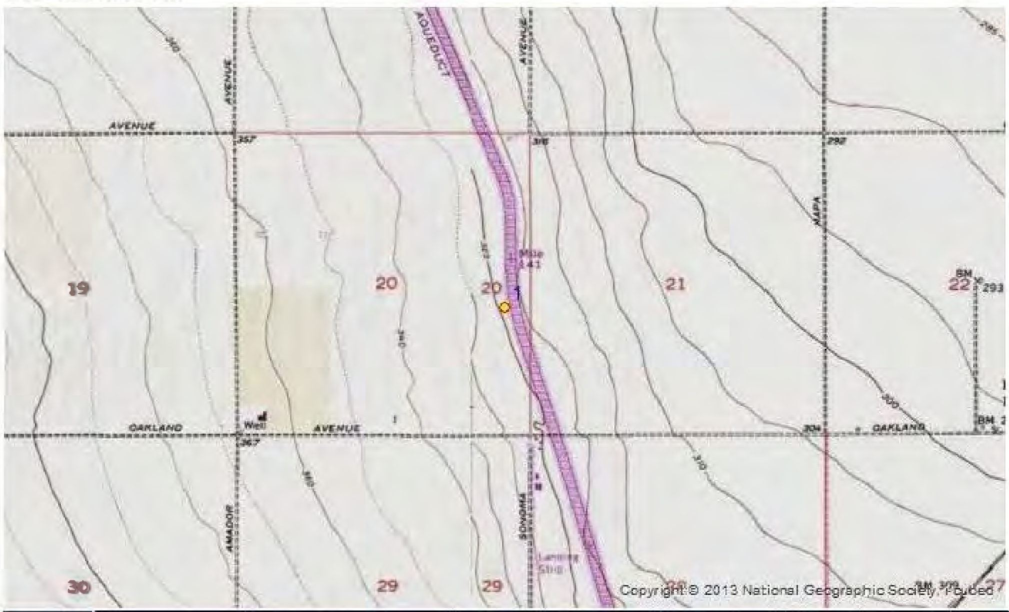
Immediate & surrounding land use: Agriculture and CA Aqueduct

Visible disturbances: Agriculture and embankment road

Threats: Predation, degradation of habitat, agriculture, vehicle strikes

General comments: Degradation of habitat - Maintenance and agricultural activity could impact or alter the stability of the burrow. Agricultural spraying could cause decline or contamination of food source.

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTME NAD83	UTMN NAD83	UTM Zone
	Fresno	Harris Ranch	327	36.34787	-120.24890	746885	4026049	10
1	**Public Land Survey**	**Feature Comment**						
	M T18S R16E 20	MP 141.02 on right side of CA Aqueduct						

The mapped feature is accurate within: 5 m

Source of mapped feature: GPS

Mapping notes: MP 141.02 on right side of CA Aqueduct

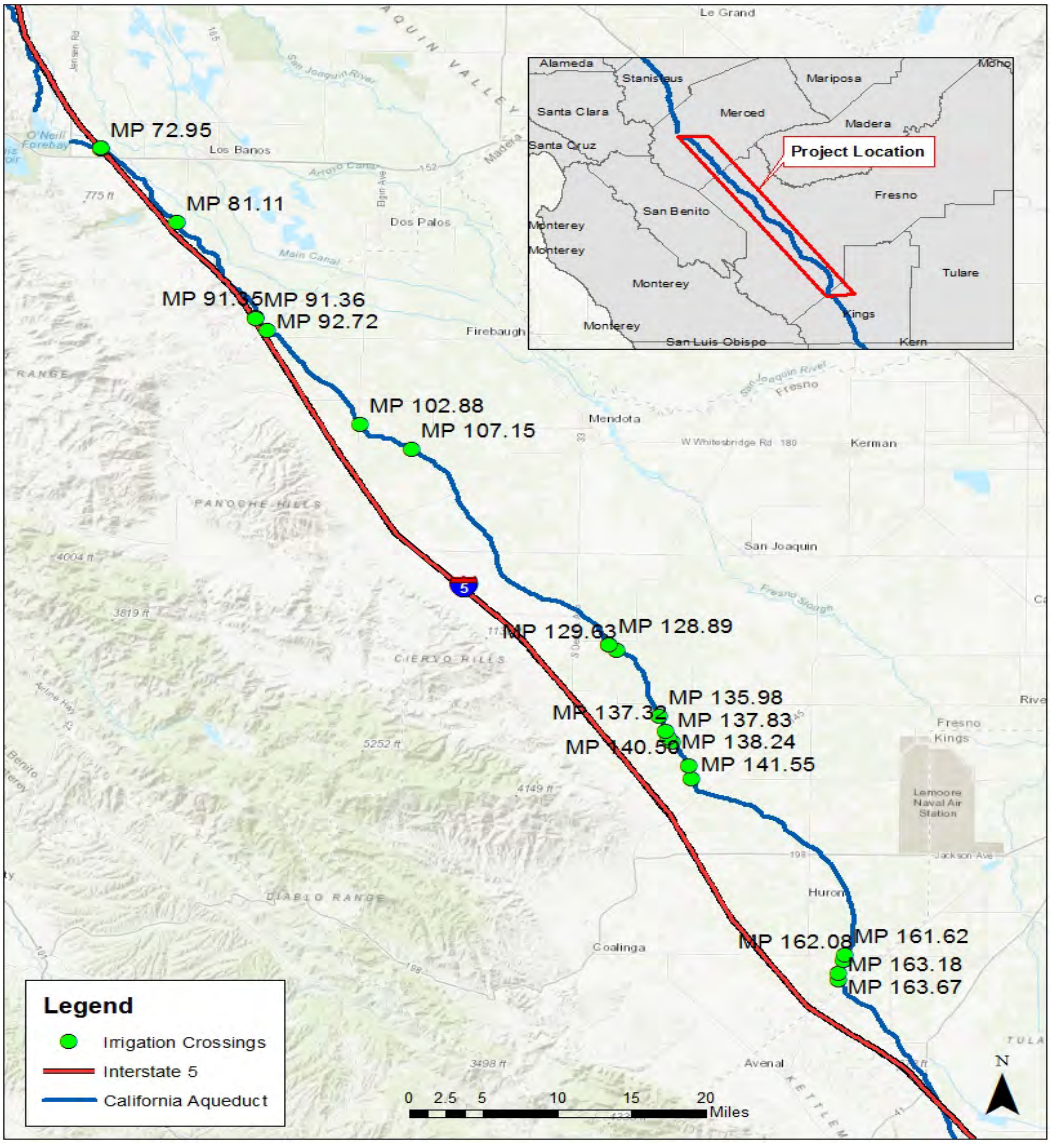
Location/directions comments:

Attachment(s): 20170216_MP 141.02 burrow and habitat.jpg; 20170216_MP 141.02 burrow.jpg

Project Location

The Irrigation Crossing Pipe Inspections and Repair Project (Project) is located along the California Aqueduct (Aqueduct) in Merced County and Fresno County. The Project includes 19 irrigation pipe crossings (Irrigation Crossings) at milepost (MP) 72.95, MP 81.11, MP 91.35, MP 91.36, MP 92.72, MP 102.88, MP 107.15, MP 128.89, MP 129.63, MP 135.98, MP 137.32, MP 137.83, MP 138.24, MP 140.50, MP 141.55, MP 161.62, MP 162.08, MP 163.18, and MP 163.67. The most northern Irrigation Crossing, MP 72.95, is adjacent to Interstate Highway 5, which is approximately 2.3 miles east of the O'Neill Forebay in Merced County, and the most southern Irrigation Crossing, MP 163.67, is approximately 6 miles southeast of the City of Huron in Fresno County (**Figure 1**).

Figure 1. Location Map of the 19 Irrigation Crossings on the Aqueduct.



Project Description

Diversified Project Services International (DPSI), a private contractor, will be conducting ground penetrating radar surveys to locate the Irrigation Crossings that are associated with the Aqueduct. This will allow cleaning and Remote Video Inspection (RVI) to be conducted. The Project is organized into three groups, A, B, and C, based on their conditions, but cleaning and inspections will be performed at all pipes. The Project footprint will be a 300 feet area on both sides of the Aqueduct at each pipe crossing site. The date of mobilization is November 4, 2019, and the first step will be exposing the Crossings and determining their condition. The staging area and work area for this first step will be within the 300 feet footprint surrounding each Irrigation Crossing. Work also includes a pipeline abandonment option if an emergency arises.

Group A

Two Irrigation Crossing pipes located at MP 163.18 and MP 137.32 have been identified as having open ends. The Irrigation Crossing pipes will be depressurized and any standing water inside the pipes or near the pipe ends will be placed in a Baker tank. Next, the pipes will be cleaned by hydroblasting; any water from this process will also be placed in the Baker tank. All water found in the pipes will be tested and later disposed of appropriately. RVI will commence after water has been removed.

Group B

A set of 11 Irrigation Crossings, located at MP 163.67, MP 162.08, MP 141.55, MP 140.50, MP 138.24, MP 135.98, MP 129.63, MP 128.89, MP 92.72, MP 81.11, and MP 72.95 are not in service but has closed ends. These pipes will be located with hydrovac excavation equipment, which is a method that uses a high-pressured water device to break down the soil and a vacuum to lift the slurry into a debris tank. The ends of the pipes will then be exposed by backhoe excavation. Shoring will need to be installed for safe access to the pipeline. After each pipe has been exposed and investigated to address any source of water intrusion into the pipe, the pipes will be depressurized, drained, inspected, blocked, and a section will be cut and removed. This inspection and preparation will allow hydroblasting to prepare the pipe for RVI. All water will be collected into Baker tanks, tested, and disposed of appropriately.

Group C

Six Irrigation Crossing pipes located at MP 161.62, MP 137.83, MP 107.15, MP 102.88, MP 91.36, and MP 91.35 were determined to be in service. These pipes will be located with hydrovac equipment, excavated, inspected, depressurized, and drained. This

inspection and preparation will allow hydroblasting to prepare the pipes for RVI. All water will be collected into Baker tanks, tested, and disposed of appropriately.

After each Irrigation Crossing has been inspected, they will either be permanently abandoned and replaced, or the site will be returned to pre-construction condition.

Site Description

The Project includes both the Aqueduct primary road and secondary road and DWR's right-of-way (ROW), with the ROW being the work area. The habitat consists largely of non-native grass, Russian thistle (*Salsola* sp.), and bare ground. The habitat is highly disturbed due to continual DWR maintenance of the Aqueduct and ROW and heavy agricultural activity. Adjacent land use to the ROW includes annual crops and orchards.

Methodology

Environmental Scientists (ES) Foung Vang, Alex Single, Nicholas Teague, Guillermo Coronado, and Fish and Wildlife Scientific Aid Marina Raya conducted an overall site assessment over a 7-day survey period (October 3,4, 7, 8, 9, 10 and 11, 2019). These surveys consisted of surveying 1,640 feet upstream and downstream of both sides of the Aqueduct at each Irrigation Crossing. On October 3, 4, and 7 to 11, 2019, Environmental Scientists (ES) Foung Vang, Alex Single, Nicholas Teague, Guillermo Coronado, and Fish and Wildlife Scientific Aid Marina Raya conducted an overall site assessment which included surveying 1640 feet upstream and downstream of both sides of the Aqueduct at each Irrigation Crossing.

The overall site assessment was conducted to assess the habitat associated with the Project area and survey for species that have the potential to be in the area. The density, type, and proximity of burrows and canid dens were assessed. The potential for listed species was also assessed. The California Natural Diversity Database (CNDDB 2019), California Native Plant Society (CNPS 2019), and the United States Fish and Wildlife Information for Planning and Consultation (IPaC 2019) were consulted. Listed special status species were recorded within a 5-mile radius of the Project area (Table 1), but those species with habitat associated with the Project area were considered potential to occur.

Table 1. Special Status Species Recorded Near the Project Area; CNDDB, CNPS, and the IPaC.

Common Name	Scientific Name	Federal T/E	State T/E/SSC	CNPS
San Joaquin kit fox	*Vulpes macrotis mutica*	E	T	
American badger	*Taxidea taxus*		SSC	
San Joaquin antelope squirrel	*Ammospermophilus nelsoni*		T	
Giant kangaroo rat	*Dipodomys ingens*	E	E	
Tulare grasshopper mouse	*Onychomys torridus*		SSC	
Swainson's hawk	*Buteo swainsoni*		T	
*Golden eagle	*Aquila chrysaetos*		FP	
Northern harrier	*Circus hudsonius*		SSC	
Burrowing owl	*Athene cunicularia*		SSC	
Tricolored blackbird	*Agelaius tricolor*		T	
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*		SSC	
Loggerhead shrike	*Lanius ludovicianus*		SSC	
*Blunt-nosed leopard lizard	*Gambelia sila*	E	E	
Northern California legless lizard	*Anniella pulchra*		SSC	
San Joaquin coachwhip	*Coluber flagellum ruddocki*		SSC	
Western pond turtle	*Actinemys marmorata*		SSC	
Spiny-sepaled button-celery	*Eryngium spinosepalum*			1B.2
Heartscale	*Atriplex cordulata*			1B.2
Munz's tidy-tips	*Layia munzii*			1B.2
San Joaquin woollythreads	*Monolopia congdonii*			1B.2
Panoche pepper-grass	*Lepidium jaredii album*			1B.2

*Fully protected; E = Endangered; T = Threatened; SSC = Special Species of Concern; 1B.2 = Plants Rare, Threatened, or Endangered in California and Elsewhere

Results

Due to the highly disturbed ROW, the Project area does not contain suitable habitat for San Joaquin kit fox, San Joaquin antelope squirrel, giant kangaroo rat, Tulare grasshopper mouse, tricolored blackbird, yellow-headed blackbird, blunt-nosed leopard lizard, northern California legless lizard, western pond turtle, spiny-sepaled button-celery, heartscale, Munz's tidy-tips, San Joaquin woolythreads, and Panoche pepper-grass. None of these species were observed during the overall site assessment.

Some of the Irrigation Crossings had large numbers of small mammal burrows, with an accumulated total of approximately 577 burrows. California ground squirrels (*Otospermophilus beecheyi*) were the only observable rodent (Figure 2). A total of 47 canid-sized dens (Figure 4) and eight burrowing owl (BUOW) burrows (Figure 3) were documented in the ROW near several of the Irrigation Crossings (**Table 2) (Appendix A**). During the October 8, 2019 survey, a BUOW was observed near BUOW burrow #3 and #4 near the MP 137.32 Irrigation Crossing on the right side of the Aqueduct (See Appendix A).

Table 2. Burrows and Dens Observed During Surveys.

Milepost	Canid Dens	Active BUOW Burrows	Small Mammal Burrows
72.95	0	0	21
81.11	6	0	105
*91.35/91.36	2	0	1
92.72	11	0	2
102.88	0	0	22
107.15	1	0	9
128.89	0	0	0
129.63	0	0	2
135.98	1	2	5
*137.32/137.83/138.24	8	5	24
140.50	1	0	74
141.55	0	0	Over 110
*161.62/162.08	5	1	27
*163.18/163.67	12	0	Over 175
Total:	47	8	Minimum 577

*Multiple mileposts are placed together due to overlapping BUOW restrictive areas.

Figure 2. Small Mammal Burrow Complex near MP 140.50 Irrigation Crossing on the Right Side of the Aqueduct.

Figure 3. BUOW Burrow #3 in the ROW near MP 137.32 Irrigation Crossing on the Right Side of the Aqueduct.

Figure 4. Canid Den in the ROW near MP 140.50 Irrigation Crossing on the Right Side of the Aqueduct.

Discussion

The 19 Irrigation Crossings are adjacent to heavily disturbed areas with intense agriculture activity and degraded habitat, which are not suitable for many of the special status species listed in Table 1. However, the Project has the potential to impact documented BUOWs, BUOW burrows, canid dens, and small mammals. Burrowing owls are protected under the Migratory Bird Treaty Act (MBTA), and canid dens must be avoided due to potential presence of San Joaquin kit fox. San Joaquin kit fox occurrences were recorded in the vicinity of the Irrigation Crossings in CNDDB. Many of the Irrigation Crossings have nearby small mammal burrows that are potential BUOW burrows. Although these burrows do not have BUOW sign (such as whitewash, owl pellets, feathers, and prey remains), they are large enough (with at least a 3-inch diameter) to be inhabited by a BUOW.

Minimization Measures

To avoid and minimize potential impacts to sensitive species and their habitat, the following measures will be applied:

- Within the 1640 feet impact area, one-way doors will be temporarily installed in BUOW burrows, canid dens will be burrow probed and temporary one-way doors will be installed, and small mammal burrows will be investigated with a burrow probe and temporarily blocked with sandbags or similar material (Appendix B).
- All work and staging will be within a 300 feet work footprint at each Irrigation Crossing, and parking will be on the paved Aqueduct road, graveled shoulders, or work footprint. No parking on embankments, embankment roads, and embankment slopes.
- Paved roads will be used to access and exit the work area. Alternate routes on dirt roads will require ES approval.
- Exclusion areas surrounding burrows will be designated with flagged stakes to prevent disturbance to these areas. An ES will monitor all construction work.
- All trenches less than 2 feet deep will have escape ramps made of sand bags or similar material, with a 2:1 slope, and trenches greater than 2 feet deep will be covered with plywood or similar material and weighed down.
- Work will only occur during daylight hours.

If these measures are not followed there can be potential permanent impacts to these special status species and their habitat. These impacts might require mitigation, and regulatory agencies will need to be consulted.

Appendix A

Maps of Irrigation Crossings and Burrow and Den Locations

Figure 5. MP 72.95 Irrigation Crossing on the Aqueduct.

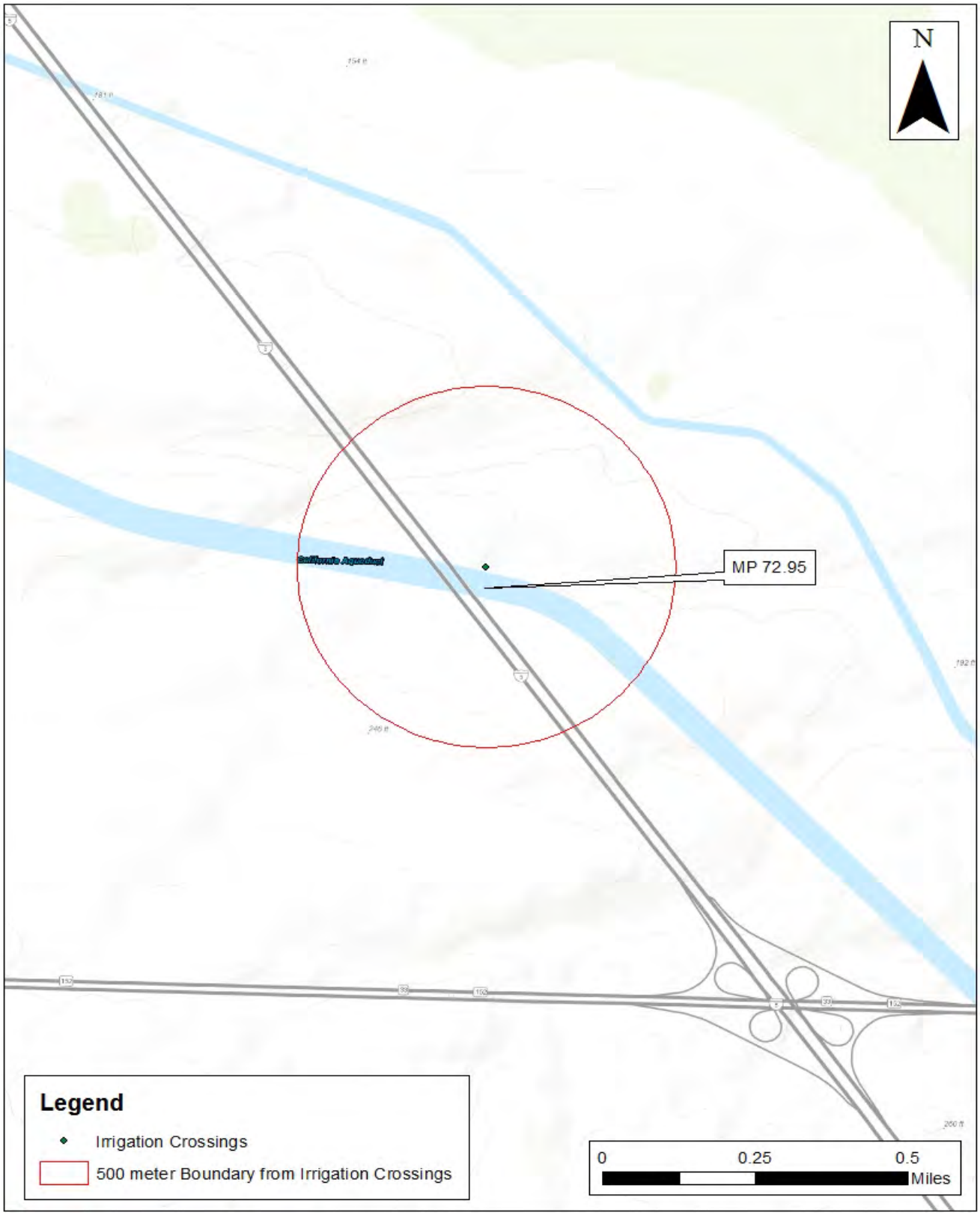


Figure 6. MP 81.11 Irrigation Crossing and Canid Dens on the Aqueduct.

Figure 7. MP 91.35 and MP 91.36 Irrigation Crossings and Canid Dens on the Aqueduct.

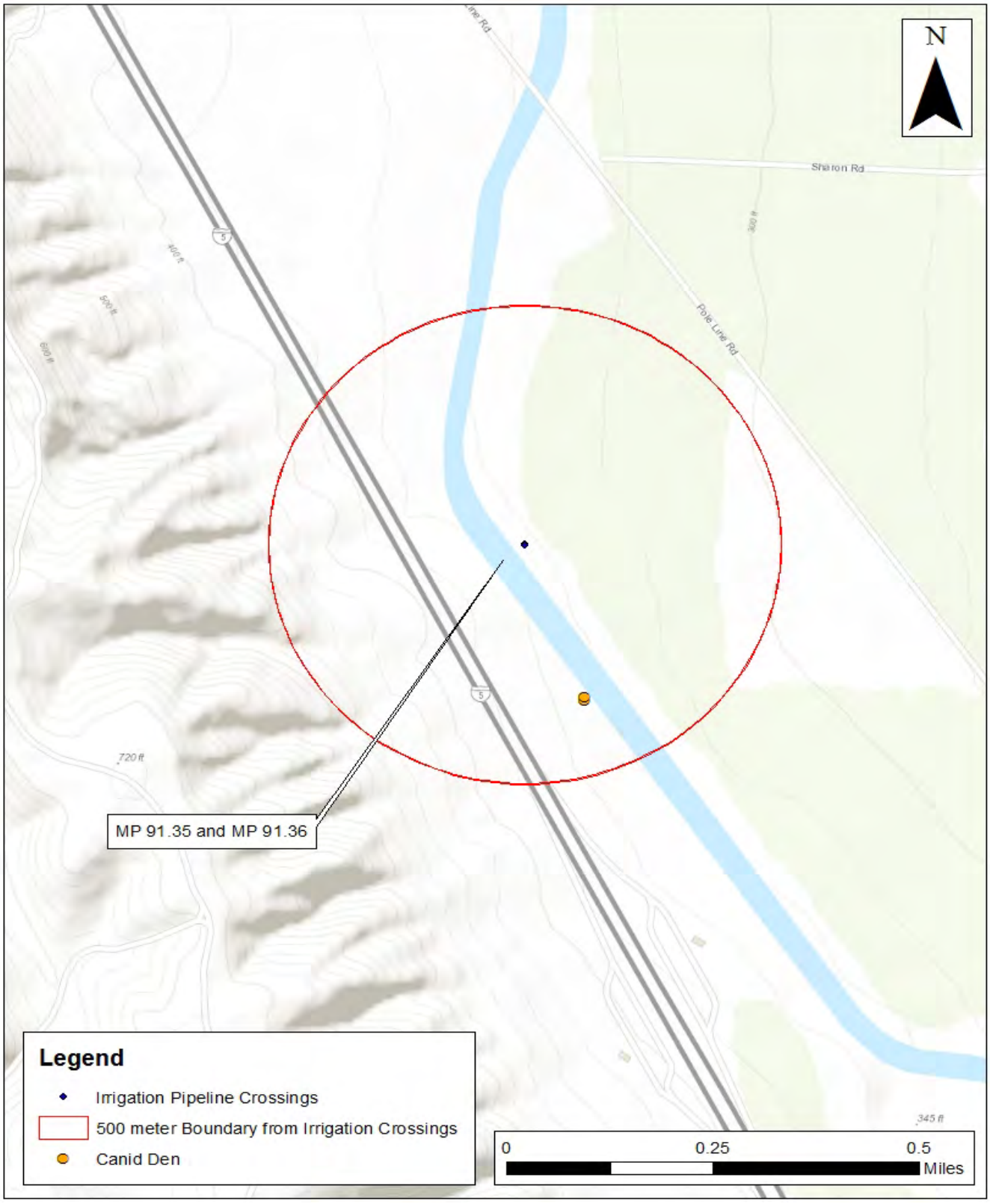


Figure 8. MP 92.72 Irrigation Crossing and Canid Dens on the Aqueduct.

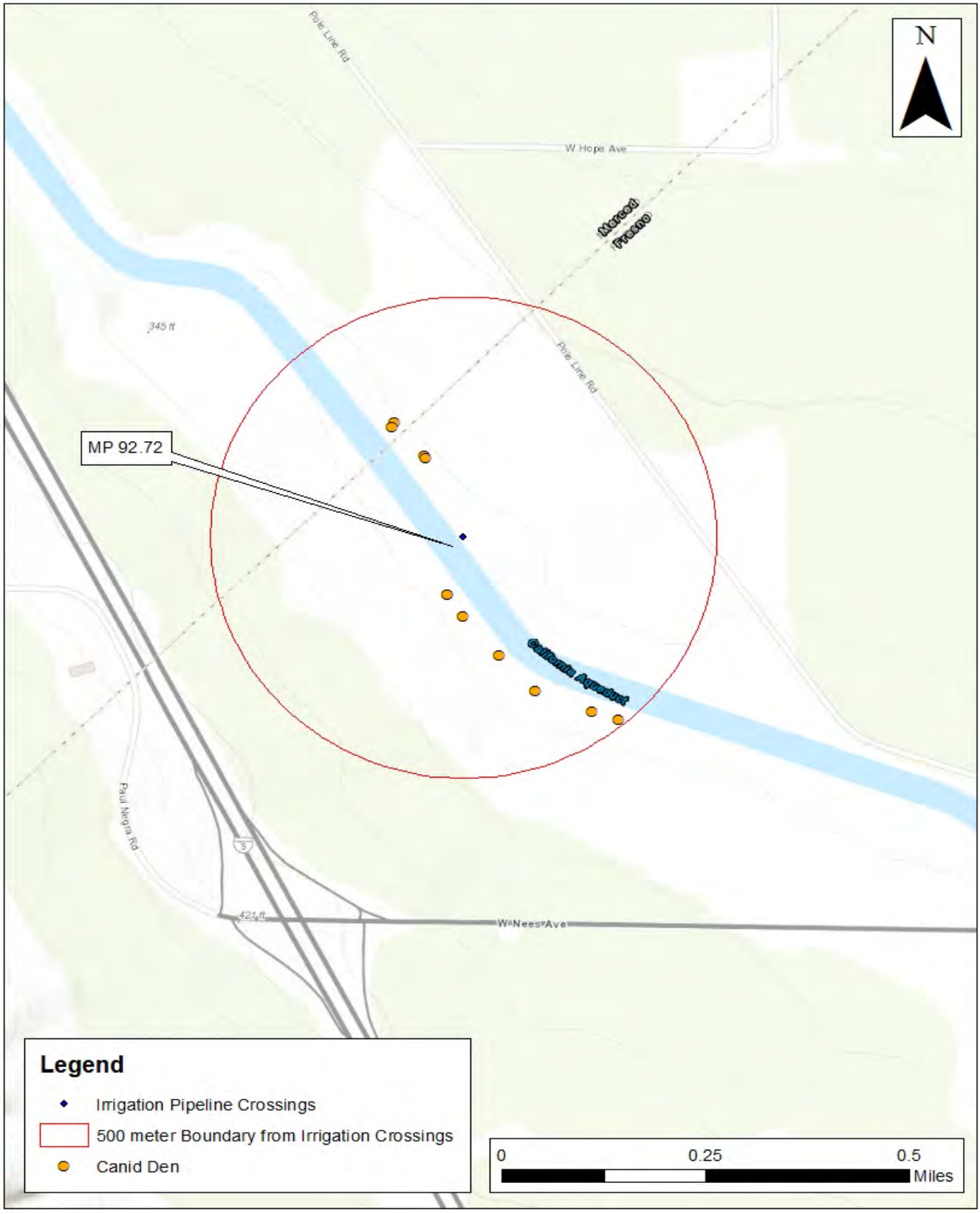


Figure 9. MP 102.88 Irrigation Crossing on the Aqueduct.

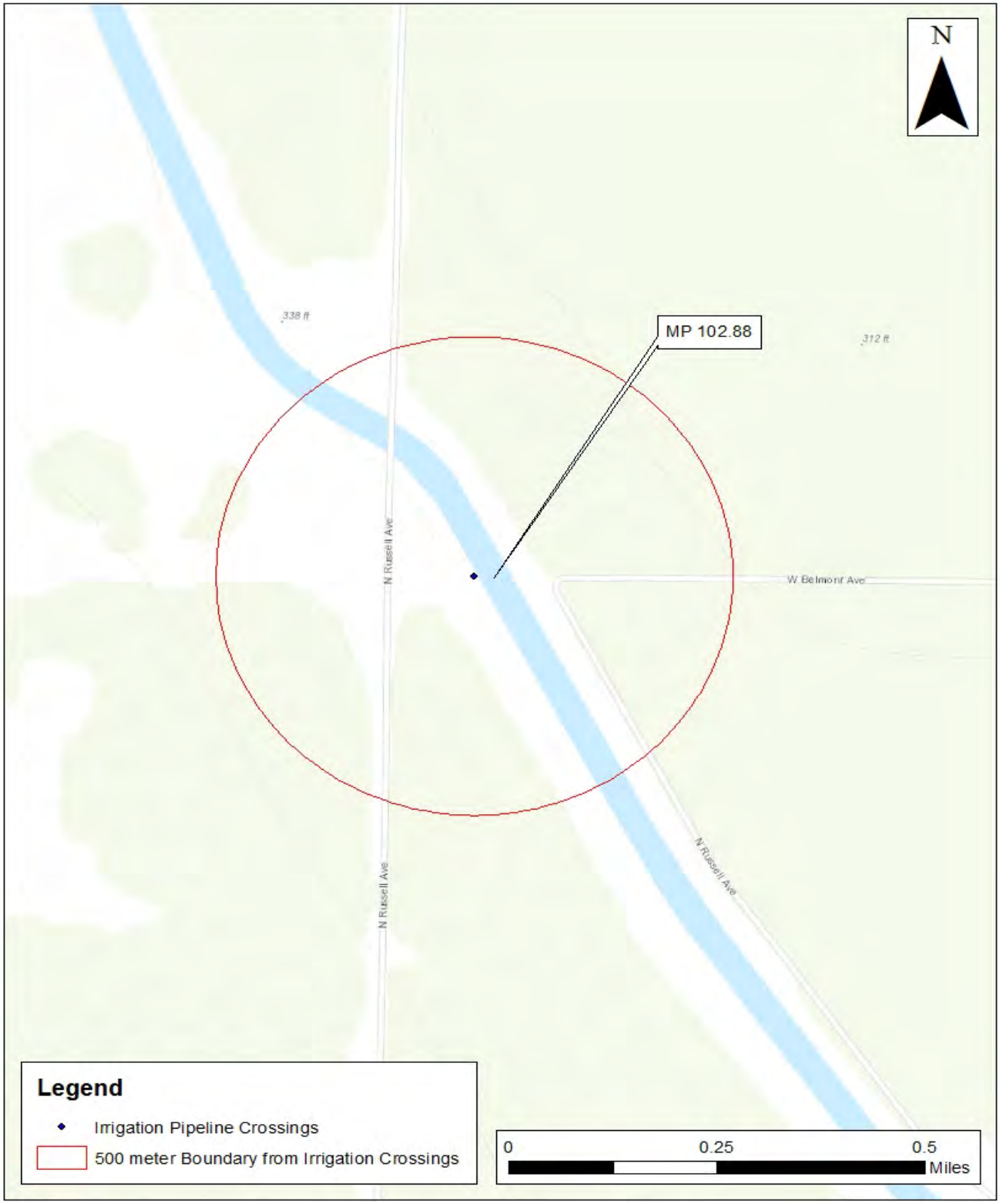


Figure 10. MP 107.15 Irrigation Crossing and a Canid Den on the Aqueduct.

Figure 11. MP 128.89 and MP 129.63 Irrigation Crossings on the Aqueduct.

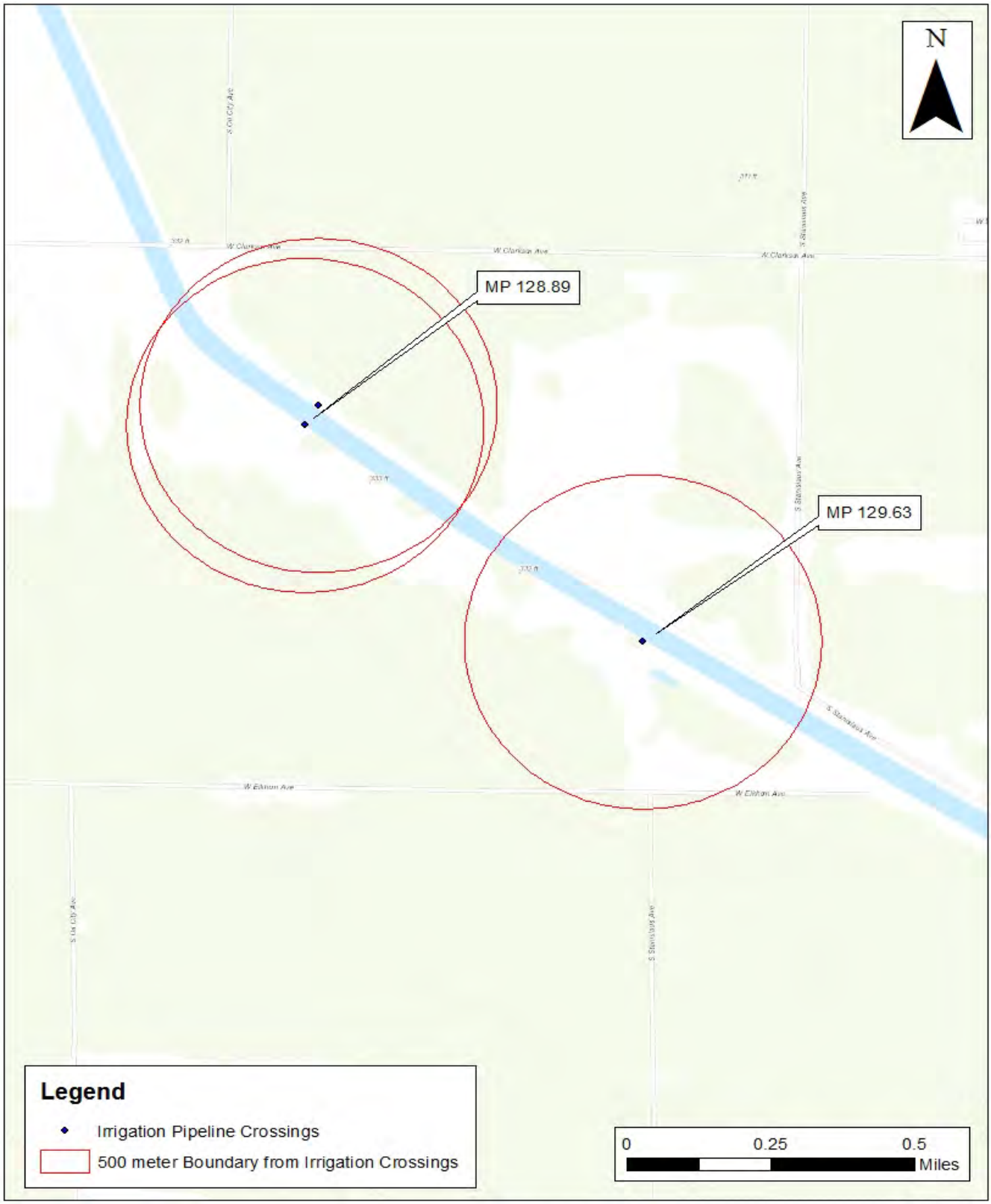


Figure 12. MP 135.98 Irrigation Crossing, BUOW Burrow, and Canid Den on the Aqueduct.

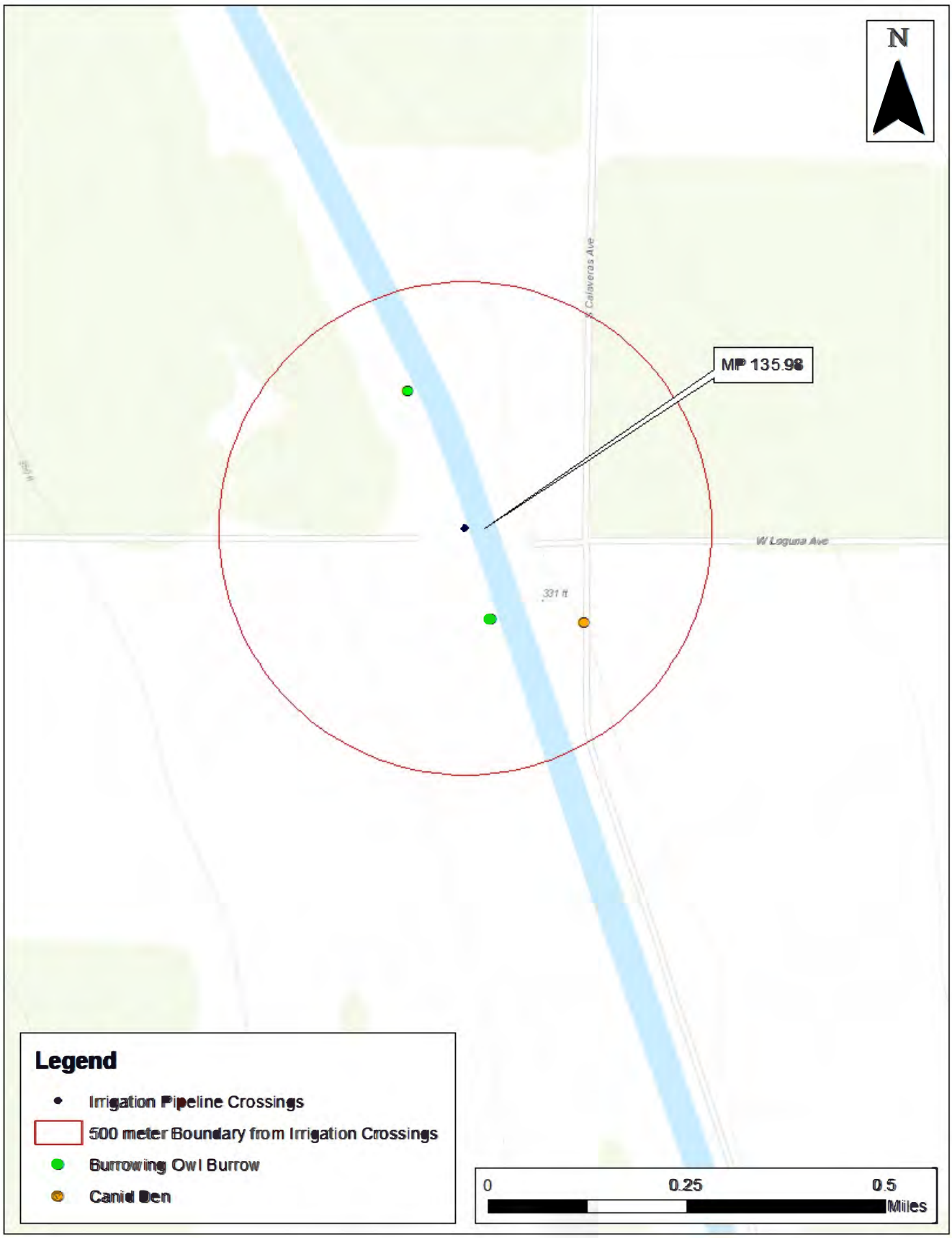

N
MP 135.98
N Calaveras Ave
W Laguna Ave
331 ft
Legend
Irrigation Pipeline Crossings
500 meter Boundary from Irrigation Crossings
Burrowing Owl Burrow
Canid Den
0
0.25
0.5
Miles

Figure 13. MP 137.32, MP 137.83, and MP 138.24 Irrigation Crossings, BUOW Burrows, and Canid Dens on the Aqueduct.

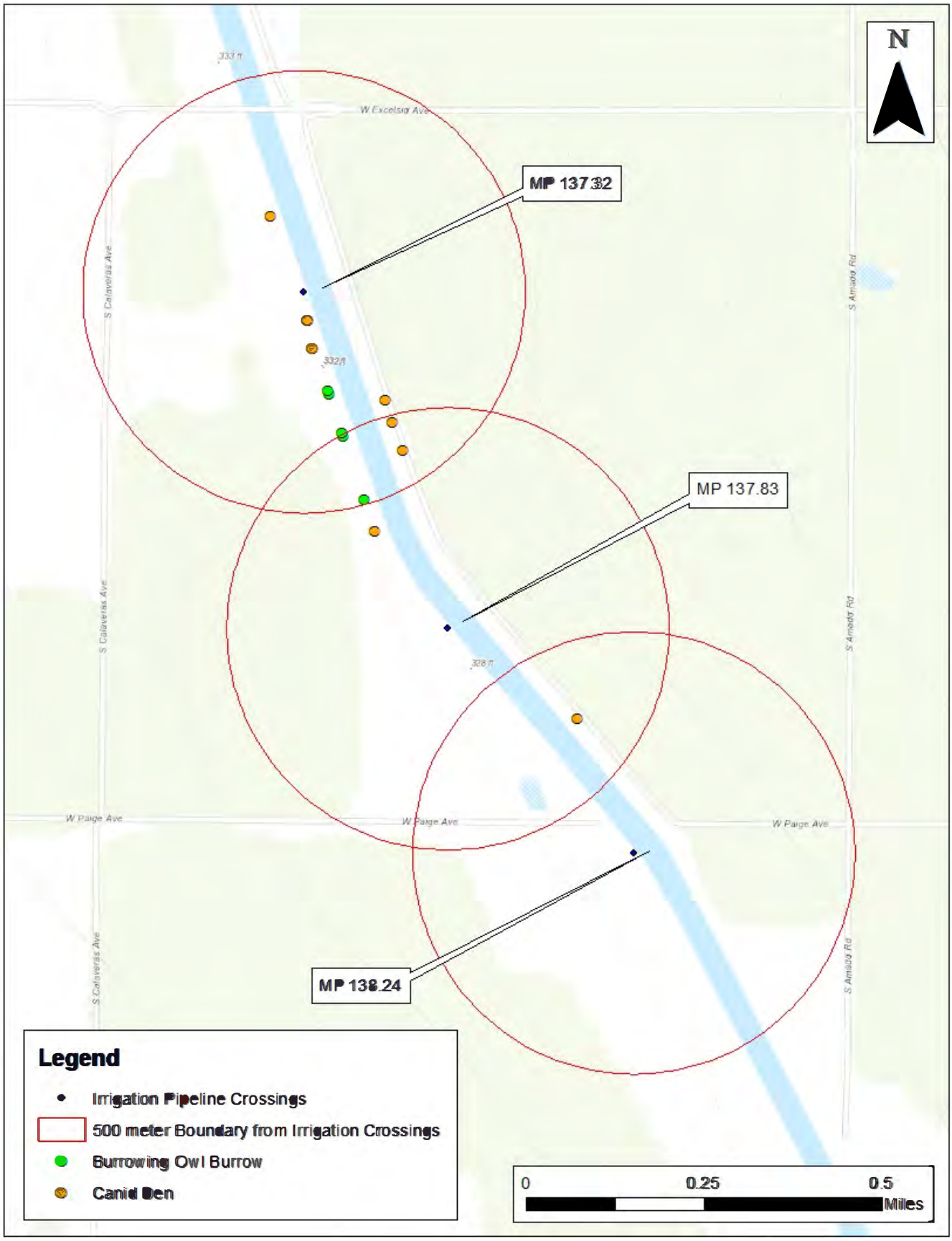

N
MP 137.32
MP 137.83
MP 138.24
W Excelsior Ave
W Paige Ave
S Calaveras Ave
S Amador Rd
333 ft
332 ft
328 ft
Legend
Irrigation Pipeline Crossings
500 meter Boundary from Irrigation Crossings
Burrowing Owl Burrow
Canid Den
0
0.25
0.5
Miles

Figure 14. MP 140.50 and 141.55 Irrigation Crossings and a Canid Den on the Aqueduct.

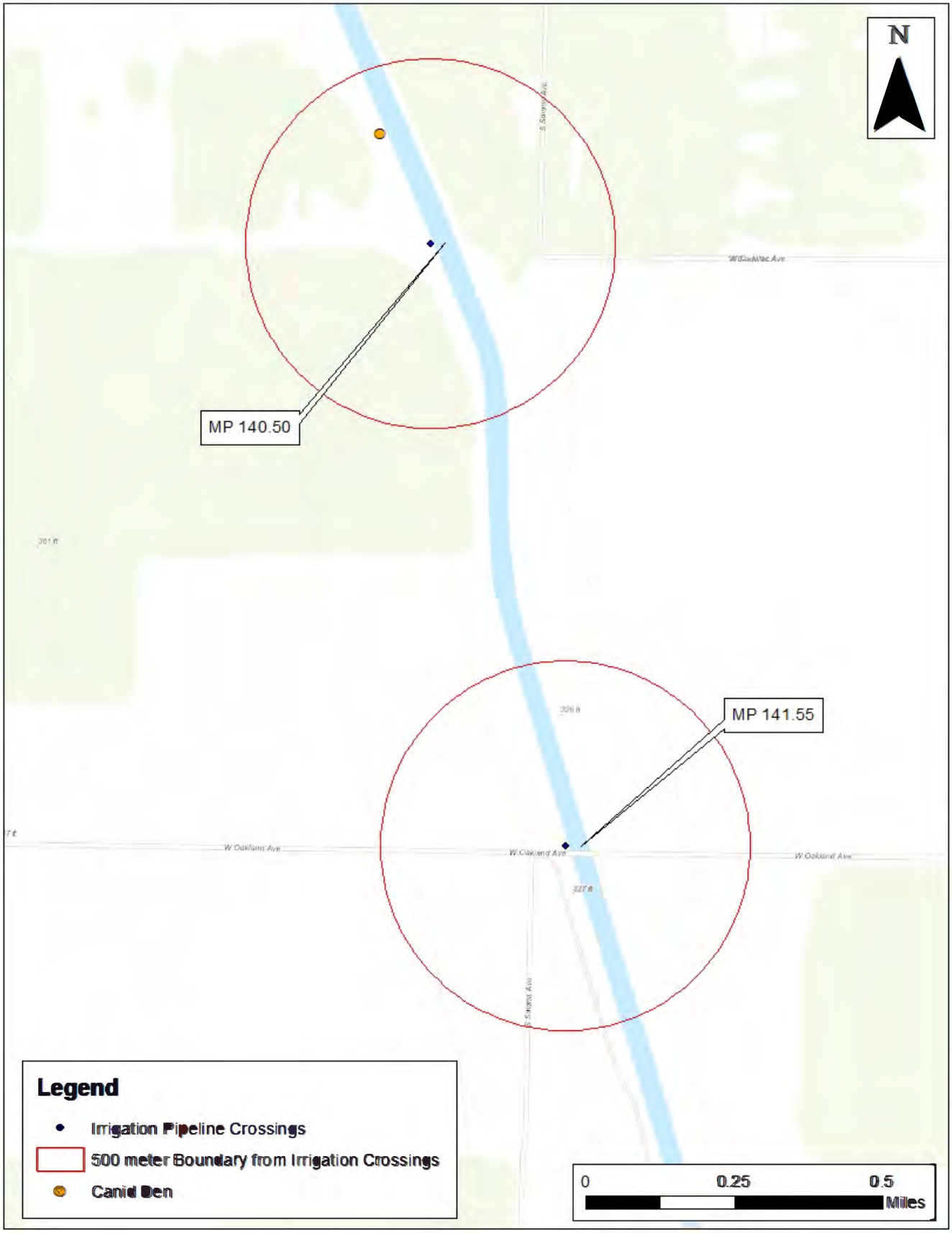

N
MP 140.50
MP 141.55
W Oakland Ave
W Oakland Ave
W Oakland Ave
Legend
Irrigation Pipeline Crossings
500 meter Boundary from Irrigation Crossings
Canid Den
0
0.25
0.5
Miles

Figure 15. MP 161.62 and 162.08 Irrigation Crossings, BUOW Burrow, and Canid Dens on the Aqueduct.

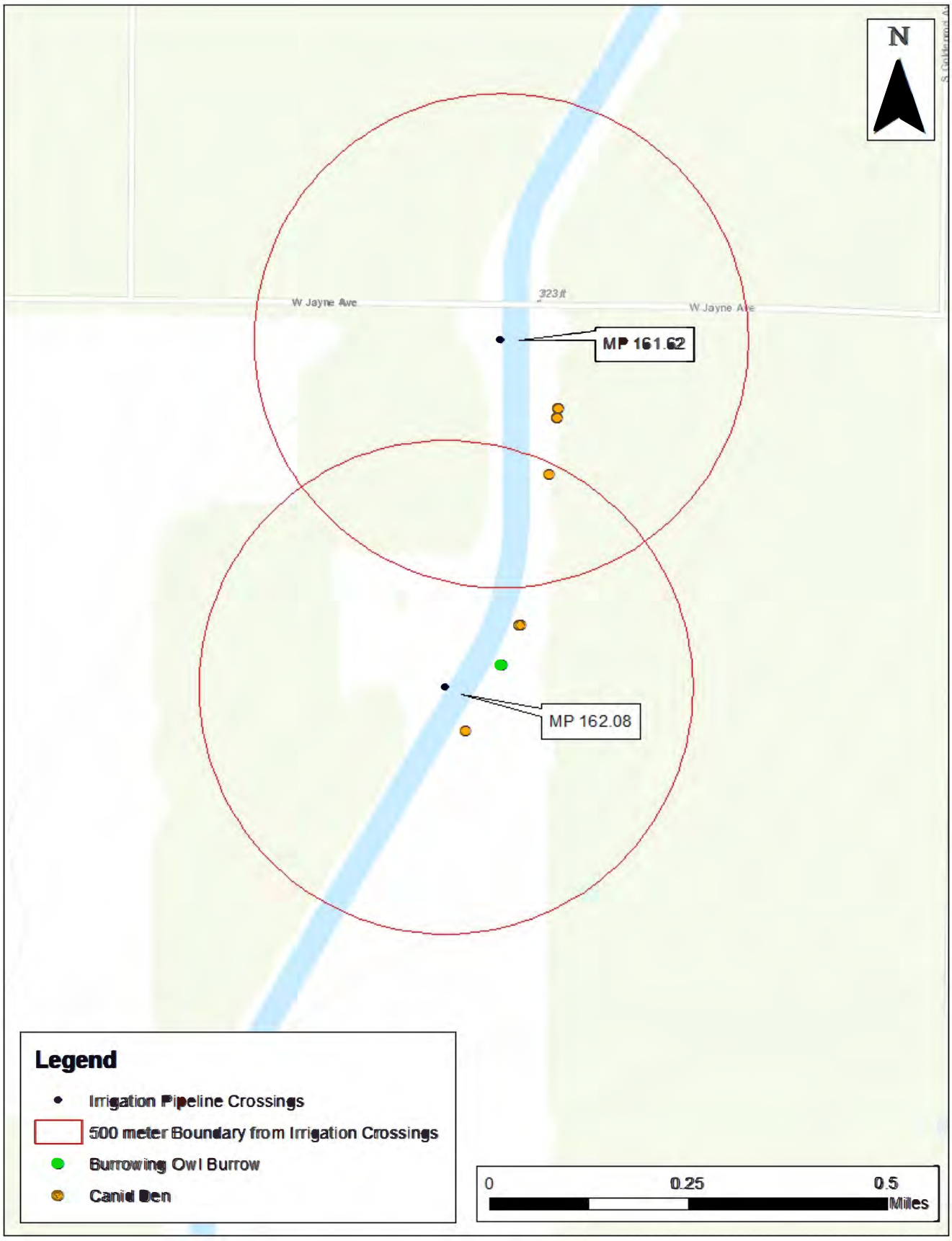
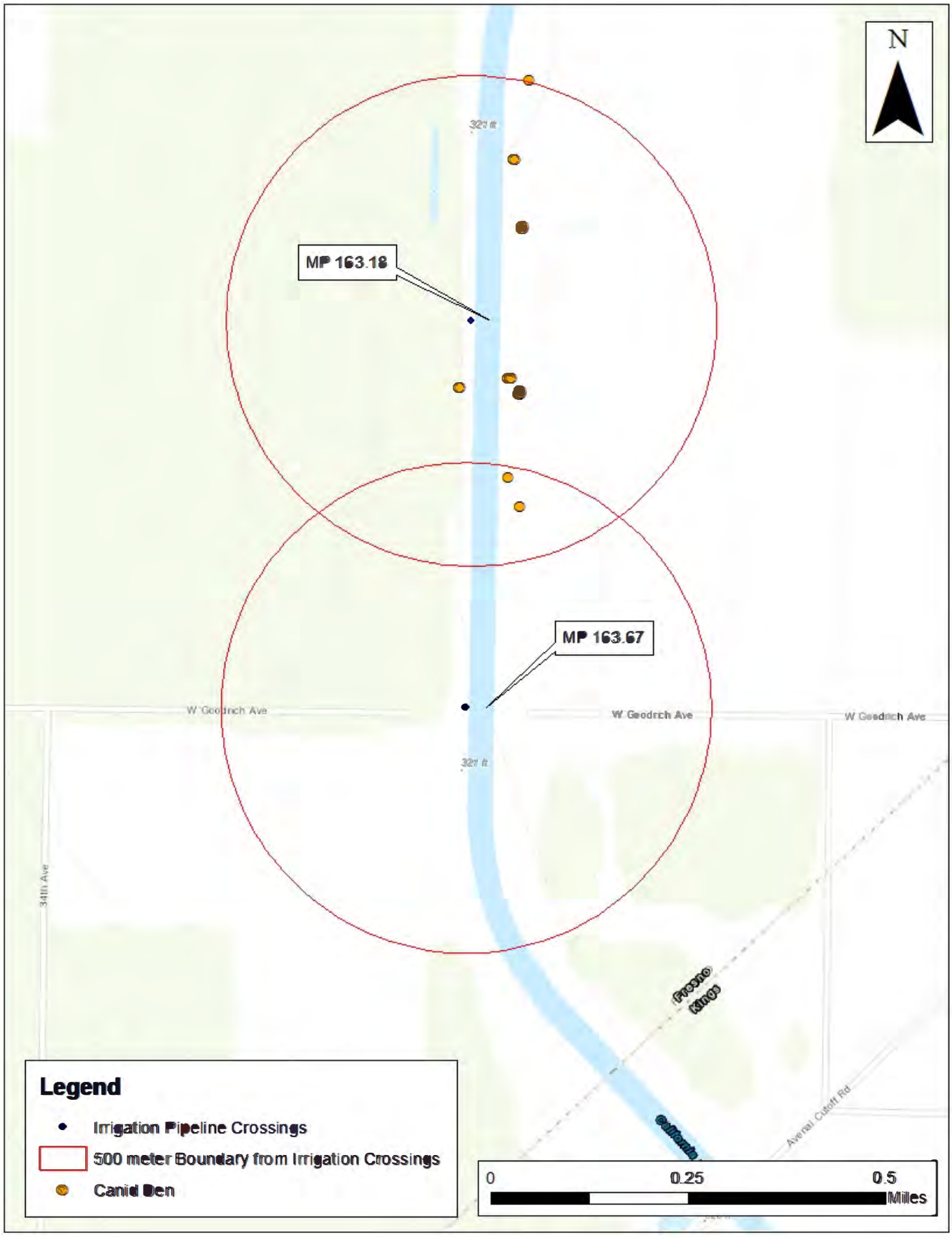

N
W Jayne Ave
323 ft
W Jayne Ave
MP 161.62
MP 162.08
Legend
Irrigation Pipeline Crossings
500 meter Boundary from Irrigation Crossings
Burrowing Owl Burrow
Canid Den
0
0.25
0.5
Miles

Figure 16. MP 163.18 and 163.67 Irrigation Crossings and Canid Dens on the Aqueduct.


N
MP 163.18
MP 163.67
W Goodrich Ave
W Goodrich Ave
W Goodrich Ave
321 ft
321 ft
34th Ave
Fresno
Kings
California
Avenal Cutoff Rd
Legend
Irrigation Pipeline Crossings
500 meter Boundary from Irrigation Crossings
Canid Den
0
0.25
0.5
Miles