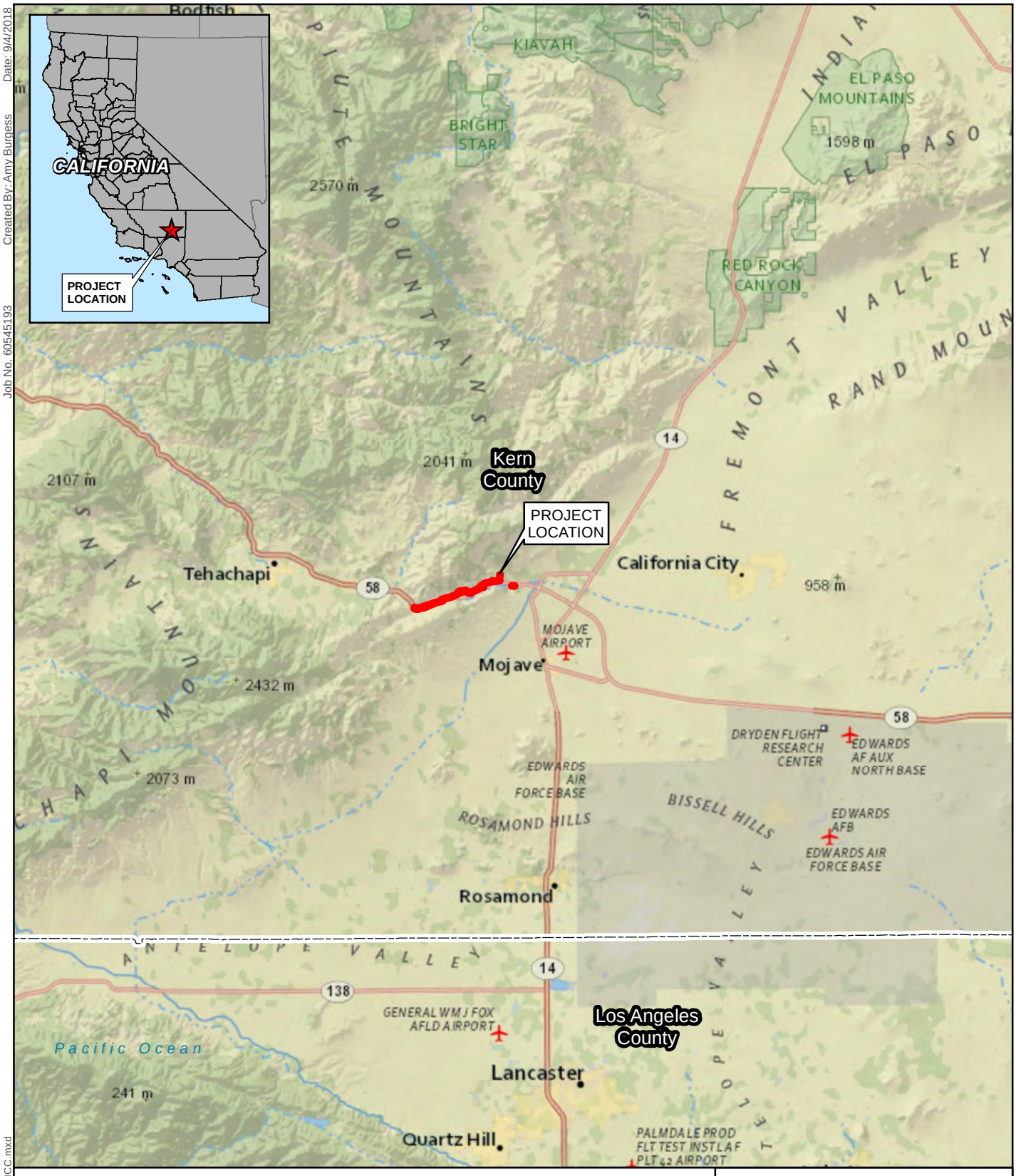
Appendix A

Figures



Date: 9/4/2018
Created By: Amy Burgess
Job No. 60545193
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Legend

Project Area

County Boundary

0 5 10 Miles

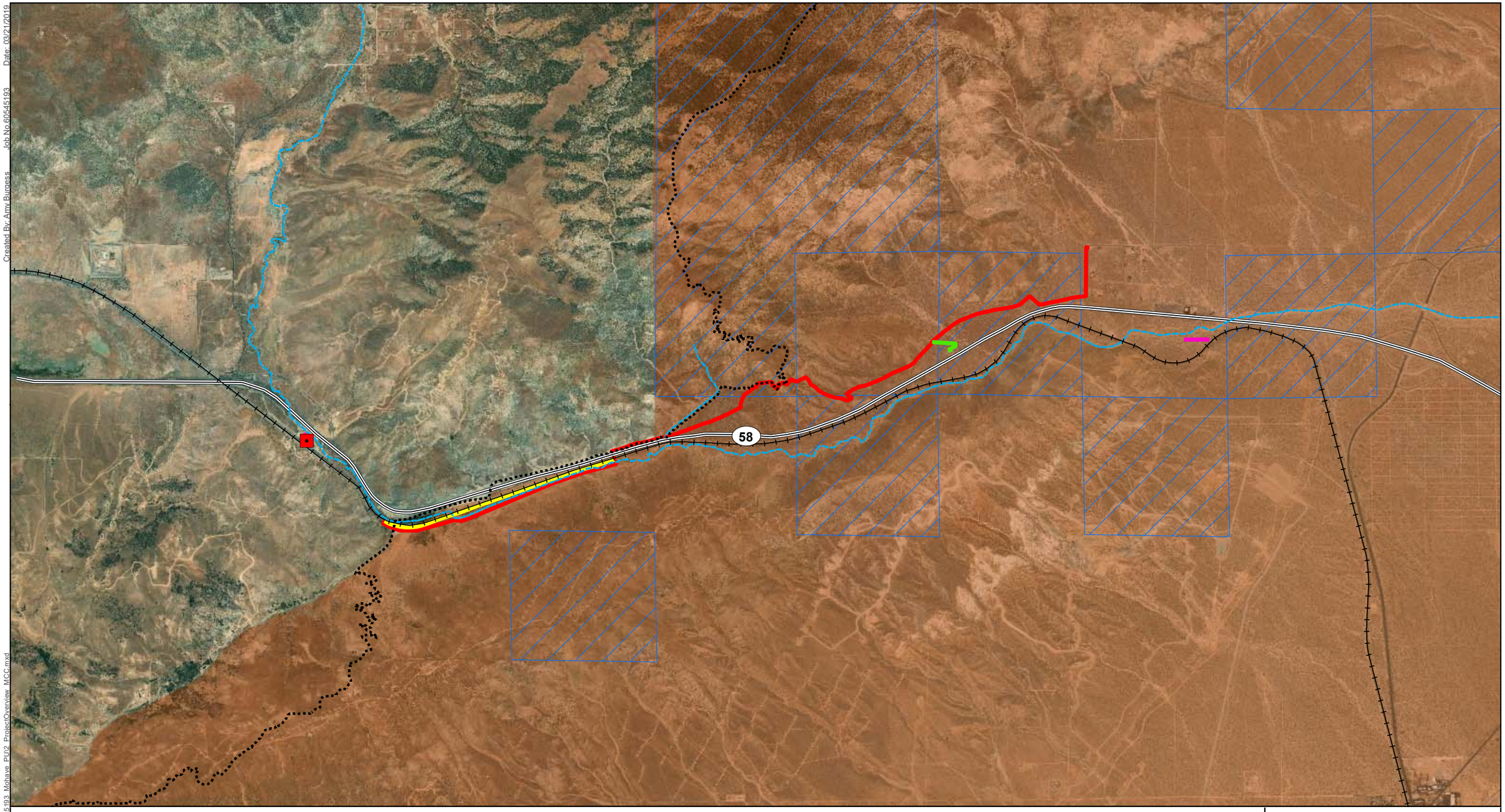
Base Map Source:
ESRI, ArcGIS Online
National Geographic World Map

FIGURE 01
PROJECT LOCATION

Mojave Public Utility District
Cache Creek Pipeline

AECOM

Date: 03/21/2019
Job No:60545193
Created By: Amy Burgess



Legend

- Well 9 Facility
- Cache Creek
- Railroad
- Pacific Crest Trail
- Alternate Conceptual Alignment
- Conceptual Alignment
- Feeder to CHP Facility
- Pump Station Connection Alignment
- BLM Property
- West Mojave Plan Boundary (WEMO)

0 0.5 1 Miles

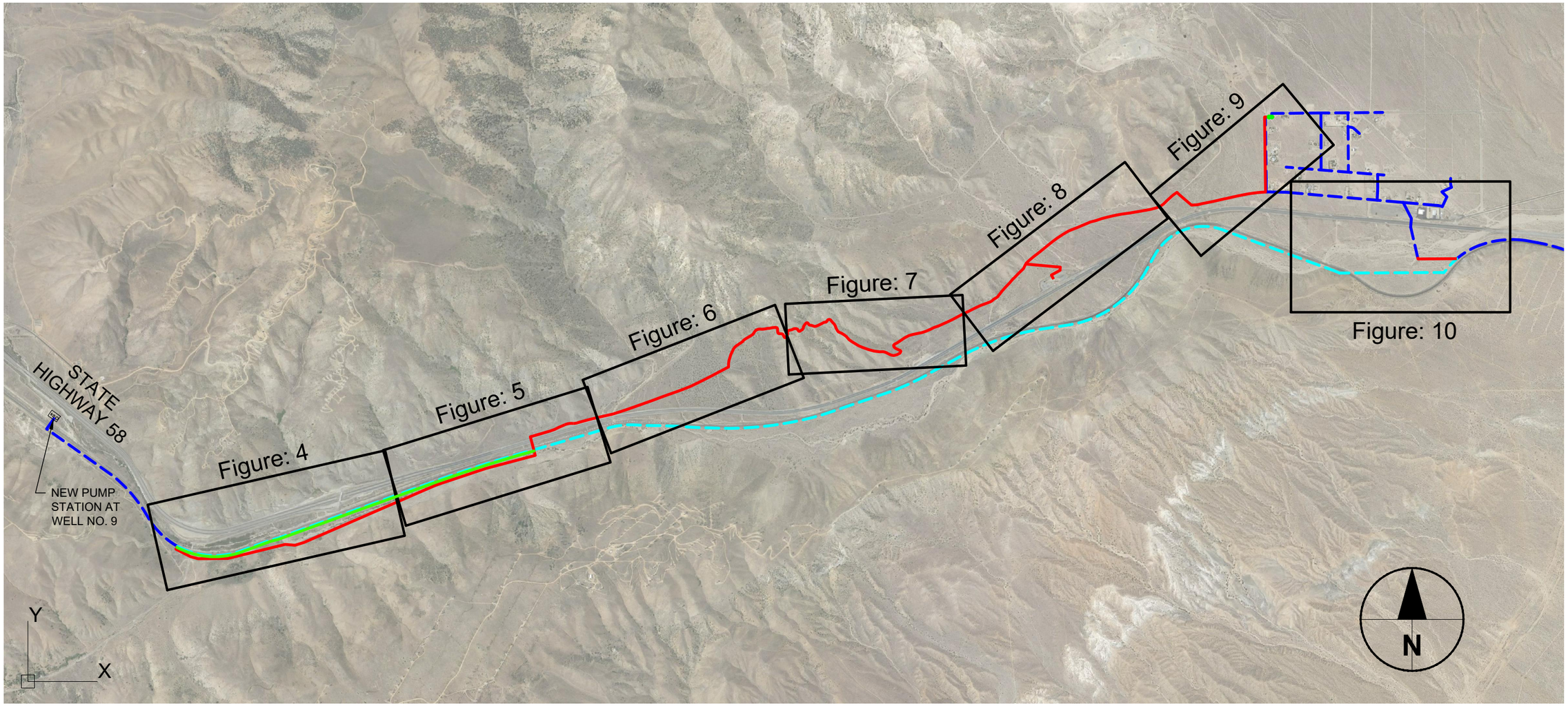
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 2
PROJECT OVERVIEW

Mojave Public Utility District
Cache Creek Project

AECOM

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LEGEND

- EXISTING WATER LINE TO REMAIN (APPROXIMATE ALIGNMENT)
- EXISTING WATER LINE TO BE ABANDONED IN PLACE (APPROXIMATE ALIGNMENT)
- CONCEPTUAL ALIGNMENT FOR WATERLINE
- ALTERNATE CONCEPTUAL ALIGNMENT FOR WATERLINE

0 2500' 5000'

1" = 2500'

INDEX MAP

AECOM

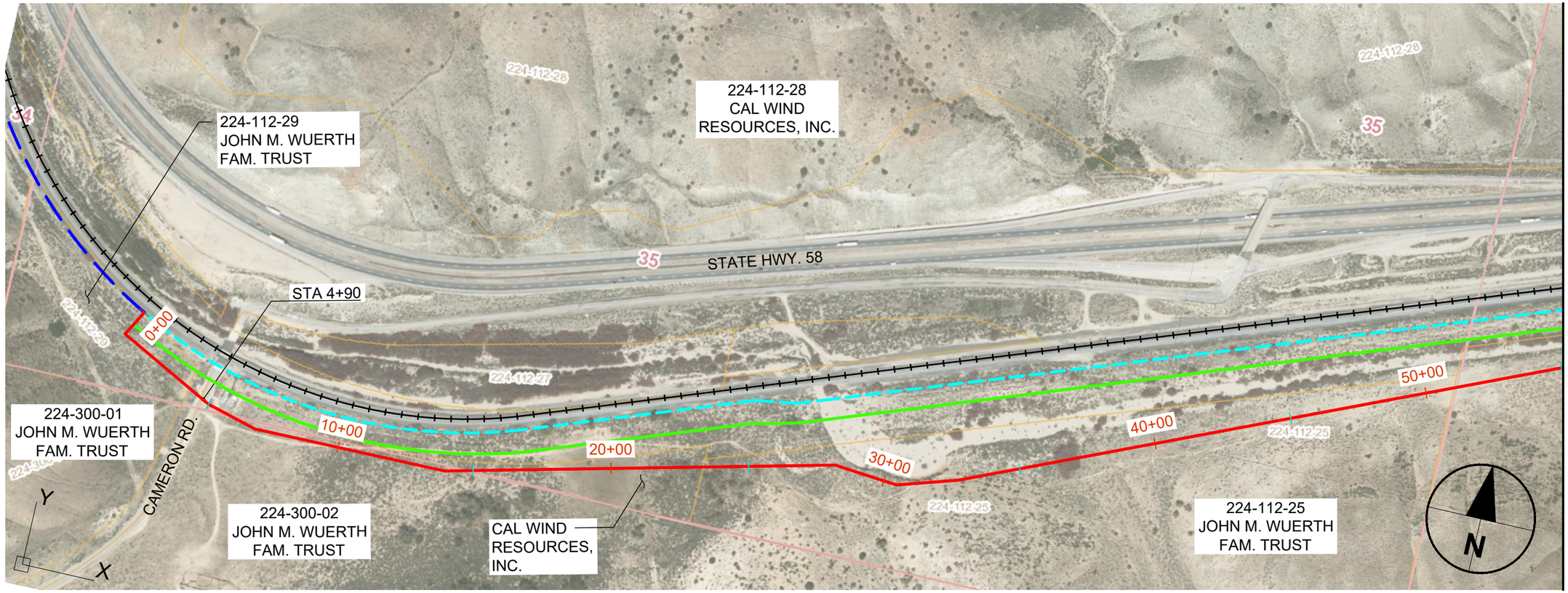
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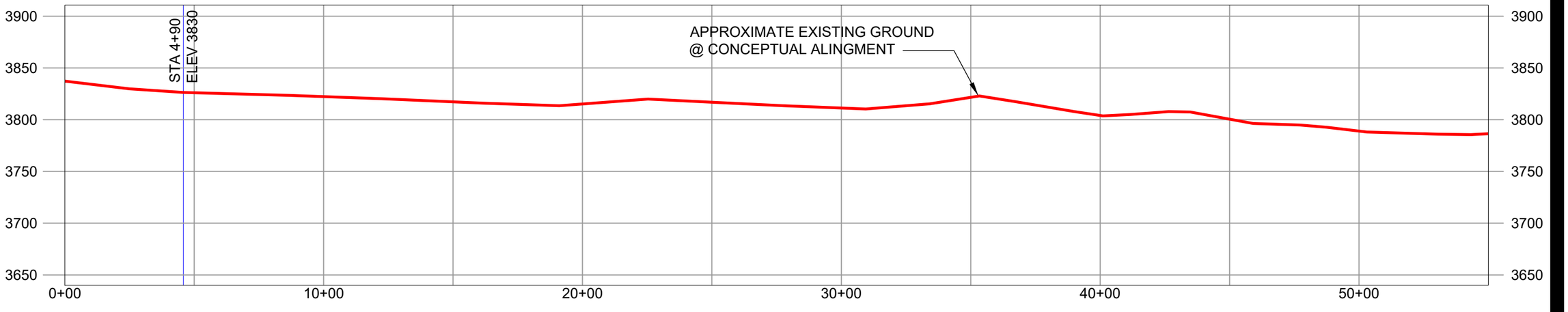
CACHE CREEK WATER LINE
ALIGNMENT ALTERNATIVE
MOJAVE PUBLIC UTILITY DISTRICT
Project No.: 60545193

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- SECTION LINE
- RAILROAD
- 224-300-01 JOHN M. WUERTH FAM. TRUST — COUNTY ASSESSOR PARCEL NO. (APN) AND LAND OWNER

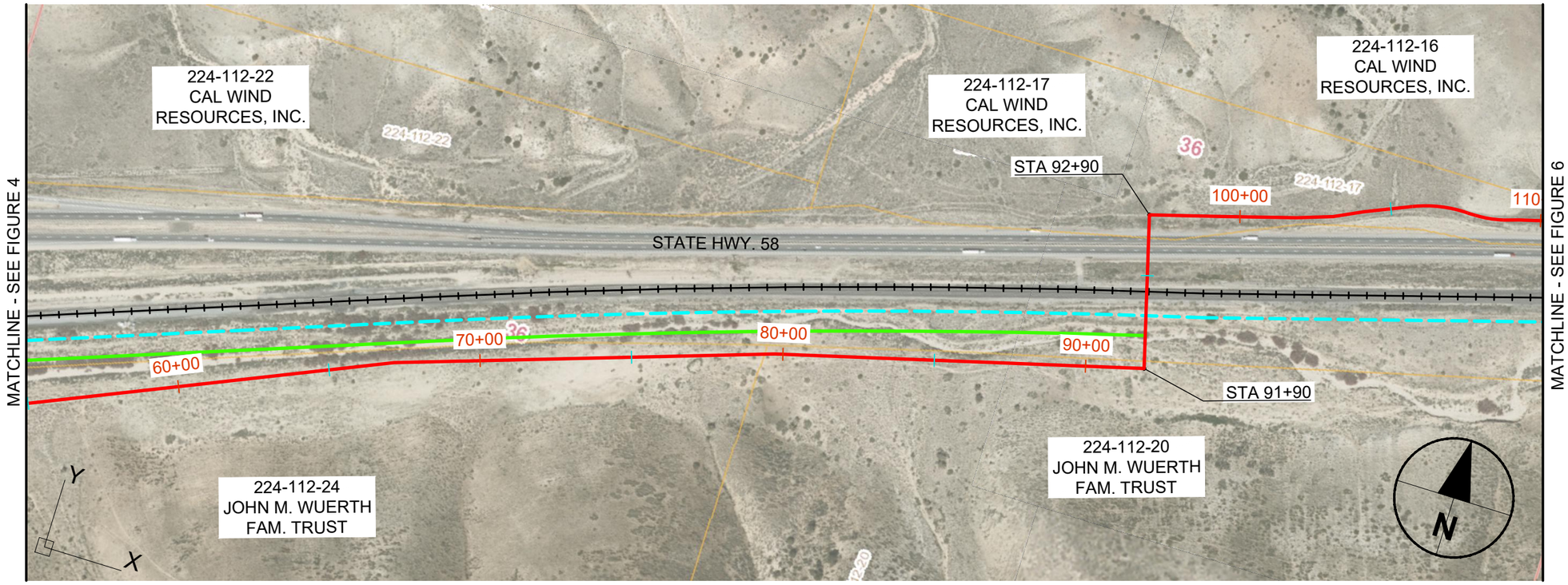
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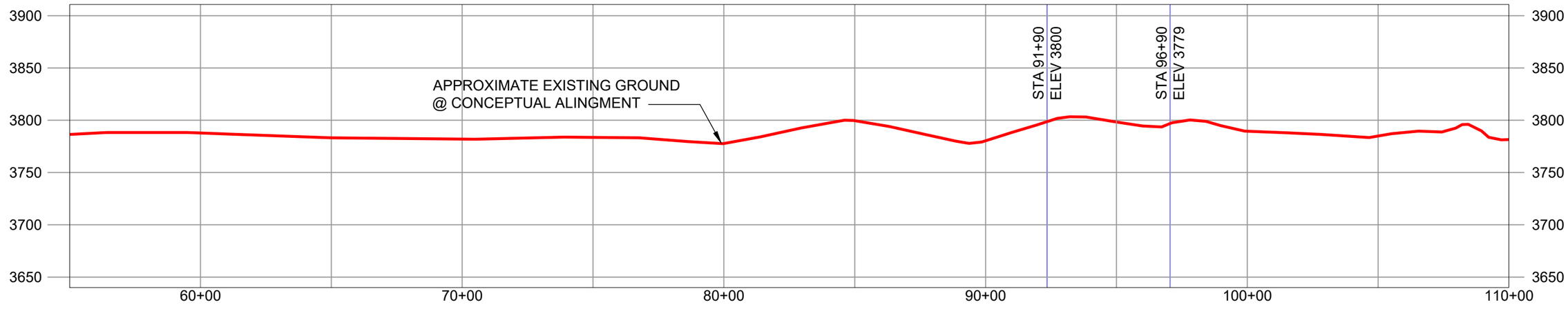
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1" = 100' VERT.

AECOM

Figure: 4

CACHE CREEK WATER LINE
ALIGNMENT ALTERNATIVE
MOJAVE PUBLIC UTILITY DISTRICT
Project No.: 60545193





LEGEND

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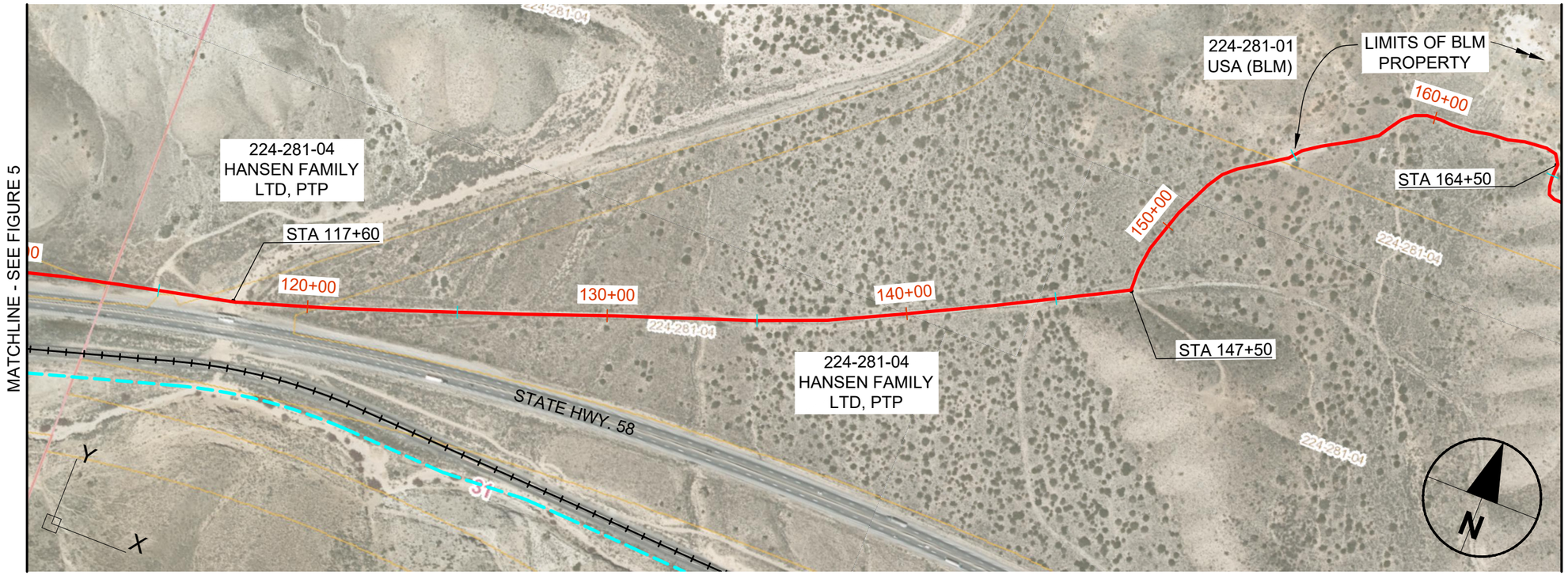
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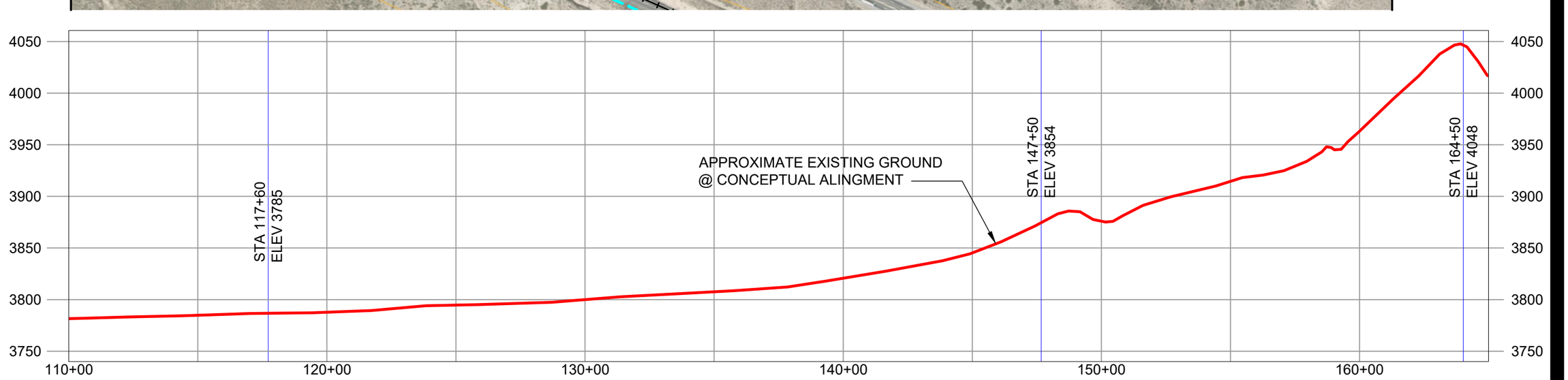
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Figure: 5

CACHE CREEK WATER LINE
ALIGNMENT ALTERNATIVE
MOJAVE PUBLIC UTILITY DISTRICT
Project No.: 60545193

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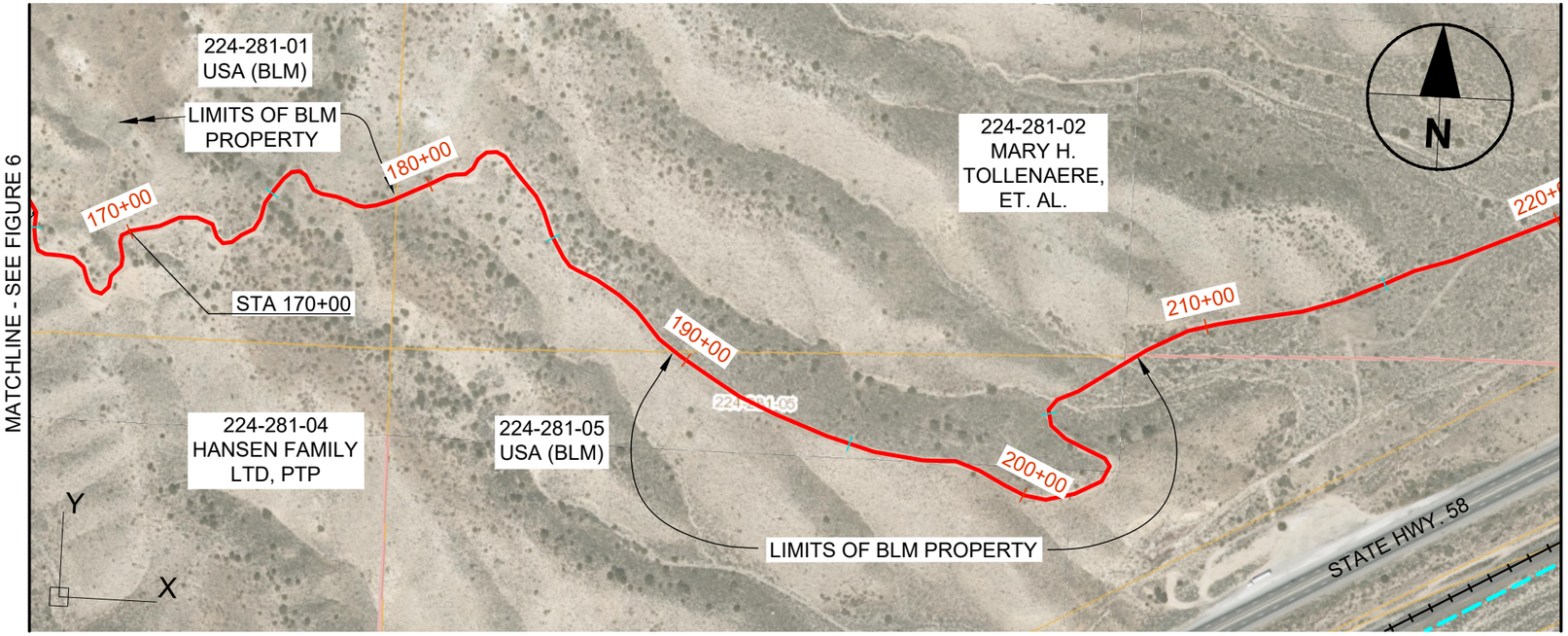
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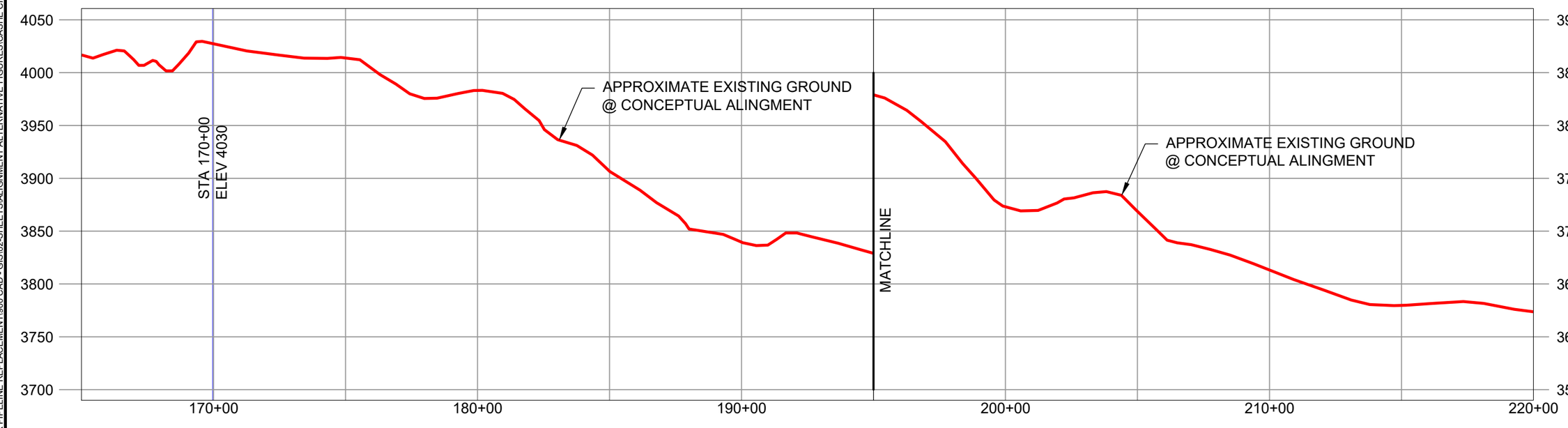
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Figure: 6

CACHE CREEK WATER LINE
ALIGNMENT ALTERNATIVE
MOJAVE PUBLIC UTILITY DISTRICT
Project No.: 60545193

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1" = 400' HORIZ.
1" = 100' VERT.

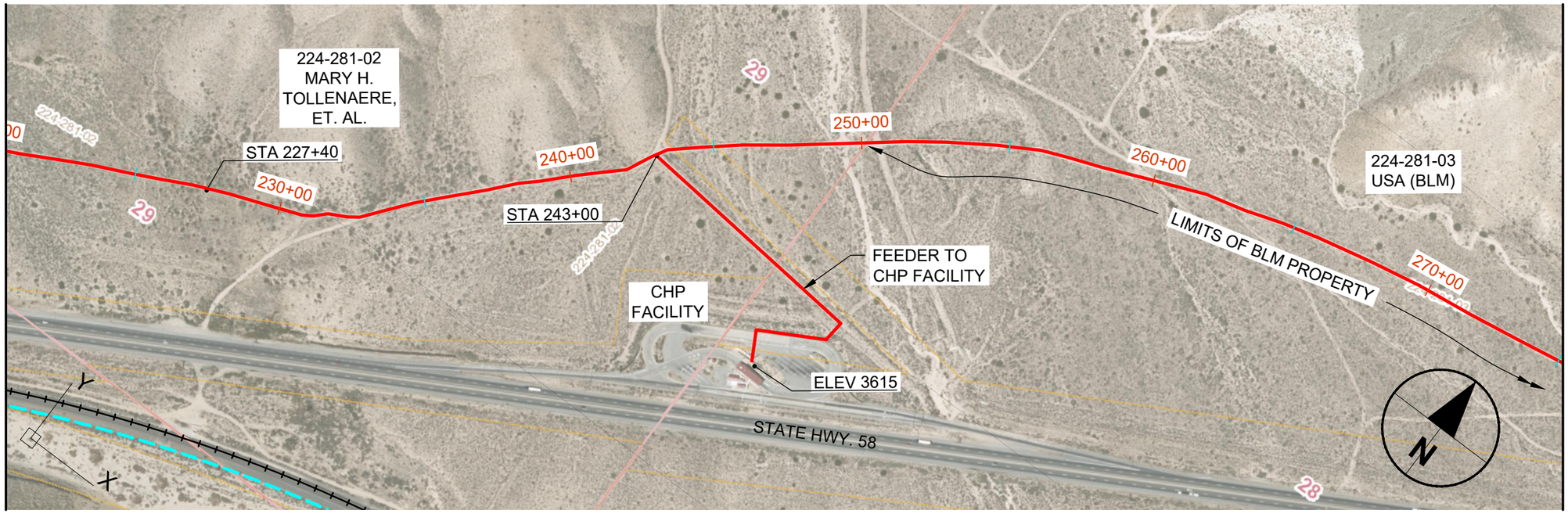
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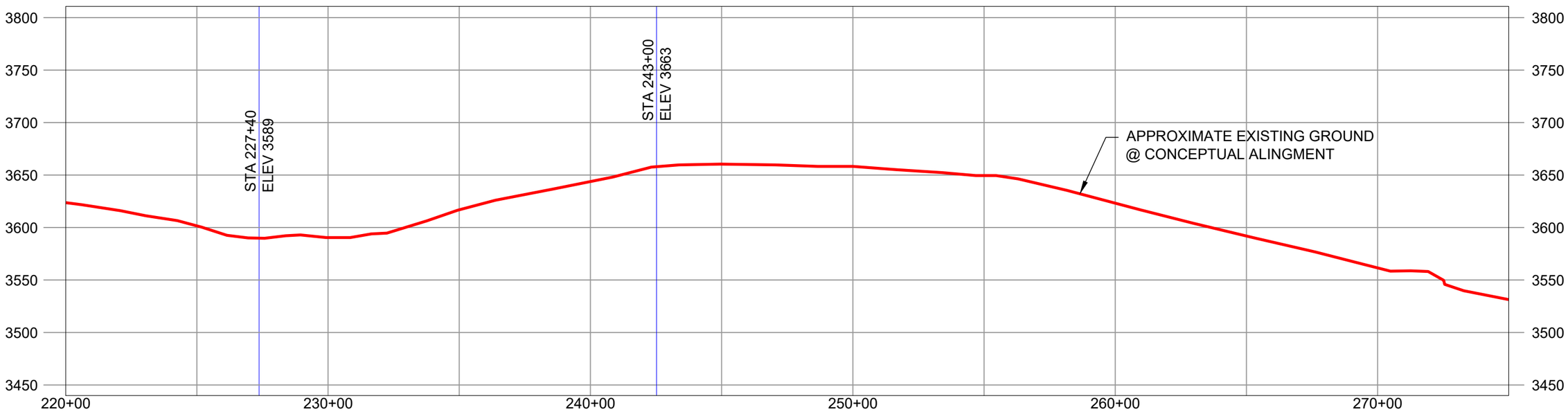
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CACHE CREEK WATER LINE
ALIGNMENT ALTERNATIVE
MOJAVE PUBLIC UTILITY DISTRICT
Project No.: 60545193

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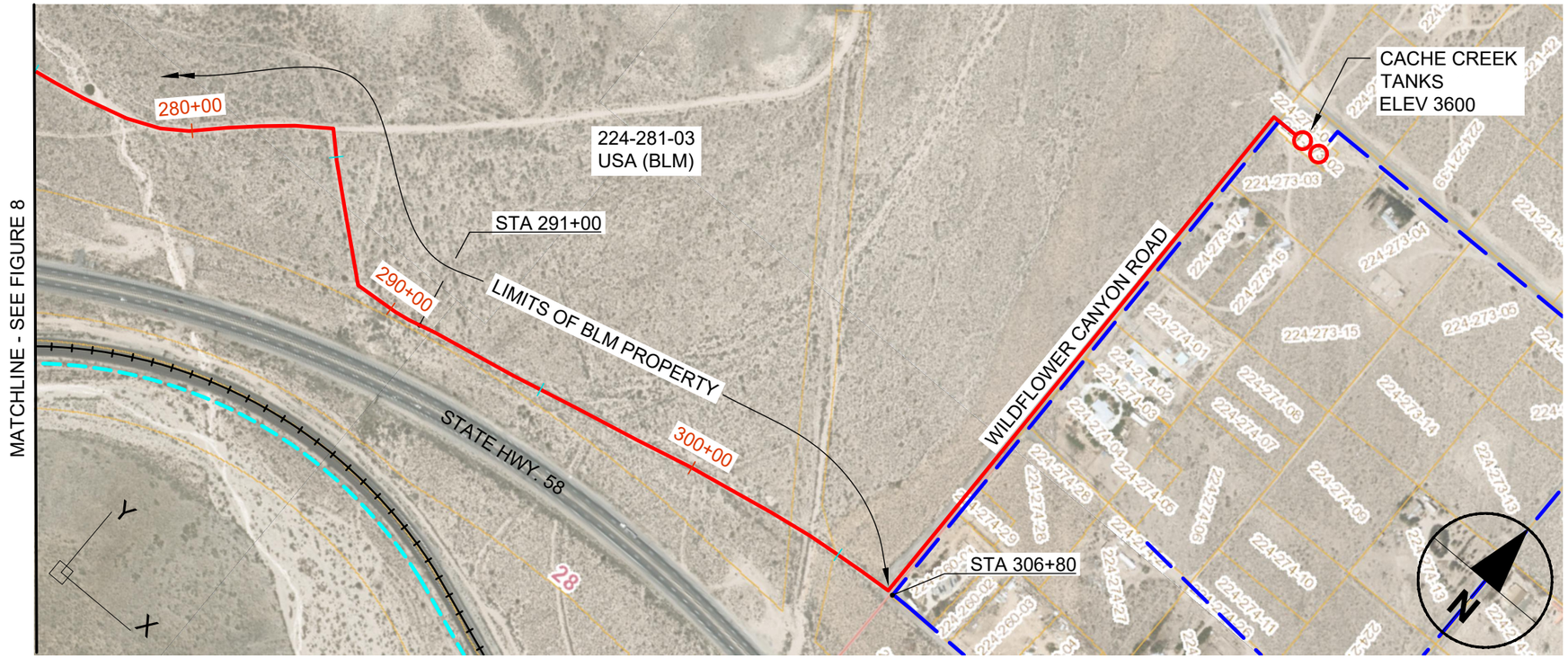
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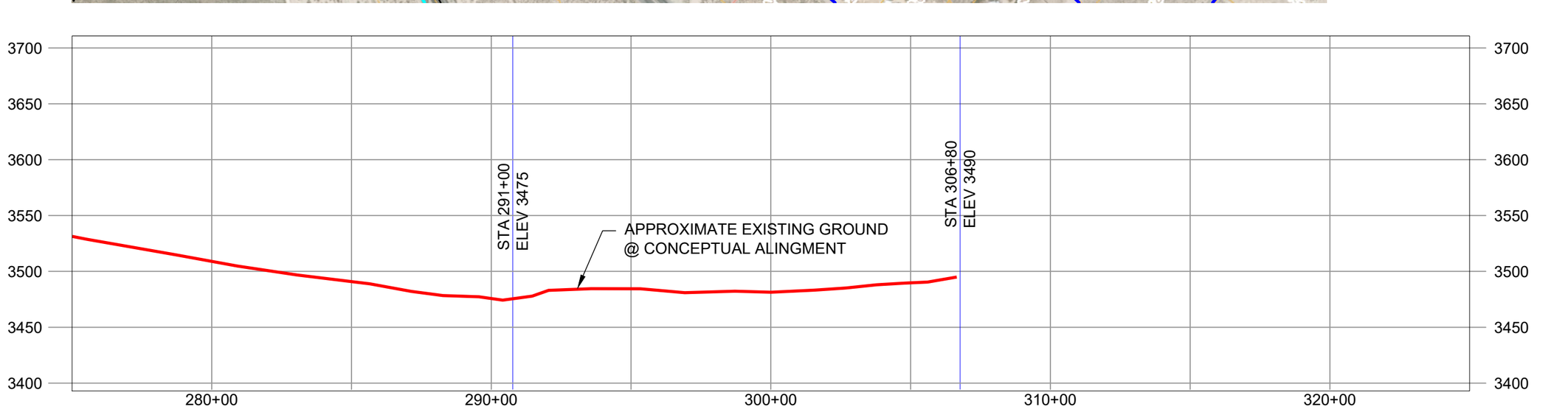
CACHE CREEK WATER LINE
ALIGNMENT ALTERNATIVE
MOJAVE PUBLIC UTILITY DISTRICT
Project No.: 60545193

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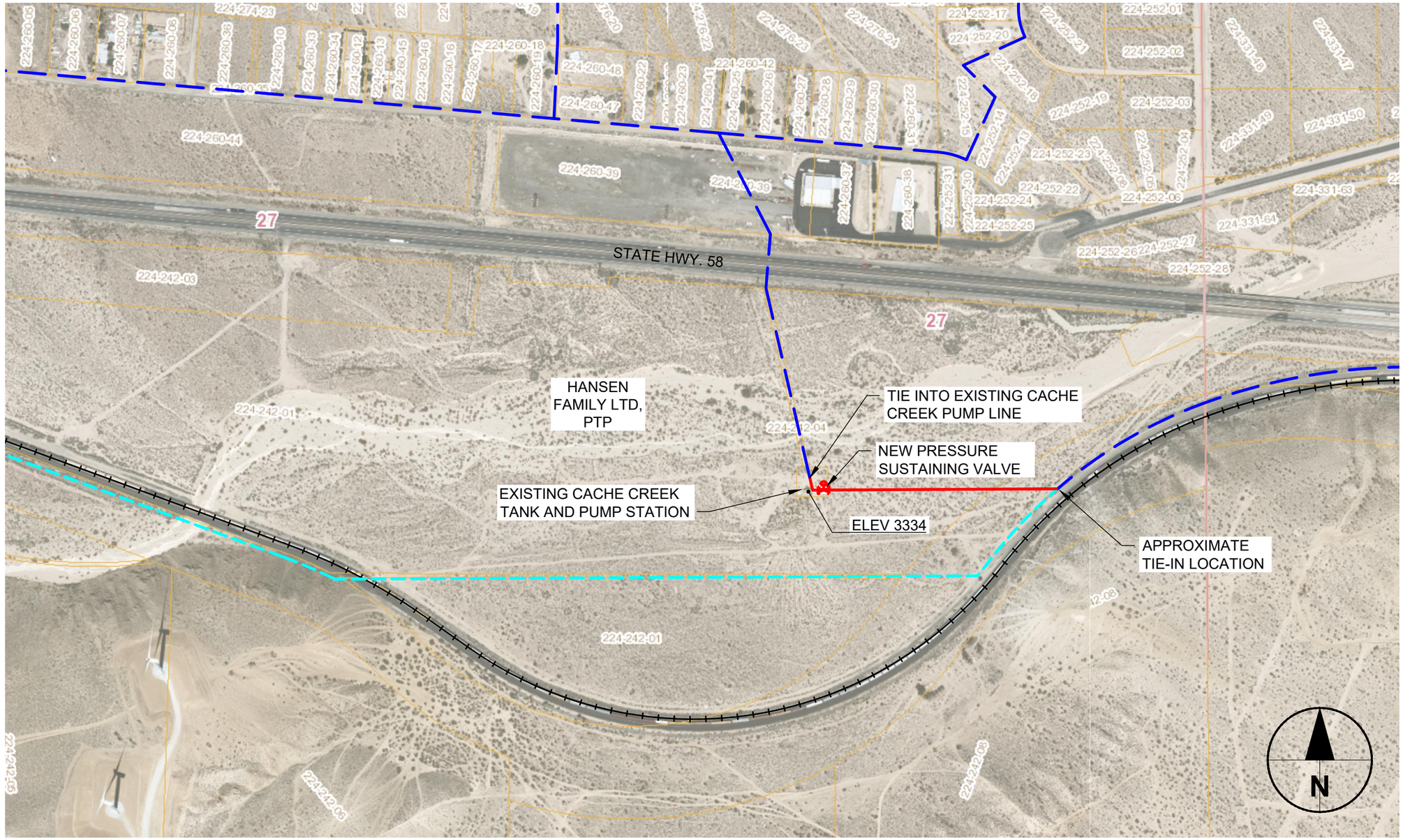
0 400' 800'

1" = 400' HORIZ.
1" = 100' VERT.

AECOM

Figure: 9

CACHE CREEK WATER LINE
ALIGNMENT ALTERNATIVE
MOJAVE PUBLIC UTILITY DISTRICT
Project No.: 60545193



LEGEND

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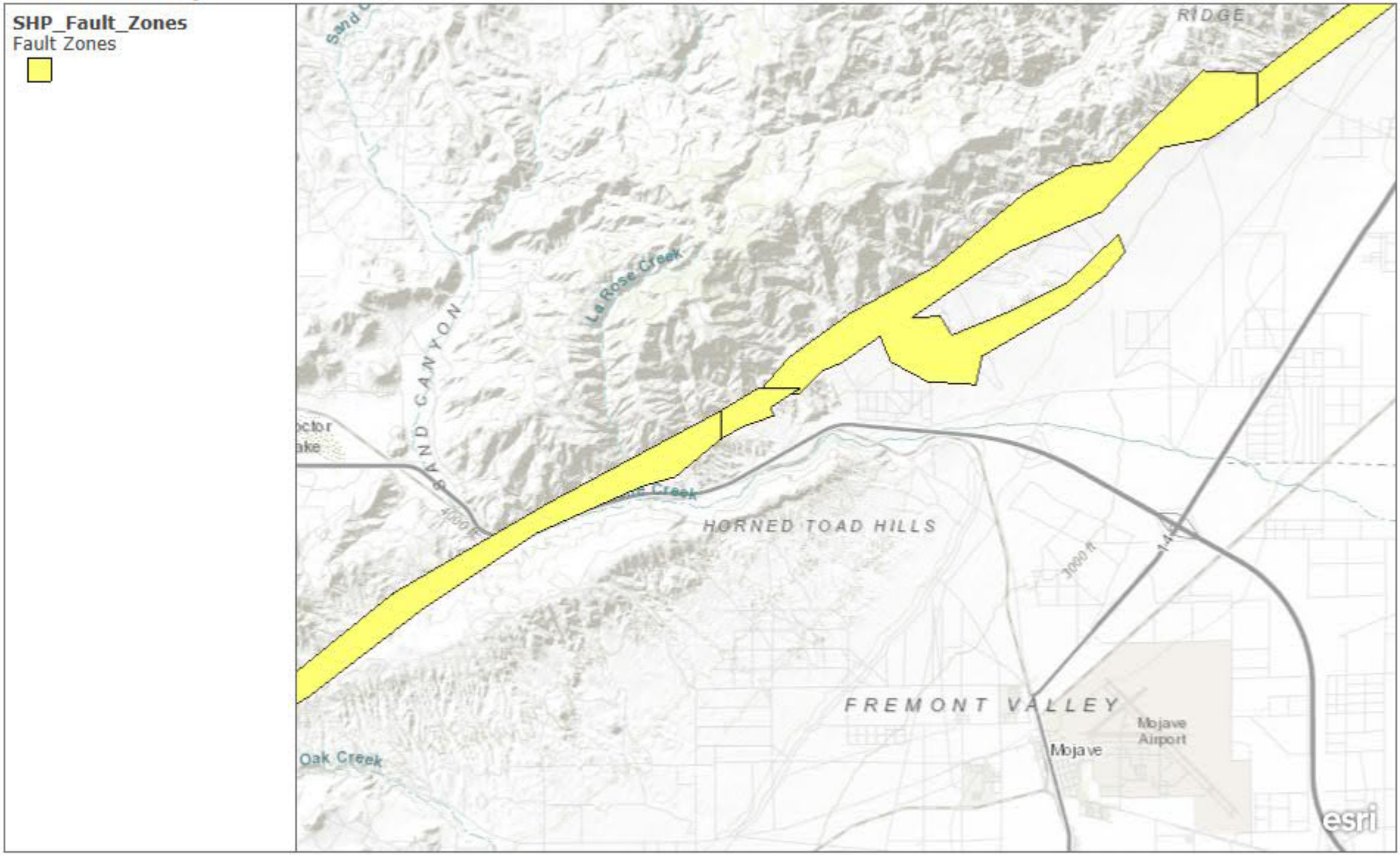
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CACHE CREEK WATER LINE
ALIGNMENT ALTERNATIVE
MOJAVE PUBLIC UTILITY DISTRICT
Project No.: 60545193

AECOM
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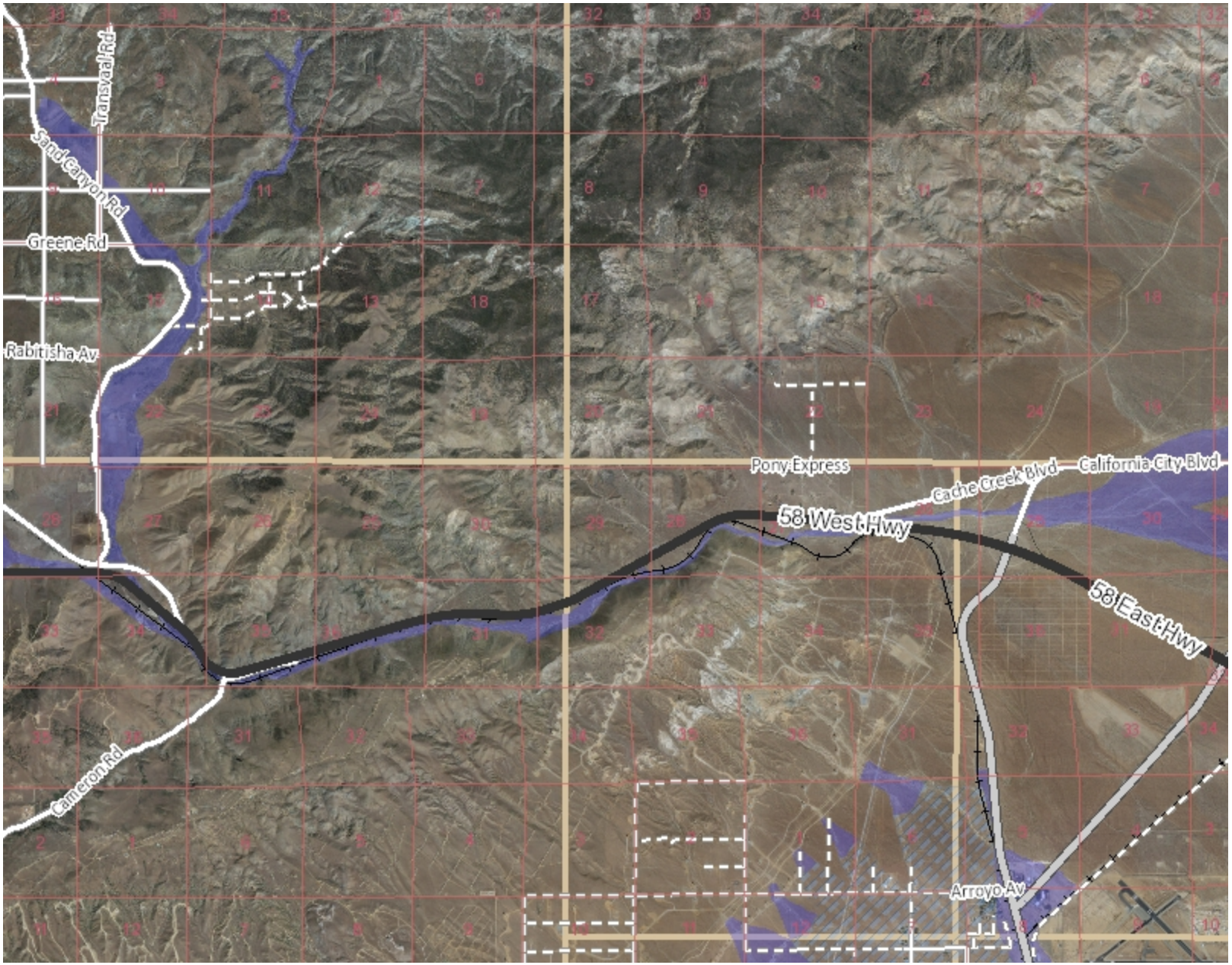
Seismic Hazard Fault Zones - Figure 11



Fault Zone Map

Seismic Hazards Program, California Geological Survey, California Department of Conservation | Bureau of Land Management, Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS

FEMA Flood Zones - Figure 12





Legend

- County
- Cities (City Limits 100K)
  - CITIES
  - CITY OF BAKERSFIELD
- Sections
- Roads 50k-100k
  - Freeway
  - Highway
  - Local
  - Major
  - Minor
  - Ramp
  - Unpaved
- Railroad
- Dfirm Flood Zones
  - 0.2 PCT ANNUAL CHANCE FLOO
  - A; AE; AH; AO
  - D
  - X
- DFirm Panels

1: 84,066

2.7 0 1.33 2.7 Miles

NAD_1983_StatePlane_California_V_FIPS_0405_Feet

© Latitude Geographics Group Ltd.

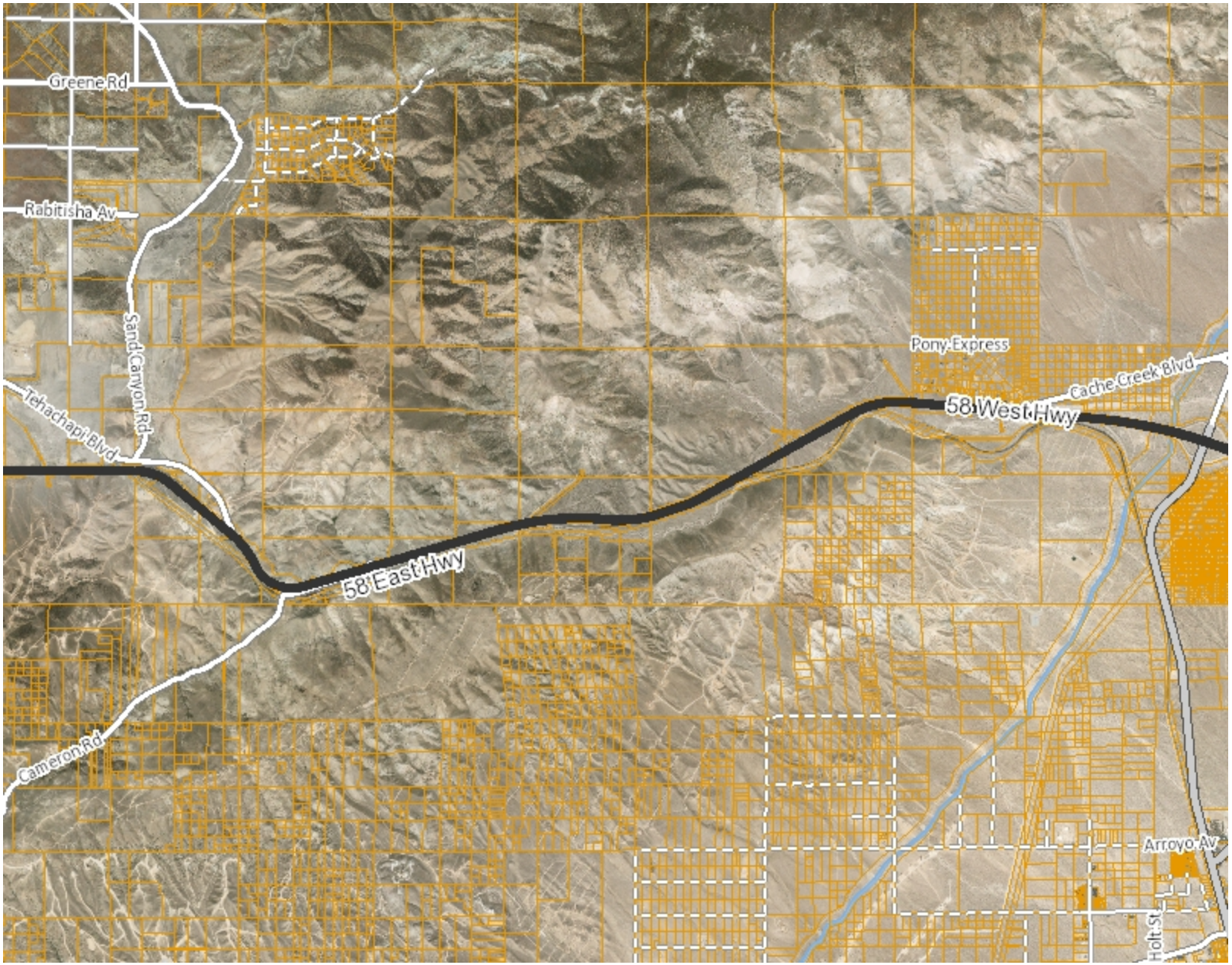
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Notes

Add notes here

Kern County
Online Mapping System

Mineral Resource Zones (MRZ) - Figure 13





Legend

- County
- Cities (City Limits 100K)
  - CITIES
  - CITY OF BAKERSFIELD
- Roads 50k-100k
  - Freeway
  - Highway
  - Local
  - Major
  - Minor
  - Ramp
  - Unpaved
- Parcels
- MRZ
- Lakes & Ponds
- Water Course
- Canals

1: 71,531

2.3 0 1.13 2.3 Miles

NAD_1983_StatePlane_California_V_FIPS_0405_Feet

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Notes

Add notes here

Appendix B

CEQA Checklist

MOJAVE PUBLIC UTILITY DISTRICT
CEQA CHECKLIST

CACHE CREEK PIPELINE REPLACEMENT PROJECT

PROJECT DESCRIPTION AND BACKGROUND

Project Title:	Cache Creek Pipeline Replacement Project
Lead Agency Name and Address:	Mojave Public Utility District 15844 K Street Mojave, CA 93501
Contact Person and Phone Number:	Bee Coy Jr., General Manager (661) 824 – 4161
Project Location:	Portions of Sections 34, 35, and 36 of Township 32 South, Range 34 East, M.D.M., and portions of Sections 27, 28, 29, 31, and 32 of Township 32 South, Range 35 East, M.D.M.
Project sponsor's name and address:	Mojave Public Utility District 15844 K Street Mojave, CA 93501
General Plan Description:	The General Plan designations within the project limits are as follows: 8.3/2.5-Extensive Agriculture (min. 20 acre parcel size)/Flood Hazard, 4.1-Accepted County Plan Areas (Non-Jurisdictional Land), 8.5/2.4-Resource Management (min. 20 acre parcel size)/Steep Slope, 8.5/2.5- Resource Management (min. 20 acre parcel size)/Flood Hazard, 1.1-State or Federal Land, 4.2-Rural Community, and 8.5-Resource Management (min. 20 acre parcel size).
Zoning:	The Zoning designations within the project limits are as follows: Exclusive Agriculture (A), Limited Agriculture (A-1), Exclusive Agriculture/Wind Energy Combining (A WE), Exclusive Agriculture/Geologic Hazard Combining (A GH), Exclusive Agriculture/Flood Plain Secondary Combining (A FPS), Estate 2 ½ Acres/Mobile Home Combining (E 2 ½ MH).
Description of Project:	The Mojave Public Utilities District proposes to replace approximately 5.6 miles of 8-inch diameter steel pipeline that conveys water from the Sand Canyon Well Field to the unincorporated communities of Cache Creek and Mojave, CA. The existing pipeline was installed around 1950 and has been repaired many times over the years as its proximity to Cache Creek has resulted in washouts of the pipe during heavy rain events. The pipeline is critical because it provides the only supply of potable water to the community of Cache Creek and the California Highway Patrol (CHP) facility on Highway 58. The existing alignment is installed on the south side of the Union Pacific Railroad (UPRR) tracks on railroad right of way. The new alignment will remain on the south side for approximately 1,100 feet, but will be installed on a new easement on private property. The pipe will then be bored and jacked under the railroad tracks and Freeway 58 and will follow a new alignment north of the freeway on private easement. This will allow for the majority of the line to be outside the confines of Cache Creek. The line will tie into two MPUD owned tanks in the northwest corner of the Cache Creek community. In order to replace the connection between Cache Creek and the Mojave communities, 1,000 linear

	Creek and the Mojave communities, 1,000 linear feet of new piping will be installed southwest of the Cache Creek community.
Surrounding Land Uses and Setting;	The project area is adjacent to the UPRR tracks and Highway 58. Outside this corridor the project area is surrounded by mountainous open space to the north and the south. On the east side lies Cache Creek, an unincorporated community of about 20 residential and mobile homes.
Other Public Agencies Whose Approval is Required (e.g. Permits, Financial Approval, or Participation Agreements):	Regional Water Quality Control Board CALTRANS Union Pacific Railroad Kern County Bureau of Land Management

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this Project. Please Refer to the project's Initial Study for additional details which determined the conclusions of the below noted findings.

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

DETERMINATION:

On the basis of this initial evaluation:

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

Signature: Bee Coy	**Date:** 9/3/2019
Printed Name: **Bee Coy Jr.** **General Manager**	

CEQA Environmental Checklist

This checklist identifies physical, biological, social and economic factors that might be affected by the proposed Project. In many cases, background studies performed in connection with the Projects indicate no impacts. A NO IMPACT answer in the last column reflects this determination. Where there is a need for clarifying discussion, the discussion is included either following the applicable section of the checklist or is within the body of the environmental document itself. The words "significant" and "significance" used throughout the following checklist are related to CEQA impacts. The questions in this form are intended to encourage the thoughtful assessment of impacts and do not represent thresholds of significance.

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
I. AESTHETICS: Would the Project:				
a) Have a substantial adverse effect on a scenic vista	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway	☐	☐	☐	☒
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☐	☒
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒
II. AGRICULTURE AND FOREST RESOURCES: In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project; and the forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the Project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒
III. AIR QUALITY: Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the Project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒
b) Violate any air quality standard or contribute substantially to an existing or Projected air quality violation?	☐	☐	☒	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non- attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☒	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☒
IV. BIOLOGICAL RESOURCES: Would the Project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or US Fish and Wildlife Service?	☐	☒	☐	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☒	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒
V. CULTURAL RESOURCES: Would the Project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☒	☐	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☒	☐	☐
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☒	☐	☐
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☒	☐	☐
VI. GEOLOGY AND SOILS: Would the Project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42?	☐	☒	☐	☐
ii) Strong seismic ground shaking?	☐	☒	☐	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☒	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒

VII. GREENHOUSE GAS EMISSIONS: Would the Project:	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☒

VIII. HAZARDS AND HAZARDOUS MATERIALS: Would the Project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a Project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project result in a safety hazard for people residing or working in the Project area?	☐	☐	☐	☒
f) For a Project within the vicinity of a private airstrip, would the Project result in a safety hazard for people residing or working in the Project area?	☐	☐	☐	☒
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒

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IX. HYDROLOGY AND WATER QUALITY: Would the Project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☐	☒
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☐	☒	☐
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☒	☐
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☒	☐
f) Otherwise substantially degrade water quality?	☐	☐	☒	☐
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☒
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☒
j) Inundation by seiche, tsunami, or mudflow	☐	☐	☐	☒
X. LAND USE AND PLANNING: Would the Project:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒
XI. MINERAL RESOURCES: Would the Project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

XII. NOISE: Would the Project result in:	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☒	☐	☐
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☒	☐	☐
c) A substantial permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project?	☐	☒	☐	☐
d) A substantial temporary or periodic increase in ambient noise levels in the Project vicinity above levels existing without the Project?	☐	☒	☐	☐
e) For a Project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?	☐	☐	☐	☒
f) For a Project within the vicinity of a private airstrip, would the Project expose people residing or working in the Project area to excessive noise levels?	☐	☐	☐	☒
XIII. POPULATION AND HOUSING: Would the Project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
XIV. PUBLIC SERVICES:				
a) Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:	☐	☐	☒	☐
Fire protection?	☐	☐	☒	☐
Police protection?	☐	☐	☒	☐
Schools?	☐	☐	☐	☒
Parks?	☐	☐	☐	☒
Other public facilities?	☐	☐	☐	☒

XV. RECREATION: Would the Project result in:	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
a) Would the Project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Does the Project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☒	☐
XVI. TRANSPORTATION/TRAFFIC: Would the Project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☐	☒
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the District congestion management agency for designated roads or highways?	☐	☐	☐	☒
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that result in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☐	☐	☐	☒
f) Conflict with adopted policies, plans or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☒
XVII. UTILITIES AND SERVICE SYSTEMS: Would the Project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
d) Have sufficient water supplies available to serve the Project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
e) Result in a determination by the wastewater treatment provider which serves or may serve the Project that it has adequate capacity to serve the Project's Projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
f) Be served by a landfill with sufficient permitted capacity to accommodate the Project's solid waste disposal needs?	☐	☐	☐	☒
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒

XVIII. MANDATORY FINDINGS OF SIGNIFICANCE

a) Does the Project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b) Does the Project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a Project are considerable when viewed in connection with the effects of past Projects, the effects of other current Projects, and the effects of probable future Projects)?	☐	☒	☐	☐
c) Does the Project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☒	☐

Appendix C

Air Quality and GHG Technical Memorandum

Air Quality & Greenhouse Gas Technical Memorandum

I. Introduction

This technical memorandum describes the potential air quality and greenhouse gas (GHG) emissions associated with the replacement of approximately six miles of an existing potable water pipeline (proposed project) running roughly parallel to the Union Pacific Railroad (UPRR) and State Route 58 (SR 58) right-of-way between the city of Tehachapi and the community of Cache Creek in Kern County, California, owned and operated by the Mojave Public Utility District.

The proposed project includes pipeline installation, construction of a booster pump station, and demolition of the California Highway Patrol (CHP) and Cache Creek lift stations. Construction and demolition would take place in overlapping phases over a nine-month period. Emission sources include off-road equipment and trucks, on-road worker, vendor, and haul trips, and fugitive dust. The project area consists of relatively mountainous desert terrain, along the UPRR right-of-way and SR 58. The majority of the alignment is not within the vicinity of sensitive receptors. However, sensitive receptors in proximity to the project area do include residences near the eastern most segment of the proposed pipeline. The area of these residences is generally bounded by Wildflower Canyon Road (on the west), Pony Express Road (on the north), Homer Hansen's Private Road (on east), and SR 58 (on the south). There are four residences located along the proposed pipeline alignment on Wildflower Canyon Road.

II. Air Quality Planning

The project is located within the Mojave Desert Air Basin (MDAB), which consists of the eastern half of Kern County, the northern desert portion of Los Angeles County, a majority of San Bernardino County, and eastern Riverside County. The project would be located within the eastern portion of Kern County, which is under the jurisdiction of the Eastern Kern Air Pollution Control District (EKAPCD).

The primary purpose of an air quality plan is to bring an area that does not attain National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) into compliance with those standards pursuant to the requirements of the Clean Air Act and California Clean Air Act. NAAQS and CAAQS have been established for the following criteria pollutants: ozone, carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), and lead. Because ozone is not directly emitted in the air, rather it is formed by chemical reactions between nitrogen oxides (NOx) and volatile organic compounds (VOC) in the presence of sunlight, air quality regulations focus on ozone's precursors. With respect to regional air quality, the EKAPCD region is currently designated as serious nonattainment for the NAAQS for 8-hour ozone, and nonattainment for the CAAQS for 1-hour and 8-hour ozone, and PM_{10} (EKAPCD 2018).

The most recent applicable air quality plan developed by the EKAPCD is the *Eastern Kern Air Pollution Control District Plan for 2008 Federal 75 ppb 8-Hour Ozone Standard*, adopted in 2017 (EKAPCD 2017). This plan includes the latest planning assumptions regarding population, vehicle activity, and industrial activity, as well as emissions reductions and control measures necessary to demonstrate attainment with the 2008, 8-hour Ozone NAAQS by the year 2020.

III. BLM Air Quality Requirements

The BLM's Desert Renewable Energy Conservation Plan (DRECP) identifies the following Conservation and Management Actions (CMA's) for the Land Use Plan Amendments (LUPA's) related to Air Quality:

LUPA-AIR-1 All activities must meet the following requirements:

- Applicable National Ambient Air Quality Standards (Section 109)
- State Implementation Plans (Section 110)
- Control of Pollution from Federal Facilities (Section 118) including non-point source
- Prevention of Significant Deterioration, including visibility impacts to mandatory Federal Class I Areas (Section 160 et seq.)

- Conformity Analyses and Determinations (Section 176[c])
- Apply best management practices on a case by case basis
- Applicable local Air Quality Management Jurisdictions (e.g., 403 SCAQMD)

LUPA-AIR-2 Because project authorizations are a federal undertaking, air quality standards for fugitive dust may not exceed local standards and requirements.

LUPA-AIR-3 Where impacts to air quality may be significant under NEPA, requiring analysis through an Environmental Impact Statement, require documentation for activities to include a detailed discussion and analysis of Ambient Air Quality conditions (baseline or existing), National Ambient Air Quality Standards, criteria pollutant nonattainment areas, and potential air quality impacts of the proposed project (including cumulative and indirect impacts and greenhouse gas emissions). This content is necessary to disclose the potential impacts from temporary or cumulative degradation of air quality. The discussion will include a description and estimate of air emissions from potential construction and maintenance activities, and proposed mitigation measures to minimize net PM10 and PM2.5 emissions. The documentation will specify the emission sources by pollutant from mobile sources, stationary sources, and ground disturbance. A Construction Emissions Mitigation Plan will be developed.

LUPA-AIR-4 Because fugitive dust is the number one source of PM10 and PM2.5 emissions in the Mojave and Sonoran Deserts, fugitive dust impacts to air quality must be analyzed for all activities/projects requiring an Environmental Impact Statement and Environmental Assessment.

- The NEPA air quality analysis may include modelling of the sources of PM10 and PM2.5 that occur prior to construction and/or ground disturbance from the activity/project, and show the timing, duration and transport of emissions off site. When utilized, the modeling will also identify how the generation and movement of PM10 and PM2.5 will change during and after construction and/or ground disturbance of the activity/project under all activity/project specific NEPA alternatives. The BLM air resource specialist and Authorizing Officer will determine if modelling is required as part of the NEPA analysis based on estimated types and amounts of emissions.

LUPA-AIR-5 A fugitive Dust Control Plan will be developed for all projects where the NEPA analysis shows an impact on air quality from fugitive dust.

The portion of the project located on BLM managed lands will require adherence to the above requirements.

IV. Emissions Estimating

a. Methodology

Localized emissions of criteria air pollutants and precursors, and GHG emissions, were assessed in accordance with Kern County's 2006 Guidelines for Preparing an Air Quality Assessment for Use in Environmental Impact Reports (Adopted by the EKAPCD). The significance thresholds for criteria air pollutants are 25 tons per year (tpy) for VOCs and NO_X and 15 tpy for PM_{10}. Modeled emissions of criteria air pollutants were compared with the applicable EKAPCD thresholds. As listed in the EKAPCD Addendum to CEQA Guidelines, the EKAPCD has established a significance threshold of 25,000 tons per year of carbon dioxide equivalents (CO_2e) for new stationary source projects (EKAPCD 2012). While the project does not propose a new stationary source, this threshold is compared to emissions resulting from the proposed temporary construction activities.

Construction-related emissions were modeled using the California Emissions Estimator Model (CalEEMod), Version 2016.3.2. CalEEMod allows the user to input project-specific parameters. In this case, project-specific construction inputs included site acreage, construction schedule, the types, number, and horsepower of construction equipment, and the number and length of off-site motor vehicle trips. Construction emissions were

estimated for worker commutes, haul trucks, and the use of off-road equipment. To conservatively estimate the maximum daily emissions, construction emissions were modeled based on certain construction activities taking place concurrently, thereby representing the most intensive day of construction.

TAC emissions associated with project construction that could affect surrounding areas are evaluated based on modeled emissions estimates using CalEEMod and an analysis of the proximity of sensitive receptors to emission sources and their potential duration of exposure.

b. Criteria Air Pollutant Emissions

Construction

Construction of the Proposed Project would result in the generation of criteria pollutant emissions. Construction of the Proposed Project is expected to last approximately nine months. The proposed schedule, including a three-month planning and mobilization period, is shown in Table 1 below. The estimated construction workforce is a maximum of 10 workers per day. The site is anticipated to be a balanced site, with no import or export of material.

Table 1

MPUD Cache Creek Pipeline Replacement Project												
Estimated Construction Schedule												
Month	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Construction Task												
Planning / Mobilization / Material Procurement	■	■	■									
Pipeline Installation				■	■	■	■	■	■	■		
Pump Station							■	■	■	■	■	■
Demolition												■

Tables 2 and 3 below provide the detailed and summary maximum emissions of VOC, NO_X, and PM_{10}, respectively, associated with each phase of construction, as modeled using CalEEMod. As shown in Table 3, the modeled annual emissions generated by construction would not exceed the EKAPCD-recommended thresholds of significance. Section IV, *CalEEMod Model Outputs*, below provides the detailed modeling output files.

Table 2

Modeled Annual Construction-Related Emissions of Criteria Air Pollutants and Precursors			
	Maximum Annual Emissions (tons/year)		
Construction Phase	**VOC**	**NO_X**	**PM_{10}**
Pipeline Installation	0.46736	5.11548	0.7319
On-Site	*0.4586*	*5.1078*	*0.7125*
Off-Site	*0.00876*	*0.00768*	*0.0194*
Pump Stations	0.2758	3.7028	0.2093
On-Site	*0.203*	*1.9155*	*0.1005*
Off-Site	*0.0728*	*1.7873*	*0.1088*
Demolition	0.03996	0.395	0.02279
On-Site	*0.0387*	*0.3936*	*0.02*
Off-Site	*0.00126*	*0.0014*	*0.00279*

Notes: VOC = volatile organic compounds; NO_X = oxides of nitrogen; PM_{10} = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less
Source: Modeled by AECOM, 2018.

Table 3

Summary of Modeled Annual Construction-Related Emissions of Criteria Air Pollutants and Precursors			
Construction Phase	**Maximum Annual Emissions (tons/year)**		
	VOC	**NO_X**	**PM_{10}**
Pipeline Installation	0.5	5.1	0.7
Pump Stations Construction	0.3	3.7	0.2
Demolition	0.0	0.4	0.0
Total Annual Emissions	**0.8**	**9.2**	**0.9**
EKAPCD significance threshold	**25**	**25**	**15**
Exceeds Threshold?	**No**	**No**	**No**

Notes: VOC = volatile organic compounds; NO_X = oxides of nitrogen; PM_{10} = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less; EKAPCD = Eastern Kern Air Pollution Control District
Source: Modeled by AECOM, 2018.

Operations

Operations of the Proposed Project would be essentially the same as existing conditions, except for the new booster station replacing two existing booster stations, for a net power usage increase of approximately 30 horsepower. Southern California Edison provides power supply to the region and the proposed power demand represents less than 0.003 percent of Southern California Edison's total electric power generation and associated air pollutant emissions. These emissions would be generated at the locations of the Southern California Edison-owned power plants and those of the suppliers from which Southern California Edison purchases power. These emissions represent a negligible increase in emissions regionally.

c. Greenhouse Gas Emissions

Construction

GHG emissions contribute, on a cumulative basis, to global climate change. The proposed project would not contribute significantly to climate change by itself. However, cumulative emissions from many projects and plans would all contribute to global GHG concentrations. Total construction GHG emissions were estimated using the same construction parameters discussed earlier under Section III.b, *Criteria Air Pollutant Emissions*.

Heavy-duty off-road equipment, materials transport, and worker commutes during construction of the Proposed Project would result in exhaust-related GHG emissions. Tables 4 and 5 below provide the detailed and summary total annual emissions of GHGs, respectively, associated with each phase of construction, as modeled using CalEEMod. As shown in Table 5, the modeled GHG emissions generated by construction would not exceed the EKAPCD annual threshold of significance for stationary sources of 25,000 tons/year. Section IV, *CalEEMod Model Outputs*, below provides the detailed modeling output files.

Table 4

Modeled Construction-Related GHG Emissions	
Construction Phase	**GHG Emissions (MT CO_2e)**
Pipeline Installation	613.3229
On-Site	*596.5799*
Off-Site	*1.67E+01*
Pump Stations	658.6826
On-Site	*246.6249*
Off-Site	*412.0577*
Demolition	40.829
On-Site	*38.3539*
Off-Site	*2.48E+00*

Notes: GHG = greenhouse gas; MT CO_2e = metric tons of carbon dioxide equivalents
Source: Modeled by AECOM, 2018.

Table 5

Summary of Modeled Construction-Related GHG Emissions	
Construction Phase	**GHG Emissions (MT CO_2e)**
Pipeline Installation	613
Pump Stations Construction	659
Demolition	41
Total Annual Emissions	**1,313**
EKAPCD Significance Threshold	**Not established for construction operations**
Exceeds Threshold?	**NA**
Notes: GHG = greenhouse gas; MT CO_2e = metric tons of carbon dioxide equivalents; EKAPCD = Eastern Kern Air Pollution Control District Source: Modeled by AECOM, 2018.	

Operations

As described above under Section III.b, *Criteria Air Pollutant Emissions,* operations of the Proposed Project would result in a net increase in connected power demand of approximately 30 horsepower (See Table 6), which represents less than 0.003 percent of Southern California Edison's total electric power generation and associated air pollutant emissions. Southern California Edison's CO_2e emissions rate from delivered electricity was 549 pounds per Megawatt-hour in 2017 (Southern California Edison 2018). As shown in Table 6, net annual GHG emissions associated with operations of the replacement pipeline would be approximately 53.8 MT CO_2e/yr.

Table 6

Net Operational Power Demand	
	Power Demand (hp)
CHP Station Booster (demolished)	-5
Cache Creek Pump Station (demolished)	-15
New Booster Station	50
Total Daily	**30**

Table 7

Summary of Annual Operations-Related GHG Emissions	
Net Power Demand (hp)	30
Net Power Usage (MW-hr/dy)	0.537
CO_2e Emissions Rate (lb/MW-hr)	549
Total Annual Emissions (tons CO_2e per year)	**53.8**
EKAPCD Significance Threshold (tons CO_2e year)	**25,000**
Exceeds Threshold?	**No**

Notes: GHG = greenhouse gas; hp = horsepower; MW/dy = Megawatts per day; lb/MW-hr = pounds per Megawatt-hour; CO_2e = carbon dioxide equivalents; EKAPCD = Eastern Kern Air Pollution Control District

[a] Southern California Edison 2018

IV. CalEEMod Modeling Output Files

MPUD Cache Creek Waterline Alternative Project

Kern County APCD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	29.09	1,267,200.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	32
Climate Zone	7			**Operational Year**	2020
Utility Company					
CO2 Intensity (lb/MWhr)	0	**CH4 Intensity (lb/MWhr)**	0	**N2O Intensity (lb/MWhr)**	0

1.3 User Entered Comments & Non-Default Data

MPUD Cache Creek Waterline Alternative Project - Kern County APCD Air District, Annual

Project Characteristics -

Land Use - Per project description, 6 miles of pipeline with 40 ft wide project area.

Construction Phase - Per project description, 9 months of construction with overlapping phases.

Off-road Equipment - Pipeline installation modeled using project-specific equipment list, using CalEEMod default load factors. Water Trucks modeled as 200HP off-highway trucks

Off-road Equipment - Pump stations construction modeled using project-specific equipment list, using CalEEMod default load factors. Water Truck modeled as 200HP off-highway trucks

Off-road Equipment - Demolition equipment modeled as CalEEMod defaults.

Demolition -

Off-road Equipment - Earthwork grading phase added to account for material movement during construction, but no equipment listed as it is captured under the pipeline installation phase.

Grading -

Trips and VMT - Construction crew of 10 individuals per day. Vendor and haul trips using CalEEMod defaults.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	440.00	132.00
tblConstructionPhase	NumDays	30.00	22.00
tblConstructionPhase	NumDays	45.00	154.00
tblConstructionPhase	PhaseEndDate	1/18/2021	12/31/2019
tblConstructionPhase	PhaseEndDate	2/11/2019	12/31/2019
tblConstructionPhase	PhaseStartDate	5/14/2019	7/1/2019
tblConstructionPhase	PhaseStartDate	1/1/2019	12/1/2019
tblGrading	AcresOfGrading	365.75	57.75
tblLandUse	LandUseSquareFeet	0.00	1,267,200.00
tblLandUse	LotAcreage	0.00	29.09
tblOffRoadEquipment	HorsePower	158.00	180.00
tblOffRoadEquipment	HorsePower	187.00	174.00
tblOffRoadEquipment	HorsePower	231.00	190.00

tblOffRoadEquipment	HorsePower	402.00	479.00
tblOffRoadEquipment	HorsePower	402.00	200.00
tblOffRoadEquipment	HorsePower	203.00	165.00
tblOffRoadEquipment	HorsePower	65.00	88.00
tblOffRoadEquipment	HorsePower	97.00	108.00
tblOffRoadEquipment	HorsePower	221.00	250.00
tblOffRoadEquipment	HorsePower	158.00	180.00
tblOffRoadEquipment	HorsePower	402.00	479.00
tblOffRoadEquipment	HorsePower	402.00	200.00
tblOffRoadEquipment	HorsePower	203.00	165.00
tblOffRoadEquipment	HorsePower	80.00	114.00
tblOffRoadEquipment	HorsePower	97.00	108.00
tblOffRoadEquipment	HorsePower	65.00	88.00
tblOffRoadEquipment	HorsePower	46.00	25.00
tblOffRoadEquipment	HorsePower	78.00	25.00
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Graders
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Bore/Drill Rigs
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders

tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Welders
tblOffRoadEquipment	OffRoadEquipmentType		Air Compressors
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	7.00	6.00
tblOffRoadEquipment	UsageHours	8.00	5.00
tblOffRoadEquipment	UsageHours	7.00	5.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	33.00	20.00
tblTripsAndVMT	WorkerTripNumber	532.00	20.00
tblTripsAndVMT	WorkerTripNumber	15.00	20.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.7831	9.2133	5.1017	0.0144	0.6161	0.3478	0.9639	0.2924	0.3222	0.6147	0.0000	1,304.8977	1,304.8977	0.3175	0.0000	1,312.8344
Maximum	**0.7831**	**9.2133**	**5.1017**	**0.0144**	**0.6161**	**0.3478**	**0.9639**	**0.2924**	**0.3222**	**0.6147**	**0.0000**	**1,304.8977**	**1,304.8977**	**0.3175**	**0.0000**	**1,312.8344**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.7831	9.2133	5.1017	0.0144	0.6161	0.3478	0.9639	0.2924	0.3222	0.6147	0.0000	1,304.8967	1,304.8967	0.3175	0.0000	1,312.8334
Maximum	**0.7831**	**9.2133**	**5.1017**	**0.0144**	**0.6161**	**0.3478**	**0.9639**	**0.2924**	**0.3222**	**0.6147**	**0.0000**	**1,304.8967**	**1,304.8967**	**0.3175**	**0.0000**	**1,312.8334**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
2	4-1-2019	6-30-2019	2.3564	2.3564
3	7-1-2019	9-30-2019	4.3522	4.3522
		Highest	4.3522	4.3522

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	6.4174	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**6.4174**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	6.4174	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**6.4174**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Pipeline Installation	Grading	4/1/2019	10/31/2019	5	154	
2	Pump Stations	Building Construction	7/1/2019	12/31/2019	5	132	
3	Demolition	Demolition	12/1/2019	12/31/2019	5	22	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

MPUD Cache Creek Waterline Alternative Project - Kern County APCD Air District, Annual

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Pipeline Installation	Excavators	2	6.00	180	0.38
Demolition	Excavators	3	8.00	158	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Pipeline Installation	Graders	1	6.00	174	0.41
Pump Stations	Cranes	1	6.00	190	0.29
Pump Stations	Forklifts	3	8.00	89	0.20
Pump Stations	Generator Sets	1	8.00	84	0.74
Pipeline Installation	Off-Highway Trucks	1	4.00	479	0.38
Pipeline Installation	Off-Highway Trucks	2	4.00	200	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Pipeline Installation	Rubber Tired Loaders	1	8.00	165	0.36
Pipeline Installation	Rubber Tired Dozers	1	8.00	247	0.40
Pipeline Installation	Skid Steer Loaders	1	3.00	88	0.37
Pipeline Installation	Tractors/Loaders/Backhoes	1	5.00	108	0.37
Pipeline Installation	Bore/Drill Rigs	1	8.00	250	0.50
Pump Stations	Excavators	1	6.00	180	0.38
Pump Stations	Off-Highway Trucks	1	4.00	479	0.38
Pump Stations	Off-Highway Trucks	1	4.00	200	0.38
Pipeline Installation	Scrapers	2	8.00	367	0.48
Pump Stations	Rubber Tired Loaders	1	8.00	165	0.36
Pump Stations	Rollers	1	3.00	114	0.38
Pump Stations	Tractors/Loaders/Backhoes	1	5.00	108	0.37
Pump Stations	Skid Steer Loaders	1	1.00	88	0.37
Pump Stations	Welders	1	8.00	25	0.45
Pump Stations	Air Compressors	1	8.00	25	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Pipeline Installation	13	20.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Pump Stations	14	20.00	208.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	6	20.00	0.00	2.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Pipeline Installation - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.4943	0.0000	0.4943	0.2582	0.0000	0.2582	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.4586	5.1078	2.9586	6.5900e-003		0.2182	0.2182		0.2007	0.2007	0.0000	591.8982	591.8982	0.1873	0.0000	596.5799
Total	**0.4586**	**5.1078**	**2.9586**	**6.5900e-003**	**0.4943**	**0.2182**	**0.7125**	**0.2582**	**0.2007**	**0.4589**	**0.0000**	**591.8982**	**591.8982**	**0.1873**	**0.0000**	**596.5799**

3.2 Pipeline Installation - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.7600e-003	7.6800e-003	0.0670	1.9000e-004	0.0193	1.2000e-004	0.0194	5.1200e-003	1.1000e-004	5.2300e-003	0.0000	16.7299	16.7299	5.2000e-004	0.0000	16.7430
Total	**8.7600e-003**	**7.6800e-003**	**0.0670**	**1.9000e-004**	**0.0193**	**1.2000e-004**	**0.0194**	**5.1200e-003**	**1.1000e-004**	**5.2300e-003**	**0.0000**	**16.7299**	**16.7299**	**5.2000e-004**	**0.0000**	**16.7430**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.4943	0.0000	0.4943	0.2582	0.0000	0.2582	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.4586	5.1078	2.9586	6.5900e-003		0.2182	0.2182		0.2007	0.2007	0.0000	591.8974	591.8974	0.1873	0.0000	596.5792
Total	**0.4586**	**5.1078**	**2.9586**	**6.5900e-003**	**0.4943**	**0.2182**	**0.7125**	**0.2582**	**0.2007**	**0.4589**	**0.0000**	**591.8974**	**591.8974**	**0.1873**	**0.0000**	**596.5792**

3.2 Pipeline Installation - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.7600e-003	7.6800e-003	0.0670	1.9000e-004	0.0193	1.2000e-004	0.0194	5.1200e-003	1.1000e-004	5.2300e-003	0.0000	16.7299	16.7299	5.2000e-004	0.0000	16.7430
Total	**8.7600e-003**	**7.6800e-003**	**0.0670**	**1.9000e-004**	**0.0193**	**1.2000e-004**	**0.0194**	**5.1200e-003**	**1.1000e-004**	**5.2300e-003**	**0.0000**	**16.7299**	**16.7299**	**5.2000e-004**	**0.0000**	**16.7430**

3.3 Pump Stations - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2030	1.9155	1.3546	2.7800e-003		0.1005	0.1005		0.0941	0.0941	0.0000	244.9899	244.9899	0.0654	0.0000	246.6249
Total	**0.2030**	**1.9155**	**1.3546**	**2.7800e-003**		**0.1005**	**0.1005**		**0.0941**	**0.0941**	**0.0000**	**244.9899**	**244.9899**	**0.0654**	**0.0000**	**246.6249**

3.3 Pump Stations - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0653	1.7807	0.4118	4.1800e-003	0.0829	9.2200e-003	0.0921	0.0239	8.8200e-003	0.0328	0.0000	396.3779	396.3779	0.0531	0.0000	397.7065
Worker	7.5100e-003	6.5800e-003	0.0574	1.6000e-004	0.0165	1.0000e-004	0.0166	4.3900e-003	9.0000e-005	4.4800e-003	0.0000	14.3399	14.3399	4.5000e-004	0.0000	14.3511
Total	**0.0728**	**1.7873**	**0.4692**	**4.3400e-003**	**0.0995**	**9.3200e-003**	**0.1088**	**0.0283**	**8.9100e-003**	**0.0372**	**0.0000**	**410.7178**	**410.7178**	**0.0536**	**0.0000**	**412.0577**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2030	1.9155	1.3546	2.7800e-003		0.1005	0.1005		0.0941	0.0941	0.0000	244.9896	244.9896	0.0654	0.0000	246.6246
Total	**0.2030**	**1.9155**	**1.3546**	**2.7800e-003**		**0.1005**	**0.1005**		**0.0941**	**0.0941**	**0.0000**	**244.9896**	**244.9896**	**0.0654**	**0.0000**	**246.6246**

3.3 Pump Stations - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0653	1.7807	0.4118	4.1800e-003	0.0829	9.2200e-003	0.0921	0.0239	8.8200e-003	0.0328	0.0000	396.3779	396.3779	0.0531	0.0000	397.7065
Worker	7.5100e-003	6.5800e-003	0.0574	1.6000e-004	0.0165	1.0000e-004	0.0166	4.3900e-003	9.0000e-005	4.4800e-003	0.0000	14.3399	14.3399	4.5000e-004	0.0000	14.3511
Total	**0.0728**	**1.7873**	**0.4692**	**4.3400e-003**	**0.0995**	**9.3200e-003**	**0.1088**	**0.0283**	**8.9100e-003**	**0.0372**	**0.0000**	**410.7178**	**410.7178**	**0.0536**	**0.0000**	**412.0577**

3.4 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.5000e-004	0.0000	2.5000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0387	0.3936	0.2427	4.3000e-004		0.0197	0.0197		0.0184	0.0184	0.0000	38.0890	38.0890	0.0106	0.0000	38.3539
Total	**0.0387**	**0.3936**	**0.2427**	**4.3000e-004**	**2.5000e-004**	**0.0197**	**0.0200**	**4.0000e-005**	**0.0184**	**0.0184**	**0.0000**	**38.0890**	**38.0890**	**0.0106**	**0.0000**	**38.3539**

3.4 Demolition - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-005	3.0000e-004	4.0000e-005	0.0000	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0000	1.0000e-005	0.0000	0.0831	0.0831	1.0000e-005	0.0000	0.0833
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2500e-003	1.1000e-003	9.5700e-003	3.0000e-005	2.7600e-003	2.0000e-005	2.7700e-003	7.3000e-004	2.0000e-005	7.5000e-004	0.0000	2.3900	2.3900	7.0000e-005	0.0000	2.3919
Total	**1.2600e-003**	**1.4000e-003**	**9.6100e-003**	**3.0000e-005**	**2.7800e-003**	**2.0000e-005**	**2.7900e-003**	**7.3000e-004**	**2.0000e-005**	**7.6000e-004**	**0.0000**	**2.4730**	**2.4730**	**8.0000e-005**	**0.0000**	**2.4751**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.5000e-004	0.0000	2.5000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0387	0.3936	0.2427	4.3000e-004		0.0197	0.0197		0.0184	0.0184	0.0000	38.0889	38.0889	0.0106	0.0000	38.3538
Total	**0.0387**	**0.3936**	**0.2427**	**4.3000e-004**	**2.5000e-004**	**0.0197**	**0.0200**	**4.0000e-005**	**0.0184**	**0.0184**	**0.0000**	**38.0889**	**38.0889**	**0.0106**	**0.0000**	**38.3538**

3.4 Demolition - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-005	3.0000e-004	4.0000e-005	0.0000	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0000	1.0000e-005	0.0000	0.0831	0.0831	1.0000e-005	0.0000	0.0833
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2500e-003	1.1000e-003	9.5700e-003	3.0000e-005	2.7600e-003	2.0000e-005	2.7700e-003	7.3000e-004	2.0000e-005	7.5000e-004	0.0000	2.3900	2.3900	7.0000e-005	0.0000	2.3919
Total	**1.2600e-003**	**1.4000e-003**	**9.6100e-003**	**3.0000e-005**	**2.7800e-003**	**2.0000e-005**	**2.7900e-003**	**7.3000e-004**	**2.0000e-005**	**7.6000e-004**	**0.0000**	**2.4730**	**2.4730**	**8.0000e-005**	**0.0000**	**2.4751**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Industrial	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
User Defined Industrial	0.476209	0.032680	0.180467	0.114087	0.024329	0.006580	0.011188	0.138783	0.002207	0.001422	0.009265	0.001243	0.001540

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	6.4174	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Unmitigated	6.4174	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	1.4684					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	4.9491					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**6.4174**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	1.4684					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	4.9491					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**6.4174**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

MPUD Cache Creek Waterline Alternative Project

Kern County APCD Air District, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	29.09	1,267,200.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.7	**Precipitation Freq (Days)**	32
Climate Zone	7			**Operational Year**	2020
Utility Company					
CO2 Intensity (lb/MWhr)	0	**CH4 Intensity (lb/MWhr)**	0	**N2O Intensity (lb/MWhr)**	0

1.3 User Entered Comments & Non-Default Data

MPUD Cache Creek Waterline Alternative Project - Kern County APCD Air District, Winter

Project Characteristics -

Land Use - Per project description, 6 miles of pipeline with 40 ft wide project area.

Construction Phase - Per project description, 9 months of construction with overlapping phases.

Off-road Equipment - Pipeline installation modeled using project-specific equipment list, using CalEEMod default load factors. Water Trucks modeled as 200HP off-highway trucks

Off-road Equipment - Pump stations construction modeled using project-specific equipment list, using CalEEMod default load factors. Water Truck modeled as 200HP off-highway trucks

Off-road Equipment - Demolition equipment modeled as CalEEMod defaults.

Demolition -

Off-road Equipment - Earthwork grading phase added to account for material movement during construction, but no equipment listed as it is captured under the pipeline installation phase.

Grading -

Trips and VMT - Construction crew of 10 individuals per day. Vendor and haul trips using CalEEMod defaults.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	440.00	132.00
tblConstructionPhase	NumDays	30.00	22.00
tblConstructionPhase	NumDays	45.00	154.00
tblConstructionPhase	PhaseEndDate	1/18/2021	12/31/2019
tblConstructionPhase	PhaseEndDate	2/11/2019	12/31/2019
tblConstructionPhase	PhaseStartDate	5/14/2019	7/1/2019
tblConstructionPhase	PhaseStartDate	1/1/2019	12/1/2019
tblGrading	AcresOfGrading	365.75	57.75
tblLandUse	LandUseSquareFeet	0.00	1,267,200.00
tblLandUse	LotAcreage	0.00	29.09
tblOffRoadEquipment	HorsePower	158.00	180.00
tblOffRoadEquipment	HorsePower	187.00	174.00
tblOffRoadEquipment	HorsePower	231.00	190.00

tblOffRoadEquipment	HorsePower	402.00	479.00
tblOffRoadEquipment	HorsePower	402.00	200.00
tblOffRoadEquipment	HorsePower	203.00	165.00
tblOffRoadEquipment	HorsePower	65.00	88.00
tblOffRoadEquipment	HorsePower	97.00	108.00
tblOffRoadEquipment	HorsePower	221.00	250.00
tblOffRoadEquipment	HorsePower	158.00	180.00
tblOffRoadEquipment	HorsePower	402.00	479.00
tblOffRoadEquipment	HorsePower	402.00	200.00
tblOffRoadEquipment	HorsePower	203.00	165.00
tblOffRoadEquipment	HorsePower	80.00	114.00
tblOffRoadEquipment	HorsePower	97.00	108.00
tblOffRoadEquipment	HorsePower	65.00	88.00
tblOffRoadEquipment	HorsePower	46.00	25.00
tblOffRoadEquipment	HorsePower	78.00	25.00
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Graders
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Bore/Drill Rigs
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders

tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Welders
tblOffRoadEquipment	OffRoadEquipmentType		Air Compressors
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	8.00	6.00
tblOffRoadEquipment	UsageHours	7.00	6.00
tblOffRoadEquipment	UsageHours	8.00	5.00
tblOffRoadEquipment	UsageHours	7.00	5.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	33.00	20.00
tblTripsAndVMT	WorkerTripNumber	532.00	20.00
tblTripsAndVMT	WorkerTripNumber	15.00	20.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	10.3001	121.9650	67.2418	0.1939	8.2068	4.4993	12.7061	3.8562	4.1698	8.0261	0.0000	19,461.8976	19,461.8976	4.7354	0.0000	19,580.2825
Maximum	**10.3001**	**121.9650**	**67.2418**	**0.1939**	**8.2068**	**4.4993**	**12.7061**	**3.8562**	**4.1698**	**8.0261**	**0.0000**	**19,461.8976**	**19,461.8976**	**4.7354**	**0.0000**	**19,580.2825**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	10.3001	121.9650	67.2418	0.1939	8.2068	4.4993	12.7061	3.8562	4.1698	8.0261	0.0000	19,461.8976	19,461.8976	4.7354	0.0000	19,580.2825
Maximum	**10.3001**	**121.9650**	**67.2418**	**0.1939**	**8.2068**	**4.4993**	**12.7061**	**3.8562**	**4.1698**	**8.0261**	**0.0000**	**19,461.8976**	**19,461.8976**	**4.7354**	**0.0000**	**19,580.2825**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	35.1639	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**35.1639**	**0.0000**	**1.0000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	35.1639	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**35.1639**	**0.0000**	**1.0000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Pipeline Installation	Grading	4/1/2019	10/31/2019	5	154	
2	Pump Stations	Building Construction	7/1/2019	12/31/2019	5	132	
3	Demolition	Demolition	12/1/2019	12/31/2019	5	22	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

MPUD Cache Creek Waterline Alternative Project - Kern County APCD Air District, Winter

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Pipeline Installation	Excavators	2	6.00	180	0.38
Demolition	Excavators	3	8.00	158	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Pipeline Installation	Graders	1	6.00	174	0.41
Pump Stations	Cranes	1	6.00	190	0.29
Pump Stations	Forklifts	3	8.00	89	0.20
Pump Stations	Generator Sets	1	8.00	84	0.74
Pipeline Installation	Off-Highway Trucks	1	4.00	479	0.38
Pipeline Installation	Off-Highway Trucks	2	4.00	200	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Pipeline Installation	Rubber Tired Loaders	1	8.00	165	0.36
Pipeline Installation	Rubber Tired Dozers	1	8.00	247	0.40
Pipeline Installation	Skid Steer Loaders	1	3.00	88	0.37
Pipeline Installation	Tractors/Loaders/Backhoes	1	5.00	108	0.37
Pipeline Installation	Bore/Drill Rigs	1	8.00	250	0.50
Pump Stations	Excavators	1	6.00	180	0.38
Pump Stations	Off-Highway Trucks	1	4.00	479	0.38
Pump Stations	Off-Highway Trucks	1	4.00	200	0.38
Pipeline Installation	Scrapers	2	8.00	367	0.48
Pump Stations	Rubber Tired Loaders	1	8.00	165	0.36
Pump Stations	Rollers	1	3.00	114	0.38
Pump Stations	Tractors/Loaders/Backhoes	1	5.00	108	0.37
Pump Stations	Skid Steer Loaders	1	1.00	88	0.37
Pump Stations	Welders	1	8.00	25	0.45
Pump Stations	Air Compressors	1	8.00	25	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Pipeline Installation	13	20.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Pump Stations	14	20.00	208.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	6	20.00	0.00	2.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Pipeline Installation - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.4198	0.0000	6.4198	3.3532	0.0000	3.3532			0.0000			0.0000
Off-Road	5.9554	66.3356	38.4232	0.0856		2.8332	2.8332		2.6065	2.6065		8,473.4548	8,473.4548	2.6809		8,540.4776
Total	**5.9554**	**66.3356**	**38.4232**	**0.0856**	**6.4198**	**2.8332**	**9.2530**	**3.3532**	**2.6065**	**5.9597**		**8,473.4548**	**8,473.4548**	**2.6809**		**8,540.4776**

3.2 Pipeline Installation - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1252	0.0947	0.8147	2.3300e-003	0.2555	1.5200e-003	0.2570	0.0678	1.4000e-003	0.0692		231.9388	231.9388	7.2300e-003		232.1196
Total	**0.1252**	**0.0947**	**0.8147**	**2.3300e-003**	**0.2555**	**1.5200e-003**	**0.2570**	**0.0678**	**1.4000e-003**	**0.0692**		**231.9388**	**231.9388**	**7.2300e-003**		**232.1196**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.4198	0.0000	6.4198	3.3532	0.0000	3.3532			0.0000			0.0000
Off-Road	5.9554	66.3356	38.4232	0.0856		2.8332	2.8332		2.6065	2.6065	0.0000	8,473.4548	8,473.4548	2.6809		8,540.4776
Total	**5.9554**	**66.3356**	**38.4232**	**0.0856**	**6.4198**	**2.8332**	**9.2530**	**3.3532**	**2.6065**	**5.9597**	**0.0000**	**8,473.4548**	**8,473.4548**	**2.6809**		**8,540.4776**

3.2 Pipeline Installation - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1252	0.0947	0.8147	2.3300e-003	0.2555	1.5200e-003	0.2570	0.0678	1.4000e-003	0.0692		231.9388	231.9388	7.2300e-003		232.1196
Total	**0.1252**	**0.0947**	**0.8147**	**2.3300e-003**	**0.2555**	**1.5200e-003**	**0.2570**	**0.0678**	**1.4000e-003**	**0.0692**		**231.9388**	**231.9388**	**7.2300e-003**		**232.1196**

3.3 Pump Stations - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.0760	29.0229	20.5241	0.0421		1.5224	1.5224		1.4260	1.4260		4,091.7440	4,091.7440	1.0923		4,119.0519
Total	**3.0760**	**29.0229**	**20.5241**	**0.0421**		**1.5224**	**1.5224**		**1.4260**	**1.4260**		**4,091.7440**	**4,091.7440**	**1.0923**		**4,119.0519**

3.3 Pump Stations - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	1.0183	26.4171	6.6652	0.0616	1.2761	0.1407	1.4167	0.3676	0.1345	0.5021		6,432.8212	6,432.8212	0.9477		6,456.5139
Worker	0.1252	0.0947	0.8147	2.3300e-003	0.2555	1.5200e-003	0.2570	0.0678	1.4000e-003	0.0692		231.9388	231.9388	7.2300e-003		232.1196
Total	**1.1435**	**26.5118**	**7.4799**	**0.0639**	**1.5316**	**0.1422**	**1.6737**	**0.4353**	**0.1359**	**0.5713**		**6,664.7600**	**6,664.7600**	**0.9549**		**6,688.6335**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.0760	29.0229	20.5241	0.0421		1.5224	1.5224		1.4260	1.4260	0.0000	4,091.7440	4,091.7440	1.0923		4,119.0518
Total	**3.0760**	**29.0229**	**20.5241**	**0.0421**		**1.5224**	**1.5224**		**1.4260**	**1.4260**	**0.0000**	**4,091.7440**	**4,091.7440**	**1.0923**		**4,119.0518**

3.3 Pump Stations - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	1.0183	26.4171	6.6652	0.0616	1.2761	0.1407	1.4167	0.3676	0.1345	0.5021		6,432.8212	6,432.8212	0.9477		6,456.5139
Worker	0.1252	0.0947	0.8147	2.3300e-003	0.2555	1.5200e-003	0.2570	0.0678	1.4000e-003	0.0692		231.9388	231.9388	7.2300e-003		232.1196
Total	**1.1435**	**26.5118**	**7.4799**	**0.0639**	**1.5316**	**0.1422**	**1.6737**	**0.4353**	**0.1359**	**0.5713**		**6,664.7600**	**6,664.7600**	**0.9549**		**6,688.6335**

3.4 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0227	0.0000	0.0227	3.4400e-003	0.0000	3.4400e-003			0.0000			0.0000
Off-Road	3.5134	35.7830	22.0600	0.0388		1.7949	1.7949		1.6697	1.6697		3,816.8994	3,816.8994	1.0618		3,843.4451
Total	**3.5134**	**35.7830**	**22.0600**	**0.0388**	**0.0227**	**1.7949**	**1.8176**	**3.4400e-003**	**1.6697**	**1.6731**		**3,816.8994**	**3,816.8994**	**1.0618**		**3,843.4451**

3.4 Demolition - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	7.9000e-004	0.0264	4.1100e-003	8.0000e-005	1.6000e-003	7.0000e-005	1.6700e-003	4.4000e-004	7.0000e-005	5.1000e-004		8.1625	8.1625	8.1000e-004		8.1827
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1252	0.0947	0.8147	2.3300e-003	0.2555	1.5200e-003	0.2570	0.0678	1.4000e-003	0.0692		231.9388	231.9388	7.2300e-003		232.1196
Total	**0.1260**	**0.1211**	**0.8188**	**2.4100e-003**	**0.2571**	**1.5900e-003**	**0.2587**	**0.0682**	**1.4700e-003**	**0.0697**		**240.1013**	**240.1013**	**8.0400e-003**		**240.3023**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0227	0.0000	0.0227	3.4400e-003	0.0000	3.4400e-003			0.0000			0.0000
Off-Road	3.5134	35.7830	22.0600	0.0388		1.7949	1.7949		1.6697	1.6697	0.0000	3,816.8994	3,816.8994	1.0618		3,843.4451
Total	**3.5134**	**35.7830**	**22.0600**	**0.0388**	**0.0227**	**1.7949**	**1.8176**	**3.4400e-003**	**1.6697**	**1.6731**	**0.0000**	**3,816.8994**	**3,816.8994**	**1.0618**		**3,843.4451**

3.4 Demolition - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	7.9000e-004	0.0264	4.1100e-003	8.0000e-005	1.6000e-003	7.0000e-005	1.6700e-003	4.4000e-004	7.0000e-005	5.1000e-004		8.1625	8.1625	8.1000e-004		8.1827
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1252	0.0947	0.8147	2.3300e-003	0.2555	1.5200e-003	0.2570	0.0678	1.4000e-003	0.0692		231.9388	231.9388	7.2300e-003		232.1196
Total	**0.1260**	**0.1211**	**0.8188**	**2.4100e-003**	**0.2571**	**1.5900e-003**	**0.2587**	**0.0682**	**1.4700e-003**	**0.0697**		**240.1013**	**240.1013**	**8.0400e-003**		**240.3023**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Industrial	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
User Defined Industrial	0.476209	0.032680	0.180467	0.114087	0.024329	0.006580	0.011188	0.138783	0.002207	0.001422	0.009265	0.001243	0.001540

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	35.1639	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Unmitigated	35.1639	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	8.0459					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	27.1181					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**35.1639**	**0.0000**	**1.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	8.0459					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	27.1181					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**35.1639**	**0.0000**	**1.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

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Appendix D

Biological Resources Reconnaissance Survey Report/Supplemental Rare Plant Survey

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September 27, 2018

Mr. Eric Garibay
Senior Engineer
AECOM
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Bakersfield, California 93309

Subject: Biological Resources Reconnaissance Survey Report for the Proposed Mojave Public Utility District Cache Creek Water Line Replacement Project

Dear Mr. Garibay,

AECOM conducted a biological resources desktop literature review and reconnaissance survey for the Mojave Public Utility District (MPUD) Cache Creek Water Line Replacement Project (Project). This biological resources technical report summarizes the Project description as well as methods, results, and discussion of the review and survey. Specifically, the report identifies sensitive biological resources, classifies vegetation communities, addresses potential impacts, and proposes protection measures and mitigation in support of the Project.

Project Description

MPUD owns and operates an 8-inch-diameter steel pipeline that conveys potable water from the Sand Canyon Well Field (Wells 6, 7, 8, and 9) to the communities of Cache Creek and Mojave as well as a California Highway Patrol (CHP) station on State Highway 58. The existing pipeline was installed in approximately 1950 and has become an operational burden to MPUD due to its age, poor condition, and other contributing factors including the location of the pipeline. The existing pipeline is located within the Union Pacific Railroad (UPRR) Right-of-Way (ROW) and within the confines of Cache Creek. The proximity to Cache Creek has resulted in washouts of the pipeline during heavy rain events over the past decades. An inspection of the pipeline in January 2015 revealed several locations where the pipeline is no longer buried and exposed to the creek and/or railroad operations.

To resolve this issue, MPUD proposes to install approximately 6 miles of new 10-inch-diameter potable water pipeline south and north of the UPRR ROW and State Highway 58, between the City of Tehachapi and the community of Cache Creek in Kern County, California (Figure 1). Specifically, the pipeline will be located within Sections 34, 35, and 36 of Township 32 South, Range 34 East, M.D.M., and Sections 27, 28, 29, 30, 31, and 32 of Township 32 South, Range 35 East, M.D.M. With the exception of a few sections of Bureau of Land Management (BLM)-administered public land, the conceptual alignment will be located within utility easements along private property (Figure 2). MPUD has ongoing relationships with all of the private land owners along the conceptual alignment. Therefore, it is assumed easements within these properties will be granted for the new pipeline alignment.

The existing 8-inch-diameter steel pipeline will be abandoned in place after the new pipeline is in service. The portion of the pipeline from the Sand Canyon Well Field to a point approximately 400 feet west of Cameron Road is in good condition and will not require replacement. The proposed pipeline replacement will begin at this location and remain south of the UPRR ROW to a point approximately 8,600 feet east of Cameron Road where the pipeline will be bored and jacked under Cache Creek, UPRR ROW, and State Highway 58. The exact location of the crossing will be determined in consultation with California Department of Transportation and UPRR at the time of the pipeline design. At this point, the pipeline will be located north of State Highway 58 where the Pacific Crest Trail coincides with a portion of the alignment and will likely be encroached during construction. The alignment will intersect the LA Rose Creek and will be bored and jacked under the creek. From the creek, the pipeline will travel northeast along a series of defined dirt roads that are used for access across the hills north of State Highway 58, to a point north of the CHP station. The proposed Project includes a new service line within a previously disturbed corridor to the CHP station. From the station, the pipeline will continue east along the same defined dirt roadways to the final point of connection at the Cache Creek water system. The proposed Project also includes approximately a quarter mile of new 8-inch-

diameter pipeline between the Cache Creek Pump Station and the existing Cache Creek Pipeline. This pipeline is referred to as the pump station connection alignment (Figure 2).

The new 10-inch-diameter pipeline will be placed in a trench varying in depth between approximately 6 and 16 feet, with 1.5-to-1 side slopes for trench safety and stability or vertical sides that will be shored. Given an average trench bottom width of 3 feet and an average trench depth of 6 feet, the width of the trench at ground level would be about 21 feet. Excavation would involve removal of about 72 cubic feet of soil per linear foot of trench. A stockpile would be maintained along the pipeline alignment. The pipeline installation rate is estimated at 250 feet per day. The daily work area would be approximately 500 feet long by 40 feet wide. Any excess spoil from the excavations will be used to re-establish grade along the alignment, resulting in no need for off-site hauling. Earthwork for this phase of construction is estimated at 84,500 cubic yards. Typical underground pipeline construction equipment will include two excavators, one motor grader, one off-highway truck, two water trucks, one wheeled loader, one skip loader, one backhoe, and one boring machine. Equipment and materials will be staged at various locations within the alignments. The alignment access and egress routes will be via existing dirt roads and through gates along fenced areas. As an alternative, MPUD is considering replacement of the existing 8-inch-diameter steel pipeline with a new 10-inch-diameter pipeline within the UPRR ROW to the south of State Highway 58. The work description is similar to that mentioned above (Figure 2).

Currently, there are two pump stations which are part of the existing pipeline system that includes a pump serving the CHP station and another pump serving the Cache Creek community. These two pump stations will be abandoned as part of the Project. The existing pipeline operates by gravity with no pumping of flows on the main line. Due to the steep terrain of the conceptual alignment along the northern side of State Highway 58, a pump station will be needed to boost the water to the Cache Creek water system. The new pump station will be installed inside of a new building at the existing and fully fenced Well 9 facility because electrical power and Supervisory Control and Data Acquisition are already available at the site. As a result of the water boosting, pressures downstream of the high point are anticipated to be high, resulting in the need to install one or two pressure-reducing stations along the alignment between the pipeline high point and the final point of connection with the Cache Creek water system. Construction would consist of site grading and earthwork, piping installation, concrete foundation work, building construction including mechanical, electrical, plumbing, instrumentation, and installation of a hydro-pneumatic tank. Construction equipment will vary by phase and will include one crane, one excavator, one off-highway truck, one water truck, one wheeled loader, one roller, one backhoe, one skip loader, one welder, and one air compressor for sandblasting and coating. Equipment and materials will be staged within or directly adjacent to the fenced Well 9 facility (Figure 2).

The construction schedule is anticipated to be continuous for a period of approximately 12 months during daylight hours at 10 hours per day, Monday through Friday. The following schedule identifies the duration for each construction task.

MPUD Cache Creek Pipeline Replacement Project

Estimated Construction Schedule

Month	1	2	3	4	5	6	7	8	9	10	11	12
Construction Task												
Planning/Mobilization/Material Procurement												
Pipeline Installation/Abandonment												
Pump Station Installation												
Cleanup/Demobilization												

Methods

Biological investigations to determine the potential for sensitive biological resources to occur within the proposed Project included both a desktop literature review and field surveys. The methods employed for these investigations are described in the following sections. For the purposes of this report, sensitive biological resources are defined as species that are included on one or more of the following lists:

- Plant and wildlife species that are listed as threatened or endangered, or are candidates for listing as threatened or endangered under the Federal Endangered Species Act (ESA);
- Plant and wildlife species that are listed as threatened or endangered, or are candidates for listing as threatened or endangered under the California ESA;
- Plant and wildlife species covered in the BLM West Mojave Plan (WEMO)[1];
- California Department of Fish and Wildlife (CDFW)-designated Species of Special Concern (SSC) and Rare Plant Species;
- CDFW-designated Fully Protected Species;
- CDFW-designated Natural Communities[2]; and
- California Native Plant Society (CNPS) with a California Rare Plant Rank of 1, 2, or 3[3].

Desktop Literature Review

Prior to conducting field surveys, AECOM biologists reviewed state and federal databases and historical reports to identify sensitive biological resources including federal- and state-listed plant and wildlife species, other special-status species, and sensitive Natural Communities with the potential to occur within the vicinity of the proposed Project. Additionally, the Natural Communities were assessed for their suitability to support sensitive biological resources. Natural Communities and special-status plant and wildlife species data was evaluated and mapped within a 1-mile buffer surrounding the Project using the following sources:

- Cache Peak, Mojave, and Monolith 7.5-minute United States Geological Survey topographic quadrangles;
- Aerial maps of the proposed Project location;
- CDFW-designated Natural Communities;
- California Natural Diversity Database (CNDDB)[4]; and
- CNPS Inventory of Rare and Endangered Plants.

Reconnaissance Survey

On May 30 and 31, 2018, AECOM senior biologist Mr. Ray Romero, conducted a biological resources reconnaissance survey and vegetation community assessment of the proposed Project, including a 250-foot vegetation mapping buffer known collectively as the study area. The observed vegetation communities were documented and the study area was assessed for the potential presence of special-status species and their habitat. A pedestrian survey was conducted, wherever access was available, and binoculars were used where access was restricted to verify vegetation communities, wildlife, and plants. A single transect was walked in a zig-zag pattern that extended approximately 50 feet wide on each side of the pipeline centerline. Therefore, the transect encompassed the 40-foot-wide work area and an additional 60 feet. The vegetation community mapping extended 250 feet on each side of the pipeline centerline. Vegetation communities were classified and defined according to A Manual of California Vegetation, 2nd Edition[5]. Protocol and focused plant and wildlife species surveys were not conducted. Incidental observations of water drainages, plants, and wildlife were documented. A camera was used to photo-document the study area and vegetation communities (Attachment 1).

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[1] U.S. Department of Interior. Bureau of Land Management. 2005. Final Environmental Impact Report and Statement for the West Mojave Plan. A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment.
[2] California Department of Fish and Wildlife Natural Community Database from www.wildlife.ca.gov/Data/GIS/Vegetation-Data Vegetation Datasets: Tehachapi Pass High Speed Rail Corridor and Mojave Vegetation for the DRECP, Expansion Sept 30, 2014.
[3] California Native Plant Society Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California (online edition, v8-02). California Native Plant Society. Sacramento, CA. Accessed at http://www.rareplants.cnps.org. Accessed through August 2018.
[4] California Department of Fish and Wildlife. 2018. California Natural Diversity Database. Database Query for the Cache Peak, Mojave and Monolith 7.5 minute Quadrangle. August.
[5] Sawyer, J.O., T. Keeler-Wolf, and J. Evens. 2009. A Manual of California Vegetation, Second Edition. California Native Plant Society. Sacramento, California.

Results

This section presents the results of the desktop literature review and reconnaissance survey. The review and survey results identified potential and field documented sensitive biological resources and vegetation communities within the study area, respectively.

Desktop Literature Review

The study area is located within private property and BLM-administered public lands. With the exception of a couple of short segments, the entire Project area is located within the BLM WEMO boundary (Figure 2). The CDFW Natural Communities review within 1 mile of the study area resulted in numerous sensitive Natural Communities (Figure 3). Based on the CNDDB review, no special-status plant species and several special-status wildlife species records are within 1 mile of the study area (Table 1 and Figure 3).

Table 1. CNDDB Records of Special-status Wildlife Species within 1 Mile of the Study Area

Common Name	Scientific Name	Status
Mojave Desert Tortoise	*Gopherus agassizii*	Federal and State of California Threatened
Mohave Ground Squirrel	*Xerospermophilus mohavensis*	State of California Threatened
Prairie Falcon	*Falco mexicanus*	CDFW Watch List
American Badger	*Taxidea taxus*	CDFW SSC
Tulare Grasshopper Mouse	*Onychomys torridus tularensis*	BLM Sensitive and CDFW SSC
San Joaquin Pocket Mouse	*Perognathus inornatus*	BLM Sensitive
Tehachapi Pocket Mouse	*Perognathus alticolus inexpectatus*	CDFW SSC

The Mojave desert tortoise is the state reptile of California and Nevada and is listed as a threatened species under the federal and State of California ESAs. It has a long life span of 50 to 80 years. Its shell is high-domed and greenish-tan to dark brown in color. An adult can attain a length of about 15 inches with males being slightly larger than females. The front limbs have sharp, claw-like scales and are flattened for digging, and the back legs are elephantine in shape. The desert tortoise occupies the Mojave and Sonoran deserts north and west of the Colorado River in southwestern Utah, southern Nevada, southeastern California, and northwestern Arizona and is one of most elusive desert inhabitants, spending up to 95 percent of its life underground. It is most active after seasonal rains and inactive during most of the year. The desert tortoise inhabits sandy flats to rocky foothills including alluvial fans, washes, and canyons with suitable soils for burrows and a variety of plant communities including Joshua tree woodland, creosote bush scrub, saltbush scrub, and Mojave mixed woody scrub. The species is an herbivore and grasses form the bulk of its diet, but it also eats herbs, annual wildflowers, and new growth of cacti, as well as their fruit and flowers.

The Mohave ground squirrel is listed as a threatened species under the State of California ESA. It is a medium-sized ground squirrel where the adult measures about 9 inches in length. Dorsal coloration is uniformly light gray or brown, often with a wash of cinnamon or pink, while ventral coloration is cream colored. The squirrel begins a period of estivation toward the end of July, but may occur as early as April in drought years. This species inhabits the western Mojave Desert in portions of Inyo, Kern, Los Angeles, and San Bernardino counties in California. It is the only ground squirrel that exclusively inhabits the Mojave Desert in California. It can occupy a variety of desert habitats including Joshua tree woodland, creosote bush scrub, saltbush scrub and Mojave mixed woody scrub. Soils are usually friable and conducive to burrow excavation. The species is an herbivore and typical forage shrubs include winterfat (*Krascheninnikovia lanata*), spiny hopsage (*Grayia spinosa*), and saltbush (*Atriplex* sp.). Preferred habitat includes ample forage to allow Mohave ground squirrels to persist during drought periods.

The Prairie falcon is on the CDFW watch list. Males and females are about 15 and 17 inches in length, respectively. The plumage is warm gray-brown above and pale with dark mottling below. The head has a narrow "moustache" mark similar to the Peregrine falcon and a white line over the eye. In summer, it occupies open country, especially arid habitats including high desert. In winter, it is more widespread, ranging to low deserts and occasionally to towns. The

Prairie falcon preys on small mammals and small to medium-sized birds caught in flight, though it will occasionally take larger birds.

The American badger is a CDFW SSC. It has a stocky and low-slung body with short, powerful legs that are identifiable by their huge fore claws. Measuring generally between 23 and 30 inches in length, males are slightly larger than females. Except for the head, the American badger is covered with a grizzled, brown, black, and white coat of coarse fur, giving almost a mixed brown-tan appearance. Its triangular face shows a distinctive black and white pattern, with brown or blackish "badges" marking the cheeks and a white stripe extending from the nose to the base of the head. It is found in the western and central United States in habitat typified by open grasslands. It may also be found in forest glades, marshes, deserts and mountain meadows. The badger is generally nocturnal; however, in remote areas with no human encroachment it is routinely observed foraging during the day. This fossorial carnivore predominantly preys on gophers, ground squirrels, moles, woodrats, kangaroo rats and deer mice, often digging to pursue prey into their dens.

The Tulare grasshopper mouse is a BLM sensitive species and CDFW SSC. It is a subspecies of the southern grasshopper mouse with a stout body, short, club-like tail, and sharply bicolored fur with the head and upperparts pale brown to gray or pinkish-cinnamon and the underparts white. The tail is usually bicolored with a white tip. Historically, the Tulare grasshopper mouse ranged from western Merced and eastern San Benito counties east to Madera County and south to the Tehachapi Mountains. Currently, the species is known to occur along the western margin of the Tulare Basin, including western Kern County; Carrizo Plain Natural Area; along the Cuyama Valley side of the Caliente Mountains, San Luis Obispo County; and the Ciervo-Panoche Region, in Fresno and San Benito counties. Typically, it inhabits arid shrub land communities in hot, arid grassland and shrub land associations. The Tulare grasshopper mouse is primarily a carnivore, with a particular appetite for small mammals and insects; it also eats other invertebrates and seeds. This species is no longer known to occupy the Tehachapi Mountains including the Project area; therefore, it is given no further consideration or analysis.

The San Joaquin pocket mouse is a BLM sensitive species. It is buff in color, and the tail has a short tuft of hairs at its tip. The fur on the head and body is short and soft, without spines or bristles. The pocket mouse can be distinguished from similar small rodents by their external opening, fur-lined cheek pouches. The pocket mouse differs from the kangaroo mouse in not having the soles of the feet entirely covered in fur. The San Joaquin pocket mouse is endemic to California and is found in the Tehachapi Mountains and the lower slopes of the western Sierra Nevada. It also occurs in the upper Sacramento Valley, San Joaquin Valley, Salinas Valley, and Mojave Desert. The San Joaquin pocket mouse feeds on seeds of grasses and various plants, carrying them back to its burrow in its cheek pouches. It may also eat soft-bodied invertebrates.

The Tehachapi pocket mouse is a CDFW SSC. Its coloration is yellowish-brown and heavily overlaid with black dorsally and white ventrally. The tail is bicolored, measures slightly more than the head-body length, and is crested along the distal one-third. The pocket mouse can be distinguished from similar small rodents by their external opening fur-lined cheek pouches. The pocket mouse differs from the kangaroo mouse in not having the soles of the feet entirely covered in fur. The Tehachapi pocket mouse occupies native and non-native grasslands, Joshua tree woodland, pinyon-juniper woodland, yellow pine woodland and oak savannah. Potential habitat exists along the southeastern slopes of the Tehachapi Mountains. The Tehachapi pocket mouse is a nocturnal granivore, foraging primarily on seeds of grasses, forbs and annuals, but also on leafy plant material and insects.

Reconnaissance Survey

Pre-existing site disturbance conditions were observed within the study area and consisted of State Highway 58, UPRR ROW, residential housing, roads, Pacific Crest Trail, barbed wire fencing with locked gates, cattle grazing, utilities, CHP weigh station, water tanks, and ephemeral drainage enhancements. The mid and eastern segments of the conceptual alignment and alternate conceptual alignment follow existing dirt roads and UPRR ROW. The western segment of the conceptual alignment and pump station connection alignment are not located within an existing dirt road; however, this segment of the conceptual alignment is located within land currently used for cattle grazing.

Observed vegetation communities were mapped within the study area and are described below. The field mapping effort complemented the Natural Communities literature review. The sensitive vegetation communities with a state rarity rank of S1 to S3 that were identified during the literature review including California juniper woodland, Joshua

tree woodland, brittlebrush scrub, scale broom scrub and red willow thicket were confirmed present within the study area during the reconnaissance survey. Table 2 identifies the field-observed vegetation communities and associated acreages within the study area. Figures 4 through 12 graphically depict the vegetation communities within the study area.

Table 2. Vegetation Communities and Estimated Acreages within the Study Area

Vegetation Community	Area (acres)
California juniper woodland*	81.0
Joshua tree woodland**	106.0
creosote bush scrub	19.1
rubber rabbitbrush scrub	102.1
brittlebrush scrub**	36.0
allscale scrub	4.1
scale broom scrub**	4.0
tamarisk thicket	24.4
red willow thicket**	1.8
disturbed/ruderal	66.8
Total	**445.3**

*Sensitive Natural Community State Rarity Rank S4 with some S2
**Sensitive Natural Community State Rarity Rank S3

California juniper woodland is comprised of California juniper (*Juniperus californica*) as a dominant or co-dominant in a small tree canopy with Joshua tree (*Yucca brevifolia*). Associated shrubs include Mojave yucca (*Yucca schidigera*), California buckwheat (*Eriogonum wrightii*), paperbag bush (*Scutellaria mexicana*) and Mormon tea (*Ephedra nevadensis*). Stands are along slopes and alluvial fans with rocky or sandy soils associated with the lower Sierra Mountains. The mid-section of the conceptual alignment and CHP feeder are located within this vegetation community. Observed pre-existing disturbances included dirt roads, fencing, and Pacific Crest Trail. Therefore, this community is considered moderate- to high-quality habitat for the Prairie falcon, American badger, San Joaquin pocket mouse, and Tehachapi pocket mouse. The state rarity ranking for this community is S4 which is greater than 100 viable occurrences. However, some associations are as rare as S2 which is 6 to 20 viable occurrences.

Joshua tree woodland is comprised of Joshua tree as an emergent small tree over a shrub canopy with burrobush (*Ambrosia dumosa*), cheesebush (*Ambrosia salsola*), Mojave yucca, California buckwheat, creosote bush (*Larrea tridentata*), Anderson's thorn bush (*Lycium andersonii*) and Mormon tea. California juniper is a co-dominant in a small tree canopy with Joshua tree in some areas. Stands are along slopes and alluvial fans with gravel, coarse sands and sandy loam soils associated with the lower Sierra Mountains. The mid and eastern sections of the conceptual alignment are located within this vegetation community. Observed pre-existing disturbances included dirt roads, fencing, and an electrical powerline with poles and access road. Therefore, this community is considered moderate to high quality habitat for the Mojave desert tortoise, Mohave ground squirrel, Prairie falcon, American badger, San Joaquin pocket mouse and Tehachapi pocket mouse. The state rarity ranking for this community is S3 which is 21 to100 viable occurrences with some associations considered rare.

Creosote bush scrub is comprised of creosote bush as a dominant or co-dominant in the shrub canopy with burrobush, cheesebush, Anderson's thorn bush and Mormon tea. Emergent Joshua trees are present in low cover. Canopies are along slopes and intermittent washes with well drained soils associated with the lower Sierra Mountains. The eastern section of the conceptual alignment is located within this vegetation community. Observed pre-existing disturbances included dirt roads, fencing, and an electrical powerline with poles and an access road. Therefore, this community is considered moderate- to high-quality habitat for the Mojave desert tortoise, Mohave ground squirrel,

Prairie falcon, American badger, San Joaquin pocket mouse, and Tehachapi pocket mouse. The state rarity ranking for this community is S4 which is greater than 100 viable occurrences.

Rubber rabbitbrush scrub is comprised of rubber rabbitbrush (*Ericameria nauseosa*) as a dominant shrub. Rubber rabbitbrush is a fast growing, early seral shrub that establishes after disturbance. Canopies are associated with well drained sands and gravel comprising of disturbed areas such as the roads, UPRR ROW, and cattle grazed lands. The western section of the conceptual and alternate conceptual alignments is located within this vegetation community. Therefore, this community is considered low-quality to unsuitable habitat for the Mojave desert tortoise, Mohave ground squirrel, Prairie falcon, American badger, San Joaquin pocket mouse and Tehachapi pocket mouse. The state rarity ranking for this community is S5 which is secure due to its abundance.

Brittlebrush scrub is comprised of Virgen River brittlebrush (*Encelia virginensis*) as a dominant or co-dominant in the shrub canopy with cheesebush, rubber rabbitbrush, Mormon tea and paperbag bush. This community occurs along intermittently flooded arroyos, canyons, alluvial fans, and roads with alluvial and gravel substrates associated with the lower Sierra Mountains. The section of the conceptual alignment that crosses State Highway 58 is located within this vegetation community. Additionally, the LA Rose Creek drains into Cache Creek at this point and appears to flood and become inundated with water during heavy rainfall events. Observed pre-existing disturbances included roads, fencing, drainage enhancements, and Pacific Crest Trail. Therefore, this community is considered low- to moderate-quality habitat for the Mojave desert tortoise, Mohave ground squirrel, Prairie falcon, American badger, San Joaquin pocket mouse, and Tehachapi pocket mouse. The state rarity ranking for this community is S3 which is 21 to100 viable occurrences with some associations considered rare.

Allscale scrub is comprised of allscale (*Atriplex polycarpa*) as a dominant plant. This community occurs along washes and dissected alluvial fans with alkaline sandy soils. The pump station connection alignment is located within this vegetation community. Observed pre-existing disturbances included State Highway 58, UPRR ROW, roads, fencing, and drainage enhancements. Therefore, this community is considered low- to moderate-quality habitat for the Mojave desert tortoise, Mohave ground squirrel, Prairie falcon, American badger, San Joaquin pocket mouse and Tehachapi pocket mouse. The state rarity ranking for this community is S4 which is greater than 100 viable occurrences. The United States Fish and Wildlife Service (USFWS) Wetland Inventory recognizes this species as a facultative plant.

Scale broom scrub is comprised of scale broom (*Lepidospartum squamatum*) as a dominant shrub. This community occurs along washes and dissected alluvial fans with sandy soils. The pump station connection alignment is located within this vegetation community. Observed pre-existing disturbances included State Highway 58, UPRR ROW, roads, fencing, and drainage enhancements. Therefore, this community is considered low- to moderate-quality habitat for the Mojave desert tortoise, Mohave ground squirrel, Prairie falcon, American badger, San Joaquin pocket mouse and Tehachapi pocket mouse. The state rarity ranking for this community is S3 which is 21 to 100 viable occurrences. However, some associations are as rare as S1.1 which is 6 or fewer viable occurrences.

Red willow thicket is comprised of red willow (*Salix laevigata*) as a dominant tree. This tree commonly grows with other riparian vegetation. The thicket is associated with a low gradient deposition south of Cache Creek. The western section of the conceptual alignment is located within this vegetation community. Observed pre-existing disturbances included fencing and cattle grazing. This community is considered moderate-quality habitat for the American badger and Prairie falcon. The state rarity ranking for this community is S3 which is 21 to100 viable occurrences. The USFWS Wetland Inventory recognizes this species as a facultative plant.

Tamarisk thicket is comprised of tamarisk (*Tamarix* spp.) as a dominant shrub. Tamarisk has invaded the area where dense, monotypic stands are associated with Cache Creek. The western section of the proposed and alternate conceptual alignments is located within this vegetation community. Observed pre-existing disturbances included roads, UPRR ROW, fencing, and cattle grazing. This community is considered low-quality to unsuitable habitat for the Mojave desert tortoise, Mohave ground squirrel, Prairie falcon, American badger, San Joaquin pocket mouse, and Tehachapi pocket mouse. There is no state rarity ranking for this community; however, tamarisk is identified as an invasive species by the BLM. Tamarisk is considered among the most invasive, widely distributed non-native plants to infest wetlands.

Disturbed/Ruderal refers to the UPRR ROW, utility corridor, roads and adjacent areas with compacted soils and invasive plant species that are first to colonize the disturbed areas. These plants include redstem filaree (*Erodium*

cicutarium), red brome (*Bromus rubens*), and Russian thistle (*Salsola tragus*). Ruderal plant species typically dominate the disturbed area for a few years, gradually losing competition to native species. Disturbed/Ruderal is generally a consequence of the activities associated with State Highway 58, UPRR ROW, roads, and utilities. This community is considered unsuitable habitat for the Mojave desert tortoise, Mohave ground squirrel, Prairie falcon, American badger, San Joaquin pocket mouse and Tehachapi pocket mouse. There is no state rarity ranking for this community; however, invasive plants comprise most of the vegetation of a ruderal community.

There were no incidental sightings of federal- or state-listed rare plant species; however, the reconnaissance survey was performed late in the blooming season and outside of the period for optimum detection of rare plants. Plants considered BLM sensitive, included Joshua tree and beavertail cactus, were observed adjacent to the conceptual alignment. Plant species observed during the survey included Joshua tree, California juniper, cheesebush, beavertail cactus (*Opuntia basilaris*), Mojave aster (*Xylorhiza tortifolia*), paperbag bush, Mojave yucca, red willow, rubber rabbitbrush, brittlebrush, Mormon tea, creosote bush, Anderson's thorn bush, burrobush, allscale, scale broom, and California buckwheat. Non-native vegetation including redstem filaree, red brome, Russian thistle, and tamarisk was observed.

Incidental sightings of special-status wildlife species included only the loggerhead shrike (*Lanius ludovicianus*), a CDFW SSC. Specifically, Mojave desert tortoise and Mohave ground squirrel as well as their sign were not observed during the survey. Wildlife species observed during the survey included western whiptail lizard (*Cnemidophorus tigris*), side-blotch lizard (*Uta stansburiana*), red-tailed hawk (*Buteo jamaicensis*), California quail (*Callipepla californica*), common raven (*Corvus corax*), desert cottontail rabbit (*Sylvilagus audubonii*), black-tailed hare (*Lepus californicus*), and white-tailed antelope ground squirrel (*Ammospermophilus leucurus*). Although the survey was performed within the bird-breeding season, nesting birds were not observed.

Several small and large ephemeral water drainages including Cache Creek, LA Rose Creek, and an unnamed wash north of the CHP facility were observed along the ROW. The proposed Project is expected to cross several drainages within the alignment. A Jurisdictional Determination and accompanying report will be completed and submitted separately.

Discussion

This section analyzes the potential impacts, discusses WEMO and potential mitigation for habitat disturbance, and proposes protection measures to avoid and minimize potential impacts to biological resources.

Impact Analysis

The pump station will be installed within a small addition to an existing building located at the Well 9 facility that is completely fenced. Additionally, equipment and materials in support of this work will be staged within or directly adjacent to the facility. The site is heavily disturbed and contains ruderal and rubber rabbitbrush scrub. New land disturbance and impacts to biological resources are not expected. Therefore, the pump station is given no further consideration or analysis.

The conceptual alignment, with the exception of the segment located south of State Highway 58, was intentionally sited within previously disturbed areas and existing dirt roads to reduce habitat disturbance and impacts to biological resources. However, this alignment is expected to result in new land disturbance resulting from a 40-foot-wide work corridor needed to install the pipeline. The segment south of State Highway 58 will result in temporary impacts within the entire 40-foot-wide disturbance corridor. Taking into account an average width of 15 feet of the existing dirt roads (defined as disturbed/ruderal), an additional 25 feet will be temporarily impacted along the segment north of State Highway 58. Therefore, the new land disturbance from the conceptual alignment was calculated as 31.1 total acres minus 8.5 disturbed/ruderal acres = 22.6 acres. It is anticipated the BLM will take into account the 22.6 acres for the habitat mitigation calculation under WEMO. The vegetation communities that will be impacted include brittlebrush scrub, California juniper woodland, creosote bush scrub, Joshua tree woodland, rubber rabbitbrush scrub, disturbed/ruderal, and tamarisk thicket (Table 3).

Table 3. Vegetation Communities and Estimated Habitat Impacts from the Conceptual Alignment

Conceptual Alignment	
Vegetation Community	**Acres**
brittlebrush scrub	2.5
California juniper woodland	4.2
creosote bush scrub	1.3
Joshua tree woodland	5.9
rubber rabbitbrush scrub	8.5
disturbed/ruderal	8.5
tamarisk thicket	0.2
Total	**31.1 (total) – 8.5 (ruderal) = 22.6**

The alternate conceptual alignment was intentionally sited within the UPRR ROW access road to reduce habitat disturbance and impacts to biological resources. However, this alignment is expected to result in new land disturbance resulting from a 40-foot-wide work corridor needed to install the pipeline. Taking into account an average width of 15 feet of the ROW road (defined as disturbed/ruderal), an additional 25 feet will be temporarily impacted. Therefore, the new land disturbance from the alternate conceptual alignment was calculated as 8.2 total acres minus 0.7 disturbed/ruderal acre = 7.5 acres. It is anticipated the BLM will take into account the 7.5 acres for the habitat mitigation calculation under WEMO. The vegetation communities that will be impacted include rubber rabbitbrush scrub, disturbed/ruderal, and tamarisk thicket (Table 4).

Table 4. Vegetation Communities and Estimated Habitat Impacts from the Alternate Conceptual Alignment

Alternate Conceptual Alignment	
Vegetation Community	**Acres**
rubber rabbitbrush scrub	4.3
disturbed/ruderal	0.7
tamarisk thicket	3.2
Total	**8.2 (total) – 0.7 (ruderal) = 7.5**

There is no pre-existing disturbance corridor for the pump station connection alignment. This alignment is expected to result in new land disturbance resulting from a 40-foot-wide work corridor needed to install the pipeline. Therefore, the new land disturbance from the pump station connection alignment is 0.9 acre. It is anticipated the BLM will take into account the 0.9 acre for the habitat mitigation calculation under WEMO. The vegetation communities that will be impacted include allscale scrub and brittlebrush scrub (Table 5).

Table 5. Vegetation Communities and Estimated Habitat Impacts from the Pump Station Connection Alignment

Pump Station Connection Alignment	
Vegetation Community	**Acres**
allscale scrub	0.3
brittlebrush scrub	0.6
Total	**0.9**

The proposed Project is located at the western extent of the geographic range for the Mojave desert tortoise and Mohave ground squirrel. The CNDDB search revealed records of these species near the eastern segment of the conceptual alignment. The Tehachapi Pass is a narrow corridor between the lower Sierra and Tehachapi Mountains. This corridor contains the Cache Creek Community, State Highway 58, Cameron Road, UPRR ROW, Pacific Crest Trail, utilities, cattle-grazed lands, several dirt roads, and mining activity. These pre-existing disturbances within and near the alignments have led to impacted soils with barren and disturbed vegetation resulting in lower-quality habitat and unsuitable conditions that further reduce the likelihood of these species occurring within the proposed Project area. However, the desert tortoise and ground squirrel may occur in undisturbed suitable habitat including Joshua tree woodland, creosote bush scrub, allscale scrub and brittlebrush scrub adjacent to the conceptual alignment that is located north of State Highway 58 and the pump station connection alignment. There is an increased chance of encountering these species as the conceptual alignment progresses to the east. Although the desert tortoise and Mohave ground squirrel may not be present within the proposed Project area and direct impacts are unlikely, these species may enter the area and become exposed to vehicle strikes, collapsed or excavated burrows, trench entrapment, or increased predation. Indirect impacts to these species may result from further habitat degradation, noise, dust, and vibration from the construction equipment. However, the equipment noise is expected to blend in with nearby vehicle and train traffic.

The aforementioned disturbances have also resulted in lower-quality habitat for the American badger, San Joaquin pocket mouse, and Tehachapi pocket mouse. However, these species may occur in undisturbed suitable habitat adjacent to the alignments. Although direct impacts are considered unlikely, these species may enter the area and become exposed to vehicle strikes, collapsed or excavated burrows, trench entrapment, or increased predation. Indirect impacts to these species may result from further habitat degradation, noise, dust, and vibration from the construction equipment. However, the equipment noise is expected to blend in with nearby vehicle and train traffic.

Suitable foraging habitat for the Prairie falcon occurs adjacent to the alignments; however, suitable nesting habitat occurs on ridges or cliffs within the surrounding mountains. Nesting habitat or behavior would not be impacted and this bird species can take flight to avoid potential impacts from the equipment installing the pipeline. Therefore, direct impacts to this species are not anticipated. Indirect impacts may result from further foraging habitat degradation, noise, dust, and vibration from the construction equipment. However, the equipment noise is expected to blend in with nearby vehicle and train traffic.

West Mojave Plan

With the exception of a couple of short segments, the alignments are entirely located within the BLM WEMO boundary. The following WEMO excerpts briefly describe the purpose of the plan and mitigation fees that apply to habitat disturbance.

> The West Mojave Plan is a habitat conservation plan and federal land use plan amendment that (1) presents a comprehensive strategy to conserve and protect the desert tortoise, Mohave ground squirrel (MGS) and nearly 100 other sensitive plants and animals and the natural communities of which they are a part, and (2) provides a streamlined program for complying with the requirements of the California and federal Endangered Species Acts (CESA and FESA, respectively). The plan was prepared through the collaborative effort of cities, counties, state and federal agencies having jurisdiction over lands within the region. The Plan will allow streamlined project permitting at the local level, equitable sharing of costs among participants, and shared stewardship of biotic resources.
>
> To replace the complex and time-consuming mitigation formulas, enhancement and endowment fees, and survey requirements, a single mitigation fee would be established as compensation for habitat disturbance within the West Mojave planning area. The mitigation fee is applicable to development and/or loss of habitat on both private and BLM-administered public lands, and is considered full compensation for habitat loss. On private lands, the mitigation fee applies to all new land disturbing development subject to a grading and/or building permit and is collected by the local jurisdiction at the time of permit issuance. On BLM lands, the mitigation fee applies to all new land disturbing projects subject to federal permits, and is collected by the BLM at the time of permit issuance. The mitigation fee is not additive where multiple species exist on site, or where species conservation areas overlap.

The alignments are expected to result in new land disturbance and habitat impacts have been calculated; therefore, mitigation fees are anticipated to be applicable. Further coordination and guidance will be sought from the BLM regarding the applicability of WEMO and potential mitigation fees.

Protection Measures

Although direct impacts to special-status wildlife species are considered unlikely, these species could potentially enter the Project area. Additionally, temporary impacts to habitat including sensitive vegetation communities are anticipated. Therefore, MPUD proposes the following protection measures to ensure avoidance and minimization of potential impacts to sensitive biological resources. These measures will also help prevent potential impacts to common wildlife and plants.

1. MPUD will develop and implement a brief Project-specific Worker Environmental Awareness Program (WEAP) that focuses on sensitive biological resources and protection measures. The WEAP will be provided by a qualified biologist and presented to all Project staff prior to working in the field.
2. Within 72 hours of the construction start, a qualified biologist will perform a preconstruction survey to identify any potential sensitive biological resources along the alignments. If the Mojave desert tortoise or Mohave ground squirrel are detected along the corridor, then avoidance measures including buffers will be implemented to protect these species. Additionally, these observations will be reported to the BLM within 24 hours. Bird buffers will also be established around active nests.
3. All observations of special-status wildlife will be reported to the qualified biologist. If a Mojave desert tortoise or Mohave ground squirrel is encountered along the alignments and is in immediate danger during construction, then work will cease in the immediate area and the qualified biologist will be consulted. These species will be allowed to leave the site on their own accord. These observations will be reported to the BLM within 24 hours. There will be no handling, harming, or harassing of wildlife by the workers.
4. All work will be performed during daylight hours. There will be no need for night lighting.
5. A speed limit of 20 miles per hour will be enforced while traveling on dirt roads to, from, and along the alignments.
6. To prevent the attraction of predators, trash will be kept in closed-lid containers and disposed of on a daily basis.
7. All equipment and workers will remain within approved work limits. Work limits will be delineated with lathe staking or a similar method.
8. Vegetation outside of the approved 40-foot-wide alignments will not be impacted. Junipers, Joshua trees, and cacti will be avoided when feasible.
9. Equipment and materials will be staged within the alignment and away from water drainages. Parked equipment will have secondary containment to prevent any fluid leaks coming into contact with the ground surface. Any hazardous waste spills will be immediately cleaned up and reported to the qualified biologist.
10. To prevent wildlife entrapment, erosion-control materials containing monofilament netting will not be used.
11. Any open trenches left overnight will be either fenced, covered, or have the ends sloped at a 3-to-1 ratio and an earthen bridge/ramp installed every 250 feet to facilitate the escape of wildlife.
12. Immediately prior to backfilling, the trench will be inspected for any entrapped wildlife. If safe to do so from the top of the trench, entrapped wildlife will be removed.
13. Open pipe segments staged along the alignment or in the trench will have the ends sealed to prevent wildlife entrapment.
14. The minimum amount of water for dust control will be used to prevent ponding/standing water that may attract predators.
15. All equipment will be clean and free of mud/debris prior to entering the Project area to prevent the spread of invasive plants.

If you have any questions regarding the biological resources technical report, please contact Ray Romero at (805) 764-4025.

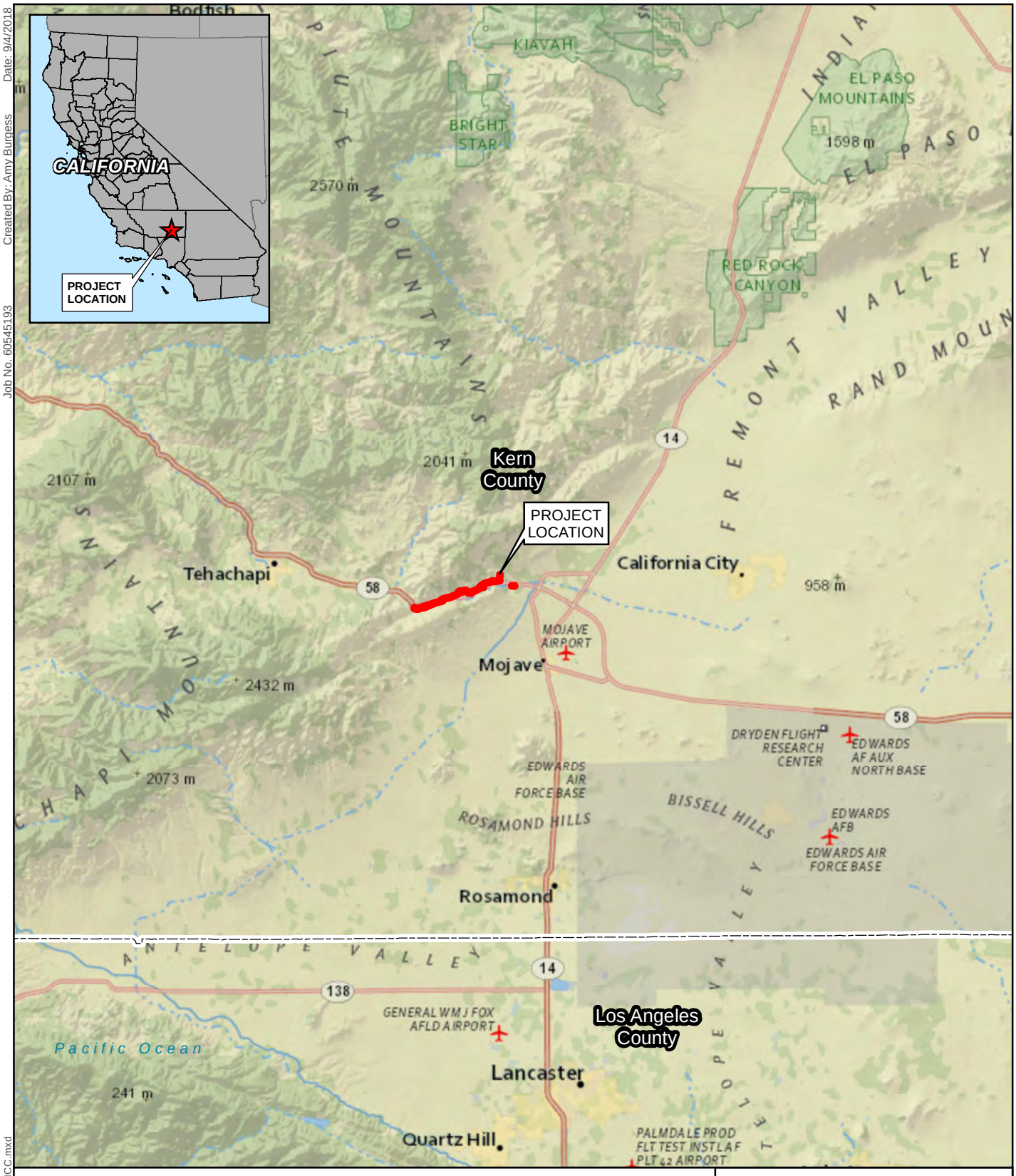
Sincerely,

Ray Romero
Senior Biologist

Julie Niceswanger-Hickman
Senior Biologist

Attachments:

Figure 1. Project Vicinity
Figure 2. Project Overview
Figure 3. Sensitive Natural Communities and Wildlife
Figures 4 through 12. Vegetation Communities and Photo Points
Attachment 1. Photographic Log



Date: 9/4/2018
Created By: Amy Burgess
Job No. 60545193
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Legend

- Project Area
- County Boundary

0 5 10 Miles

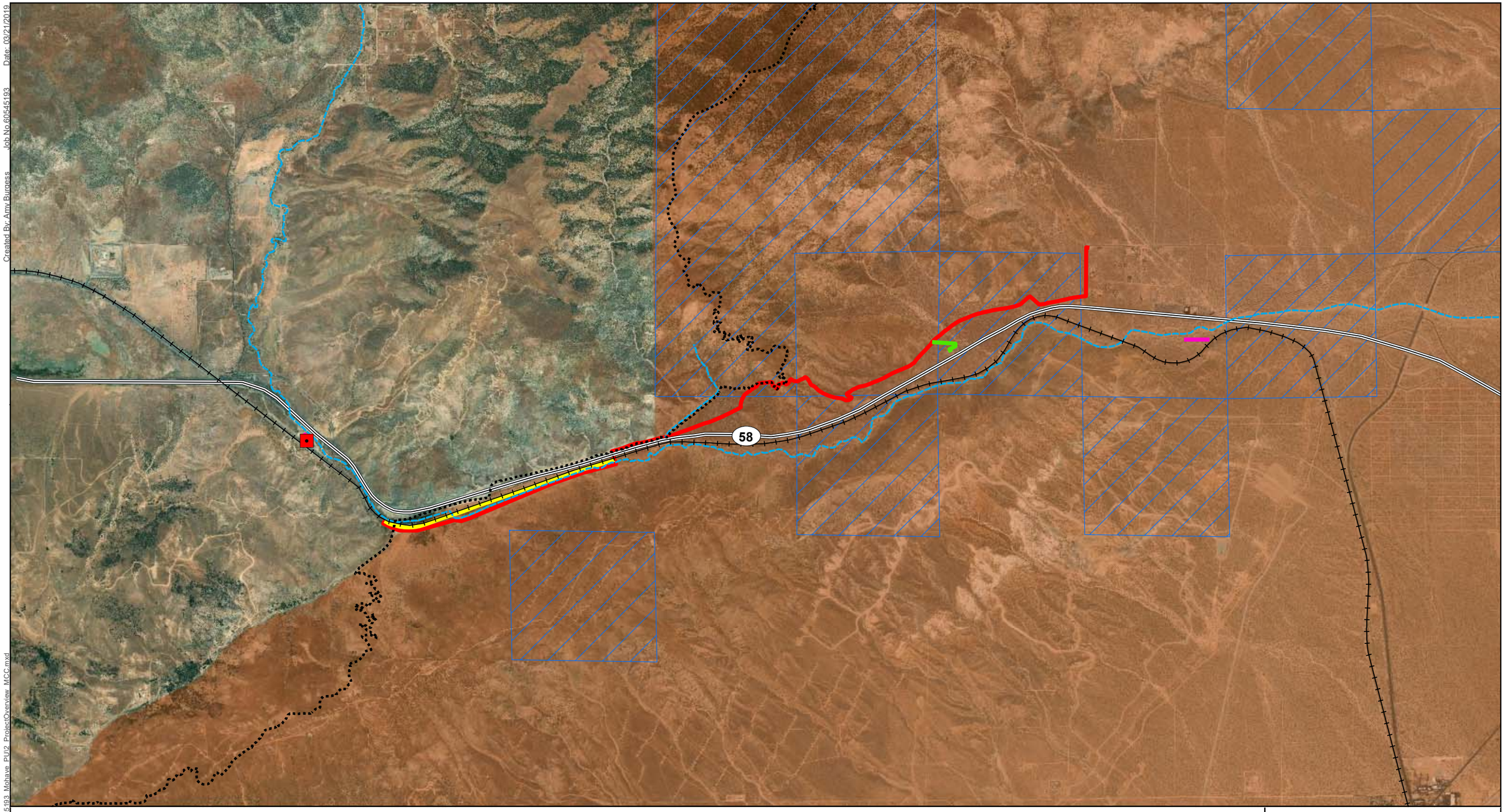
Base Map Source:
ESRI, ArcGIS Online
National Geographic World Map

FIGURE 1
PROJECT VICINITY

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 03/21/2019
Job No:60545193
Created By: Amy Burgess



Legend

- Well 9 Facility
- Cache Creek
- Railroad
- Pacific Crest Trail
- Alternate Conceptual Alignment
- Conceptual Alignment
- Feeder to CHP Facility
- Pump Station Connection Alignment
- BLM Property
- West Mojave Plan Boundary (WEMO)

0 0.5 1 Miles

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 2
PROJECT OVERVIEW

Mojave Public Utility District
Cache Creek Project

AECOM

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Date: 9/25/2018
Job No.60545193
Created By: Amy Burgess
J:\Client-Projects\Mojave Public Utility District\GIS\MXD\Figure 3 Natural Communities.mxd

58
58
58

Legend

- Well 9 Facility
- Cache Creek
- Railroad
- Pacific Crest Trail
- Alternate Conceptual Alignment
- Conceptual Alignment
- Feeder to CHP Facility
- Pump Station Connection Alignment
- 1-Mile Buffer

Sensitive Natural Community (State Rank)

- Ceanothus greggii (S3)
- Encelia (actoni, virginensis) (S3.2)
- Eriogonum wrightii (S3)
- Forestiera pubescens (S2)
- Grayia spinosa (S3)
- Gutierrezia sarothrae (S3)
- Juniperus californica (S4/S2)
- Lepidospartum squamatum (S3)
- Lycium andersonii (S3)
- Prunus fasciculata (S3)
- Purshia tridentata (S3)
- Salix laevigata (S3)
- Stipa speciosa (S2)
- Yucca brevifolia (S3)

CNDDB

- Plant
- Animal
- Tehachapi Pocket Mouse
- Desert Tortoise
- American Badger
- Tulare Grasshopper Mouse and San Joaquin Pocket Mouse
- Prairie Falcon

0 0.5 1 Miles

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 3
SENSITIVE NATURAL COMMUNITIES AND WILDLIFE

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 9/25/2018
Job No 60545193
Created By: Amy Burgess
J:\Client-Projects\Mojave Public Utility District\GIS\MXD\Figure 4-11_MPUD_VegetationCommunities.mxd



Legend

- Photo (Direction)
- Creek
- Well 9 Facility
- 250-Foot Survey Buffer

Vegetation Community

- Rubber Rabbitbrush Scrub
- Disturbed / Ruderal

0 400 800 Feet

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 4
VEGETATION COMMUNITIES AND PHOTO POINTS

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 9/25/2018
Job No 60545193
Created By: Amy Burgess
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Cameron Rd.
58
Cache Creek
Photo 1
Photo 2
Photo 3
Photo 4
Cameron Rd.

Legend

- Photo (Direction)
- Alternate Conceptual Alignment
- Conceptual Alignment
- Creek
- Pacific Crest Trail
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer

Vegetation Community

- Red Willow Thicket
- Rubber Rabbitbrush Scrub
- Tamarisk Thicket
- Disturbed / Ruderal

0 400 800 Feet

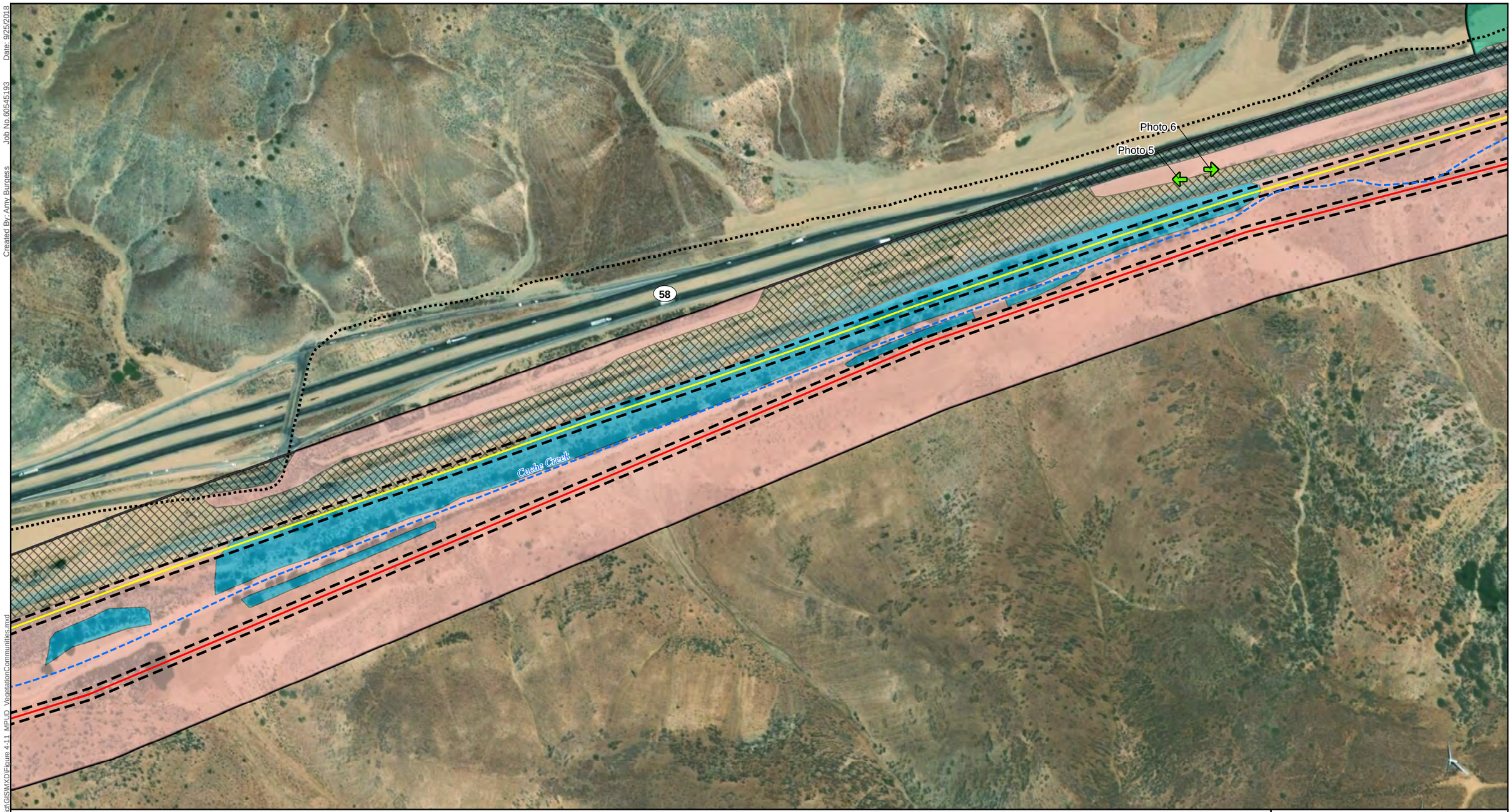
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 5
VEGETATION COMMUNITIES AND PHOTO POINTS

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 9/25/2018
Job No.60545193
Created By: Amy Burgess
J:\Client-Projects\Mojave Public Utility District\GIS\MXD\Figure 4-11_MPUD_VegetationCommunities.mxd



Legend

- Photo (Direction)
- Alternate Conceptual Alignment
- Conceptual Alignment
- Creek
- Pacific Crest Trail
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer

Vegetation Community

- Brittlebrush Scrub
- Rubber Rabbitbrush Scrub
- Tamarisk Thicket
- Disturbed / Ruderal

0 400 800 Feet

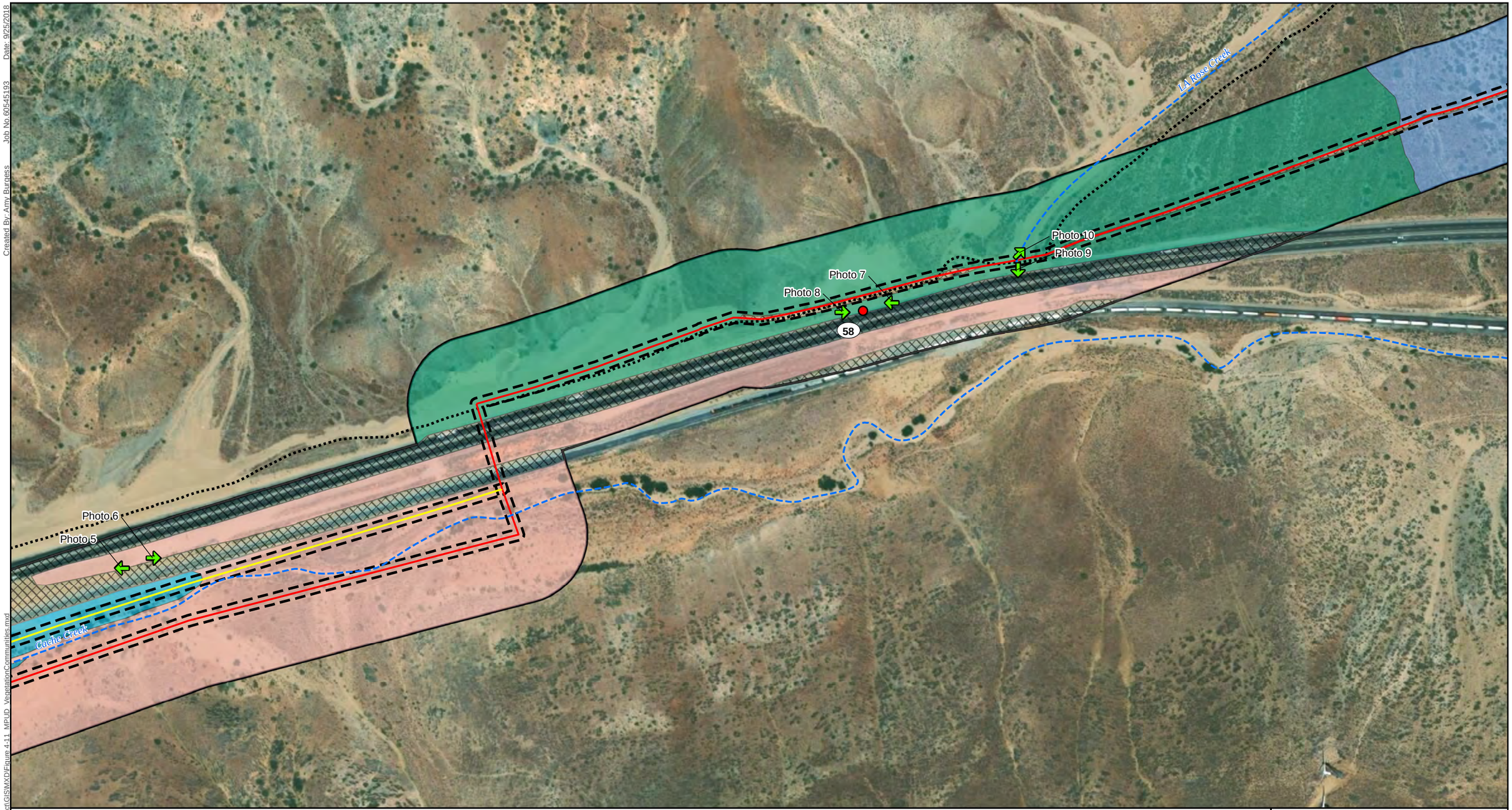
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 6
VEGETATION COMMUNITIES AND PHOTO POINTS

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 9/25/2018
Job No.60545193
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Legend

- Photo (Direction)
- Alternate Conceptual Alignment
- Conceptual Alignment
- Creek
- Pacific Crest Trail
- Gate
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer

Vegetation Community

- Brittlebrush Scrub
- California Juniper Woodland
- Rubber Rabbitbrush Scrub
- Tamarisk Thicket
- Disturbed / Ruderal

0 400 800 Feet

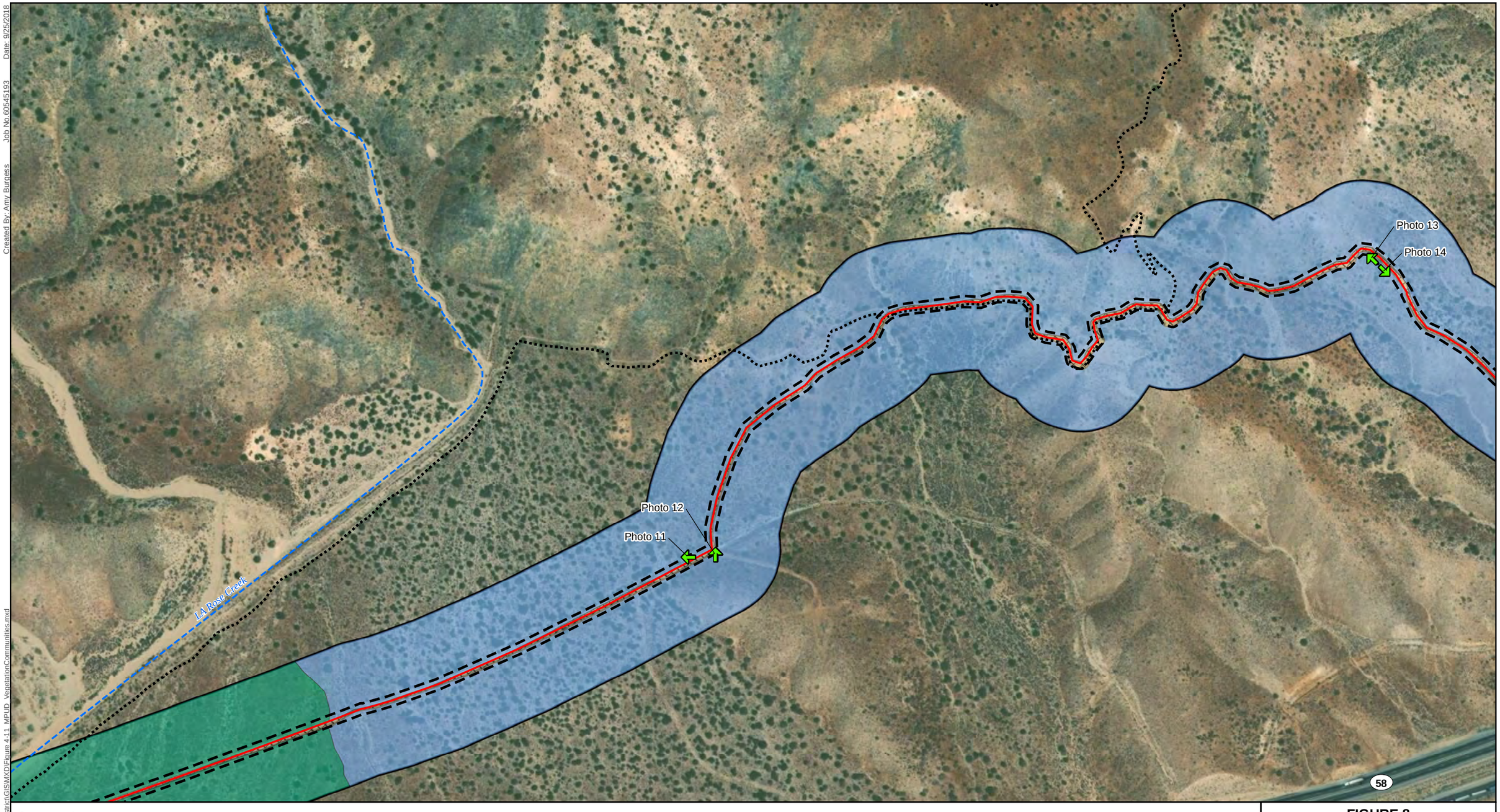
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 7
VEGETATION COMMUNITIES AND PHOTO POINTS

Mojave Public Utility District
Cache Creek Project

AECOM

Created By: Amy Burgess Job No 60545193 Date: 9/25/2018



Legend

- Photo (Direction)
- Conceptual Alignment
- Creek
- Pacific Crest Trail
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer

Vegetation Community

- Brittlebrush Scrub
- California Juniper Woodland
- Disturbed / Ruderal

0 400 800 Feet

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

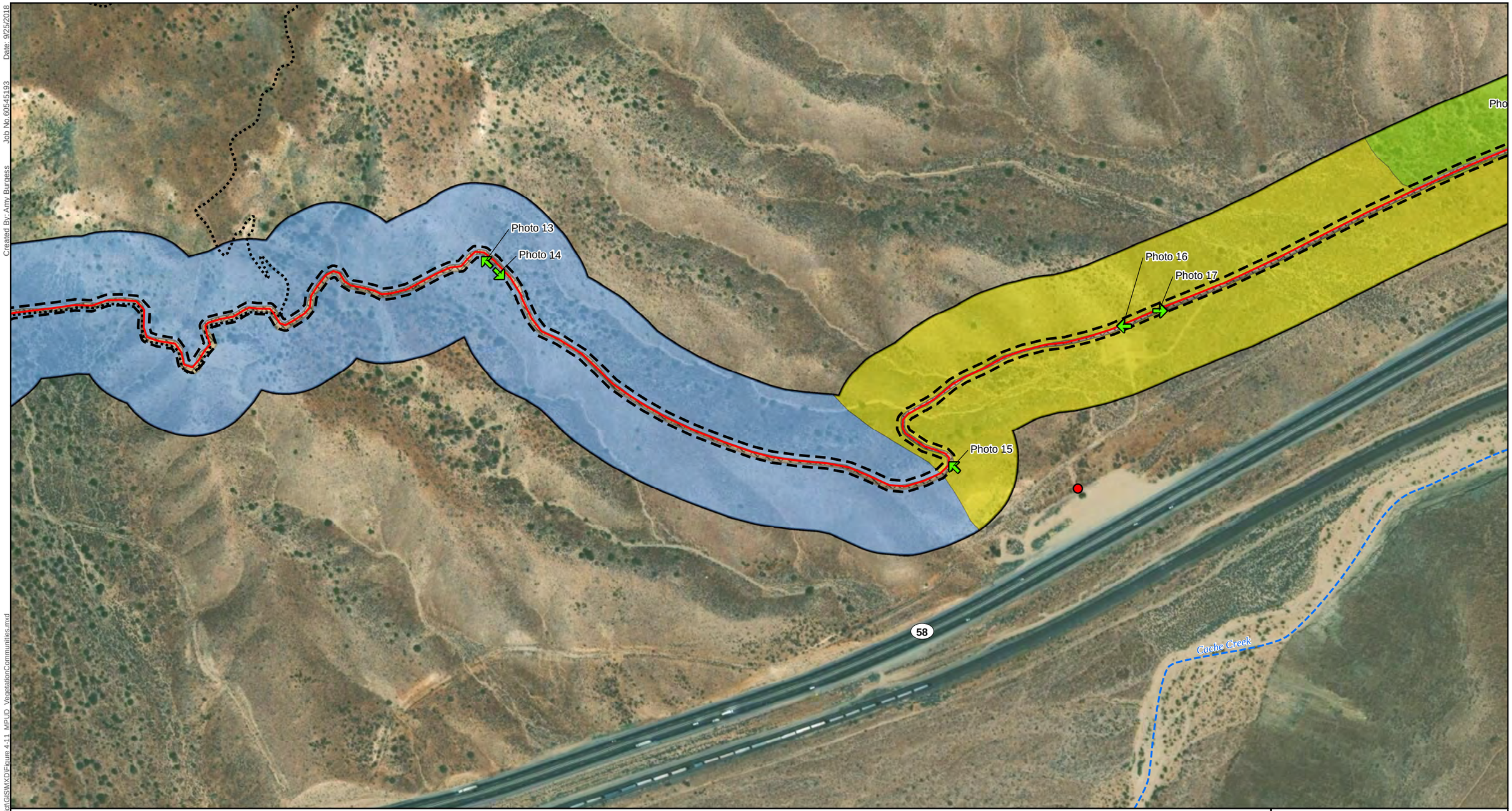
FIGURE 8
VEGETATION COMMUNITIES AND PHOTO POINTS

Mojave Public Utility District
Cache Creek Project

AECOM

J:\Client-Projects\Mojave Public Utility District\GIS\MXD\Figure 4-11_MPUD_VegetationCommunities.mxd

Date: 9/25/2018
Job No.60545193
Created By: Amy Burgess
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Legend

- Photo (Direction)
- Conceptual Alignment
- Creek
- Pacific Crest Trail
- Gate
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer

Vegetation Community

- California Juniper Woodland
- Creosote Bush Scrub
- Joshua Tree Woodland
- Disturbed / Ruderal

0 400 800 Feet

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 9
VEGETATION COMMUNITIES AND PHOTO POINTS

Mojave Public Utility District
Cache Creek Project

AECOM

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Job No 60545193
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Photo 23
Photo 22
Photo 21
58
Photo 19
Photo 18
Photo 20
Photo 16
Photo 17
Cache Creek

Legend

- Photo (Direction)
- Conceptual Alignment
- Feeder to CHP Facility
- Creek
- Gate
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer

Vegetation Community

- California Juniper Woodland
- Creosote Bush Scrub
- Joshua Tree Woodland
- Disturbed / Ruderal

0 400 800 Feet

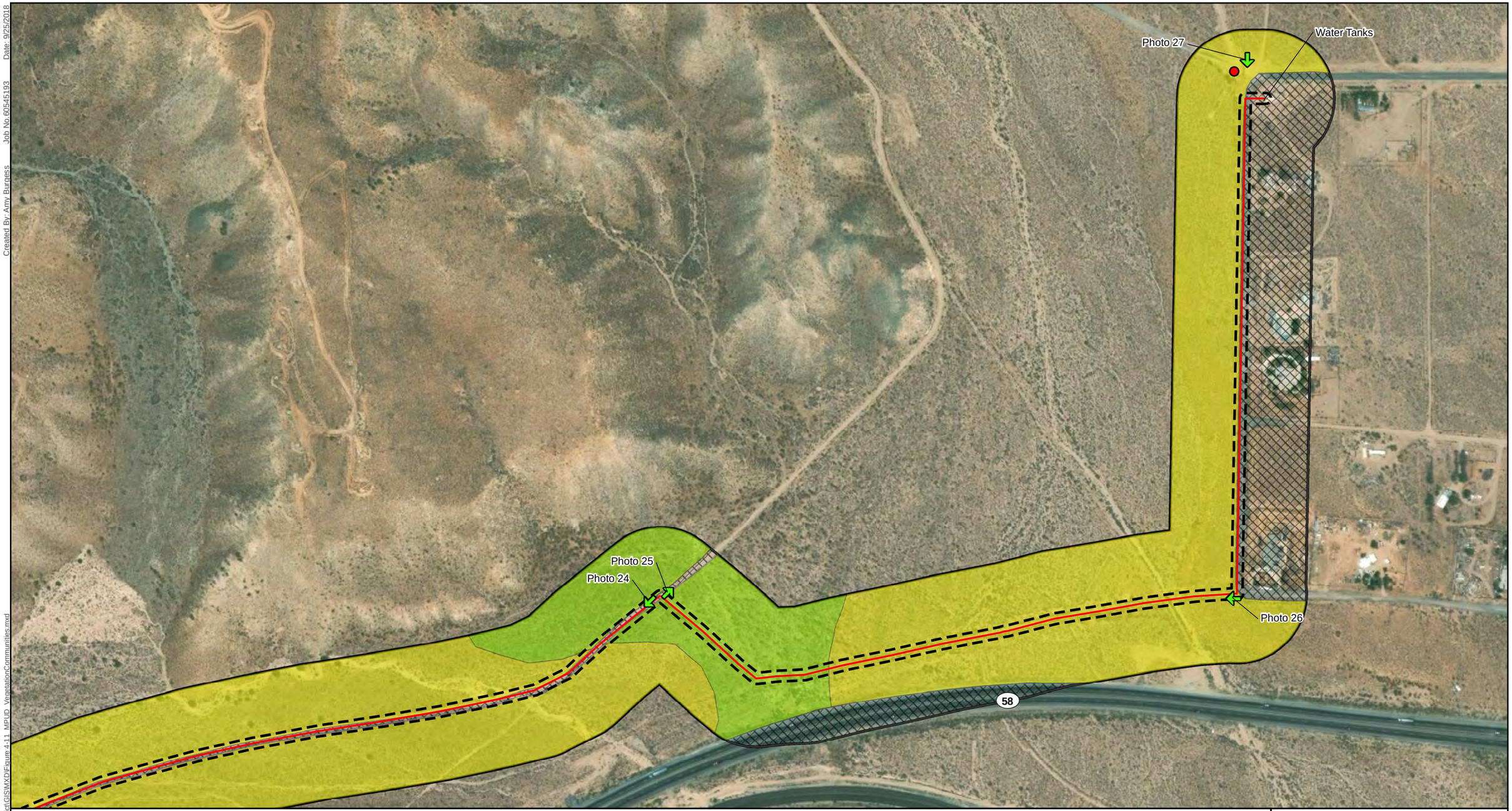
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 10
VEGETATION COMMUNITIES AND PHOTO POINTS

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 9/25/2018
Job No 60545193
Created By: Amy Burgess
J:\Client-Projects\Mojave Public Utility District\GIS\MXD\Figure 4-11_MPUD_VegetationCommunities.mxd



Legend

- Photo (Direction)
- Conceptual Alignment
- Gate
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer

Vegetation Community

- Creosote Bush Scrub
- Joshua Tree Woodland
- Disturbed / Ruderal

0 400 800 Feet

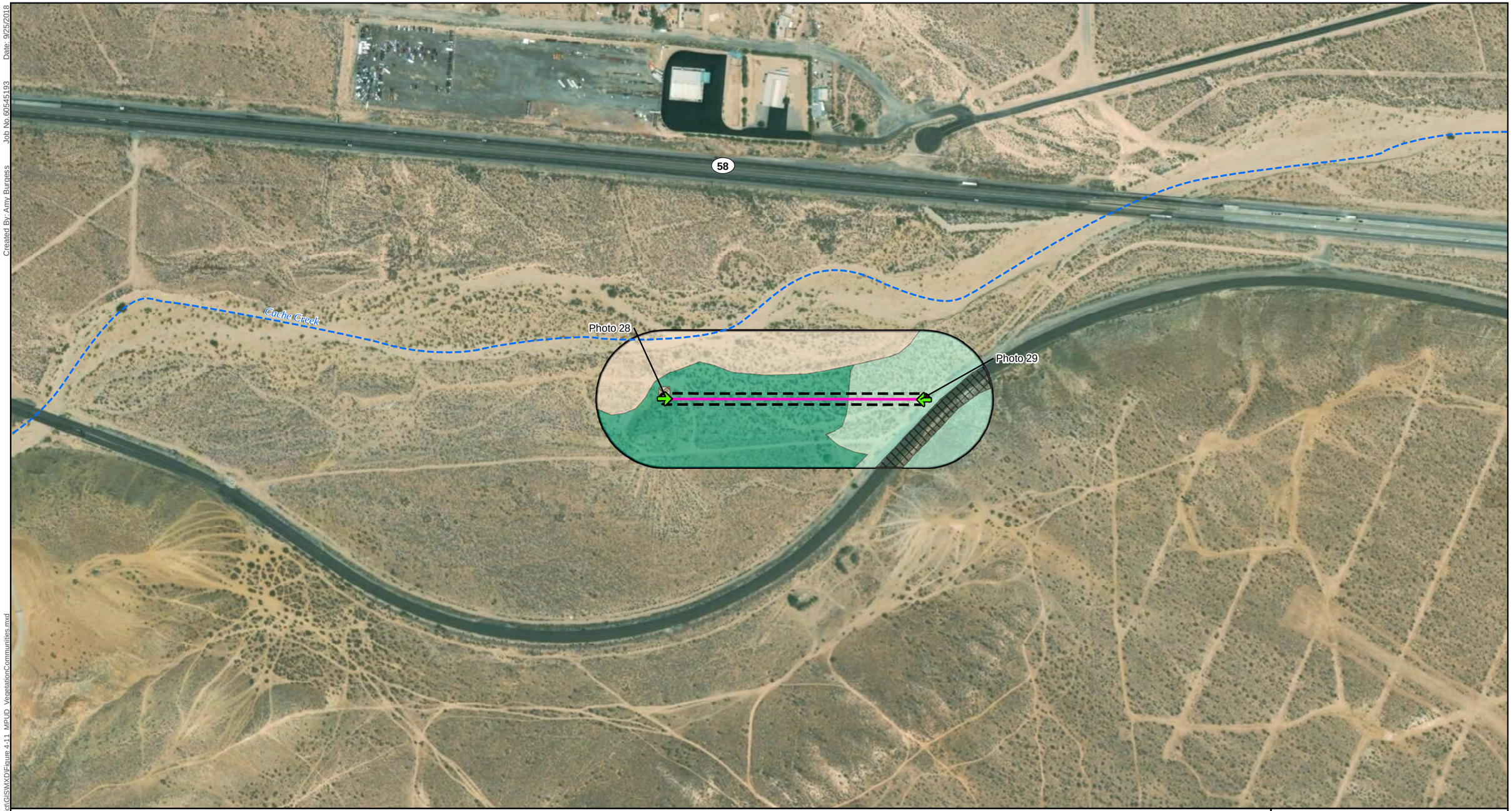
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 11
VEGETATION COMMUNITIES AND PHOTO POINTS

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 9/25/2018
Job No 60545193
Created By: Amy Burgess
J:\Client-Projects\Mojave Public Utility District\GIS\MXD\Figure 4-11_MPUD_VegetationCommunities.mxd



Legend

- Photo (Direction)
- Pump Station Connection Alignment
- Creek
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer

Vegetation Community

- Allscale Scrub
- Brittlebrush Scrub
- Scale Broom Scrub
- Disturbed / Ruderal

0 400 800 Feet

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 12
VEGETATION COMMUNITIES AND PHOTO POINTS

Mojave Public Utility District
Cache Creek Project

AECOM

Attachment 1

Photographic Log

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No.	Date:
1	5-30-18

Direction Photo Taken:
West

Description:
Looking west from Cameron Road at western extent of MPUD alternate conceptual alignment parallel to the railroad tracks. Conceptual alignment is to the south (left side of photo). Note UPRR mile post marker in foreground. Ruderal, rubber rabbitbrush scrub, and tamarisk thicket are the dominant vegetation communities.



Photo No.	Date:
2	5-30-18

Direction Photo Taken:
East

Description:
Looking east from Cameron Road at MPUD alternate conceptual alignment parallel to the railroad tracks. Conceptual alignment is to the south (right side of photo). Note conceptual route on private land with barbed-wire fencing on right side of photo. Land is used for cattle grazing. Ruderal, rubber rabbitbrush scrub, and tamarisk thicket are the dominant vegetation communities.



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No.	Date:
3	5-30-18

Direction Photo Taken:
West

Description:
Looking west at MPUD alternate conceptual alignment parallel to the railroad tracks. Conceptual alignment is to the south (left side of photo). Note conceptual alignment on private land with barbed-wire fencing on left side of photo. Land is used for cattle grazing. Ruderal, rubber rabbitbrush scrub, and tamarisk thicket are the dominant vegetation communities.



Photo No.	Date:
4	5-30-18

Direction Photo Taken:
East

Description:
Looking east at MPUD alternate conceptual alignment parallel to the railroad tracks. Conceptual alignment is to the south (right side of photo). Note conceptual alignment on private land with barbed-wire fencing and railroad tracks crossing Cache Creek. Land is used for cattle grazing. Ruderal, rubber rabbitbrush scrub, and tamarisk thicket are the dominant vegetation communities.



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No.	Date:
5	5-30-18

Direction Photo Taken:
West

Description:
Looking west at MPUD alternate conceptual alignment parallel to the railroad tracks. Conceptual alignment is to the south (left side of photo). Ruderal, rubber rabbitbrush scrub, and tamarisk thicket are the dominant vegetation communities.



Photo No.	Date:
6	5-30-18

Direction Photo Taken:
East

Description:
Looking east at MPUD alternate conceptual alignment parallel to the railroad tracks. Conceptual alignment is to the south (right side of photo). Ruderal, rubber rabbitbrush scrub, and tamarisk thicket are the dominant vegetation communities.



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No.	Date:
7	5-30-18

Direction Photo Taken:
West

Description:
Looking west at MPUD conceptual alignment adjacent to the Pacific Crest Trail. Note locked gate and Pacific Crest Trail in foreground and Cameron Road exit sign in background. Ruderal and brittlebrush scrub are the dominant vegetation communities.



Photo No.	Date:
8	5-30-18

Direction Photo Taken:
East

Description:
Looking east at MPUD conceptual alignment adjacent to the Pacific Crest Trail. Note locked gate and Pacific Crest Trail in foreground and LA Rose Creek in background. Ruderal and brittlebrush scrub are the dominant vegetation communities.



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No.	Date:
9	5-30-18

Direction Photo Taken:
South

Description:
Looking south at LA Rose Creek-State Highway 58 overpass from MPUD conceptual alignment. Note LA Rose terminates at Cache Creek beyond the overpass. Ruderal and brittlebrush scrub are the dominant vegetation communities.



Photo No.	Date:
10	5-30-18

Direction Photo Taken:
Northeast

Description:
Looking northeast at LA Rose Creek from MPUD conceptual alignment. Note LA Rose terminates at Cache Creek. Brittlebrush scrub is the dominant vegetation community.



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No.	Date:
11	5-30-18

Direction Photo Taken:
West

Description:
Looking west at MPUD conceptual alignment within existing dirt road. California juniper woodland is the dominant vegetation community. Note Joshua trees interspersed within California juniper woodland.



Photo No.	Date:
12	5-30-18

Direction Photo Taken:
North

Description:
Looking north at MPUD conceptual alignment within existing dirt road. California juniper woodland is the dominant vegetation community. Note Joshua trees interspersed within California juniper woodland.



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No.	Date:
13	5-30-18

Direction Photo Taken:
Northwest

Description:
Looking northwest at MPUD conceptual alignment within existing dirt road. California juniper woodland is the dominant vegetation community. Note Joshua trees interspersed within California juniper woodland.



Photo No.	Date:
14	5-30-18

Direction Photo Taken:
Southeast

Description:
Looking southeast at MPUD conceptual alignment within existing dirt road. California juniper woodland is the dominant vegetation community. Note Joshua trees interspersed within California juniper woodland.



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No.	Date:
15	5-30-18

Direction Photo Taken:
Northwest

Description:
Looking northwest at MPUD conceptual alignment within existing dirt road. Joshua tree woodland is the dominant vegetation community. Note California junipers interspersed within Joshua tree woodland.



Photo No.	Date:
16	5-30-18

Direction Photo Taken:
West

Description:
Looking west at MPUD conceptual alignment within existing dirt road. Joshua tree woodland is the dominant vegetation community.



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No.	Date:
17	5-30-18

Direction Photo Taken:
East

Description:
Looking east at MPUD conceptual alignment within existing dirt road. Joshua tree woodland is the dominant vegetation community.



Photo No.	Date:
18	5-31-18

Direction Photo Taken:
Southwest

Description:
Looking southwest at MPUD conceptual alignment within existing dirt road. Creosote bush scrub and Joshua tree woodland are the dominant vegetation communities.



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No.	Date:
19	5-31-18

Direction Photo Taken:
Northeast

Description:
Looking northeast at MPUD conceptual alignment within existing dirt road. Creosote bush scrub and Joshua tree woodland are the dominant vegetation communities.



Photo No.	Date:
20	5-31-18

Direction Photo Taken:
Northeast

Description:
Looking northeast toward MPUD conceptual alignment from State Highway 58 access gate. Note cattle guard in foreground.



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No.	Date:
21	5-31-18

Direction Photo Taken:
Southwest

Description:
Looking southwest at MPUD conceptual alignment within existing dirt road crossing an unnamed wash. Joshua tree woodland is the dominant vegetation community.



Photo No.	Date:
22	5-31-18

Direction Photo Taken:
Northeast

Description:
Looking northeast at MPUD conceptual alignment within existing dirt road crossing an unnamed wash. Joshua tree woodland is the dominant vegetation community.



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No.	Date:
23	5-31-18

Direction Photo Taken:
South

Description:
Looking south at CHP weigh station from MPUD conceptual alignment within existing dirt road crossing an unnamed wash. Joshua tree woodland is the dominant vegetation community.



Photo No.	Date:
24	5-31-18

Direction Photo Taken:
Southwest

Description:
Looking southwest at MPUD conceptual alignment within existing dirt road. Creosote bush scrub and Joshua tree woodland are the dominant vegetation communities.



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No.	Date:
25	5-31-18

Direction Photo Taken:
Northeast

Description:
Looking northeast at MPUD conceptual alignment within existing dirt road. Creosote bush scrub and Joshua tree woodland are the dominant vegetation communities.



Photo No.	Date:
26	5-31-18

Direction Photo Taken:
West

Description:
Looking west at MPUD conceptual alignment parallel to existing electrical distribution line. Note barbed-wire fence and signs prohibiting trespass due to mining operations. Joshua tree woodland is the dominant vegetation community.



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No.	Date:
27	5-31-18

Direction Photo Taken:
South

Description:
Looking south at eastern extent of MPUD conceptual alignment within an existing dirt road. Note the water tank to the left that the pipeline will tie into and the barbed-wire fence and signs prohibiting trespass due to mining operations on the right. Ruderal to the east and Joshua tree woodland to the west of the road are the dominant vegetation communities.



Photo No.	Date:
28	5-31-18

Direction Photo Taken:
East

Description:
Looking east at MPUD pump station connection alignment. Note State Highway 58 and UPRR ROW in background. Scale broom scrub, brittlebrush scrub, and allscale scrub are the dominant vegetation communities.



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No.	Date:
29	5-31-18

Direction Photo Taken:
West

Description:
Looking west at MPUD pump station connection alignment. Note Cache Creek community and wind turbines in background. Scale broom scrub, brittlebrush scrub, and allscale scrub are the dominant vegetation communities.



Photo No.	Date:
30	5-31-18

Direction Photo Taken:
Southeast

Description:
Looking southeast at the Well 9 Facility. Note facility is fully fenced. Ruderal and rubber rabbitbrush scrub are the dominant vegetation communities.



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June 6, 2019

Mr. Eric Garibay
Senior Engineer
AECOM
5001 East Commercenter Drive, Suite 100
Bakersfield, California 93309

Subject: Supplemental Rare Plant Survey Report for the Proposed Mojave Public Utility District Cache Creek Water Line Replacement Project

Dear Mr. Garibay,

AECOM conducted a rare plant survey and desktop literature review for rare plants as a supplement to the *Biological Resources Reconnaissance Survey Report (AECOM, September 2018)* previously prepared for the Mojave Public Utility District (MPUD) Cache Creek Water Line Replacement Project (Project). This rare plant survey report summarizes the methods, results, and discussion of the results of this survey. The Project description, construction timeline, and assessment of other natural resources can be found in the original report.

Executive Summary

Spring-season botanical surveys of the proposed MPUD Cache Creek Project (Figure 1) were conducted on May 7 through 9, 2019. This survey supplements the reconnaissance-level survey of the Project area performed in May 2018, which included vegetation classification and mapping as well as analyzed impacts to special-status wildlife and other resources. Since vegetation mapping was previously conducted, it was not included as part of this effort.

A literature review was conducted to identify special-status plant species with a potential to occur within the Project site. The list of potentially occurring special-status plants was derived from several sources including United States Geological Survey (USGS) 7.5-minute quadrangle-based searches of the California Natural Diversity Database (CNDDB), the California Native Plant Society (CNPS) on-line Inventory, and other sources. Twenty-four (24) special-status plant species were determined to have a potential to occur within and surrounding the Project site based on habitat preferences and known distribution (Table 1).

No plant taxa considered rare by the Federal Endangered Species Act (FESA) or State of California Endangered Species Act (CESA), CNPS, or sensitive by the Bureau of Land Management (BLM), were observed during the survey. Four (4) plant species protected under the California Desert Native Plants Act (CDNPA) were identified and recorded (Table 2 and Figures 3 through 11). Although problematic non-native plants were not a target of this survey, two potentially significant non-native plant species, tubercled crowfoot (*Ranunculus testiculatus*) and crossflower (*Chorispora tenella*) were observed and discussed below. A total of 142 plant taxa, representing 37 plant families, was identified within the survey area (Attachment 1).

Project Description

A detailed project description and construction timeline for the proposed Project can be found in *Biological Resources Reconnaissance Survey Report* (AECOM, September 2018).

Methods

Botanical investigations to determine the potential for special-status plants to occur within the proposed Project included both a desktop literature review and field surveys. The methods employed for these investigations are described in the following sections. For the purposes of this report, special-status plants are defined as species that are included on one or more of the following lists:

- Plant species that are listed as threatened or endangered, or are candidates for listing as threatened or endangered under the FESA;
- Plant species that are listed as threatened or endangered, or are candidates for listing as threatened or endangered under the CESA;
- Plant species considered BLM-sensitive plant species including those covered in the BLM West Mojave Plan (WEMO)[1],
- all plant lichen, or fungi recognized as "special" by the California Natural Diversity Database (CNDDB);
- California Native Plant Society (CNPS) with a California Rare Plant Rank of 1, 2, 3, or 4[2]; or
- California Desert Native Plants Act (CDNPA).

Desktop Literature Review

Prior to conducting field surveys, AECOM biologists reviewed state, federal, and public databases to identify special-status plant species with a potential to occur within the proposed Project area. Records of special-status plants recorded within nine 7.5-minute USGS quadrangles including and surrounding the proposed Project site (Cache Peak, Mojave, Monolith, Tehachapi North East, Tehachapi South, Tehachapi North, Willow Springs, Tylerhorse Canyon, and Soledad Mountain) were referenced using the following sources:

- Calflora and Consortium of California Herbaria (CCH)[3];
- CNDDB[4]; and
- CNPS Inventory of Rare and Endangered Plants.

Field Survey and Reference Site Visits

Between May 7 and 9, 2019, AECOM biologists conducted a spring rare plant survey of the proposed Project footprint. A pedestrian survey was conducted across the Project area following the guidelines of the BLM[5], California Department of Fish and Game[6], the United States Fish and Wildlife Service[7], and the CNPS.[8] Two transects were walked along the linear portion of the Project's 40-foot-wide alignment which enabled 100-percent coverage. A single transect was walked around the perimeter of the Well 9 facility and survey coverage was obtained from outside of the security-fenced facility. An inventory list of all plant taxa was maintained during the survey (Attachment 1). The surveys were floristic in nature, meaning that all plant taxa observed in identifiable condition were identified to the level necessary to determine their rarity or listing status. Specimens were viewed with the use of a microscope or hand lens and keyed with several resources including: Jepson eflora[9], Kern County Flora[10], and Crossosoma: *Cryptantha* of Southern California[11] dichotomous keys. A Global Positioning System (GPS) unit capable of recording data to an accuracy of less than 3 meters was used to record target species and a data dictionary was included to store

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[1] U.S. Department of Interior. Bureau of Land Management. 2005. Final Environmental Impact Report and Statement for the West Mojave Plan. A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment.
[2] California Native Plant Society Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California (online edition, v8-02). California Native Plant Society. Sacramento, CA. http://www.rareplants.cnps.org. Accessed through May 2019.
[3] Consortium of California Herbaria. 2019. http://ucjeps.berkeley.edu/consortium/. Accessed in May 2019.
[4] California Department of Fish and Wildlife. 2019. California Natural Diversity Database. Database Query for the Cache Peak, Mojave, Monolith, Tehachapi North East, Tehachapi South, Tehachapi North, Willow Springs, Tylerhorse Canyon, and Soledad Mountain 7.5-minute Quadrangles. May 2019.
[5] Bureau of Land Management. 2009. Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant Species.
[6] California Department of Fish and Wildlife. 2018. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=18959&inline. Accessed in May 2019.
[7] United States Fish and Wildlife Service. 1996. Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed, and Candidate Plants. https://www.fws.gov/sacramento/es/Survey-Protocols-Guidelines/Documents/Listed_plant_survey_guidelines.PDF. Accessed in May 2019.
[8] California Native Plant Society (CNPS). 2001. CNPS Botanical Survey Guidelines. https://cnps.org/wp-content/uploads/2018/03/cnps_survey_guidelines.pdf. Accessed in May 2019.
[9] Jepson Flora Project (eds.) 2019. Jepson eFlora, http://ucjeps.berkeley.edu/eflora/. Accessed on May 13, 2019.
[10] Maynard, Moe, L. Kern County Flora 1st edition. California Native Plant Society, 2016.
[11] Simpson MG, Hasenstab KE (2009). *Cryptantha* of Southern California. Crossosoma 35: 1–59.

metadata associated with the occurrence. Occurrences of 0.25 mile apart or greater are considered distinct and are recorded separately. A camera was used to photograph target plant species (Attachment 2).

Reference site visits are valuable to perform prior to conducting field surveys to give the surveyors a positive search image of survey targets as well as offer information about the phenology of the target plants and their abundance in a given year. Known locations of two rare plant species considered most-likely to occur, pale yellow layia (*Layia heterotricha*) and Sylvan scorzonella (*Microseris sylvatica*), were visited in the Tehachapi area prior to the field survey. Unfortunately, the reference site visits yielded negative results, and the target species were not present in the areas searched.

Vegetation mapping was previously conducted by AECOM in 2018 and was not performed as part of this survey.

Qualifications of Biologists Performing the Survey

The spring rare plant survey was performed by senior botanist Angelique Herman and principal biologist Ray Romero. Both have over 10 years of experience in the natural resources field and have worked on a variety of projects throughout the state. They are familiar with the flora and vegetative communities of the Tehachapi Mountains and Mojave Desert. Ms. Herman has experience conducting floristic inventories and focused rare plant surveys in the Tehachapi region. Mr. Romero has experience conducting floristic inventories and focused rare plant surveys primarily in the Mojave Desert region. Resumes for both biologists are included in Attachment 3.

Results

This section presents the results of the desktop literature review and rare plant survey. The review and survey results identified rare plants with a potential to occur within the study area.

Desktop Literature Review

The study area is located within private property and BLM-administered public lands. Except for a couple of short segments, the entire Project area is located within the BLM WEMO boundary (AECOM, September 2018). The nine-quadrangle CNDDB search yielded 24 special-status plant species that were considered to have potential to occur within the Project area (Table 1). Information on regulatory status (rarity), blooming period, habitat requirements, site suitability and/or observations made are included in Table 1.

Table 1. Special-status Plant Species with Potential to Occur within the Study Area

Common Name (*Scientific Name*)	Status federal/state/CRPR	Blooming Period	Habitat Requirements	Suitability/Observations
wine-colored tufa moss (*Plagiobryoides vinosula*)	- / - / 4.2	Not applicable	Occurs in cismontane woodland, Mojavean desert scrub, meadows and seeps, pinyon-juniper woodland and riparian woodland usually on granitic rock or granitic soil along seeps and streams, or sometimes clay soils at 90-5,305 foot elevation.	**Unlikely to occur.** Suitable habitat exists within the survey area. No mosses were observed at the time of the survey; however, mosses are cryptic and hard to survey for. The nearest known location is approximately 12 miles north of the Project area (CCH 2019).
Howell's onion (*Allium howellii* var. *howellii*)	- / - / 4.3	April-June	Occurs in open sunny slopes of grassland or forb-lands usually on heavy clay soil in Tehachapi Mountains at 1,830-4,000 foot elevation.	**Absent.** Suitable habitat exists within the survey area, but none were observed during the appropriately timed survey. The nearest known location is 150 feet north of the Project area (CCH 2019); however, this record is not recent.
Spanish Needle onion (*Allium shevockii*)	- / - / 1B.3	May-June	Occurs in pinyon-juniper woodland, and upper montane coniferous forest - in soil pockets on rock outcrops and talus slopes at 2,800-8,230 foot elevation.	**Absent.** Suitable habitat exists within the survey area, but none were observed during the appropriately timed survey. The nearest known location is approximately 5 miles north of the Project area (CNDDB 2019).
California androsace *(Androsace elongata* ssp. *acuta*)	- / - / 4.2	March-June	Occurs in chaparral, cismontane woodland, coastal sage scrub, valley and foothill grassland, highly localized small stature plant at 490-4,950 foot elevation.	**Possible to occur.** Suitable habitat exists within the survey area and several records are known within 5 foot of the project area (Calflora 2019); however, these records are from 1925. None were observed during the survey; however, this species is likely only identifiable for the short period of time each year.
Palmer's mariposa-lily (*Calochortus palmeri* var. *palmeri*)	- / - / 1B.1	April-July	Occurs in meadows and seeps, chaparral, lower montane coniferous forest, and moist places in yellow-pine forest or grasslands at 3,290-7,860 foot elevation.	**Absent.** Marginal habitat for this species exists within the survey area and none were observed during the appropriately timed survey. The nearest known location is approximately 7 miles north of the Project area (CNDDB 2019).
alkali mariposa-lily (*Calochortus striatus)*	- / - / 1B.2	April-June	Occurs in chaparral, chenopod scrub, Mojavean desert scrub, alkaline meadows, and ephemeral washes at 230-5,250 foot elevation.	**Absent.** Suitable habitat exists within the survey area, but none were observed during the appropriately timed survey. The nearest known location is approximately 13 miles from the Project area (CCH 2019).
Kern County evening-primrose (*Camissonia kernensis* ssp. *kernensis*)	- / - / 4.3	March-May	Occurs in Joshua tree woodland, pinyon, juniper woodland, and Mojavean scrub on sandy or gravelly soils at 2,430-7,050 foot elevation.	**Absent.** Suitable habitat exists within the survey area, but none were observed during the appropriately timed survey. The nearest known location is approximately 5 miles south of the Project area in Mojavean scrub (Calflora 2019).

Common Name (Scientific Name)	Status federal/state/CRPR	Blooming Period	Habitat Requirements	Suitability/Observations
white pygmy-poppy (*Canbya candida*)	- / - / 4.2	March-June	Occurs in Joshua tree woodland, and Mojavean desert scrub in washes or anywhere with loose sand between 1,970-4,800 foot elevation.	**Absent.** Suitable habitat exists within the survey area, but none were observed during the appropriately timed survey. The nearest known location is approximately 2 miles from the Project area (CCH 2019).
Mojave paintbrush (*Castilleja plagiotoma*)	- / - / 4.3	April-June	Occurs in great basin scrub, and Pinyon-juniper woodland in alluvial fans at 990-8,230 foot elevation.	**Absent.** Suitable habitat exists within the survey area, but none were observed during the appropriately timed survey. The nearest known location is approximately 2 miles from the Project area (CCH 2019).
Mojave spineflower (*Chorizanthe spinosa*)	- / - / 4.2	March-July	Occurs in chenopod scrub, and Mojavean desert scrub at 20-4,300 foot elevation.	**Absent.** Suitable habitat exists within the survey area, but none were observed during appropriately timed survey. The nearest known record is approximately 4 miles from the project area (CCH 2019).
streambank spring beauty (*Claytonia parviflora* ssp. *grandiflora)*	- / - / 4.2	May-June	Occurs in scrub, and cismontane woodland at 3,100-5,300 foot elevation.	**Absent.** Moderate habitat exists within the survey area, but none were observed during the appropriately timed survey. The nearest known location is approximately 6 miles from the Project area (CCH 2019).
Mt. Pinos larkspur (*Delphinium parryi* ssp. *purpureum*)	- / - / 4.3	May-June	Occurs in pinyon-juniper woodland, Mojavean desert scrub, and chaparral at 3,390-8,650 foot elevation.	**Absent.** Suitable habitat exists within the survey area, but none were observed during the appropriately timed survey. The nearest known location is approximately 3 miles from the Project area (Calflora 2019).
limestone dudleya (*Dudleya abramsii* ssp. *calcicole*)	- / - / 4.3	April-August	Occurs in pinyon-juniper woodland, and chaparral usually on limestone outcrops at 1,650-8,550 foot elevation.	**Absent.** Suitable habitat exists within the survey area, but none were observed during the appropriately timed survey. The nearest known location is approximately 6 miles from the Project area (CCH 2019).
Tracy's eriastrum (*Eriastrum tracyi*)	- / Rare / 3.2	May-July	Occurs in chaparral, valley and foothill grassland and cismontane woodland on gravelly shale or clay soils on sunny slopes or open areas at 1,040-3,700 foot elevation.	**Possible to occur.** Suitable habitat exists within the survey area, but none were observed during the survey. Another species of annual *Eriastrum* was observed within the survey area. The nearest known record is approximately 10 miles from the Project area (CCH 2019); however, this record is from 1910.

Common Name (Scientific Name)	Status federal/state/CRPR	Blooming Period	Habitat Requirements	Suitability/Observations
Barstow woolly sunflower (*Eriophyllum mohavense*)	- / - / 1B.2	May-July	Occurs in chenopod scrub, and creosote bush scrub, in dry washes or open playas with sandy soil in the Mojave Desert at 1,640-3,149 feet elevation.	**Unlikely to occur.** Suitable habitat exists within the survey area, but none were observed during appropriately timed survey. The nearest known record is approximately 15 miles from the Project area (CCH 2019).
Death Valley sandmat (*Euphorbia vallis-mortae*)	- / - / 4.2	May-October	Occurs in Mojavean desert scrub in dry washes or open playas with sandy soil at 1,640-4,380 feet elevation.	**Absent.** Suitable habitat exists within the survey area, but none were observed during appropriately timed survey. The nearest known record is approximately 18 miles from the Project area (CCH 2019).
pale-yellow layia (*Layia heterotricha*)	- / - / 1B.1	March-June	Occurs in pinyon-juniper woodland, and valley and foothill grassland on alkaline or fine, friable soils at 984- 5,249 feet elevation.	**Possible to occur.** Suitable habitat exists within the survey area, but none were observed during appropriately timed survey. The nearest known record is approximately 1 mile from the Project area (CNDDB 2019). Many recent records have been made of this species in the Tehachapi area.
solitary blazing star (*Mentzelia eremophila*)	- / - / 4.2	March-May	Occurs in Mojavean desert scrub at 2,300-4,010 feet elevation.	**Absent.** Suitable habitat exists within the survey area, but none were observed during appropriately timed survey. The nearest known record is approximately 9 miles from the Project area (CCH 2019).
sylvan microseris (*Microseris sylvatica*)	- / - / 4.2	March-June	Occurs in chaparral, cismontane woodland, Great Basin scrub, pinyon-juniper woodland, valley and foothill grassland at 150-4,940 foot elevation.	**Possible to occur.** Suitable habitat exists within the survey area and there are three herbarium records previously recorded within the survey area (CCH 2019). None were observed during appropriately timed survey.
Tehachapi monardella (*Monardella linoides* ssp. *oblonga*)	- / - / 1B.1	June-August	Occurs in coniferous forest, pinyon-juniper woodland on dry, decomposed granitic soils at 2,960-8,130 foot elevation.	**Absent.** Suitable habitat exists within the survey area, but none were observed during appropriately timed survey. This is a perennial herbaceous species and would have been identified if it was present. The nearest known record is approximately 10 miles from the Project area (CCH 2019).
large-flowered nemacladus (*Nemacladus secundiflorus* var. *secundiflorus*)	- / - / 4.3	April-June	Occurs in openings in chaparral, and valley and foothill grassland on dry, gravelly flats and slopes at 660-6,580 foot elevation.	**Absent.** Suitable habitat exists within the survey area, but none were observed during appropriately timed survey. The nearest known record is within the Tehachapi South Quadrangle (CNPS 2019).

Common Name (Scientific Name)	Status federal/state/CRPR	Blooming Period	Habitat Requirements	Suitability/Observations
adobe yampah (*Perideridia pringlei*)	- / - / 4.3	April-July	Occurs in chaparral, cismontane woodland, pinyon and juniper woodland, coastal scrub, and serpentine habitats on grassland hillsides, with clay soils, or seasonally wet sites between 990-5,920 foot elevation.	**Unlikely to occur.** Suitable habitat exists within the study area and the species has been observed to be common in similar habitats in the area, however none were observed during appropriately timed surveys. The nearest known locations are about 2 miles from the Project area (Calflora 2019).
Charlotte's phacelia (*Phacelia nashiana*)	- / - / 1B.2	May-June	Occurs in Joshua tree, pinyon-juniper woodlands, Mojavean scrub in Tehachapi Mountains on sandy to rocky soils at 1,968-7,217 feet elevation.	**Absent.** Suitable habitat exists within the survey area, but none were observed during appropriately timed survey. The nearest known record is approximately 20 miles from the survey area (CCH 2019).
Latimer's woodland-gilia (*Saltugilia latimeria*)	- / - / 1B.2	March-June	Occurs in chaparral, Mojavean desert scrub, and pinyon-juniper woodland in rocky or sandy, areas often granitic substrate, and sometimes found in washes at 1,200-5,700 foot elevation.	**Absent.** Suitable habitat exists within the survey area, but none were observed during appropriately timed survey. Fewer than 10 occurrences are known of this species (CNPS 2019) and the nearest known record is approximately 7 miles from the survey area (CCH 2019).

Sources:
California Natural Diversity Database. 2019; Calflora.org 2019; Consortium of California Herbaria 2019.

[1] **Conservation status abbreviations:**
United States Fish and Wildlife Service designations:
FE Endangered: Any species in danger of extinction throughout all or a significant portion of its range.
FT Threatened: Any species likely to become endangered within the foreseeable future.

California Department of Fish and Wildlife designations:
SE Endangered: Any species in danger of extinction throughout all or a significant portion of its range.
ST Threatened: Any species likely to become endangered within the foreseeable future.
SR Rare: Any species not currently threatened with extinction, but in such small numbers throughout its range that it may become endangered if its present environment worsens.

California Rare Plant Rank (CRPR) designations:
1B Plants rare, threatened or endangered in California and elsewhere.
2 Plants rare, threatened or endangered in California, but more common elsewhere.
3 Plants for which more information is needed – a review list.
4 Plants of limited distribution – a watch list.

CRPR threat categories:
.1 Seriously endangered in California.
.2 Fairly endangered in California.
.3 Not very endangered in California.

[2] **Occurrence potential definitions:**
Present: Species or sign of their presence observed on the site.
Likely: Species or sign not observed on the site, but reasonably certain to occur on the site.
Possible: Species or sign not observed on the site, but conditions suitable for occurrence.
Unlikely: Species or sign not observed on the site, conditions marginal for occurrence.
Absent: Species or sign not observed on the site during surveys.

Rare Plant Survey

A total of 142 plant taxa, representing 37 plant families, was identified within the survey area (Attachment 1). Floral nomenclature follows Jepson Eflora Project (2019). No plant taxa considered to be rare by FESA, CESA, BLM-sensitive, BLM WEMO, or CNPS were observed. Four plant species protected under CDNPA were identified and recorded (Table 2 and Figures 3 through 11). The number of individuals varied for each occurrence with the exception of silver cholla. For example, a single Joshua tree occurrence may have contained three individuals.

Table 2. Plant Species protected under CDNPA observed within the Survey Area

Common Name *(Scientific Name)*	Number of Occurrences	Number of Individuals
Joshua tree (*Yucca brevifolia*)	302	716
chaparral yucca (*Hesperoyucca whipplei*)	155	238
beavertail cactus (*Opuntia basilaris* var. *basilaris*)	81	87
silver cholla (*Cylindropuntia echinocarpa*)	4	4

Although non-native/invasive plants were not a specific target of this survey, BLM requests that plant observations of regional or local significance be reported as part of floristic inventories conducted under the Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant Species[12]. Two noteworthy non-native plant species, tubercled crowfoot (*Ranunculus testiculatus*) and crossflower (*Chorispora tenella*), were observed during the survey and require consideration. Observations of these species are noteworthy due to their limited distribution in the state. At the time of writing, both species have been documented only sporadically within the state, which could imply that they are early invaders and management considerations could be taken to limit their spread.

Tubercled crowfoot is a non-native plant species in the buttercup family (Ranunculaceae) and was found to be invasive in Canada and parts of the Midwest[13]. Records of tubercled crowfoot were first made in the Tehachapi region in 1998 but remain limited to the mountain ranges southwest of the Project site associated with Tehachapi Mountain Park. The nearest occurrence recorded prior to this survey, is approximately 5 miles away from the Project site. Observations of tubercled crowfoot within the proposed Project site were limited to the Well 9 Facility, and this species was not seen along the rest of the alignment.

Crossflower is a non-native plant species in the mustard family (Brassicaceae) and is classified as a List B noxious weed by California Department of Food and Agriculture[14]. This species is also currently limited in distribution across the state and has been documented only recently (2016) in the Tehachapi region. Observations of crossflower were made at the Well 9 Facility as well as along the pipeline alignment parallel to the Pacific Crest Trail.

Coordinate information for both potentially significant non-native plant species listed above can be provided to BLM upon request. No CNDDB forms or shapefile with corresponding metadata will be submitted with this report due to the lack of rare plant observations associated with this survey.

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[12] Bureau of Land Management. 2009. Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant Species.
[13] Cusick, A. W. 1989. Bur buttercup (*Ceratocephalus testiculatus*: Ranunculaceae): a poisonous plant newly established in Ohio. Mich. Bot., 28: 33-35.
[14] California Department of Food and Agriculture. 2003. *Pest ratings of noxious weed species and noxious weed seed* (20 October 2003). California Department of Food and Agriculture.

Discussion

This section discusses factors that may have affected the results of the survey, including local or range-wide significance of any plant population discovered, analyzes the potential impacts, and potential mitigation, and proposes protection measures to avoid and minimize potential impacts to special-status plant species.

Survey Limitations

No major environmental factors (i.e., drought, recent fire, severe grazing) were observed that would limit the effectiveness of this survey. The Tehachapi area received approximately 15 inches of rainfall over the course of the rain year between October 2018 and April 2019, which is considered above average rainfall for the area[15]. Annual plant species were present in abundance and most were at a phenological stage which made them readily identifiable.

Although it is difficult to time a survey perfectly to capture a multitude of target species, this survey is believed to have been well-timed to capture the twenty-four special-status species with potential to occur (Table 1). Common (non-special-status) taxa similar-looking to the special-status were identified during the survey, including species within the genera *Layia*, *Eriastrum*, and *Calochortus*. Attachment 1 provides a full list of all plants encountered during the survey. Most of the *Eriastrum* encountered during the survey could be positively identified as a common species called, maroon-spotted woollystar (*Eriastrum signatum*) based on floral characteristics. However, few of the plants did not have a corolla present during the time of the survey, and the vegetative characteristics are not diagnostic enough to provide a species-level determination for this group. It is likely that these unidentifiable plants follow the same species determination as the others; however, it is possible that other species of *Eriastrum* could occur within the survey location, including Tracy's eriastrum (*Eriastrum tracyi*) which is considered state rare and CRPR 3.2.

Impact Analysis

Because no plant taxa considered to be rare by FESA, CESA, BLM-sensitive, BLM WEMO, or CNPS were observed during the survey, it is considered unlikely that direct impacts to these species would occur as a result of the proposed Project. Further coordination and guidance will be sought from the BLM regarding the applicability of potential mitigation fees for the documented CDNPA species including: Joshua tree, chaparral yucca, beavertail cactus, and silver cholla.

Indirect impacts to special-status plant species and wildlife habitats in the vicinity of the proposed Project could occur as a result of Project equipment spreading invasive plant species.

Protection Measures

A comprehensive list of protection measures which includes measures for special-status wildlife, and other natural resources can be found in *Biological Resources Reconnaissance Survey Report (AECOM, September 2018).* Although direct impacts to rare plant species are considered unlikely, it is possible that a rare plant could be observed within the proposed Project area at a later time. Therefore, MPUD proposes the following protection measures to ensure avoidance and minimization of potential impacts to special-status plant species in addition to the measures originally proposed (AECOM, September 2018).

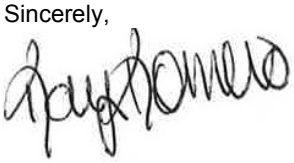
1. Within 72 hours of the construction start, a qualified biologist will perform a preconstruction survey to identify any potential sensitive biological resources along the proposed alignment. If a rare plant is detected along the corridor, then avoidance measures including buffers will be implemented to protect these species. Additionally, these observations will be reported to the BLM within 24 hours.
2. Vegetation outside of the approved 40-foot-wide alignments will not be impacted. Joshua trees, chaparral yucca, cacti, and other species included in the CDNPA, will be avoided when feasible.
3. Special care will be taken not to move soil or plant parts of non-native plant species considered to be of limited distribution across the state of California including: crossflower and tubercled crowfoot between Project locations

[15] Wunderground. 2019. Accessed online at: https://www.wunderground.com/dashboard/pws/KCATEHAC101/graph/2019-05-19/2019-05-19/monthly. Visited on May 19, 2019.

to limit the spread of early-introduction invasive plant species. Soil will not be moved from Well 9 Facility to any other Project location. All equipment will be clean and free of mud/debris prior to moving between Project locations in order to prevent the spread of invasive plants.

If you have any questions regarding the biological resources technical report, please contact Ray Romero at (805) 764-4025.

Sincerely,



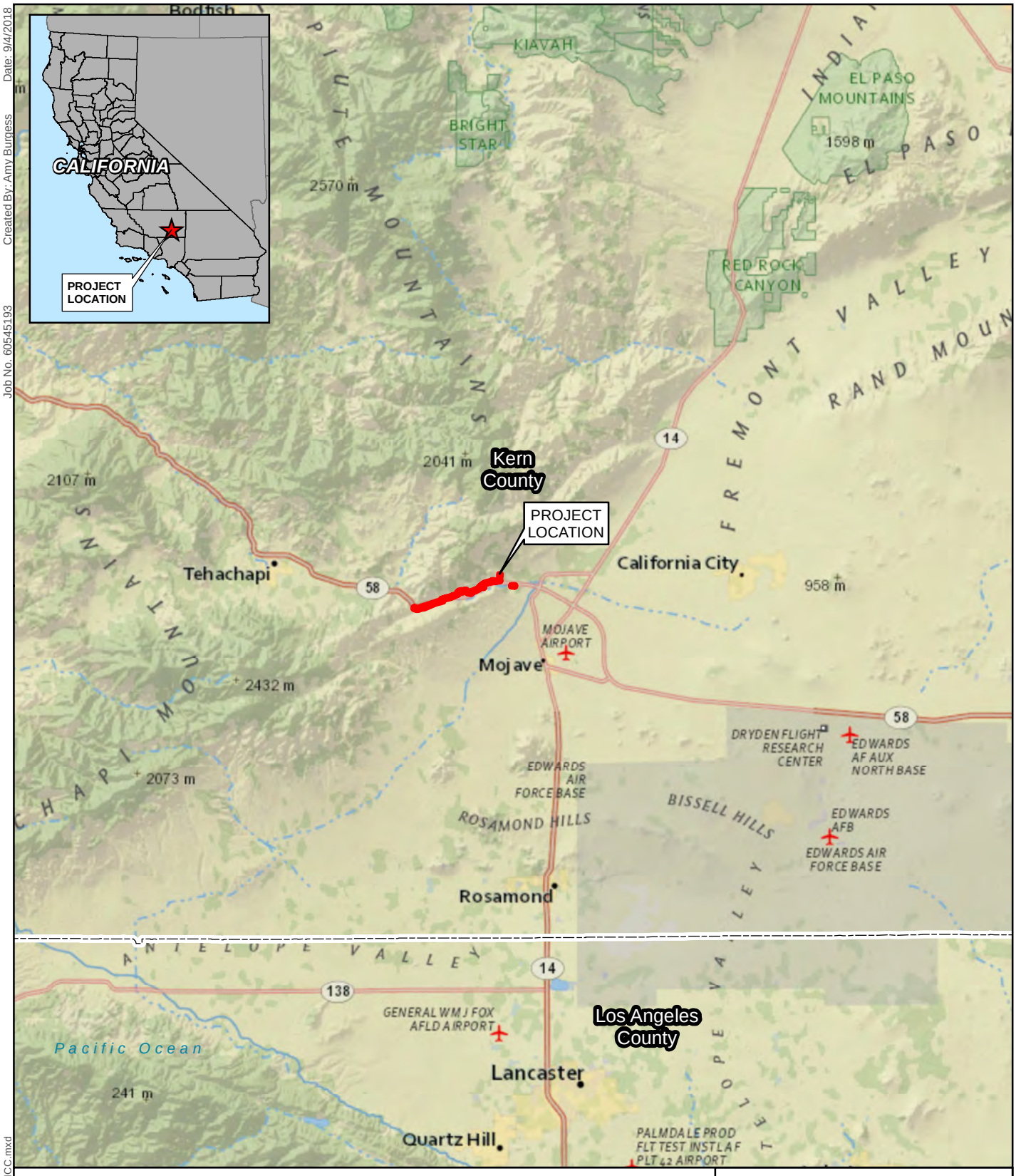


Ray Romero
Senior Biologist

Angelique Herman
Senior Botanist/ ISA-Certified Arborist

Attachments:

Figure 1 - Project Vicinity
Figure 2 - Project Overview
Figures 3 through 11 – Rare Plant Survey Supplemental (CDNPA Species Mapped)
Attachment 1 - Plant Taxa Observed
Attachment 2 - Photographic Log
Attachment 3 - Biologist Resumes



Date: 9/4/2018
Created By: Amy Burgess
Job No. 60545193
F:\MojaveCasheCreek\1. Project\Vicinity_MCC.mxd

Legend

- Project Area
- County Boundary

0 5 10 Miles

Base Map Source:
ESRI, ArcGIS Online
National Geographic World Map

FIGURE 1
PROJECT VICINITY

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 9/18/2018
Job No 60545193
Created By: Amy Burgess
J:\Client Projects\Mojave Public Utility District\GIS\MXD\Figure 2 Overview Figure.mxd

58
58
58

Legend

- Well 9 Facility
- Cache Creek
- Railroad
- Pacific Crest Trail
- Alternate Conceptual Alignment
- Conceptual Alignment
- Feeder to CHP Facility
- Pump Station Connection Alignment
- BLM Property
- West Mojave Plan Boundary (WEMO)

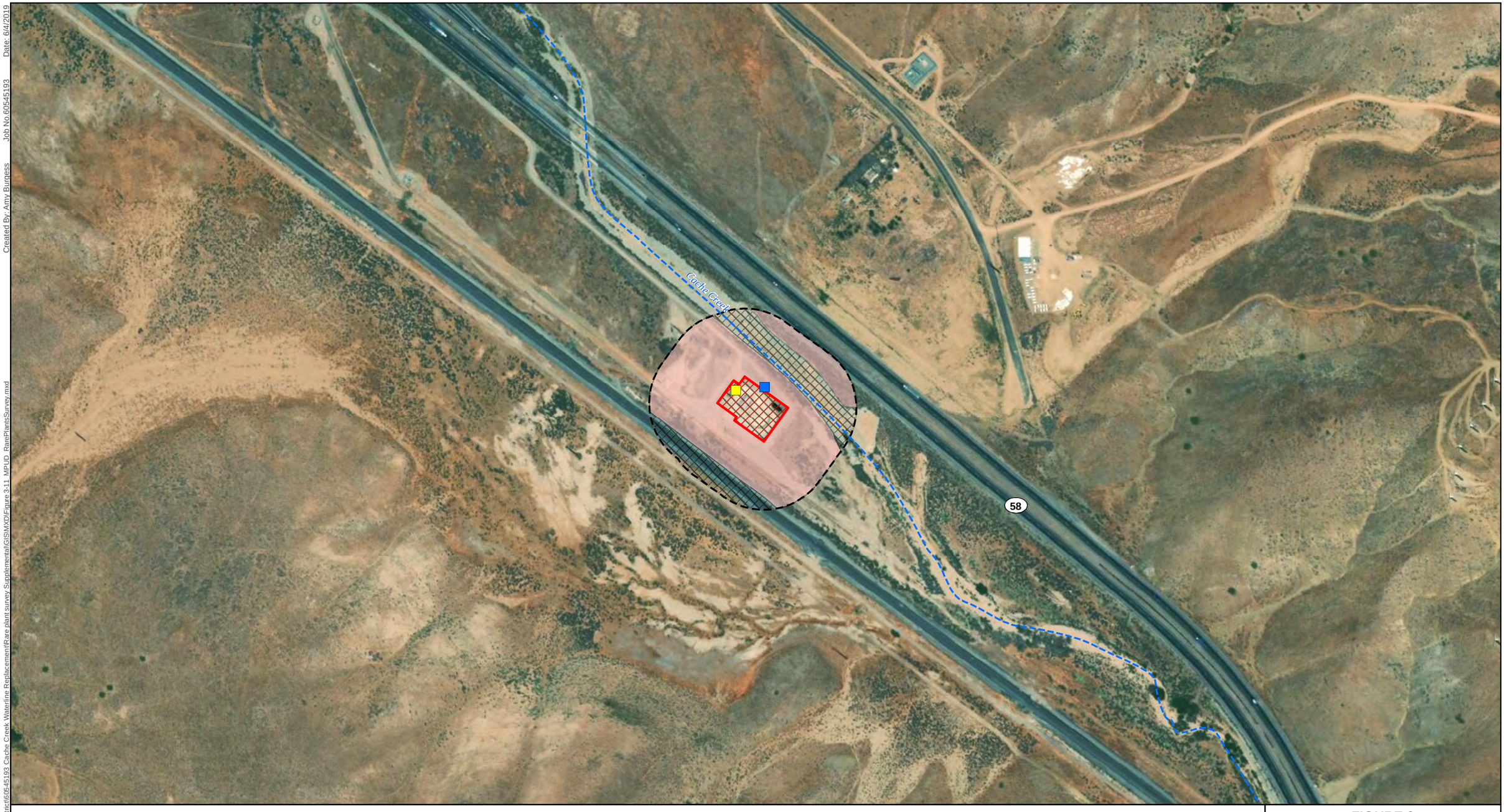
0 0.5 1 Miles

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 2
PROJECT OVERVIEW

Mojave Public Utility District
Cache Creek Project

AECOM



Legend

- Creek
- Well 9 Facility
- 250-Foot Vegetation CommunitySurvey Boundary (2018)

Potentially Significant Non-Native Plant Species

- Crossflower
- Tubercled crowfoot

Vegetation Community

- Rubber Rabbitbrush Scrub
- Disturbed / Ruderal

0 400 800 Feet

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 3
RARE PLANT SURVEY SUPPLEMENTAL

Mojave Public Utility District
Cache Creek Project

AECOM

J:\Client-Projects\Mojave Public Utility District\60545193 Cache Creek Waterline Replacement\Rare plant survey Supplemental\GIS\MXD\Figure 3-11_MPUD_RarePlantsSurvey.mxd Created By: Amy Burgess Job No.60545193 Date: 6/4/2019



Date: 6/4/2019
Job No.60545193
Created By: Amy Burgess
J:\Client\Projects\Mojave Public Utility District\60545193 Cache Creek Waterline Replacement\Rare plant survey Supplemental\GIS\MXD\Figure 3-11_MPUD_RarePlantsSurvey.mxd

Legend

- Alternate Conceptual Alignment
- Conceptual Alignment
- Creek
- Pacific Crest Trail
- 40-Foot Disturbance Boundary (Rare Plant Survey Boundary)
- 250-Foot Vegetation CommunitySurvey Boundary (2018)

Vegetation Community

- Red Willow Thicket
- Rubber Rabbitbrush Scrub
- Tamarisk Thicket
- Disturbed / Ruderal

0 400 800 Feet

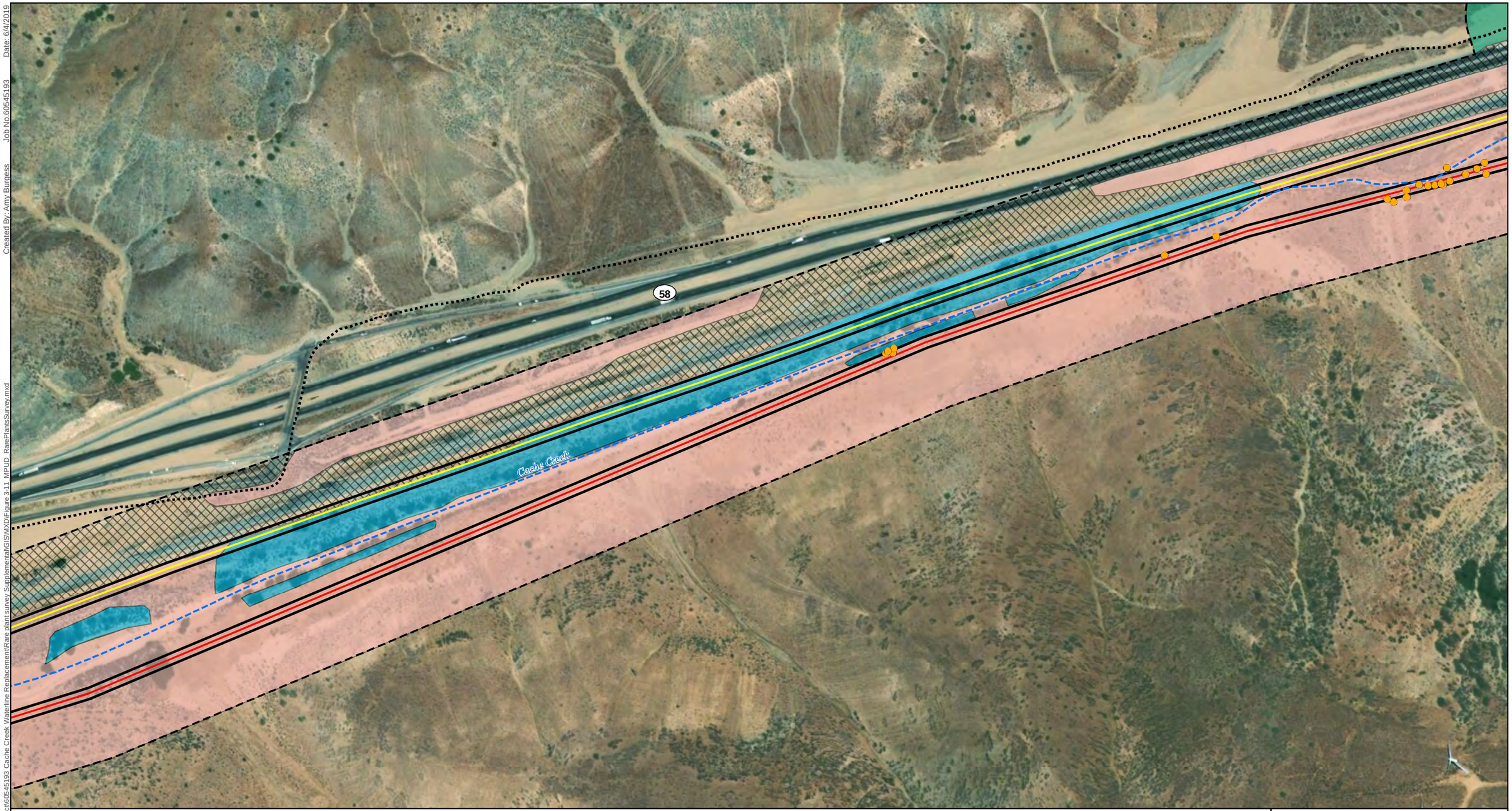
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 4
RARE PLANT SURVEY SUPPLEMENTAL

Mojave Public Utility District
Cache Creek Project

AECOM

J:\Client Projects\Mojave Public Utility District\60545193 Cache Creek Waterline Replacement\Rare plant survey Supplemental\GIS\MXD\Figure 3-11_MPUD_RarePlantsSurvey.mxd Created By: Amy Burgess Job No.60545193 Date: 6/4/2019



Legend

- Alternate Conceptual Alignment
- Conceptual Alignment
- Creek
- Pacific Crest Trail
- 40-Foot Disturbance Boundary (Rare Plant Survey Boundary)
- 250-Foot Vegetation CommunitySurvey Boundary (2018)

Rare Plant Survey Data

- *Hesperoyucca whipplei* (238)
- *Yucca brevifolia* (716)

Vegetation Community

- Brittlebrush Scrub
- Rubber Rabbitbrush Scrub
- Tamarisk Thicket
- Disturbed / Ruderal

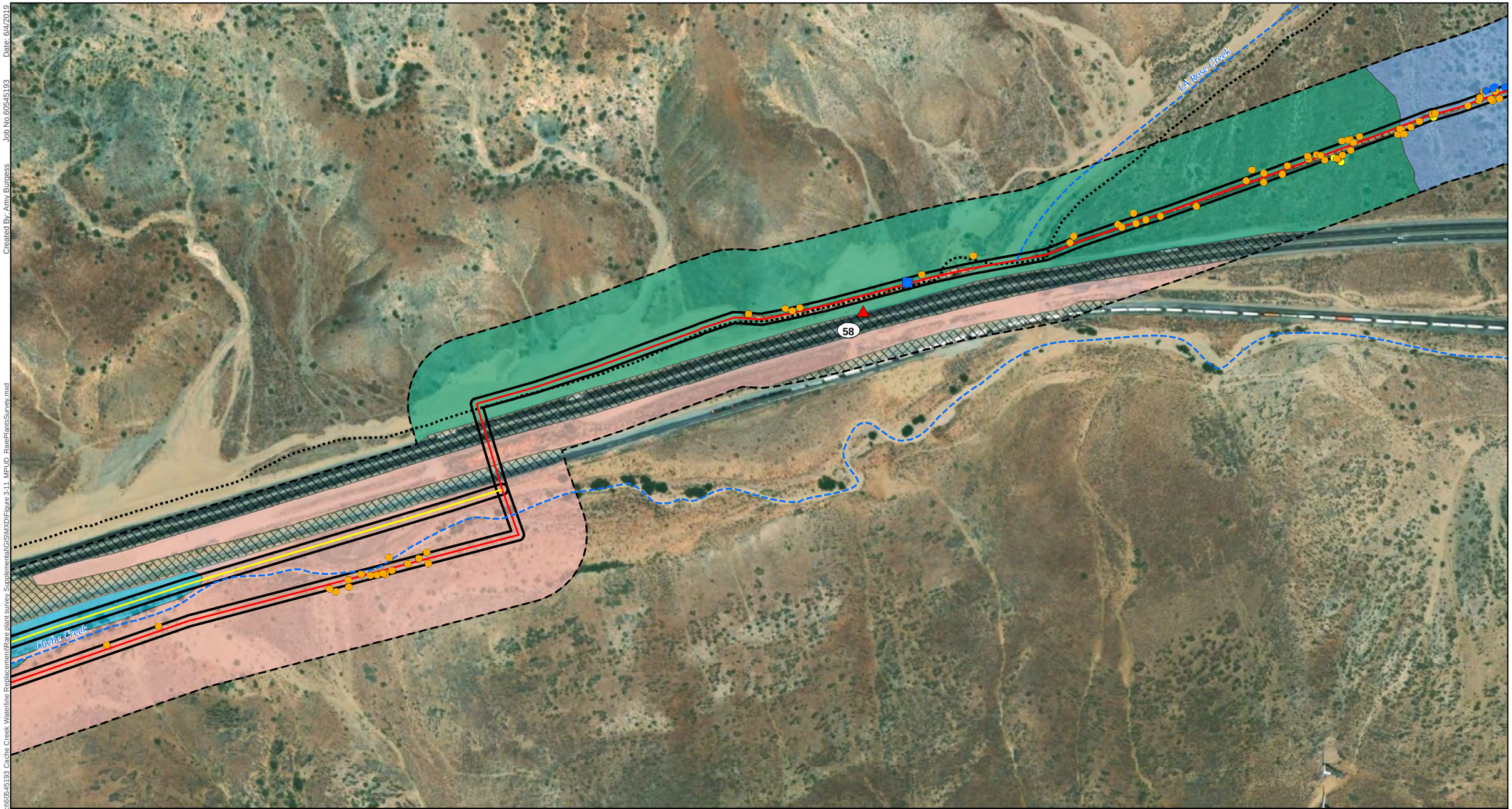
0 400 800 Feet

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 5
RARE PLANT SURVEY SUPPLEMENTAL

Mojave Public Utility District
Cache Creek Project

AECOM



Date: 6/4/2019
Job No.60545193
Created By: Amy Burgess
J:\Client-Projects\Mojave Public Utility District\60545193 Cache Creek Waterline Replacement\Rare plant survey\Supplemental\GIS\MXD\Figure 3-11_MPUD_RarePlantsSurvey.mxd

Legend

- Alternate Conceptual Alignment
- Conceptual Alignment
- Creek
- Pacific Crest Trail
- Gate
- 40-Foot Disturbance Boundary (Rare Plant Survey Boundary)
- 250-Foot Vegetation CommunitySurvey Boundary (2018)

Potentially Significant Non-Native Plant Species

- Crossflower

Rare Plant Survey Data

- *Hesperoyucca whipplei* (238)
- *Opuntia basilaris* (87)
- *Yucca brevifolia* (716)

Vegetation Community

- Brittlebrush Scrub
- California Juniper Woodland
- Rubber Rabbitbrush Scrub
- Tamarisk Thicket
- Disturbed / Ruderal

0 400 800 Feet

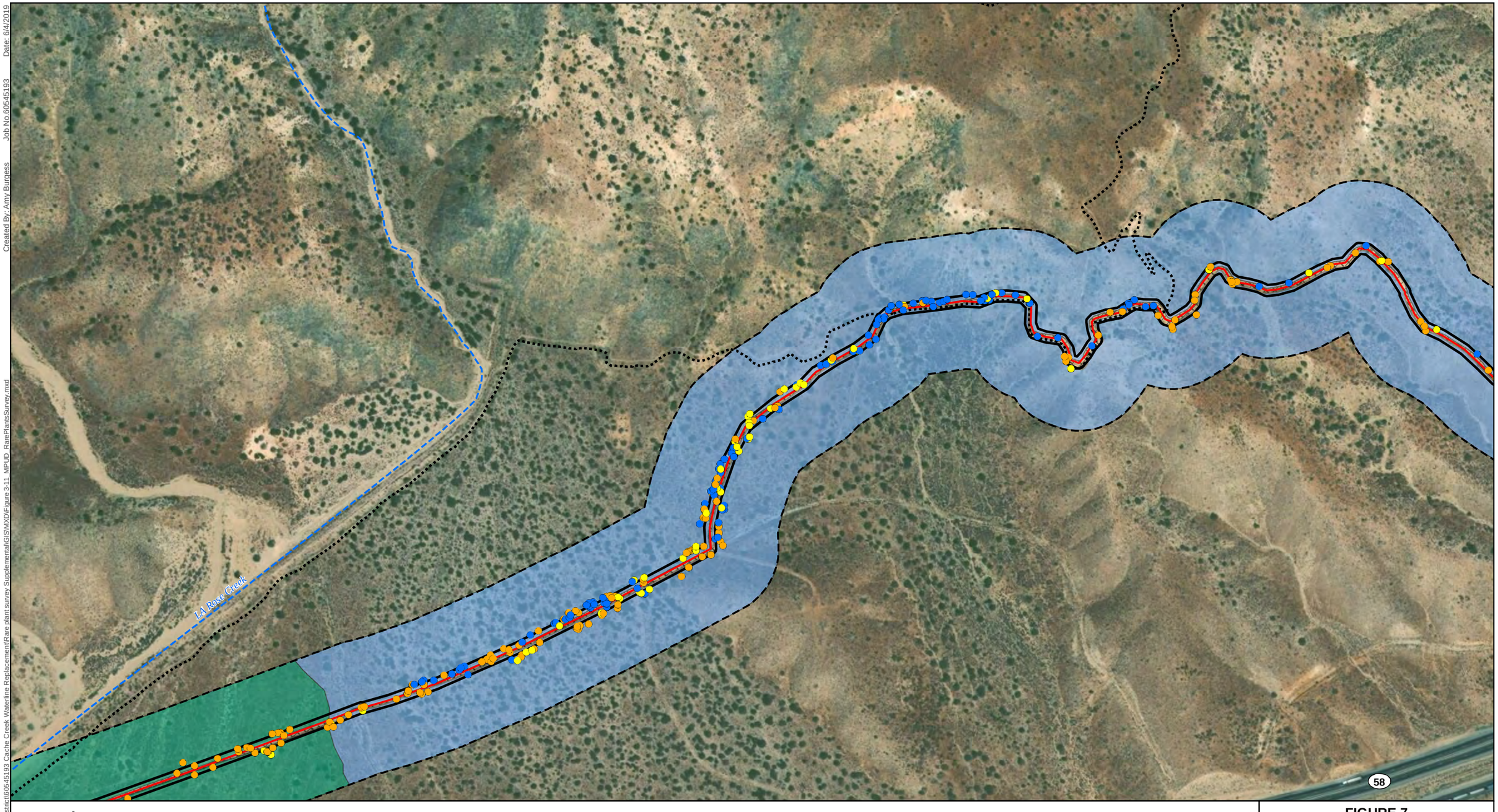
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 6
RARE PLANT SURVEY SUPPLEMENTAL

Mojave Public Utility District
Cache Creek Project

AECOM

J:\Client-Projects\Mojave Public Utility District\605345193 Cache Creek Waterline Replacement\Rare plant survey Supplemental\GIS\MXD\Figure 3-11_MPUD_RarePlantsSurvey.mxd Date: 6/4/2019 Job No.605345193 Created By: Amy Burgess



Legend

- Conceptual Alignment
- Creek
- Pacific Crest Trail
- 40-Foot Disturbance Boundary (Rare Plant Survey Boundary)
- 250-Foot Vegetation CommunitySurvey Boundary (2018)

Rare Plant Survey Data

- *Hesperoyucca whipplei* (238)
- *Opuntia basilaris* (87)
- *Yucca brevifolia* (716)

Vegetation Community

- Brittlebrush Scrub
- California Juniper Woodland
- Disturbed / Ruderal

0 400 800 Feet

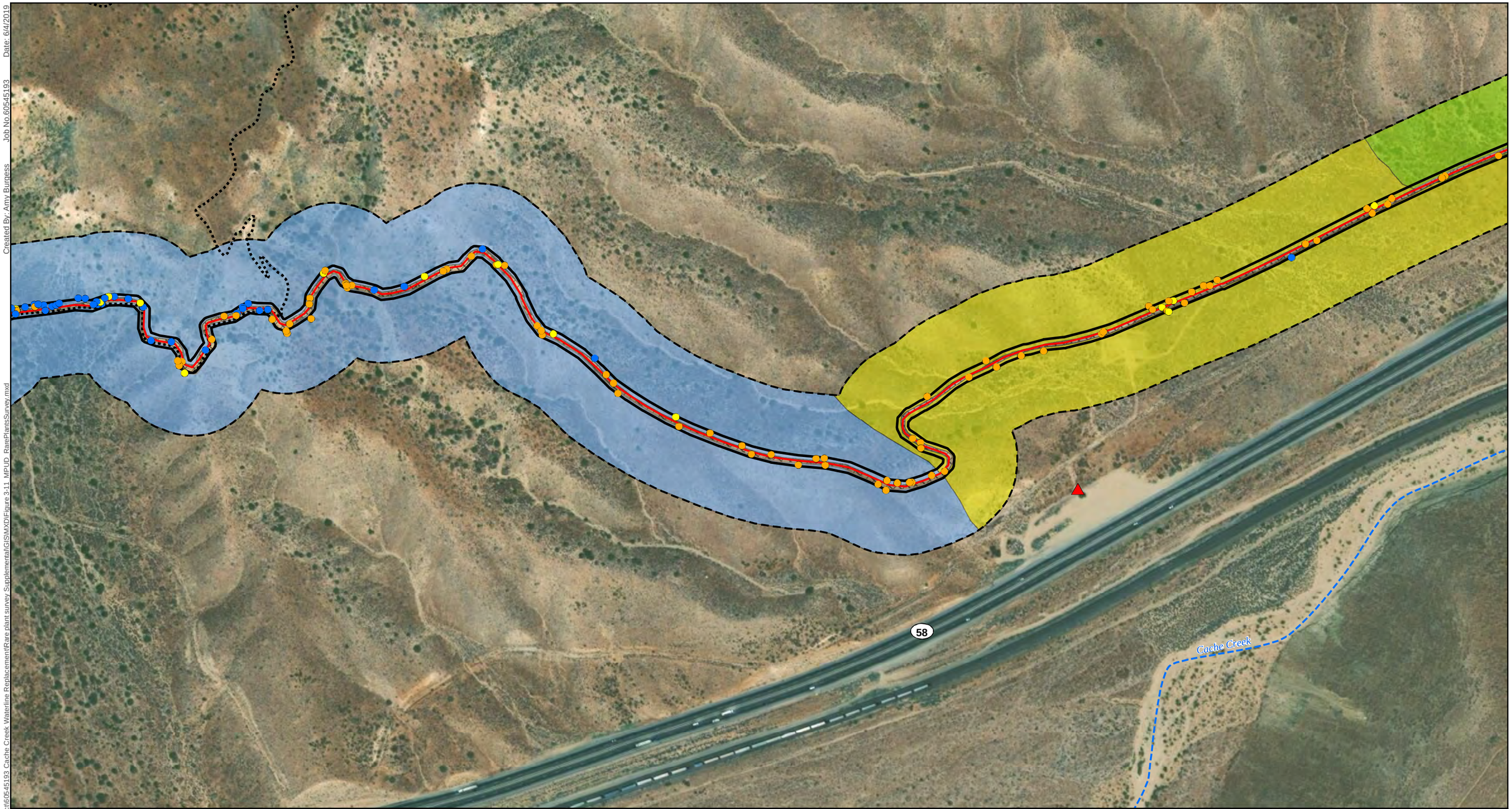
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 7
RARE PLANT SURVEY SUPPLEMENTAL

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 6/4/2019
Job No.60545193
Created By: Amy Burgess
N:\Client\Projects\Mojave Public Utility District\60545193 Cache Creek Waterline Replacement\Rare plant survey Supplemental\GIS\MXD\Figure 3-11_MPUD_RarePlantsSurvey.mxd



Legend

- Conceptual Alignment
- Creek
- Pacific Crest Trail
- Gate
- 40-Foot Disturbance Boundary (Rare Plant Survey Boundary)
- 250-Foot Vegetation CommunitySurvey Boundary (2018)

Rare Plant Survey Data

- *Hesperoyucca whipplei* (238)
- *Opuntia basilaris* (87)
- *Yucca brevifolia* (716)

Vegetation Community

- California Juniper Woodland
- Creosote Bush Scrub
- Joshua Tree Woodland
- Disturbed / Ruderal

0 400 800 Feet

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 8
RARE PLANT SURVEY SUPPLEMENTAL

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 6/4/2019
Job No.60545193
Created By: Amy Burgess
J:\Client Projects\Mojave Public Utility District\60545193 Cache Creek Waterline Replacement\Rare plant survey Supplemental\GIS\MXD\Figure 3-11_MPUD_RarePlantsSurvey.mxd

58

Cache Creek

Legend

- Conceptual Alignment
- Feeder to CHP Facility
- Creek
- Gate
- 40-Foot Disturbance Boundary (Rare Plant Survey Boundary)
- 250-Foot Vegetation CommunitySurvey Boundary (2018)

Rare Plant Survey Data

- *Hesperoyucca whipplei* (238)
- *Opuntia basilaris* (87)
- *Yucca brevifolia* (716)

Vegetation Community

- California Juniper Woodland
- Creosote Bush Scrub
- Joshua Tree Woodland
- Disturbed / Ruderal

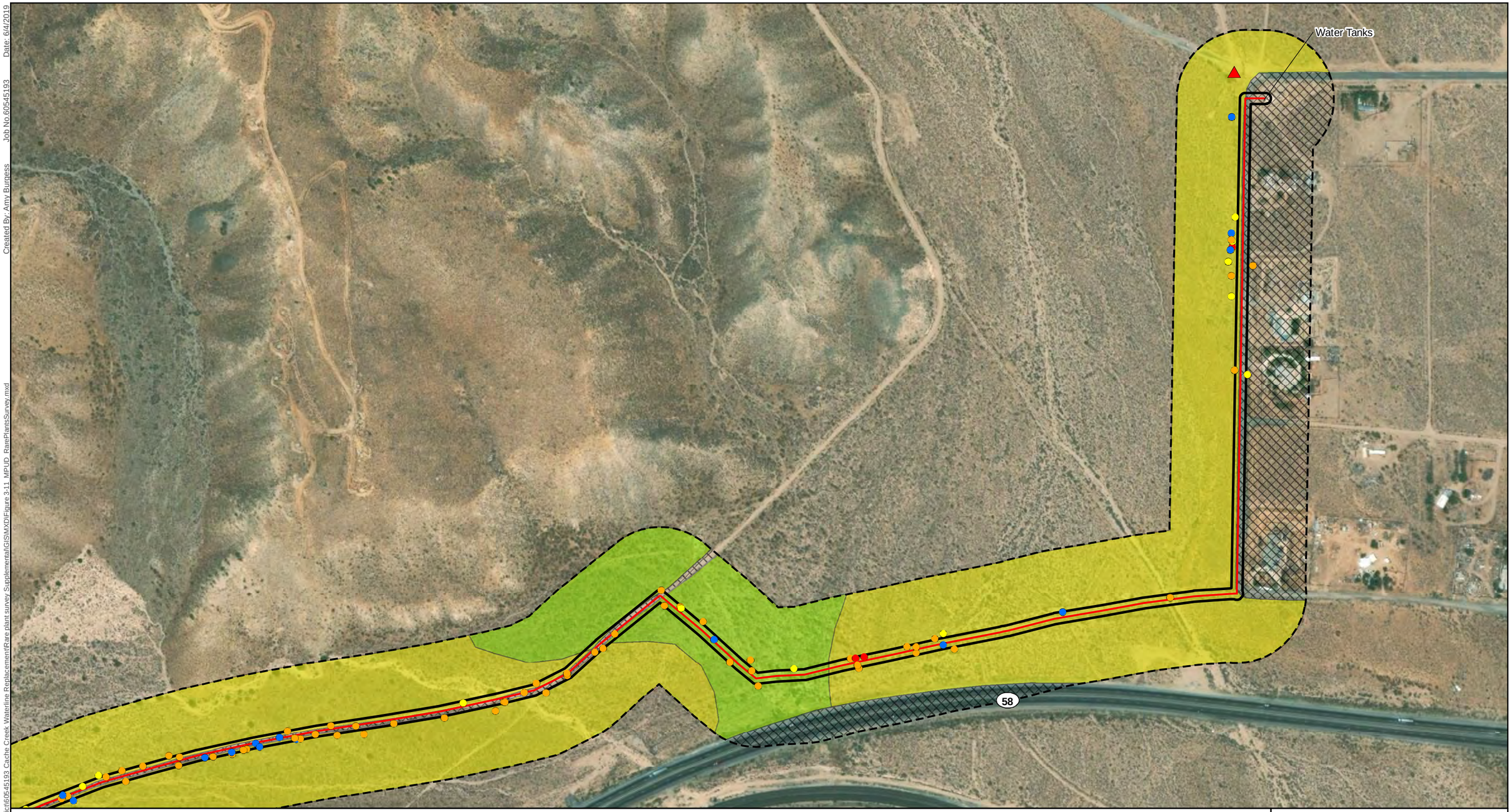
0 400 800 Feet

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 9
RARE PLANT SURVEY SUPPLEMENTAL

Mojave Public Utility District
Cache Creek Project

AECOM



Date: 6/4/2019
Job No.60545193
Created By: Amy Burgess
N:\Client\Projects\Mojave Public Utility District\60545193 Cache Creek Waterline Replacement\Rare plant survey Supplemental\GIS\MXD\Figure 3-11_MPUD_RarePlantsSurvey.mxd

Legend

- Conceptual Alignment
- Gate
- 40-Foot Disturbance Boundary (Rare Plant Survey Boundary)
- 250-Foot Vegetation CommunitySurvey Boundary (2018)

Rare Plant Survey Data

- *Cylindropuntia echinocarpa* (4)
- *Hesperoyucca whipplei* (238)
- *Opuntia basilaris* (87)
- *Yucca brevifolia* (716)

Vegetation Community

- Creosote Bush Scrub
- Joshua Tree Woodland
- Disturbed / Ruderal

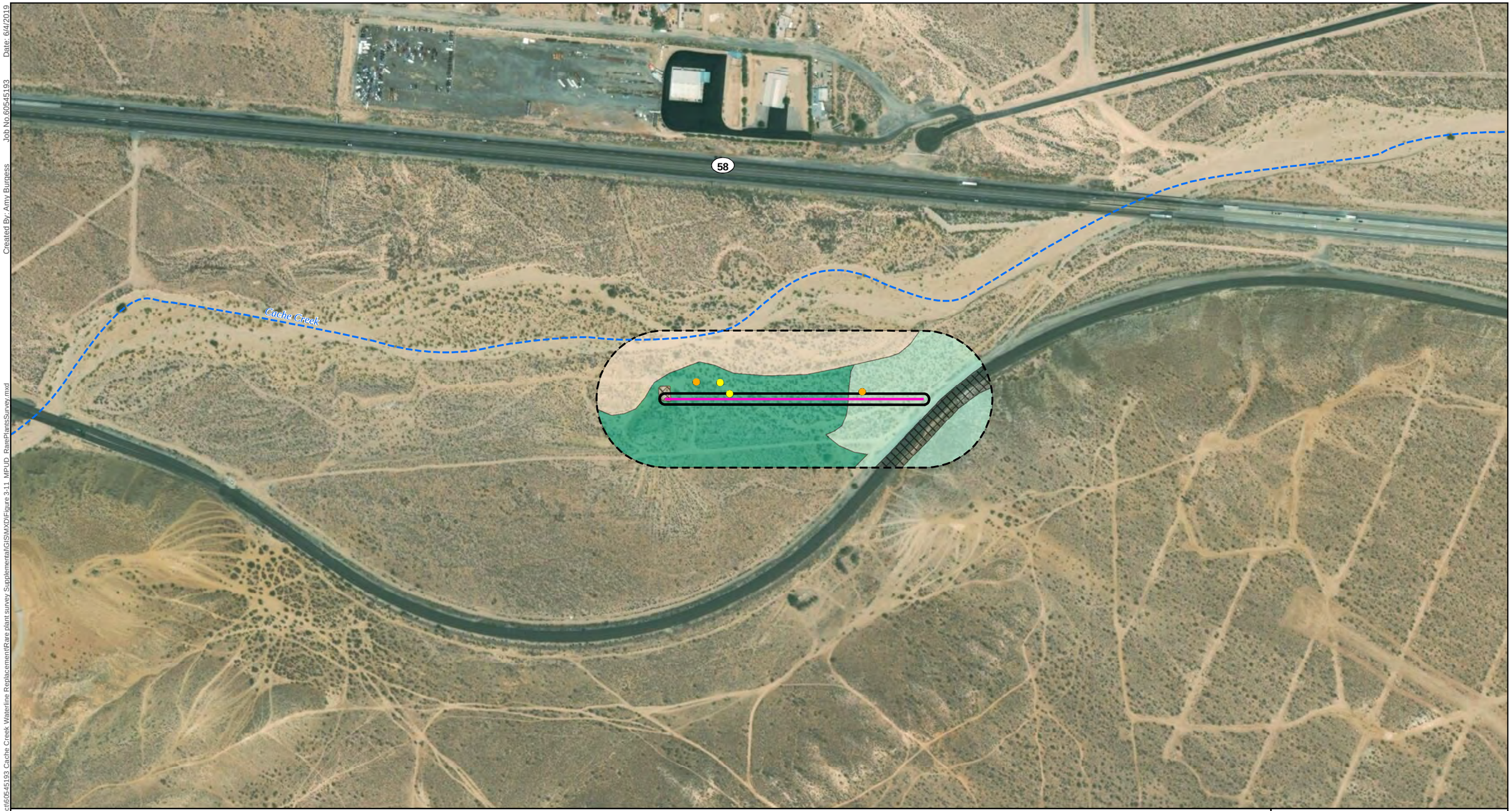
0 400 800 Feet

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 10
RARE PLANT SURVEY SUPPLEMENTAL

Mojave Public Utility District
Cache Creek Project

AECOM



Legend

- Pump Station Connection Alignment
- Creek
- 40-Foot Disturbance Boundary (Rare Plant Survey Boundary)
- 250-Foot Vegetation CommunitySurvey Boundary (2018)

Rare Plant Survey Data

- *Opuntia basilaris* (87)
- *Yucca brevifolia* (716)

Vegetation Community

- Allscale Scrub
- Brittlebrush Scrub
- Scale Broom Scrub
- Disturbed / Ruderal

0 400 800 Feet

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 11
RARE PLANT SURVEY SUPPLEMENTAL

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 6/4/2019
Job No:60545193
Created By: Amy Burgess
J:\Client-Projects\Mojave Public Utility District\60545193 Cache Creek Waterline Replacement\Rare plant survey Supplemental\GIS\MXD\Figure 3-11_MPUD_RarePlantsSurvey.mxd

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Attachment 1

Plant Taxa Observed

Plant Family	Scientific Name	Common Name
Gymnosperms		
Ephedraceae	*Ephedra nevadensis*	Nevada ephedra
Ephedraceae	*Ephedra viridis*	Green ephedra
Dicots		
Amaranthaceae	*Amaranthus albus*	Tumbleweed
Apiaceae	*Lomatium mohavense*	Mohave wild parsely
Apiaceae	*Lomatium nevadense*	Nevada lomatium
Asteraceae	*Ericameria cooperi*	Cooper's goldenbush
Asteraceae	*Ericameria nauseosa*	Rubber rabbitbrush
Asteraceae	*Ericameria paniculata*	Mojave rabbitbrush
Asteraceae	*Ericameria* sp.	goldenbush
Asteraceae	*Eriophyllum wallacei*	Wallace eriophyllum
Asteraceae	*Gutierrezia* sp.	Matchweed
Asteraceae	*Lasthenia gracilis*	Needle goldfields
Asteraceae	*Layia glandulosa*	White layia
Asteraceae	*Lepidospartum squamatum*	Scalebroom
Asteraceae	*Leptosyne bigelovii*	Bigelow coreopsis
Asteraceae	*Malacothrix glabrata*	Desert dandelion
Asteraceae	*Matricaria discoidea*	Pineapple weed
Asteraceae	*Stephanomeria pauciflora*	Wire lettuce
Asteraceae	*Stephanomeria* sp.	Wire lettuce
Asteraceae	*Tetradymia stenolepis*	Narrow scaled felt thorn
Asteraceae	*Uropappus lindleyi*	Silver puffs
Asteraceae	*Xylorhiza tortifolia*	Mojave woodyaster
Asteraceae	*Acamptopappus shockleyi*	Shockley's goldenhead
Asteraceae	*Ambrosia acanthicarpa*	Annual burrweed
Asteraceae	*Ambrosia dumosa*	Burro weed
Asteraceae	*Ambrosia salsola*	Burrobrush
Asteraceae	*Artemisia douglasiana*	California mugwort
Asteraceae	*Chaenactis fremontii*	Fremont pincushion
Asteraceae	*Cirsium occidentale*	Western thistle
Asteraceae	*Encelia actoni*	Acton encelia
Boraginaceae	*Amsinckia tessellata*	Devil's lettuce
Boraginaceae	*Cryptantha mohavensis*	Mojave cryptantha
Boraginaceae	*Cryptantha pterocarya*	Winged nut forget me not
Boraginaceae	*Cryptantha similis*	Dome cryptantha
Boraginaceae	*Emmenanthe penduliflora*	Whispering bells
Boraginaceae	*Heliotropium curassavicum*	Chinese parsley
Boraginaceae	*Pectocarya linearis*	Sagebrush combseed
Boraginaceae	*Pectocarya penicillata*	Winged pectocarya
Boraginaceae	*Phacelia distans*	Common phacelia
Boraginaceae	*Phacelia fremontii*	Fremont's phacelia
Boraginaceae	*Phacelia tanacetifolia*	Tansy leafed phacelia
Boraginaceae	*Plagiobothrys arizonicus*	Arizona popcorn flower
Brassicaceae	*Brassica nigra*	Black mustard
Brassicaceae	*Brassica tournefortii*	Saharan mustard

Plant Family	Scientific Name	Common Name
Brassicaceae	*Caulanthus coulteri*	Coulter's jewel flower
Brassicaceae	*Caulanthus lasiophyllus*	California mustard
Brassicaceae	*Chorispora tenella*	Crossflower
Brassicaceae	*Descurainia pinnata*	Yellow tansy mustard
Brassicaceae	*Descurainia sophia*	Herb sophia
Brassicaceae	*Hirschfeldia incana*	Mediterranean mustard
Brassicaceae	*Lepidium fremontii*	Desert pepper grass
Brassicaceae	*Lepidium latifolium*	Perennial pepperweed
Brassicaceae	*Lepidium perfoliatum*	Klamath pepper grass
Brassicaceae	*Sisymbrium altissimum*	Tumble mustard
Brassicaceae	*Sisymbrium irio*	London rocket
Brassicaceae	*Sisymbrium orientale*	Indian hedge mustard
Brassicaceae	*Stanleya pinnata*	Prince's plume
Cactaceae	*Cylindropuntia echinocarpa*	Silver cholla
Campanulaceae	*Nemacladus californicus*	Mojave dwarf
Chenopodeaceae	*Chenopodium album*	Lambs quarters
Chenopodeaceae	*Iva axillaris*	Povertyweed
Chenopodeaceae	*Krascheninnikovia lanata*	Winter fat
Chenopodeaceae	*Salsola tragus*	Russian thistle
Chenopodiaceae	*Atriplex canescens*	Hoary saltbush
Chenopoeaceae	*Grayia spinosa*	Hop sage
Cleomaceae	*Peritoma arborea*	Bladderpod
Convolvulaceae	*Cuscuta* sp.	dodder
Cucurbitaceae	*Marah* sp.	Wild Cucumber
Cupressaceae	*Juniperus californica*	California juniper
Fabaceae	*Astragalus didymocarpus*	Dwarf white milk vetch
Fabaceae	*Astragalus douglasii*	Douglas's milkvetch
Fabaceae	*Astragalus pachypus*	Thick pod milk vetch
Fabaceae	*Lupinus excubitus*	Grape lupine
Fabaceae	*Lupinus microcarpus*	Chick lupine
Grossulariaceae	*Ribes quercetorum*	Oak gooseberry
Lamiaceae	*Lamium amplexicaule*	Henbit
Lamiaceae	*Marrubium vulgare*	White horehound
Lamiaceae	*Salvia columbariae*	Chia sage
Lamiaceae	*Salvia dorrii*	Dorr's sage
Lamiaceae	*Scutellaria mexicana*	Mexican bladder sage
Loasaceae	*Mentzelia albicaulis*	White stemmed blazing star
Nyctaginaceae	*Mirabilis laevis*	Desert wishbone bush
Oleaceae	*Forestiera pubescens*	Desert olive
Onagraceae	*Camissonia campestris*	Field primrose
Onagraceae	*Chylismia claviformis*	Clavate fruited primrose
Onagraceae	*Oenothera californica*	California evening primrose
Orobanchaceae	*Castilleja linariifolia*	Desert paintbrush
Papaveraceae	*Argemone munita*	Prickly poppy
Papaveraceae	*Eschscholzia caespitosa*	Tufted eschscholzia
Papaveraceae	*Eschscholzia californica*	California poppy

Plant Family	Scientific Name	Common Name
Papaveraceae	*Eschscholzia minutiflora*	Minute-flowered poppy
Plantaginaceae	*Collinsia callosa*	Desert collinsia
Plantaginaceae	*Penstemon incertus*	Western desert penstemon
Polemoneacea	*Gilia capitata*	Blue field gilia
Polemoneacea	*Gilia* spp.	Gilia
Polemoneacea	*Loeseliastrum matthewsii*	Desert calico
Polemoneacea	*Loeseliastrum schottii*	Schott gilia
Polemoniaceae	*Eriastrum densifolium*	Giant eriastrum
Polemoniaceae	*Eriastrum signatum*	Maroon-spotted woollystar
Polygonaceae	*Chorizanthe brevicornu*	Brittle spine flower
Polygonaceae	*Eriogonum angulosum*	Angled stem buckwheat
Polygonaceae	*Eriogonum davidsonii*	Davidson buckwheat
Polygonaceae	*Eriogonum deflexum*	Flat topped buckwheat
Polygonaceae	*Eriogonum fasciculatum*	California buckwheat
Polygonaceae	*Eriogonum heermannii*	Heerman buckwheat
Polygonaceae	*Eriogonum inflatum*	Desert trumpet
Polygonaceae	*Eriogonum nudum* var. *pubiflorum*	Hairy flowered buckwheat
Polygonaceae	*Eriogonum pusillum*	Yellow turban
Polygonaceae	*Rumex* sp.	Dock
Ranunculaceae	*Ranunculus testiculatus*	Tubercled crowfoot
Rosaceae	*Prunus fasciculata*	Desert almond
Rosaceae	*Purshia tridentata*	Antelope bush
Salicaceae	*Salix laevigata*	Red willow
Salicaceae	*salix melanopsis*	Willow
Solanaceae	*Datura wrightii*	Jimsonweed
Solanaceae	*Lycium andersonii*	Anderson thornbush
Solanaceae	*Lycium cooperi*	Cooper's box thorn
Solanaceae	*Nicotiana attenuata*	Coyote tobacco
Solanaceae	*Solanum xanti*	Nightshade
Tamaricaceae	*Tamarix ramosissima*	Tamarisk
Zygophllaceae	*Larrea tridentata*	Creosote bush
Monocots		
Agavaceae	*Hesperoyucca whipplei*	Chaparral yucca
Agavaceae	*Yucca brevifolia*	Joshua tree
Alliaceae	*Allium fimbriatum* var. *fimbriatum*	Fringed onion
Liliaceae	*Calochortus kennedyi*	Desert mariposa
Poaceae	*Bromus diandrus*	Ripgut brome
Poaceae	*Bromus hordeaceus*	Soft chess
Poaceae	*Bromus madritensis* ssp. *madritensis*	Foxtail chess
Poaceae	*Bromus madritensis* ssp. *rubens*	Red brome
Poaceae	*Bromus tectorum*	Downy chess
Poaceae	*Elymus elymoides*	Squirrel tail grass
Poaceae	*Elymus* sp.	Rye
Poaceae	*Festuca myuros*	Rattail sixweeks grass
Poaceae	*Hordeum murinum*	Foxtail barley
Poaceae	*Hordeum vulgare*	Common barley

Plant Family	Scientific Name	Common Name
Poaceae	*Poa bulbosa*	Bulbous blue grass
Poaceae	*Poa secunda*	Pine bluegrass
Poaceae	*Schismus* spp.	Mediterranean grass
Poaceae	*Stipa hymenoides*	Indian rice grass
Poaceae	*Stipa occidentalis*	Western needlegrass
Poaceae	*Stipa speciosa*	Desert needle grass
Themidaceae	*Dichelostemma capitatum*	Blue dicks

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Attachment 2

Photographic Log

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
Mojave Public Utility District (MPUD)	Kern County, California	60545193

Photo No.	**Date:**
1	5-9-2019

Direction Photo Taken:
East

Description:
Representative photo of Joshua trees (*Yucca brevifolia*), covered under CDNPA, were recorded in the survey area.



Photo No.	**Date:**
2	5-9-2019

Direction Photo Taken:
South

Description:
Representative photo of Chaparral yucca (*Hesperoyucca whipplei*), covered under CDNPA, were recorded in the survey area.



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No.	Date:
3	5-9-2019

Direction Photo Taken:
South



Description:
Representative photo of beavertail cactus (*Opuntia basilaris* var. *basilaris*), covered under CDNPA, were recorded in the survey area. This variety is distinguished from the rare variety (*O. b.* var. *treleasei*) by a few morphological characters, some of which include: lack of long spines at each node, number of areoles per row, and areole position (sunken or flush).

Photo No.	Date:

Direction Photo Taken:

Description:

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AECOM Imagine it. Delivered.

Attachment 3

Biologist Resumes

Angelique Herman, Senior Biologist

Professional History

AECOM, Santa Maria, CA, 2018-Present

Encelia Biological Consulting, LLC, San Diego, CA, 2015-present

San Elijo Lagoon Conservancy, Solana Beach, CA 2014-2015

Garcia and Associates (GANDA), Oceanside, CA, 2011-2014

San Diego Zoo Global, San Diego, CA, 2010-2011

Indiana Dunes National Lakeshore, Porter, IN, 2009

Virginia Polytechnic Institute and State University, Blacksburg, VA, 2007-2009

Education

B.S. Environmental Science, Emphasis on Plant Resources, Virginia Polytechnic Institute and State University, 2009

Technical Specialties

Monitoring sensitive, threatened and endangered reptiles, amphibians, birds, mammals and plants of California

Wildlife surveys

Nesting bird surveys

Botanical surveys

Habitat assessments

Affiliations

The Wildlife Society – California Central Coast Chapter

San Diego Audubon Society

California Native Plant Society (CNPS)

Ms. Herman is a field biologist and ISA-certified arborist with 10 years of experience performing habitat restoration, wildlife and vascular plant surveys, and natural lands management. Ms. Herman has extensive field experience in California and is familiar with the flora and vegetative communities of southern and central California. She has provided biological services to support large-scale transportation and energy projects for clients such as: High Speed Rail Authority, Southern California Gas Company, Southern California Edison, and Con Edison.

In addition to her botanical background, Ms. Herman has a wide breadth of experience in wildlife science. Her small mammal experience includes: trapping and translocating Stephens', Tipton and giant kangaroo rats and Mohave ground squirrels. She has experience surveying for desert and San Joaquin kit fox and monitoring potential dens using wildlife cameras and tracking medium. Her avian experience includes: nest monitoring for Ridgeway's rail, collecting avian point count data for coastal cactus wren and California gnatcatcher, performing burrowing owl presence/absence surveys, MBTA-protected nesting bird surveys, Swainson's Hawk surveys/nest monitoring, and banding passerine birds. She assisted with monitoring the biodiversity of herpetofauna using a variety of techniques including: pit-fall traps, coverboards, surveys, and noosing. She has performed protocol surveys for desert tortoise and blunt-nosed leopard lizard. She has assisted permitted biologists with translocating California tiger salamander and can distinguish egg masts from several sympatric amphibians.

Select Project Experience

BOTANICAL SURVEYS

California High-speed Rail, Construction Package 1, Fresno to Madera, CA. *Surveyor:* Ms. Herman performed construction monitoring and pre-construction surveys including weeds surveys. Ms. Herman added 26 invasive plant taxa to the project's weed inventory.

Dense Urban Terrain (DUT) Rare Plant Survey, Fort Irwin, CA. *Surveyor:* With a team of EREMICO botanists, Ms. Herman participated in a protocol-level full coverage rare plant survey focusing on federally endangered Lane Mountain Milkvetch and California Desert Native Plant Act (CNDPA)-protected species. The 4,014-acre survey was floristic in nature and results included an inventory of 153 taxa.

San Elijo Lagoon Ecological Reserve Botanical Inventory, Solana Beach, CA. *Botanist:* Ms. Herman maintained the botanical inventory for the 900-acre coastal wetland reserve. Over the course of one year, she added 25 taxa to the list and updated the taxonomy consistent with The Jepson Manual II.

San Diego Management and Monitoring Program (SDMMP) Rare Plant Population Monitoring, San Diego County, CA. *Botanist:* Ms. Herman performed

International Society of Arboriculture (ISA)

Southern California Botanists

California Society for Ecological Restoration (SERCAL)

a comprehensive rare plant monitoring protocol on several occurrences of rare plant species. Plant occurrence data included: population size, health, phenology, associated species and percent cover information, vegetation alliances, and potential threats.

Alta Wind Energy Complex, Tehachapi, Kern County, CA. *Botanist:* S. Herman participated in a comprehensive floristic inventory including a wide range of plant community types such as: Mojave Desert scrub, riparian scrub, and chaparral. Morphological data was collected for the federally endangered Bakersfield cactus found on the project site.

Black Mountain Wind Energy Project, Imperial County, CA. *Botanist:* Ms. Herman performed a floristic inventory of a 1,161-acre proposed wind energy complex. The botanical survey included mapping rare plants including Fairy Duster, as well as California Desert Native Plant Act (CNDPA) protected species.

Loma Verde Solar Project, Desert Center, CA. *Surveyor:* Ms. Herman performed a protocol-level rare plant survey including a full floristic inventory.

Ridgetop Wind Project, Kern County, CA. *Surveyor*: Ms. Herman performed a focused protocol-level survey for federally endangered Bakersfield cactus (200+ mapped).

West of Devers Vegetation Mapping Project, Riverside County, CA. *Botanist:* Ms. Herman delineated and mapped vegetative communities along a 45-mile transmission line ROW.

Path 42 Reconductoring Project, Coachella Valley, CA. *Surveyor:* Ms. Herman performed pre-construction surveys for nesting birds and raptors, listed wildlife and rare plants. Pre-disturbance weed surveys were also performed along the entire 500-foot right-of-way recording all Cal-IPC invasive species.

RESTORATION

Carlsbad Hydrologic Unit (CHU) Invasive Vegetation Control Program, Project Management, Solana Beach, CA. *Restoration Ecologist/Project Manager:* Ms. Herman's primary responsibility while at San Elijo Lagoon Conservancy was implementation of CHU Invasive Vegetation Control Program. The Program included seven coastal watersheds (140,000 acres), controlled over two hundred non-native plant species, was performed in collaboration with other non-profit organizations, municipalities, and resource agencies, was funded through grants as well as mitigation projects and resulted approximately 300 acres of enhanced native vegetation per year. The Program focused restoration and enhancement efforts on Southern Riparian Scrub/Woodland, Southern Coastal Salt Marsh, Diegan Coastal Sage Scrub, and native grassland vegetation types. Areas of responsibility included: restoration and invasive vegetation control plan design and implementation, design and implementation of success monitoring protocol and field data collection, permit compliance and reporting, budgeting tasks totaling $200,000 annually, preparation of deliverables, and grant writing. Field data collection for success monitoring included annual releve' sampling (percent cover), DBH (diameter at breast height), survival counts for container plantings, plant species richness, percent seed germination, and photo monitoring. Ms. Herman was the primary author on a successful $250,000 Supplemental Environmental Project proposal to the Regional Water Quality Control Board and wrote a successful grant proposal to San Diego Association of Governments

contributing $200,000 to the Program. Outreach presentations were performed at several regional conferences.

Devers-Palo Verde No. 2 Transmission Line Project (DPV2), Riverside County, CA. *Restoration Ecologist/Botanist:* Ms. Herman played a key role in the rare plant mitigation component of the project. She oversaw the cactus salvage program, was responsible for transplantation, monthly health assessments, irrigation, data management, and monthly report submittal for the 400+ transplants on the project representing seven different species. Ms. Herman also conducted seed and/or tuber salvage of several rare plant species. She also led teams consisting of 3-4 biologists to conduct pre-construction surveys for sensitive plants and wildlife. Surveys also included pre-construction photo documentation, habitat assessments, special-status vegetation delineations, and mapping of invasive plant species and jurisdictional waters of the U.S. and state. Working in cooperation with construction contractors, Ms. Herman provided site specific restoration recommendations in the areas of topsoil salvage/storage/replacement, site recontouring, jurisdictional waters excavation, and soil stabilization.

Chiriaco Summit Restoration Site Monitoring, Coachella Valley, CA.
Restoration Ecologist: Ms. Herman monitored hydroseeding success rate of a 7-acre desert scrub restoration site. Monitoring data included percent cover, botanical inventory, and photo monitoring.

San Diego Zoo Global, Institute for Conservation Research, San Diego County, CA. *Research Technician:* Ms. Herman contributed botanical expertise to a coastal cactus wren habitat restoration project. She performed pre-treatment vegetation surveys, collected seed material, propagated, and planted native shrub and *Opuntia* species relevant to the cactus wren's success. She performed point count surveys for the cactus wren and California gnatcatcher and assisted with biodiversity monitoring of herpetofauna using pitfall traps. Ms. Herman collected soil data for compaction, bulk density and soil texture. Ms. Herman also participated in a habitat management study for Stephens' kangaroo rat. She conducted pre- and post-treatment grassland vegetation surveys, collected seed material, and planted native grass species. She assisted in handling Stephens' kangaroo rats during temperament tests, ear tagging, and ear snipping for genetic profiling of the population; trapping and release; the construction of outdoor acclimation burros; and used radio telemetry to locate and recapture study animals.

Seeds of Success Plant Materials Development Program, San Diego County, CA. *Botanist:* Ms. Herman scouted and gathered seed lots of more than 80 native plant populations to contribute to the U.S. National Seedbank and performed germination tests on over 25 plant species. She also collected and managed the data associated with seed collections including: plant phenology, plant morphology, and geomorphology of seed localities throughout San Diego County.

<u>BOTANY INSTRUCTION/PUBLIC OUTREACH</u>
San Dieguito River Valley Conservancy Naturalist Training, Rancho Bernardo, CA. *Instructor:* Ms. Herman led a Coastal Sage Scrub botany course with a focus on plant family characteristics, particularly the sunflower family (Asteraceae). The class included a power-point presentation with detailed photos of plant anatomy, followed by a field exercise discussing over 50 taxa.

San Dieguito River Valley Conservancy Rare Plant Survey, Rancho Santa Fe, CA. *Instructor:* Ms. Herman led a rare plant survey citizen science event. Nine (9)

rare plant species were identified. A full botanical inventory was also conducted and included 200 taxa.

California Naturalist Certification Program, Yosemite National Park, Wawona CA. *Instructor:* In partnership with Yosemite Conservancy and UC Merced, Ms. Herman led an entry-level botany course with a focus on plant anatomy and plant family characteristics. The class included a lab component consisting of a flower dissection and a field component focusing on herbaceous species within a mixed-conifer forest.

ISA-CERTIFIED ARBORIST

California High-speed Rail, Construction Package 2-3, Fresno to Delano, CA. *Certified Arborist*: Ms. Herman performed arborist surveys in riparian areas and residential areas within project right-of-way. Data collected included diameter-at-breast-height (DBH), height, and health of each tree.

Saint Albans Drive Addition, Encinitas, CA. *Certified Arborist:* Ms. Herman authored a Tree Protection and Preservation Plan pursuant to City of Encinitas Tree Protection Ordinance for city street trees. The plan included minimization measures to limit zoot-zone disturbance during the construction of a new driveway which encroached onto the city right-of-way.

Southern California Gas Company Ventura and Montgomery Street Pipeline Replacement Project, Ojai, CA. *Certified Arborist:* Ms. Herman performed an arborist survey and monitored construction pursuant of City of Ojai Tree Protection Ordinance.

Southern California Gas Company North Signal Street Pipeline Replacement Project Arborist Survey and Tree Protection Plan, Ojai, CA. *Certified Arborist:* Ms. Herman performed a comprehensive arborist survey, prepared a Tree Protection Plan, and monitored construction pursuant of City of Ojai Tree Protection Ordinance. The arborist inventory included diameter-at-breast-height (DBH), canopy cover, height, and health of 30 protected trees. The Tree Protection Plan included mitigation measures to minimize root-zone disturbance caused by trenching activities. Western Oak Bark Beetle (*Pseudopityopthorus pubipennis*) was observed and documented in several trees.

Southern California Gas Company Del Norte Road Pipeline Replacement Project Arborist Survey and Tree Protection Plan, Ojai, CA. *Certified Arborist:* Ms. Herman performed a comprehensive arborist survey and prepared a Tree Protection Plan pursuant of City of Ojai Tree Protection Ordinance. The 2-acre arborist inventory included 150+ protected trees and included diameter-at-breast-height (DBH), canopy cover and health of each tree. The Tree Protection Plan included mitigation measures to minimize root-zone disturbance caused by trenching activities.

Training

- The Wildlife Society Annual Symposium, Central Coast Chapter, San Luis Obispo, CA, 2018
- Desert Tortoise Authorized Biologist Training, Desert Tortoise Council, Primm, Nevada, September 2017

- Ecology of California Tiger Salamander, Elkhorn Slough Coastal Training Program, May 2017
- Buena Vista Lake Ornate Shrew Workshop, High Speed Rail Authority, April 2017
- Arroyo Toad Workshop, Southern California Chapter of The Wildlife Society, April 2017
- California Rapid Assessment Method (CRAM) 5-day Training, Moss Landing Marine Labs, August 2016
- San Joaquin Kit Fox Workshop, California Department of Fish and Wildlife and The Wildlife Society California Central Coast Chapter, September 2015
- Advanced Bird Banding, Starr Ranch Audubon Society, March 2015
- California Native Plant Conservation Conference, San Jose, CA, January 2015
- Winter Bird Identification, University of California Riverside Extension, January/February 2014
- Introduction to Bird Banding, University of California Riverside Extension, November 2013
- NEPA Basics Workshop, Association of Environmental Professionals (AEP), August 2013
- Soil Resource Evaluation: Regeneration of Disturbed Soils for Vegetation Cover and Erosion Resistance, SERCAL, June 2013
- SERCAL Annual Conference, SERCAL, May 2013
- Riparian Plant Identification for Southern California Rivers and Streams, Wetland Training Institute, June 2012
- Proper Techniques for Handling of Venomous Snakes, Loma Linda University, April 2012
- Vegetation Mapping Workshop using: A Manual of California Vegetation II, CNPS, January 2012
- Southern California Botanist (SCB) Annual Symposium, SCB, 2012, 2014, 2018
- CNPS Semi-annual Conservation Conference, CNPS, 2012 & 2014
- Desert Tortoise Surveying, Monitoring, and Handling Techniques Workshop, Desert Tortoise Council, November 2011
- Fall and Summer Blooming Plant of the Mojave Desert, CNPS, October 2011

Raymond D. Romero
Principal Biologist

Education
BS, Wildlife Management (major), Fisheries (minor), Humboldt State University

Registrations
USFWS/BLM/NDOW Authorized Biologist
CDFW/CEC/CPUC Designated Biologist
TWS Certified Wildlife Biologist

Years of Experience
With AECOM 9
With other firms 21

Technical Specialties
Project Management
Regulatory Permitting
Environmental Compliance
Desert Ecology
NEPA/CEQA

Professional Affiliations
The Wildlife Society
Desert Tortoise Council
The Nature Conservancy

Training and Certifications
40 Hour Hazwoper, ETAC, 2018
First Aid/CPR/AED, Red Cross, 2018
Defensive Driving, AECOM, 2018
Fall Protection, AECOM, 2018
30 Hour OSHA, AECOM, 2018
Fitness for Duty, AECOM, 2018
Safety for Life, AECOM, 2018
Anti-Corruption, AECOM, 2018
Information Security, AECOM, 2018
SWPPP Training, AECOM, 2015
Desert Tortoise Health Assessment Training, USFWS, 2011

Mr. Romero is a Principal Biologist for AECOM with 30 years of experience specializing in southwestern desert ecology. He has managed numerous projects and supervised over 60 staff/contract biologists and other environmental specialists. He has been a biological task lead for numerous large scale proposals where he developed scopes, budgets and schedules. Mr. Romero is an Authorized Biologist (AB) with the U.S. Fish and Wildlife Service (USFWS), Bureau of Land Management (BLM), and Nevada Department of Wildlife (NDOW); Designated Biologist (DB) with the California Department of Fish and Wildlife (CDFW), California Energy Commission (CEC) and California Public Utilities Commission (CPUC); and Certified Wildlife Biologist with The Wildlife Society (TWS). He has been approved on over 50 USFWS biological opinions (BOs) and numerous CDFW Incidental Take Permits (ITPs) and NDOW Special Purpose Permits (SPPs) for the desert tortoise. He also attended the USFWS desert tortoise health assessment training and is approved to perform the assessment including blood draws. Mr. Romero has primarily supported the military, oil/gas/electric/water companies, and renewable energy projects. His roles and responsibilities have included project management, business development and technical leadership to ensure compliance with the National Environmental Policy Act (NEPA), California Environmental Quality Act (CEQA), Endangered Species Act (ESA), Migratory Bird Treaty Act (MBTA), Bald and Golden Eagle Protection Act (BGEPA), Fish and Wildlife Coordination Act (FWCA), Clean Water Act (CWA), as well as numerous State and Department of Defense (DoD) regulations. He has extensive experience with environmental permitting, special-status species protocol surveys, compliance monitoring, awareness trainings and technical writing including Biological Assessments (BAs), permit applications, and NEPA/CEQA documents. Mr. Romero has routinely coordinated and interfaced with the DoD, USFWS, BLM, USACE, CDFW, NDOW, CEC, CPUC and CSLC.

Experience

AERA, Well Abandonment Project, Ventura, California. Principal Biologist. Biological resources lead supervising biologists. Performed wildlife, vegetation community and plant surveys. Produced biological resource survey report. AERA safety trained. [03/2019-Present: AECOM]

Mojave Public Utility District (MPUD), Cache Creek and Well 30 Blending Projects, Mojave, California. Principal Biologist. Environmental lead supervising biologists, archaeologists and wetland

Smith's Driver Training, AECOM, 2010
Bat Ecology and Field Techniques Workshop, TWS, 2006
California Tiger Salamander Workshop, TWS, 2003
Flat-tailed Horned Lizard Workshop, BLM, 2001
Southwestern Willow Flycatcher Workshop, Southern Sierra Research Station, 2001
Desert Springs & Wetlands Assessment Workshop, Desert Managers Group, 2001
Desert Tortoise Line-Distance Sampling Workshop, USFWS, 2001
Environmental Compliance Assessment Management Program, Shipley and Associates, 1999
National Military Fish and Wildlife Association Conference, Wildlife Management Institute, 1998
Regional Habitat and Species Conservation Planning Conference, UC Davis, 1996
The Wildlife Society Annual Conference, TWS, 1995 - 1998, 2001, 2003, 2009, 2010, 2012, 2013, 2014
Desert Tortoise Conference, Desert Tortoise Council, 1992 - 1995, 2001, 2003, 2009, 2013
Mohave Ground Squirrel Workshop, TWS, 1992, 2005
Desert Tortoise Workshop, Desert Tortoise Council, 1990, 1993, 2000 – 2006 (Field Instructor and Speaker – Administering Awareness Training)

delineation staff. Performed wildlife, vegetation community, rare plant and non-native plant surveys. Produced natural resources sections of Environmental Assessment/Mitigated Negative Declaration, Plan of Development, and biological resource survey reports. [05/2018-Present: AECOM]

Southern California Edison, San Onofre Nuclear Generating Station (SONGS) Decommissioning Project, San Onofre, California. Principal Biologist. Lead Biologist and Lead Verifier working under the auspices of the California State Lands Commission (CSLC) conditions and SONGS program procedures. Provide assistance on biological resource matters pertaining to the decommissioning of the facility. Ensured adherence to various conditions, procedures, protocols, and guidelines to minimize impacts to biological resources. [10/2018-Present: AECOM]

Southern California Gas Company, Aliso Canyon Turbine Replacement Project, Northridge, California. Principal Biologist. Approved CPUC Environmental Compliance Manager (ECM) and DB working under the auspices of the CPUC conditions. Manager and lead biologist who supervised field staff including biologists, archaeologists, and paleontologists. Liaison between field staff, client, contractors, and regulatory agencies. Supervised and performed surveys for special-status plant and wildlife species, nesting birds, jurisdictional waters, vegetation/habitat mapping and non-native plants. Performed numerous awareness trainings for SCG staff and contractors. Ensured adherence to all CPUC conditions, mitigation measures, protocols, and guidelines to minimize impacts to sensitive resources during construction. Provided CDFW 1602 permitting support. Frequently interfaced with CPUC environmental monitor [09/2014-Present: AECOM]

Los Angeles Department of Water and Power, Beacon Solar Project, California City, California. Principal Biologist. Approved CDFW DB working under the auspices of the State of California and Kern County conditions. Manager and lead biologist who supervised field staff including biologists, archaeologists, and paleontologists. Liaison between field staff, client, contractors, and regulatory agencies. Performed special-status plant and wildlife species surveys (wildlife included desert tortoise, Mohave ground squirrel, burrowing owl, desert kitfox and American badger), nesting bird surveys, common raven point counts, and vegetation surveys. Performed numerous awareness trainings for LADWP staff and contractors. Ensured adherence to all permit conditions, mitigation measures, protocols, and guidelines to minimize impacts to sensitive resources during construction. Oversaw and provided guidance on installation of desert tortoise exclusion fencing and guards. [01/2014-02/2019: AECOM]

NV Energy, Harry Allen Substation, Clark County, Nevada. Principal Biologist. Approved USFWS AB working under the auspices of the USFWS Biological Opinion (BO) and NDOW SPP conditions. Lead biologist who supervised biological field staff. Liaison between field staff, client, contractors, and regulatory agencies. Ensured adherence to all permit conditions, mitigation measures, protocols, and guidelines to minimize impacts to sensitive resources. [05/2015-11/2015: AECOM]

Southern California Edison, Eldorado Ivanpah Transmission Project, Las Vegas, Nevada. Principal Biologist. Approved USFWS AB and CPUC DB working under the auspices of the USFWS Biological Opinion (BO), CPUC conditions and NDOW SPP. Lead biologist who supervised over 60 biological field staff. Liaison between field staff, client, contractors, and regulatory agencies. Ensured adherence to established permit conditions, mitigation measures, protocols, and guidelines to minimize impacts to sensitive biological resources including special-status plant and wildlife species. Supervised and performed protocol surveys, nesting bird surveys, compliance monitoring, awareness trainings and reporting. [10/2012-9/2013: AECOM]

Abengoa, Mojave Solar Power Project, Hinkley, California. Principal Biologist. Approved USFWS AB and CEC DB working under the auspices of the USFWS BO and CEC conditions. Supervised biological field staff. Liaison between field staff, client, contractors, and regulatory agencies. Ensured adherence to all permit conditions, mitigation measures, protocols, and guidelines to minimize impacts to sensitive biological resources. Supervised and performed special-status plant and wildlife species surveys (wildlife included desert tortoise, Mohave ground squirrel, burrowing owl, desert kitfox and American badger), nesting bird surveys, vegetation surveys, compliance monitoring, awareness trainings, and reporting. Oversaw and provided guidance on installation of desert tortoise exclusion fencing and guards. [11/2011-10/2012: AECOM]

NextEra, Genesis Solar Energy Project, Blythe, California. Principal Biologist. Approved USFWS AB and CEC DB working under the auspices of the USFWS BO and CEC conditions. Ensured adherence to all permit conditions, mitigation measures, protocols, and guidelines to minimize impacts to sensitive resources. Performed special-status plant and wildlife species surveys (wildlife included desert tortoise, burrowing owl, desert kitfox and American badger), vegetation surveys, compliance monitoring, awareness trainings, and reporting. [10/2011-11/2011: AECOM]

Solar Millennium, Blythe Solar Power Project, Blythe, California. Principal Biologist. Approved USFWS AB and CEC DB working under the auspices of the USFWS BO and CEC conditions. Provided supervision of biological field staff. Served as liaison between field staff, client, contractors, and regulatory agencies. Ensured adherence to all permit conditions, mitigation measures, protocols, and guidelines to minimize impacts to sensitive biological resources. Performed special-status plant and wildlife species surveys (wildlife included desert tortoise, burrowing owl, desert kitfox and American badger), nesting bird surveys, vegetation surveys, compliance monitoring, awareness trainings, and reporting. Oversaw and provided guidance on installation of desert tortoise exclusion fencing and guards. [11/2010-10/2011: AECOM]

Southern California Edison, Stirling Transmission Line, Victorville, California. Principal Biologist. Lead Biologist performing vegetation community mapping and habitat suitability assessment along a 100-mile long stretch of the Stirling transmission line corridors – Pisgah to Gale substations and Pisgah to Lugo substations. Documented special-status plant and wildlife species (wildlife included desert tortoise, burrowing owl, desert kitfox as well as raptors and nesting birds) within the survey area.

Supervised up to 6 field biologists. Assisted with production of a biological resources technical report to document the findings. [06/2010: AECOM]

Southern California Edison, Leatherneck Transmission Line, Yucca Valley, California. Principal Biologist. Lead Biologist performing a biological survey for special-status plant and wildlife species (wildlife included desert tortoise, burrowing owl, desert kitfox, American badger) as well as raptors and nesting birds within a 22-mile long portion of the Leatherneck transmission line corridor. [05/2010: AECOM]

CPV, Lazy J Wind Energy Project, New Mexico. **Project Manager.** Managed biological resource surveys including nesting birds and technical reports in support of this proposed wind energy project. [04/2010-05/2010: Tetra Tech]

RES, Granite Mountain Wind Energy Project, Apple Valley, California. **Project Manager.** Managed biological resource surveys including nesting birds, technical reports, agency coordination, and regulatory permitting in support of this proposed wind energy project in southern California. Technical reports were in support of the EIS for BLM. [03/2010 - 05/2010: Tetra Tech]

CPV, Saltdale Wind Energy Project, Ridgecrest, California. Project Manager. Managed biological including nesting birds and cultural resource surveys, technical reports, Worker Environmental Awareness Program (WEAP), and agency coordination in support of this proposed wind energy project in southern California. [11/2009 - 05/2010: Tetra Tech]

Iberdrola, Dillon Wind Energy Project, San Gorgonio Pass, California. **Project Manager**. Managed biological resource survey including nesting birds and regulatory compliance report in support of this wind energy project in southern California. [07/2009 - 11/2009: Tetra Tech]

US Navy, Moffett Field, California. Task Manager. Managed biological resource technical report in support of a remediation project. [04/2009 - 5/2010: Tetra Tech]

Iberdrola, Amargosa Solar Energy Project, Amargosa Valley, Nevada. **Project/Task Manager.** Managed engineering support, cultural resource survey, technical reports, and agency coordination in support of a proposed solar energy project in southwestern Nevada. Biological resources task manager who conducted plant and wildlife surveys including nesting birds in Spring 2010 and produce technical reports in support of the EIS for BLM. [01/2009 - 05/2010: Tetra Tech]

Cogentrix, Proposed Solar Energy Projects, Silurian Valley and Daggett, California and Jean, Nevada. Task Manager. Managed wildlife including nesting birds, botanical (vegetation community and rare plant), and waters field surveys at 4 proposed utility scale solar sites. Managed staff and subcontractors, produced proposals, procured equipment, consulted with agencies, produced and reviewed technical reports. Reports were in support of two Applications for Certification (AFC) documents for CEC, two EIS documents for BLM and various permit applications. [07/2008 - 05/2010: Tetra Tech]

eSolar, Alta Vista/Gaskell/Willow Springs Solar Energy Projects, Antelope Valley, California. Project Manager. Managed staff and subcontractors in

support of the three AFCs for the proposed solar energy projects. [07/2008 - 09/2009: Tetra Tech]

Iberdrola, Tule Wind Energy Project, Eastern San Diego County, California. Project Manager. Managed biological including nesting birds and cultural resource surveys, technical reports, agency coordination, and production of an EA for the BLM. [07/2008 - 05/2010: Tetra Tech]

Confidential Client, Alternative Energy Prospecting in Arizona, California, Colorado, New Mexico, and Utah. Task Manager. Managed biological resources sections of five critical issues analysis (CIA) reports. [03/2008 - 05/2008: Tetra Tech]

Edison Mission Energy, Proposed Solar Energy Project, Edwards, California. Task Manager. Managed and conducted biological resources field survey including nesting birds and report in support of a CIA for a proposed site in southern California. [03/2008 - 04/2008: Tetra Tech]

Florida Power and Light Energy (FPLE), Solar Energy Prospecting, Mojave Desert, California. Task Manager. Managed biological resources due diligence desk top analysis and ground verification for various sites in southern California. [03/2008 - 09/2008: Tetra Tech]

PPM Energy, Inc., Mojave Desert Wind Energy Projects, Mojave Desert, California. Task Manager. Managed and performed biology tasks including proposals, literature searches, and special-status plant and wildlife species (wildlife included desert tortoise, burrowing owl, Mohave ground squirrel, and raptor) presence/absence surveys. Provided technical writing for fatal flaws analyses of three potential wind energy farms. Interfaced with BLM staff on surveying and reporting efforts. [08/2007 - 10/2007: CH2M Hill]

Los Angeles County Sanitation District, Mesquite Regional Landfill Project, El Centro, California. Task Manager. Managed and performed biology tasks including proposals, literature searches, awareness trainings, special-status species (plants, desert tortoise, burrowing owl, and nesting bird) surveys, compliance monitoring and technical reporting for the construction of the landfill railroad spur. Authorized biologist to work under the auspices of the USFWS BO issued for the project. [01/2007 - 10/2007: CH2M Hill]

BrightSource Energy, Ivanpah Solar Energy Generating System (ISEGS) Project, Primm, Nevada. Task Manager. Managed and performed biology tasks including proposals, literature searches, habitat characterization, special-status species (plants, desert tortoise and raptor) surveys, nesting bird surveys, and technical writing (fatal flaws analyses, Application for Certification, and Biological Assessments [BA]) for the proposed installation of a 5.25 square mile solar energy plant. Provided supervision of numerous staff and subcontract biologists for the field survey effort. Worked with GIS to create data dictionaries to standardize data collection. Coordinated with USFWS, BLM, CDFG and CEC regarding surveying, reporting, and permitting efforts. Technical reports were in support of AFC for CEC and EIS for BLM. [12/2006 - 10/2007: CH2M Hill]

County of Santa Barbara, Lompoc Wind Energy Farm Project, Lompoc, California. Task Manager. Managed and performed biology tasks including proposals, literature searches, habitat characterization and mapping, special-

status species plant and wildlife surveys, avian point counts, and technical writing for the proposed installation of a 1,000 acre wind energy farm. Technical writing was provided for the draft EIR. Coordinated with the County of Santa Barbara, local experts, and Audubon Society. [08/2006 - 10/2007: CH2M Hill]

Corrections Corporation of America, California City Prison Expansion Project, California City, California. Task Manager. Managed and performed biology tasks including proposals, literature searches, agency coordination, technical writing in support of the supplemental EIR, special-status plant and wildlife species (wildlife included desert tortoise, Mohave ground squirrel and burrowing owl) surveys, nesting bird surveys, awareness training, compliance monitoring, and agency reporting. Authorized biologist to work under the auspices of the USFWS BO issued for the project. [06/2006 - 10/2007: CH2M Hill]

U.S. Air Force, Plant 42 Area of Concern 3 Project, Palmdale, California. Task Manager. Managed and performed biology tasks including proposals, literature searches, special-status species (plants, desert tortoise, Mohave ground squirrel, burrowing owl, desert kitfox) surveys, nesting bird surveys, production and presentation of environmental awareness training, as well as coordinating and writing technical reports for the Department of Toxic Substances Control and CDFG. [05/2006 - 10/2007: CH2M Hill]

National Aeronautics and Space Administration, X-37 Test Program, Edwards Air Force Base, California. Task Manager. Managed and performed biology tasks including literature searches, agency coordination, technical writing in support of the EA and permitting for the proposed National Aeronautics and Space Administration (NASA) X- 37 Test Program. Focused wildlife species included the desert tortoise and nesting birds. Coordinated with NASA and Air Force personnel on EA content. [11/2003 - 05/2004: CH2M Hill]

California High Speed Rail Authority, California High Speed Rail Project, Sacramento, California. Task Manager. Co-wrote the biological resources and jurisdictional waters technical evaluation for the linear railway project segment between Los Angeles and San Diego, CA via the Inland Empire. The program level analysis primarily relied on GIS, databases, and literature searches focusing on jurisdictional waters including wetlands and vernal pools, sensitive plant communities, threatened and endangered species, species of special concern, and wildlife movement corridors. The evaluation was incorporated into the joint EIS/EIR for the project. [10/2002 - 04/2003: CH2M Hill]

Pacific Gas and Electric, Investigative and Remedial Action Project, Hinkley, California. Task Manager. Managed and performed biology tasks including proposals, literature searches, special-status plant and wildlife species (wildlife included desert tortoise, Mohave ground squirrel, and burrowing owl) surveys, nesting bird surveys, technical writing in support of the Mitigated Negative Declaration (MND) and permitting for the ground water treatment system and extraction wells. Authorized biologist to work under the auspices of the USFWS BO issued to Pacific Gas and Electric (PG&E). [08/2002 - 10/2007: CH2M Hill]

Pacific Gas and Electric, Investigative and Remedial Action Project, Topock, Arizona. Project Manager. Managed and performed technical support for the groundwater remediation project. Responsible for managing 1 million dollar budget, numerous staff and subcontract biologists, and various reports and permits. Liaison between regulatory agencies (USFWS, BLM, and CDFG) and

project staff. Biological oversight and support included special-status plant and wildlife species (wildlife included desert tortoise and southwestern willow flycatcher) surveys, nesting bird surveys, wetlands and jurisdictional waters delineations, preconstruction surveys, compliance monitoring, awareness trainings, and technical writing. Produced numerous biological reports, construction completion reports, restoration plan, streambed alteration agreement applications, BAs including a programmatic biological assessment, various sections for CEQA documents, and regulatory permits (USFWS BO, BLM ROW, USFWS ROW/SUP, CDFG 1600, etc.). Authorized biologist to work under the auspices of the USFWS BO issued to PG&E. Oversaw and provided guidance on installation of desert tortoise exclusion fencing. [08/2002 - 10/2007: CH2M Hill]

Lockheed Martin, On-call Biological Support Services, Palmdale, California. Task Manager. Managed and performed technical support for biology tasks including proposals, literature searches, special-status plant and wildlife species (wildlife included desert tortoise, Mohave ground squirrel, burrowing owl and desert kitfox) surveys, nesting bird surveys, production and presentation of a desert tortoise awareness training, and Section 7 Consultation with the USFWS to obtain a BO for the desert tortoise. Tasks performed at Lockheed Martin Plants 9 and 10. Regularly interfaced with client. Coordinated with USFWS and CDFG regarding Section 7 and 2081 permitting, respectively. Authorized biologist to work under the auspices of the USFWS BO issued to Lockheed Martin. [07/2002 - 10/2007: CH2M Hill]

PPM Energy, Inc., Fairmont Wind Energy Project, Lancaster, California. Task Manager. Managed and performed technical support for biology related tasks including proposals, literature searches, habitat characterization and mapping, special-status species plant and wildlife surveys, avian point counts, and technical reporting for the proposed installation of a wind farm. Technical writing support was provided for the draft EIR and regulatory permitting. [03/2002 - 11/2005: CH2M Hill]

Los Angeles Department of Water and Power, Owens Lake Dust Mitigation Project, Owens Lake, California. Task Manager. Managed and performed technical support for wildlife biology related tasks including the Western Snowy Plover Mitigation Monitoring Program. Over four years, managed an annual budget of more than 0.5 million dollars, provided oversight of several staff and subcontract biologists, and responsible for numerous deliverables. Streamlined the environmental compliance reporting process for the appropriate regulatory agencies. Responsible for a program that entailed performing awareness trainings, preconstruction and presence/absence surveys for numerous avian species, and mitigation monitoring. Liaison between the field biologists and client/regulatory agencies. Provided technical writing support for several CEQA documents, regulatory permits, and biological reports. Routinely coordinated and ensured compliance with CDFG, CSLC, and Great Basin Unified Air Pollution Control District permit conditions to minimize potential impacts to sensitive biological resources. [01/2002 - 12/2006: CH2M Hill]

Pacific Gas and Electric, Environmental Permitting Review, San Francisco, California. Senior Wildlife Biologist. As a senior review team, categorized several hundred land, planning, and environmental permits in preparation for the restructuring of PG&E. Key elements of the permits were entered into a standardized Excel spreadsheet. Permits included grants, titles, deeds, right of ways, easements, joint use agreements, etc. [01/2002 - 05/2002: CH2M Hill]

BLM, Imperial Sand Dunes Recreation Area, El Centro, California. Senior Wildlife Biologist. Served as the liaison between CH2M HILL and the BLM. Onsite within the BLM office full-time and coordinated with BLM staff on a daily basis. Assisted BLM with any and all matters pertaining to the lawsuit filed by the Center for Biological Diversity and other environmental organizations against the BLM. Consulted with the USFWS on behalf of the BLM. Performed substantial literature searches and data collections. Prepared case files for court appeals. Established and maintained the legal administrative record. Co-wrote and provided technical assistance with three major documents prepared for the BLM Imperial Sand Dunes Recreation Area including the BA, Recreation Area Management Plan, and EIS. The documents focused on the following special-status species Peirson's milkvetch, desert tortoise, flat-tailed horned lizard, and Colorado Desert fringe-toed lizard. [10/2001 - 03/2002: CH2M Hill]

Monument 3D, Seismic Exploration Project, Los Banos, California. Biological Consultant. Provided biological surveying and monitoring support for the Monument 3D Seismic Project located in Los Banos, CA. Support was a cooperative effort with the ACOE, USFWS, and CDFG. The project traversed 250 square miles and several sensitive biological resource habitats including Volta and Los Banos State Wildlife Areas, San Luis National Wildlife Refuge, Waters of the U.S., San Joaquin kit fox, San Joaquin antelope squirrel, riparian brush rabbit, riparian woodrat, giant garter snake, blunt-nosed leopard lizard, burrowing owl, various nesting birds and numerous special-status plant species. Responsibilities included compliance with the ACOE Nationwide 6 Permit, USFWS BO, CDFG Memorandum of Agreement (MOA), seismic plan of operations, and several other protection measures. Coordinated with USFWS/CDFG biological monitor, project biologists, and seismic personnel. Produced numerous monitoring reports. Additional responsibilities included recording sensitive species and sign, minimizing project impacts, and reporting noncompliance issues. [03/2002 - 08/2002: BEA]

U.S. Army, Fort Irwin, California. Project Manager/Senior Wildlife Biologist. Managed and performed technical support to the Fort Irwin Directorate of Public Works to ensure compliance with Federal, State, local, and Army Regulations (ARs) pertaining to natural resources. These regulations included NEPA, ESA, SA, MBTA, FWCA, CWA, and AR 200-3 as well as other ARs. Provided support to other programs within the department such as Air and Water Quality (AWQ), Hazardous Waste (HW), and Cultural Resources. Administrative writing experience included standard operating procedures, statements of work, statements of qualifications, proposals, and cost estimates. Technical writing experience included EIS and EA support, ESA annual reports, resource management plans, biological assessments, damage assessments, mitigation/monitoring plans, compliance monitoring reports, regulatory coordination letters, and standardized field forms. Fieldwork experience included biological research, presence/absence surveys, clearance surveys, zone of influence surveys, line-distance sampling, compliance monitoring, awareness training, radio tagging and tracking, passive integrated transponder (PIT) tagging, wildlife relocations, wildlife damage control, ecological restoration, and floral/faunal inventories including nesting birds. Responsible for managing sensitive species and habitats including desert tortoise, Lane Mountain milkvetch, Mohave ground squirrel, burrowing owl, American badger, LeConte's thrasher, golden eagle, prairie falcon, loggerhead shrike, Mojave fringe-toed lizard, Waters of the US (8 playas and 12 natural springs), Joshua tree woodland, and desert tortoise critical habitat. Permit coordination and authorizations included ESA

Section 7 consultation, ESA compliance monitor authorization, line-distance sampling, MBTA depredation, and State scientific collecting permits. Authorized biologist on USFWS biological opinion for the desert tortoise at Fort Irwin. Familiar with various Federal, State, and local protocols and guidelines pertaining to biological field techniques and documentation. Routinely coordinated with Military Police on wildlife damage control issues. Interfaced with client (Army) on a daily basis. Experienced with fiber optic scope, Palm Pilot, GPS, and GIS technology. Participated in numerous awareness trainings, educational briefings and community outreach programs. Received DoD defensive driver's and explosive ordnance training. Oversaw and provided guidance on installation of desert tortoise exclusion fencing. [11/2000 - 10/2001: Charis Corporation]

Level (3), Fiber Optic Communications Line Installation Project, Mojave Desert/Tehachapi Mountains/San Joaquin Valley, California. Biological Consultant. Provided environmental compliance support as outlined in the EIR, Biological Evaluation (BE), and various regulatory permits for the Level (3) Communications Fiber Optic Project. Responsible for the segment located between Cajon Pass and Bakersfield, CA. Support was a cooperative effort with the ACOE, USFWS, CDFG, CPUC, and UPR. This linear project traversed several sensitive biological resource habitats including desert tortoise, Tehachapi slender salamander, yellow-blotched salamander, western spadefoot toad, San Joaquin kit fox, Tipton kangaroo rat, blunt-nosed leopard lizard, Mohave ground squirrel, burrowing owl, elderberry beetle, Joshua tree woodland, oak tree woodland, and Waters of the U.S. Responsibilities included compliance with the ACOE nationwide permit, CDFG streambed alteration agreement, and numerous USFWS, CDFG and County protection measures. Assumed responsibilities of lead field biologist. Coordinated with biologists, archaeologists, environmental inspectors, and construction personnel on a daily basis. Provided awareness trainings, pre-activity surveys including nesting birds, compliance monitoring, and ecological restoration support. Produced numerous monitoring reports. Also recorded sensitive species and sign, minimized project impacts, and reported noncompliance issues. Received UPR 2000 safety training. [1/2000 - 10/2000: Chambers Group]

AT&T, Telephone Communications Line Removal Project, Mojave Desert, California. Biological Consultant. Performed environmental compliance support as outlined in the EIR, BE, and various regulatory permits for the AT&T P140 Coaxial Cable Removal Project located between Baker, CA and Laughlin, NV. Support was a cooperative effort with the ACOE, USFWS, NPS, CDFG, BLM, and CPUC. This linear project traversed several sensitive biological resource habitats including Mojave National Preserve, desert tortoise, desert bighorn sheep, Mohave ground squirrel, burrowing owl, Joshua tree woodland, and Soda dry lake. Responsibilities included compliance with the EIS, ACOE nationwide permit, CDFG streambed alteration agreement, USFWS BO for the desert tortoise, NPS standard use permit, construction plan of operations, and several other protection measures. Authorized biologist to work under the auspices of the USFWS BO issued for this project. Assumed responsibilities of assistant lead biologist. Coordinated with project biologists, NPS, BLM, and construction personnel on a daily basis. Provided awareness trainings, pre-activity surveys, compliance monitoring, and ecological restoration support. Provided daily verbal summaries and several written standardized reports. All desert tortoises within the zone of impact were captured, processed, and relocated. Processing entailed weighing, measuring, marking, sexing, health profiling, diagramming, and photographing each tortoise. Sensitive plants including Joshua trees and cacti were flagged and

avoided when possible. Joshua trees directly within the right-of-way were excavated and relocated nearby. Additional responsibilities included recording sensitive species and sign, collecting desert tortoise shell remains, minimizing project impacts, and reporting noncompliance issues. [10/1999 - 11/1999: On-track Consulting]

U.S. Air Force, Edwards Air Force Base, California. Program Manager. Directed the conservation program comprising of natural resources, cultural resources, and Environmental Impact and Analysis Process (EIAP) staff in support of AFFTC/EM. Additionally, supported joint efforts with the US Army, Navy, and Marines. Managed an annual 2.5 million dollar budget with a staff consisting of over 40 biologists, archaeologists, and environmental planners. Assumed responsibilities of the Environmental Department Manager in his absence. Department comprised of over 100 staff members and an annual 7 million dollar budget. Responsible for providing technical and administrative support to ensure compliance with Federal, State, local, and Air Force regulations pertaining to natural resources, cultural resources, and EIAP. These regulations included NEPA, ESA, SA, MBTA, FWCA, CWA, National Historic Preservation Act, Archaeological Resources Protection Act, and Native American Graves Protection and Repatriation Act. Provided support to other programs within the department such as AWQ, HW, Installation Restoration Program, GIS, and Community Relations Program. Responsible for employee hiring, development, evaluation, morale, discipline, and termination. Developed, planned, budgeted, scheduled, tracked, and reported overall support using database, spreadsheet, presentation, and timeline software. Produced statements of work, statements of qualifications, budgets, proposals, cost estimates, and metrics. Procured necessary materials and equipment to perform program tasks. Reviewed, commented, and approved all conservation reports and other government deliverables prior to customer submittal. Interfaced with client (Air Force) on a daily basis. Member of several technical committees. Promoted employee development through continued education courses and professional memberships. Promoted community outreach by volunteering for Science Fairs, Job Fairs, Base Open House, Antelope Valley Fair, and classroom/field trip educational events for local schools. [09/1998 - 09/1999: Computer Sciences Corporation]

U.S. Air Force, Edwards Air Force Base, California. Section Lead. Supervised and trained several natural resources staff in support of AFFTC/EM. Performed technical and administrative support to ensure compliance with Federal, State, local, and Air Force regulations pertaining to natural resources. These regulations included NEPA, ESA, SA, MBTA, FWCA, and CWA. Responsible for developing, planning, budgeting, scheduling, tracking and reporting using database, spreadsheet, presentation, and timeline software. Provided technical support to other programs within the department such as EIAP, CR, AWQ, HW, Installation Restoration Program, GIS, and Community Relations Program. Administrative writing experience included statements of work, statements of qualifications, standard operating procedures, budgets, proposals, cost estimates, and metrics. Technical writing experience included EIS and EA support, ESA No Affect Letters, ESA Annual Reports, resource management plans, biological assessments, damage assessments, mitigation/monitoring plans, standardized field forms, and compliance monitoring reports. Fieldwork experience included biological research, presence/absence surveys, clearance surveys, pre-activity surveys, compliance monitoring, awareness training, radio telemetry, bird banding/tagging, small mammal trapping, wildlife relocations, wildlife damage control, ecological restoration, and floral/faunal inventories including nesting birds. Responsible for

managing sensitive species and habitats including desert tortoise, desert cymopterus, Barstow woolly sunflower, alkali mariposa lily, Mohave ground squirrel, burrowing owl, American badger, LeConte's thrasher, golden eagle, prairie falcon, loggerhead shrike, Waters of the US (3 playas and 1 wetland), Joshua tree woodland, mesquite woodland (Los Angeles Significant Ecological Area), yardangs, and desert tortoise critical habitat. Permit coordination experience included writing 16 BAs in support of ESA Section 7 consultations, ESA compliance monitor authorizations, CWA Section 401/404 permits, MBTA depredation permits, State scientific collection permits, and bird banding permits. Familiar with various Federal, State, and local protocols and guidelines pertaining to biological field techniques and documentation. Established priorities to ensure tasking was completed within time and budget constraints. Reviewed, commented, and approved all natural resources reports and other government deliverables prior to customer submittal. Assisted customer with development of an overall natural resources management strategy for Edwards AFB. Administered the Base desert tortoise adoption, natural resources awareness training, and compliance monitoring programs. Routinely coordinated with Security Police on wildlife damage control issues. Maintained client (Air Force) relationships on a daily basis. Coordinated directly with project proponents to minimize environmental impacts. Developed various mitigation measures. Experienced with GIS and GPS technology. Oversaw and provided guidance on installation of desert tortoise exclusion fencing. Authorized biologist on over 40 USFWS BOs issued to Edwards AFB. Promoted community outreach by volunteering for numerous Science Fairs, Job Fairs, Base Open House, Antelope Valley Fair, and classroom/field trip educational events for local schools. Received DoD defensive driver and explosive ordnance training. Co-recipient of the Regional Award of Merit for Environmental Resources and Conservation by the Kern Council of Governments. [07/1991 - 08/1998: Computer Sciences Corporation]

BLM, Desert Tortoise Study Plot, Kramer Junction, California. Biological Consultant. Original research team member of a long-term mark-recapture study designed to monitor the desert tortoise. Established a new 60-day study plot near Kramer Junction, CA. Study was a cooperative effort with the USFWS, BLM, and CEC. Authorized biologist to work under the auspices of the USFWS BO issued for this project. Surveyed, captured, processed, and released desert tortoises. Processing entailed identifying, weighing, measuring, marking, sexing, health profiling, diagramming, photographing, and attaching radio transmitters and PIT tags. Additional responsibilities included daily radio tracking, recapturing and processing tortoises, recording desert tortoise sign, collecting shell remains, and assessing human impacts. Provided thorough documentation using several standardized field forms. Procedures were accomplished in accordance with permits, protocols, and guidelines. [04/1991 - 06/1991: EnviroPlus Consulting]

KRGT, Kern River Gas Transmission Pipeline, Mojave Desert, California. Biological Consultant. Performed environmental compliance support as outlined in the EIR, BO, Memorandum of Understanding and various other regulatory permits for the Kern River Gas Transmission Pipeline Responsible for the segment located between Mesquite, NV and Barstow, CA. Support for this linear project was a cooperative effort with the ACOE, USFWS, CDFG, BLM, and FERC. Ensured adherence to established permit conditions, mitigation measures, protocols, and guidelines to minimize environmental impacts. Authorized biologist to work under the auspices of the USFWS BO issued for this project. Responsible for awareness trainings, pre-activity surveys including nesting birds, compliance

monitoring, tortoise relocations, ecological restoration, and daily reports. Produced extensive field notes to document desert tortoises and sign, daily construction activities, and any noncompliance issues. Operated fiber optic scope to ensure no tortoise presence within burrows. [03/1991 - 04/1991: Dames and Moore]

U.S. Air Force, Edwards Air Force Base, California. Biological Consultant. Performed environmental compliance support with Federal, State, local, and Air Force regulations pertaining to natural resources including NEPA, ESA, MBTA, FWCA, and CWA. Responsibilities included biological assessments, damage assessments, pre-activity including nesting birds and clearance surveys, inventories, compliance monitoring, and awareness trainings. Provided natural resources sections and reviews of environmental assessments. Conducted field surveys and produced biological assessments in support of Section 7 consultations. Authorized biologist to work under the auspices of the USFWS BOs issued to the Air Force. [10/1990 - 06/1991: Computer Sciences Corporation]

Del Webb/Summerlein Homes, Las Vegas, Nevada. Biological Consultant. Performed desert tortoise pre-activity surveys and relocations in preparation for proposed golf course and housing development sites in Las Vegas and Henderson, NV. Support was a cooperative effort with USFWS and Nevada Division of Wildlife. Authorized biologist to work under the auspices of the USFWS BO issued for this project. Surveyed, captured, processed, and relocated desert tortoises outside impact zones. Processing entailed identifying, weighing, measuring, marking, sexing, health-profiling, drawing blood samples, rehydrating, diagramming, and photographing each tortoise. Additional responsibilities included recording desert tortoise sign, collecting shell remains, and assessing human impacts. Provided thorough documentation using several standardized field forms. Procedures were accomplished in accordance with the EIR, permits, protocols, and guidelines. [08/1990 - 10/1990: Converse Environmental]

CDFG, Wild Trout Program, Rancho Cordova, California. Seasonal Biologist. Crew leader of the Wild Trout Program. Responsible for assessing and monitoring the health of California's wild trout fishery. Supervised several staff members and volunteers. Assigned duties, maintained schedules, coordinated activities, resolved conflicts, and ensured objectives were met. Conducted freshwater fish population censuses by boat and backpack electro-shocking. Captured, identified, weighed, measured, marked, removed scale samples, and released fish at point of capture to assess health of fishery. Performed riparian and stream habitat assessments to determine health of system. Determined water quality and flow to assess health of stream. Provided thorough documentation using standardized field forms. [07/1990: CDFG]

Honda Motor Corporation, Automobile Test Track, California City, California. Biological Consultant. Performed desert tortoise surveys and relocations for the construction of the Honda automobile test track. Cooperative effort with the USFWS, CDFG, BLM, and University of California Los Angeles. Authorized biologist to work under the auspices of the USFWS BO issued for this project. Surveyed, captured, processed, and relocated desert tortoises outside the impact zone. Processing entailed identifying, weighing, measuring, marking, sexing, health profiling, nasal flushing, drawing blood samples, diagramming, photographing, and radio transmitter attachment. Cared for over 20 tortoises that were placed in temporary holding pens to monitor their health. Additional responsibilities included radio tracking, adaptive behavioral studies of relocated tortoises, recording desert tortoise sign, collecting shell remains, and assessing

project impacts. Oversaw and provided guidance on installation of desert tortoise exclusion fencing and guards. Provided thorough documentation using several standardized field forms. Procedures were accomplished in accordance with the EIR, permits, protocols, and guidelines. [02/1990 - 06/1990: SAIC]

CDFG, Game Bird Hunting Program, Oroville, California. Seasonal Biologist. Operated hunter check stations at Colusa, Delevan, Sutter, and Sacramento National Wildlife Refuges. Cooperative effort with USFWS. Escorted hunters throughout refuges. Assigned waterfowl hunter blinds. Monitored hunter activity. Identified and recorded bagged waterfowl and upland game birds. Ensured compliance with hunting regulations. Reported offenses to the game warden. [11/1989 - 01/1990: CDFG]

CDFG, Wild Trout Program, Rancho Cordova, California. Seasonal Biologist. Wild Trout Program assistant crew leader. Responsible for monitoring and assessing the health of California's wild trout fishery. Supervised staff and volunteers in absence of crew leader. Conducted freshwater fish population census by boat and backpack electro-shocking. Captured, identified, weighed, measured, marked, removed scale samples, and released fish at point of capture to assess health of fishery. Performed riparian and stream habitat assessments to determine health of system. Determined water quality and flow to assess health of stream. Provided thorough documentation using standardized field forms. [07/1989 - 11/1989: CDFG]

Appendix E

Jurisdictional Delineation Report

Jurisdictional Delineation of Arid Streams for the Proposed Mojave Public Utility District Cache Creek Water Line Replacement Project

Cache Creek and Associated Tributaries, Kern County, CA



Cache Creek, Kern County, CA (WP-4)

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Table of Contents

Contents

1.0 EXECUTIVE SUMMARY 1

2.0 SITE LOCATION 1

3.0 PROPOSED PROJECT 2

3.1 Background and Purpose of Project 2

3.2 General Project Description 2

3.2 Alternative Alignments and Evaluation of Impacts 4

4.0 REGULATORY SETTING / TERMINOLOGY 4

4.1 Porter-Cologne Water Quality Control Act 5

4.2 California Fish and Game Code (Section 1600 et seq.) 6

4.3 West Mojave Plan (Bureau of Land Management) 7

4.4 Glossary of Stream and Terrestrial Landforms 8

4.4.1 – CDFW MESA Terminology 8

4.4.2 – Other USACE, RWQCB, and CDFW Terminology 8

5.0 METHODOLOGY 9

5.1 Field Protocol 9

6.0 RESULTS 11

6.1 Watershed Context and Hydrology 11

6.2 Existing Setting and Vegetation Communities 12

6.2.1 Upland Vegetation Communities (Adjacent to Episodic Drainages) 13

6.2.2 Arid Wash / Riparian Vegetation Communities 15

6.3 Soils and Geology 15

6.3.1 Soils 15

6.3.2 Geology 16

6.4 Ephemeral Drainage Features within the Study Area 17

6.4.1 Study Area 17

6.4.2 Indicators of Episodic Stream Activity 21

7.0 IMPACTS 24

7.1 Impact Corridors 24

7.2 Avoidance, Minimization, and Mitigation Measures 27
8.0 DISCUSSION 28
8.1 Summary 28
8.2 Regulatory Requirements 29
9.0 REFERENCES 31

List of Tables

Table ES-1. Ephemeral Drainage Features within Study Area and Impact Corridors 1
Table 6-1. Vegetation Communities within Study Area 13
Table 6-2. Soils Data for Study Area and Impact Corridor 16
Table 6-3. Waters of the State and Streambeds within Study Area 19
Table 6-4. Summary of Jurisdictional Waters within Study Area 19
Table 6-5. Classification of Waters of the State and Streambeds 20
Table 6-6. MESA Indicators Observed within Study Area 21
Table 6-7. Geomorphic OHWM Indicators Observed within Study Area 22
Table 6-8. Watercourse Polygons and Low-Flow Channels (Study Area) 23
Table 6-9a. Overview of Proposed Avoidance within Impact Corridor 24
Table 6-9b. Overview of Anticipated Impacts within Impact Corridor 24
Table 6-10. Summary of Jurisdictional Features within Conceptual Alignment 25
Table 6-11. Summary of Jurisdictional Features within Alternative Conceptual Alignment 26
Table 6-12. Watercourse Polygons and Low-Flow Channels (Impact Corridor) 27

List of Appendix Tables

Table A-1. Pipeline Crossing Locations and Reach Mid-Point Locations .....
Table A-2. Waters of the State and Streambeds within the Study Area .....

List of Figures (Appendix A)

Figures 1 – 3. Site Location Maps

Figure 4. USGS Topographic Map

Figures 5 – 6. Watershed Maps (Hydrologic Unit Maps; HUC-8, -10; HUC-10, -12)

Figures 7 – 8. Watershed Maps (CalWaters Hydrologic Maps; Hyd Unit / Hyd Area; Hyd Sub-Area)

Figure 9. National Wetland Inventory (NWI) Map

Figure 10. Soils Map Set, Figure 10A – 10I

Figure 11. MESA Delineation Map Set, Figure 11A – 11I

Appendices

A. Figures 1-11

B. Supplemental Terminology and MESA Protocol

C. Supplemental Data Tables

D. Site Photographs

E. Vegetation Community Maps (Figures 3-4 from Biological Resources Report)

F. Observed Plant List

G. Web Soil Survey Reports

H. (1) Geologic Map; (2) Tehachapi / Hwy 58 Flood of 2015

1.0 EXECUTIVE SUMMARY

The Mojave Public Utility District (MPUD or District) proposes to replace an existing potable water pipeline running roughly parallel to the Union Pacific's railroad (UPRR) Right of Way and State Highway 58 Right of Way between the City of Tehachapi and the community of Cache Creek in Kern County, CA (Figures 1–4). AECOM conducted a jurisdictional delineation (JD) of ephemeral (or episodic) streams within the Project Study Area using standard delineation methodologies: (a) Mapping the Ordinary High Water Mark (OHWM) as utilized by the Regional Water Quality Control Board (RWQCB) for determining Waters of the State (WoST); and Mapping Episodic Stream Activity (MESA) (where applicable) as utilized by the California Department of Fish and Wildlife (CDFW). The study area (i.e., buffer) around the pipeline alignments was 250 ft. in any direction out from the pipeline; thus, the total cross-section was an area with a 500-foot width. The results include the description of the following jurisdictional features: main channel of Cache Creek; a Tributary Drainage Channel; large tributary La Rose Creek; numerous, small, ephemeral tributaries situated along a slope to the north of Hwy 58 (referred to as TR-1 through TR-12); and four floodplain areas called "watercourse polygons" (WP) mapped within the Study Area. One WP is located within lower Cache Creek (southeast corner of Study Area), and the other three WPs are located within an alluvial fan that is among the ephemeral tributaries to Cache Creek. Within the 250-foot buffer (or study area), the JD resulted in 11.3 acres of non-wetland waters of the State, 26.7 acres of CDFW streambeds, all with a linear feet of 29,852 feet (in total). The JD also presents an impact analysis for a 40-foot corridor, called the Conceptual Alignment. The impact analysis also evaluated an alternate segment called the Alternate Conceptual Alignment. Table ES-1, below, summarizes the results.

Table ES-1. Ephemeral Drainage Features within Study Area.

	Waters of the State (acres)	Streambeds (acres)	Linear Feet
Buffer			
A. Cache Creek	7.82	17.39	11,313
B. Tributary Drainage Ditch	0.68	2.29	2,464
C. La Rose Creek	0.51	1.19	763
Subtotal	**9.01**	**20.87**	**14,540**
D. Tributaries (North of Hwy 58)	2.29	5.87	15,312
Total Waters within Buffer	**11.3**	**26.74**	**29,852**

2.0 SITE LOCATION

The District proposes to replace an existing potable water pipeline running roughly parallel to the UPRR and State Highway 58 Right of Way between the City of Tehachapi and the community of Cache Creek in Kern County, California (Figures 1 - 4). The pipeline alignment will be relocated as described in Section 3, below. The project which is linear in nature will be contained within portions of Sections 34, 35, and 36 of Township 32 South, Range 34 East, M.D.M., and portions of Sections 27, 28, 29, 30, 31, and 32 of Township 32 South, Range 35 East, M.D.M. With the exception of a few sections of Bureau of Land Management (BLM)-administered public land (see Figure 2), the conceptual alignment will be located within utility easements along private property. MPUD has ongoing relationships with all of the private

land owners along the conceptual alignment. Therefore, it is assumed easements within these properties will be granted for the new pipeline alignment.

The proposed pipeline alignment is near the vicinity of the UPRR, State Highway 58, the Pacific Crest Trail, and Cache and La Rose Creeks. On the western end of the project, the land includes water system facilities owned and operated by the District. A CHP station sits off State Highway 58 near the center of the project. At the eastside of the project lies the community of Cache Creek. The general nature of the land within the proposed pipeline alignment is rough, mountainous, open space terrain. Where at all possible, the proposed pipeline will be installed along defined dirt roads that are used for access across said mountainous terrain. With the exception of the rural community of Cache Creek and the CHP station, the proposed pipeline alignment is not located nearby any sensitive receptors.

3.0 PROPOSED PROJECT

3.1 Background and Purpose of Project

MPUD owns and operates an 8-inch-diameter steel pipeline that conveys potable water from the Sand Canyon Well Field (Wells 6, 7, 8, and 9) to the communities of Cache Creek and Mojave as well as a California Highway Patrol (CHP) station on State Highway 58. The existing pipeline was installed in approximately 1950 and has become an operational burden to MPUD due to its age, poor condition, and other contributing factors including the location of the pipeline. The existing pipeline is located within the UPRR Right-of-Way (ROW) and within the confines of Cache Creek. The proximity to Cache Creek has resulted in washouts of the pipeline during heavy rain events over the past decades. An inspection of the pipeline in January 2015 revealed several locations where the pipeline is no longer buried and exposed to the creek and/or railroad operations.

The existing pipeline is critical to the District's operations as it provides the only supply of potable water to the community of Cache Creek and the aforementioned CHP station. The District recognizes the existing pipeline is in an unacceptable condition. Further, the pipeline's location within the UPRR Right of Way and the stream bed of Cache Creek makes access difficult and presents a greater risk for future damage to the pipeline from railroad operations and creek washouts. As a result, the District has determined the need for replacement of this pipeline and has evaluated a number of alternatives as listed in the following section.

3.2 General Project Description

The District proposes to install approximately 6 miles of new 10-inch diameter potable water pipeline outside of UPRR's Right of Way. The pipeline will be constructed to the south and north of UPRR's Railroad Right of Way and State Highway 58, northwest of the community of Mojave. The existing pipeline will be abandoned in place after the new pipeline is in service. The portion of the pipeline from the Sand Canyon Well Field to a point approximately 400 feet west of Cameron Road is in good condition and does not need to be replaced. The pipeline replacement will begin at that point. The new pipeline will cross Cameron Road and stay to the south of the UPRR tracks to a point about 8,600 feet easterly of Cameron Road. From there, the pipeline will be bored and jacked under Cache Creek, the UPRR tracks, and State Highway 58. The exact location of the bore and jack will be determined in consultation with Caltrans and UPRR at time of design of the pipeline. The pipeline will then run north of State Highway 58 along the Pacific Crest Trail for a short segment. It will then cross the La Rose Creek with a bored and jacked crossing. From there, the pipeline will run northeast along a series of defined dirt roadways that are used for access across the mountains north of State Highway 58, to a point north of the CHP station. The Pacific Crest Trail also coincides with the alignment of portions of these roads and will likely be encroached during construction. The proposed project includes a new service line to the CHP station

facility. From the CHP station, the pipeline will than run easterly along the same defined dirt roadways used for access across the slopes of the mountains north of State Highway 58 to the point of connection with the Cache Creek water system. The proposed project also includes approximately a ¼ mile of 8-inch diameter pipeline connecting the Cache Creek Pump Station and the existing Cache Creek Pipeline.

With the exception of 2 sections of BLM owned land, the alignment of the pipeline is proposed to sit within utility easements along private property. The District has on-going relationships with all of the private land owners along the proposed alignment. Therefore, it is assumed easements within these properties will be granted for the new pipeline alignment.

Currently there are two pump stations that are part of the existing pipeline system: one serves the CHP station; and the other serves the Cache Creek community. These two pump stations will be abandoned as part of the project.

The existing pipeline operates by gravity with no pumping of flows on the main line. As noted above, individual pump stations provide water service to CHP and the Cache Creek community. Due to the topography of the proposed alignment for the new pipeline along the north side of Highway 58, a conceptual level hydraulic analysis indicates that a pump station is required to boost the water over the mountainous terrain. The new pump station will be installed in a building at the Well 9 facility since electrical power is already available at the site. As a result of boosting the water over the mountainous terrain, pressures downstream of the high point will be near the 200 psi. This will require the installation of one to two pressure reducing stations along the alignment between the pipeline high point and the point of connection with the Cache Creek water system.

Due to concerns over possible environmental constraints associated with the potential encroachment (crossing) of washes tributary to Cache Creek along the first 1½ +/-mile of the pipeline on the south side of the UPRR, the District is considering an option to replace the pipeline within the same easement as the existing pipeline. This option will be discussed in Section 3.2 below. The new pump station will be installed within a small addition to an existing building located at the Well 9 facility that is completely fenced. Additionally, equipment and materials in support of this work will be staged within or directly adjacent to the facility. The site is heavily disturbed and new impacts to biological resources are not expected. Therefore, the pump station is given no further consideration or analysis.

The new 10-inch-diameter pipeline will be placed in a trench varying in depth between approximately 6 to 16 feet, with 1.5-to-1 side slopes for trench safety and stability or vertical sides that will be shored. Given an average trench bottom width of 3 feet and an average trench depth of 6 feet, the width of the trench at ground level would be about 21 feet. Excavation would involve removal of about 72 cubic feet of soil per linear foot of trench. A stockpile would be maintained along the pipeline alignment. The pipeline installation rate is estimated at 250 feet per day. The daily work area would be approximately 500 feet long by 40 feet wide. Any excess spoil from the excavations will be used to re-establish grade along the alignment, resulting in no need for off-site hauling. Total earthwork for this phase of construction is estimated at 84,500 cubic yards. Typical underground pipeline construction equipment will include two excavators, one motor grader, one off-highway truck, two water trucks, one wheeled loader, one skip loader, one backhoe, and one boring machine. Equipment and materials will be staged at various locations within the alignments. The alignment access and egress routes will be via existing dirt roads and through gates along fenced areas.

Construction would consist of site grading and earthwork, piping installation, concrete foundation work, building construction including mechanical, electrical, plumbing, instrumentation, and installation of a hydro-pneumatic tank. Construction equipment will vary by phase and will include some or all of the following: crane, excavator, off-highway truck, water truck, wheeled loader, roller, backhoe, skip loader, welder, and air compressor for sandblasting and coating. Equipment and materials will be staged within the fenced Well 9 facility and within project disturbance areas (along the pipeline route). The construction schedule is anticipated to be continuous for a period of approximately 12 months.

3.2 Alternative Alignments and Evaluation of Impacts

The conceptual alignment, with the exception of the western segment located south of State Highway 58, was intentionally sited within previously disturbed areas and existing dirt roads to reduce habitat disturbance and impacts to biological resources. However, this alignment is expected to result in new land disturbance resulting from a 40-foot-wide work corridor needed to install the pipeline. The segment south of State Highway 58 will result in temporary impacts within the entire 40-foot-wide disturbance corridor. Taking into account an average width of 15 feet of the existing roads, an additional 25 feet will be temporarily impacted along the segment north of State Highway 58. Therefore, the total temporary habitat impacts from the conceptual alignment are 42.9 acres. The predominant vegetation communities that will be impacted include rubber rabbitbrush scrub, tamarisk thicket, brittlebrush scrub, California juniper woodland, Joshua tree woodland and creosote bush scrub.

The alternate conceptual alignment was intentionally sited within the UPRR ROW access road to reduce habitat disturbance and impacts to biological resources. However, this alignment is expected to result in new land disturbance resulting from a 40-foot-wide work corridor needed to install the pipeline. Taking into account an average width of 15 feet of the ROW road, an additional 25 feet will be temporarily impacted. Therefore, the total temporary habitat impacts from the alternate conceptual alignment are 5.7 acres. The predominant vegetation communities that will be impacted include rubber rabbitbrush scrub and tamarisk thicket.

There is no pre-existing disturbance corridor for the pump station connection alignment. This alignment is expected to result in new land disturbance resulting from a 40-foot-wide work corridor needed to install the pipeline. Therefore, the total temporary habitat impacts from the pump station connection alignment are 1.1 acres. The predominant vegetation communities that will be impacted include brittlebrush scrub and saltbush scrub.

4.0 REGULATORY SETTING / TERMINOLOGY

The following section briefly summarizes the federal and state statutes and regulations pertaining to the jurisdictional delineation conducted for the Project. The U.S. Army Corps of Engineers (USACE) has previously issued a JD letter for the Pine Tree Project Site[1], located in the overall watershed where the MPUD Project Site is located[2]. The JD letter stated that the waters on the site are within an isolated drainage system not connected to a navigable water (or a connected tributary). Thus, this delineation report will focus solely on code, regulation, and policy for California State agencies- the Regional Water Quality Control Board (RWQCB) and the California Department of Fish and Wildlife (CDFW). Waters of the U.S. as regulated by the USACE[3] (per CWA Section 404) and RWQCB[4] (per CWA Section 401) are

[1] **Pine Tree Jurisdictional Determination Assessed under Isolation** (SPL-2003-01320-AOA; Letter dated July 22, 2003). *Based on information furnished in your letter [dated June 25, 2003] and the Corps independent analysis of the project area, we have determined that Koehn Dry Lake…exhibits insufficient evidence of interstate commerce…"* Koehn Dry Lake is geographically isolated without a connection to interstate commerce and is therefore considered a non-jurisdictional water. See Figures 5 and 6 for watershed map; Pine Tree is located within Jawbone Canyon (HUC 10: 1809020603), which is just two watershed units away to the North.

[2] Such letters have consisted of a Jurisdictional Determination assessed under geographic isolation. AECOM recommends obtaining such an official letter from the Corps Regulatory Division, Los Angeles District as official determination that the MPUD site's wash features are geographically isolated without a connection to interstate commerce and is therefore a non-jurisdictional water.

[3] Under Section 404 of the Clean Water Act (CWA), USACE regulates the discharge of dredged or fill material into jurisdictional waters of the U.S. (including adjacent wetlands), which include those waters listed in 33 CFR 328.3 (Definitions).

[4] Section 401 of the CWA requires states to certify that any activity that may result in discharge into waters of the U.S. will comply with state water quality standards. All permits issued by USACE under Section 404 of the CWA require certification pursuant to

not specifically discussed in this report. The use of the Ordinary High Water Mark (OHWM), was a defining criterion for this report though.[5]

Federal Regulation of Waters of the United States, Including Wetlands (Clean Water Act Sections 404 and 401) (33 U.S.C. 1251-1376)

The USACE and the Environmental Protection Agency (EPA) regulate the discharge of dredged or fill material into "waters of the U.S.," including wetlands, under Section 404 of the Clean Water Act (CWA). The ACOE has defined the term "wetlands" as follows: "Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstance do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (40 CFR 116.3). Some classes of fill activities may be authorized under general permits if specific conditions are met. Projects that would result in the placement of dredged or fill material into waters of the U.S. (WoUS) require a Section 404 permit from the ACOE.

Section 401 of the CWA requires the issuance of a water quality certification or waiver thereof for all Section 404 nationwide or individual permits issued by the ACOE. The EPA has deferred water quality certification authority to the State Water Resources Control Board (SWRCB). Most projects are regulated by RWQCBs. The SWRCB directly regulates multi-regional projects and supports and coordinates the program statewide.

Because the waters on the site are within an isolated drainage system not connected to a navigable water (or a connected tributary), this report will focus solely on code, regulation, and policy for California State agencies. Thus, WoUS as regulated by the USACE[6] and RWQCB[7] are not discussed in this report. Use of the Ordinary High Water Mark (OHWM) was a defining criterion for this report.[8]

4.1 Porter-Cologne Water Quality Control Act

Section 13263 of the 1969 Porter-Cologne Water Quality Control Act (Porter-Cologne) authorizes the RWQCB to regulate discharges of waste and fill material to waters of the State, including isolated waters and wetlands. The California Water Code Section 13050(e) defines the waters of the State separately

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Section 401. The RWQCB, as delegated by the U.S. EPA and SWRCB, is the state agency responsible for issuing a CWA Section 401 Water Quality Certification or waiver. In general, jurisdiction for the RWQCB will be the same as for the USACE, which includes waters of the U.S., including wetlands.

[5] For the purposes of determining the lateral extent of waters of the U.S. (as administered by the USACE/RWQCB for purposes of compliance with Section 404/401 of the CWA), the term OHWM is defined as "*That line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas*."

[6] Under Section 404 of the Clean Water Act (CWA), USACE regulates the discharge of dredged or fill material into jurisdictional waters of the U.S. (including adjacent wetlands), which include those waters listed in 33 CFR 328.3 (Definitions).

[7] Section 401 of the CWA requires states to certify that any activity that may result in discharge into waters of the U.S. will comply with state water quality standards. All permits issued by USACE under Section 404 of the CWA require certification pursuant to Section 401. The RWQCB, as delegated by the U.S. EPA and SWRCB, is the state agency responsible for issuing a CWA Section 401 Water Quality Certification or waiver. In general, jurisdiction for the RWQCB will be the same as for the USACE, which includes waters of the U.S., including wetlands.

[8] For the purposes of determining the lateral extent of waters of the U.S. (as administered by the USACE/RWQCB for purposes of compliance with Section 404/401 of the CWA), the term OHWM is defined as "*That line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas*."

and uniquely from the federal definition as *"…any surface water or groundwater, including saline waters, within the boundaries of the State."* The state definition places no limitation on the size of stream flow as is implicitly the case for the waters of the U.S. The OHWM concept is indirectly used by the State of California to determine waters of the State, and it is not used by the CDFW to delineate stream boundaries for the purpose of determining California Fish and Game Code (CFGC) jurisdiction per the MESA protocol.

The term waters of the State applies to all perennial, intermittent, and ephemeral rivers, streams, and lakes within the state of California, including wetland and/or riparian vegetation and fish and wildlife resources. This designation includes isolated, depressional wetlands, and vernal pools. Waters of the State are regulated by the SWRCB and the RWQCBs. A new policy is in the process of being introduced that will provide increased clarification with respect to waters of the State, especially wetlands, and will introduce additional regulatory requirements.[9]

When the USACE does not regulate drainages within an isolated watershed (e.g., Mojave desert areas), then the RWQCB will authorize the project per Waste Discharge Requirements (WDRs). General WDRs are available if the applicant meets particular requirements; these WDRs represent a much more streamlined process than individual WDRs.

4.2 California Fish and Game Code (Section 1600 et seq.)

CFGC Sections 1600-1617 (Lake and Streambed[10] Alteration Agreement Program) require consultation with CDFW if a proposed activity has the potential to detrimentally affect a stream, and thereby, wildlife resources that depend on a stream for continued viability. All streams present on a proposed project site must be identified to characterize the potential for adverse project-related impacts on the stream and associated wildlife. Under CFGC Sections 1600 et seq., CDFW regulates activities that would result in (1) any potential detrimental impacts associated with the substantial diversion or the obstruction of the natural flow of a stream; (2) substantial changes to the bed, channel, or banks of a stream, or the use of any material from the bed, channel, or banks; and (3) the disposal of debris or waste materials that may pass into a stream. CDFW jurisdiction can only be applied once stream presence is identified and a project design is developed to a level of detail adequate to perform impact analysis.

Per informal guidance and current practice, CDFW may assert its jurisdiction under CFGC Sections 1600 et seq. over activities in stream features laterally to the top of the bank, or to the outer edge of the riparian vegetation (also called the "drip line"), whichever is wider. CDFW jurisdiction may also extend to the limits of the 100-year floodplain. Isolated, "non-streambed" wetlands are typically not regulated by CDFW. Riparian habitat and wetlands adjacent to streambeds are additional resources that may be regulated by CDFW.

Riparian habitat refers to areas within and adjacent to rivers, streams, and creeks that support plant species adapted to (or that can tolerate) occasional or permanent flooding and/or saturated soils. Riparian habitat may include areas within the jurisdiction of the USACE and/or CDFW. Typically, USACE jurisdictional areas are much smaller than CDFW jurisdictional areas, and lateral extent vary according to

[9] Statewide Wetland and Riparian Area Protection Policy Initiative; http://www.swrcb.ca.gov/water_issues/programs/cwa401/wrapp.shtml

[10] The term streambed refers to the bed, bank, and channel geomorphic features associated with streams (in other words, the land beneath a stream).

watershed position, water availability, and other factors (Larsen 2007). Riparian vegetation can occur outside of USACE and/or CDFW jurisdiction; however, unique attributes indicate agency jurisdiction and include hydrologic interaction (both laterally and longitudinally) and distinct geomorphic features (e.g., bankfull channel, floodplain, terrace).

The California Fish and Game Commission defines the term wetland as: "*Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year."* (Cowardin et al. 1979).

The proposed California Wetland Definition (TAT 2009; 2010, 2011) states: "*An area is wetland if, under normal circumstances, it (1) is saturated by ground water or inundated by shallow surface water for a duration sufficient to cause anaerobic soil conditions within the upper substrate; (2) exhibits hydric substrate conditions indicative of such hydrology; and (3) either lacks vegetation or the vegetation is dominated by hydrophytes."*

4.3 West Mojave Plan (Bureau of Land Management)

With the exception of a couple of short segments, the project alignments are entirely located within the Bureau of Land Management's (BLM) West Mojave Plan (WEMO) boundary[11]. The following information and potential mitigation was obtained from WEMO.

> The West Mojave Plan is a habitat conservation plan and federal land use plan amendment that (1) presents a comprehensive strategy to conserve and protect the desert tortoise, Mohave ground squirrel (MGS) and nearly 100 other sensitive plants and animals and the natural communities of which they are a part, and (2) provides a streamlined program for complying with the requirements of the California and federal Endangered Species Acts (CESA and FESA, respectively). The plan was prepared through the collaborative effort of cities, counties, state and federal agencies having jurisdiction over lands within the region. The Plan will allow streamlined project permitting at the local level, equitable sharing of costs among participants, and shared stewardship of biotic resources.
>
> To replace the complex and time-consuming mitigation formulas, enhancement and endowment fees, and survey requirements, a single mitigation fee would be established as compensation for habitat disturbance within the West Mojave planning area. The mitigation fee is applicable to development and/or loss of habitat on both private and BLM-administered public lands, and is considered full compensation for habitat loss. On private lands, the mitigation fee applies to all new land disturbing development subject to a grading and/or building permit and is collected by the local jurisdiction at the time of permit issuance. On BLM lands, the mitigation fee applies to all new land disturbing projects subject to federal permits, and is collected by the BLM at the time of permit issuance. The mitigation fee is not additive where multiple species exist on site, or where species conservation areas overlap.

[11] U.S. Department of Interior. Bureau of Land Management. 2005. Final Environmental Impact Report and Statement for the West Mojave Plan. A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment.

The entire alignment is expected to result in new land disturbance and habitat impacts have been calculated; therefore, mitigation fees are expected to be applicable. Further coordination and guidance will be sought from the BLM regarding the applicability of WEMO and potential mitigation fees.

4.4 Glossary of Stream and Terrestrial Landforms

The following definitions (Section 4.3.1) are from the MESA Guidebook as used by CDFW (Vyverberg 2010; Brady and Vyverberg 2014; Vyverberg and Brady 2014), as well as the delineation manual for non-wetland WoUS (Section 4.3.2; Lichvar and McColley 2008; Curtis and Lichvar 2010). See Appendix B for additional terminology.

4.4.1 – CDFW MESA Terminology

Watercourse - The area within and along which water flows perennially or episodically through one or more channels. Or, the course over which water currently flows, or has flowed as defined by the topography that confines the water to this course when the water rises to its highest level. Where present, low flow channels, active channels, banks associated with these channels, floodplains, swales, islands, and stream-associated vegetation, may all occur within the bounds of a single larger channel designated the "watercourse" to discriminate between it and functionally related but subordinate fluvial landforms that lie within its bounds.

4.4.2 – Other USACE, RWQCB, and CDFW Terminology

Active Channel - The OHW zone in low-gradient, alluvial ephemeral/intermittent channel forms in the Arid West is the active floodplain. The dynamics of arid channel forms and the transitory nature of traditional OHWM indicators in arid environments render the limit of the active floodplain the only reliable and repeatable feature in terms of OHW delineation (Lichvar and McColley 2008)[12]. In arid channel systems, the active floodplain functions in the same manner as the bankfull channel within a perennial channel form, in that most of the hydrological and fluvial dynamics produced by repeating effective discharges is confined within its boundaries. Also, the extent of flood model outputs for effective discharges—5- to 10-year events in arid channels—aligns well with the boundaries of the active floodplain, and the characteristic vegetative behavior and sediment texture associated with the active floodplain/low terrace transition are readily observable in aerial photographs and in the field.

Streambeds – This term refers to the bed, bank, and channel geomorphic features associated with streams (in other words, the land beneath a stream). A streambed may include all or a portion of the riparian zone. The lateral extent of streambeds may reach beyond the OHWM (the extent of Corps jurisdiction), and extend laterally beneath the banks where subsurface hydrologic connectivity exists between the stream and the surrounding land. Jurisdiction extends from top-of-bank to top-of-bank. Per internal guidance and accepted practice, jurisdiction may also extend to the outer edge of the riparian corridor, if present (also called the "drip line"), or the limits of the 100-year floodplain. Streambeds are regulated by the CDFW under Section 1600 et seq. of the CFGC.

Waters of the State – Applies to all perennial, intermittent, and ephemeral rivers, streams, and lakes within the state of California, including wetland and/or riparian vegetation and fish and wildlife resources.

[12] https://www.spl.usace.army.mil/Portals/17/docs/regulatory/JD/FinalOHWMManual_2008.pdf

As defined in the State's Porter-Cologne Water Quality Control Act (revised in 2004; Water Code 13050), Waters of the State refers to any surface water or groundwater, including saline waters, within the boundaries of the State of California. This designation includes isolated, depressional wetlands, and vernal pools. Waters of the State are regulated by the SWRCB (if across multiple regions) and RWQCBs. In the context of Clean Water Act permitting, the term Waters of the State typically implies waters that the USACE have not asserted jurisdiction over. A new policy is in the process of being introduced that will provide increased clarification with respect to Waters of the State, especially wetlands, and will introduce additional requirements.[13]

Waters of the U.S. (WoUS) – Refers to federally regulated (per CWA Section 404) rivers, creeks, streams and lakes, delineated by an OHWM, and extending upstream to the headwaters. The OHWM is defined as the "*line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas*."[14]

5.0 METHODOLOGY

Prior to conducting field work, AECOM conducted a review of available mapping of watersheds, streams, wetlands, and soils (e.g., National Hydrographic Dataset, NHD [USGS 2018]; National Wetlands Inventory, NWI [USFWS 2018]; Web Soil Survey [USDA-NRCS 2018a,b,c]; CSRL 2018; USDA-SCS 1970). AECOM also reviewed accessible aerial photographs of the site from previous years (e.g., Google Earth historical aerials range from 1995 – 2017; Google Earth 2018), in order to observe consistent patterns of stream activity.

AECOM geologist Gregory Yanagihara (P.G.) provided background geological information, interpretation for the Project Site and vicinity, and reviewed applicable geological mapping. A literature review was conducted, and various references were consulted for both general and vicinity-specific data (Dibblee 1959; McDonald et al. 2003; Izbicki et al. 2007; USGS 2009; Stein et al. 2011; AFTF 2017).

5.1 Field Protocol

AECOM then conducted a field survey to evaluate the presence of CDFW-jurisdictional streambeds and any applicable riparian habitat utilizing the methods as discussed below. AECOM staff visited the MPUD Project Site on August 23 - 24, 2018. Conditions were warm, sunny, and dry (approximately 80°F). Dr. Erik Larsen (Sr. Environmental Scientist/Regulatory Specialist), and Chris Hargreaves (Biologist) of AECOM performed the jurisdictional delineation and associated vegetation mapping. The field

[13] Statewide Wetland and Riparian Area Protection Policy Initiative; *http://www.swrcb.ca.gov/ water_issues/ programs/ cwa401/wrapp.shtml*.

[14] The term ordinary high water mark means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

investigation included documenting existing conditions, vegetation community, jurisdictional resources, and land cover classification and mapping.

The Mapping Episodic Stream Activity (MESA) methodology was utilized to the extent practicable to define CDFW-jurisdictional drainages (or washes).[15] A series of parallel site transects was superimposed over the Project Site, which allowed for a systematic collection of data within each potential drainage feature over the entire Project Site (Figure 11). Jurisdictional drainage features may include washes, low-flow channels, active floodplains, and secondary channels; collectively these may be termed the "watercourse." Drainage features that may or may not be jurisdictional include swales and erosional features.

Four transects (TR-1, TR-2, TR-3, TR-4) were walked during the site visit, and MESA data sheets were filled out at two of the four transect areas (Figure 11). Each transect location (across a drainage feature) included the entire width across the drainage feature (bed, bank, channel of wash; i.e., width across drainage feature). The presence of geomorphic features were noted according to distance along the transect.

Along each transect all drainage features were thoroughly documented, and photo-location points were noted on field maps (e.g., upland, bank, upper/lower floodplain, low-flow channel). Each drainage was also mapped with the GPS unit, and photograph locations and directions were noted. MESA data sheets were filled out at two locations, one within Cache Creek, and one within an area where several small washes flow perpendicular across a dirt access road. At other locations along transects (or between transects) where MESA data sheets were not completed, potential drainage features were noted. Site photographs documented transect locations as well as hydrologic indicators and wash vegetation found at each site.

Because USACE has previously stated that waters in the high desert region are isolated and thus non-jurisdictional with respect to the USACE, data sheets specific to the delineation of waters of the U.S., including wetlands, were not completed for this report[16] (EL 1987; Lichvar and McColley 2008; USACE 2008; Curtis and Lichvar 2010). The following stream and wetland references were used to define and/or characterize potentially jurisdictional features: Cowardin et al. 1979; Lefebvre et al. 2013; CWMW 2014; Wohl et al. 2016; and California Wetland Portal 2018. Plant species were compiled for the entire site, and scientific names were consistent with standard references (Baldwin et al. 2012; Calflora 2018; Cal-IPC 2018; CNPS 2017, 2018; JFP 2018). Other vegetation-related references consulted included the following: Hanes et al. (1989); Lichvar and Dixon (2007); Buck-Diaz et al. (2011); Menke et al. (2013, 2016).

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[15] The CDFW Lake and Streambed Alteration Program web page states that "*MESA is intended to assist in identification and mapping of episodic streams when water is absent, and has perhaps been so for several years*." (https://www.wildlife.ca.gov/Conservation/LSA/Resources); MESA References: (a) *Methods to Describe and Delineate Episodic Stream Processes on Arid Landscapes for Permitting Utility-Scale Solar Power Plants, With the MESA Field Guide - Final Project Report*. Publication Number: CEC-500-2014-013. February 2014. (http://www.energy.ca.gov/2014publications/CEC-500-2014-013/CEC-500-2014-013.pdf); (b) *Appendix G - The Mesa Field Guide, Mapping Episodic Stream Activity*. Updated 12/18/2014. (http://www.energy.ca.gov/2014publications/CEC-500-2014-013/CEC-500-2014-013-APG.pdf).

[16] Applicable datasheets for USACE methodologies, including wetland delineation forms (per the Arid West Supplement, 2008) and/or OHWM Manual (per the OHWM Manual, 2010), were not completed in the field. Nonetheless, the above USACE methodology (OHWM Manual) was utilized to assist in defining and classifying drainage features on-site.

Vegetation communities were categorized using established systematic classification criteria described in Sawyer et al.'s *A Manual of California Vegetation, Second Edition* (Sawyer et al. 2009, CNPS 2018; CDFW 2018a,b,c; Holland 1986)[17]. Alternatively, vegetation communities or land cover types that are not described in A Manual of California Vegetation were classified using conventional naming practices (i.e., developed) or were defined by the dominant species. During the field survey, vegetation communities were identified and mapped within the Study Area using field observations and a high-quality aerial photograph. After the field investigation, the hand-mapped boundaries were digitized in conjunction with a high-quality aerial photograph using geographic information system (GIS) software from ArcGIS. A list of plant species was compiled by vegetation community; plant species observed incidentally during other surveys were also included. Plant nomenclature follows The Jepson Manual-Vascular Plants of California, Second Edition (Baldwin et al. 2012, JFP 2018). Photographs of the various vegetation communities and rare plant species were taken, and the location of each photograph was recorded using a GPS unit.

AECOM staff scientists recorded all spatial and attribute data using the Environmental Systems Research Institute (ESRI) ArcCollector application running on Android and Apple (iPad, iPhone) devices. Potentially jurisdictional areas were mapped using a Dual XGPS150A receiver connected to the android device through a Bluetooth connection. Global Positioning System (GPS) collected spatial data were imported into ArcMap software for post-field processing. A Trimble GeoXH sub-meter GPS was also brought to the site and used for more detailed data collection as necessary.

This process included an evaluation of historical aerial photographs, as well as aerial photographs available via Google Earth (2018). The historic, digital images were obtained from UCSB Library Aerial Photograph Archive (UCSB 2018).

It should be noted that AECOM's use of the MESA mapping for drainage features utilized the top of bank (for small, individual drainages) and watercourse elements (for larger washes) as the lateral extent of jurisdiction. However, application of the MESA methodology resulted in not including some features on the lateral limits of jurisdiction because of the lack of indicators (as described in the conventional MESA protocol).

6.0 RESULTS

6.1 Watershed Context and Hydrology

Per current agency requirements, both NHD and CalWater data are provided for the Project Site (Appendix A, Figures 5–8). In general, the watershed is an isolated, inland, desert system, within flows originating in the Tehachapi Valley and flowing down to and across the Mojave Desert floor. Within the Antelope-Fremont Valleys watershed, the Cache Creek drains into the Fremont Valley where the majority, if not all, of the surface water typically dissipates prior to reaching the dry playa, Koehn Lake, the watershed's terminal water body (approximately 25 miles northeast of the project site; Figures 5-8). The Antelope-Fremont Valleys Subbasin is internally drained, with no outlet to coastal areas or navigable waterways. None of the drainages within the Antelope-Fremont Valleys Subbasin appear to have any connection to interstate or foreign commerce. Therefore, all tributaries within this Subbasin are considered isolated.

[17] The GIS analysis also utilized the following: California Department of Fish and Wildlife Natural Community Database from www.wildlife.ca.gov/Data/GIS/Vegetation-Data Vegetation Datasets: Tehachapi Pass High Speed Rail Corridor and Mojave Vegetation for the DRECP, Expansion Sept 30, 2014.

Specifically, the project site is located within the following watershed units:

HUC 8 – Antelope-Fremont Valleys (Figures 5 and 6)

- HUC 10 – Upper Cache Creek
- HUC 12 – Waterfall Canyon-Cache Creek (Headwaters: HUC 12 – Sand Creek, Oil Canyon-Cache Creek [Cache Peak])
- Terminus: HUC 10 – Koehn Lake

9625 – Fremont Unit (Figures 7 and 8)

- Undefined 9625.300004
- East of Barren Ridge 9625.400604/1
- Terminus: 9625.400700

Regarding Beneficial Uses as discussed in the Basin Plan[18], the following drainage names were listed:

Drainage Feature (Receiving Water)

- Upper Cache Creek (Cache Creek)
- Cache Creek (Fremont Valley)
- Wetlands/Cameron Canyon Road
- Lower Cache Creek (Cache Creek)
- Seeps/Springs near Cameron Canyon Road (Cache Creek)

Beneficial Uses for Cache Creek and other nearby drainages/wetlands include the following:

- MUN – municipal/domestic water supply
- AGR – agricultural supply
- GWR – groundwater recharge
- REC-1/REC-2- water contact/non-contact recreation
- WARM – warm freshwater habitat
- WILD – wildlife habitat
- WQE – water quality enhancement (listed for Wetlands/Cameron Canyon Road only)
- FLD - Flood Peak Attenuation/Flood Water Storage Wetlands/Cameron Canyon Road (listed for Wetlands/Cameron Canyon Road only)

6.2 Existing Setting and Vegetation Communities

Pre-existing site disturbance conditions were observed within the study area and consisted of State Highway 58, UPRR ROW, residential housing, roads, Pacific Crest Trail, barbed wire fencing with locked gates, cattle grazing, utilities, CHP weigh station, water tanks, and ephemeral drainage enhancements. The mid and eastern segments of the conceptual alignment and alternate conceptual alignment follow existing dirt roads and UPRR ROW. The western segment of the conceptual alignment and pump station connection alignment are not located within an existing dirt road; however, this segment of the conceptual alignment is located within land currently used for cattle grazing.

[18] https://www.waterboards.ca.gov/lahontan/water_issues/programs/basin_plan/

Observed vegetation communities were mapped within the study area and are described below[19]. The field mapping effort complemented the natural communities' literature review. The sensitive vegetation communities with a state rarity rank of S1-3 that were identified during the literature review including California juniper woodland, Joshua tree woodland, brittlebrush scrub, scale broom scrub and red willow thicket were confirmed present within the Study Area during the reconnaissance survey. Table 6-1 identifies the field-observed vegetation communities and associated acreages within the study area. Appendix D, figures from the biological resources report, show the vegetation communities within the Study Area.

Table 6-1. Vegetation Communities within Study Area (Riparian Communities in Green Shading).

Vegetation Community[1]	Area (acres) (% of Study Area)
California juniper woodland*	99.2
Joshua tree woodland**	132.2
creosote bush scrub	23.5
rubber rabbitbrush scrub	123.5
brittlebrush scrub**	45.5
allscale scrub	4.9
scale broom scrub**	3.9 (< 1%)
tamarisk thicket / sandbar willow thicket ***	31.7 (5.8%)
red willow thicket**	2.0 (< 1%)
disturbed/ruderal	77.4
Total	**543.8**

[1] Source: AECOM 2018.
*Sensitive Natural Community State Rarity Rank S4 with some S2.
**Sensitive Natural Community State Rarity Rank S3.
***Note: two small polygons within this community are discussed below as sandbar willow thickets; 0.02 acre within OHWM, 0.14 acre within TOB.

6.2.1 Upland Vegetation Communities (Adjacent to Episodic Drainages)

California juniper woodland (*Juniperus californica* Woodland Alliance). This community is comprised of California juniper as a dominant or co-dominant in a small tree canopy with Joshua tree (*Yucca brevifolia*). Associated shrubs include Mojave yucca (*Yucca schidigera*), California buckwheat

[19] Communities were described using *A Manual of California Vegetation Online* (http://vegetation.cnps.org/).

(*Eriogonum wrightii*), paperbag bush (*Scutellaria mexicana*) and Mormon tea (*Ephedra nevadensis*). Stands are along slopes and alluvial fans with rocky or sandy soils associated with the lower Sierra Mountains. The mid-section of the conceptual alignment and CHP feeder are located within this vegetation community. Observed pre-existing disturbances included dirt roads, fencing, and Pacific Crest Trail. The state rarity ranking for this community is S4 which is greater than 100 viable occurrences. However, some associations are as rare as S2 which is 6 to 20 viable occurrences.

Joshua tree woodland (*Yucca brevifolia* Woodland Alliance). This community is comprised of Joshua tree as an emergent small tree over a shrub canopy with burrobush (*Ambrosia dumosa*), cheesebush (*Ambrosia salsola*), Mojave yucca, California buckwheat, creosote bush (*Larrea tridentata*), Anderson's thorn bush (*Lycium andersonii*) and Mormon tea. California juniper is a co-dominant in a small tree canopy with Joshua tree in some areas. Stands are along slopes and alluvial fans with gravel, coarse sands and sandy loam soils associated with the lower Sierra Mountains. The mid and eastern sections of the conceptual alignment are located within this vegetation community. Observed pre-existing disturbances included dirt roads, fencing, and an electrical powerline with poles and access road. The state rarity ranking for this community is S3 which is 21 to100 viable occurrences with some associations considered rare.

Creosote bush scrub (*Larrea tridentata* Shrubland Alliance). This community is comprised of creosote bush as a dominant or co-dominant in the shrub canopy with burrobush, cheesebush, Anderson's thorn bush and Mormon tea. Emergent Joshua trees are present in low cover. Canopies are along slopes and intermittent washes with well drained soils associated with the lower Sierra Mountains. The eastern section of the conceptual alignment is located within this vegetation community. Observed pre-existing disturbances included dirt roads, fencing, and an electrical powerline with poles and an access road. The state rarity ranking for this community is S4 which is greater than 100 viable occurrences.

Rubber rabbitbrush scrub is comprised of rubber rabbitbrush (*Ericameria nauseosa*) as a dominant shrub. Rubber rabbitbrush is a fast growing, early seral shrub that establishes after disturbance. Canopies are associated with well drained sands and gravel comprising of disturbed areas such as the roads, UPRR ROW, and cattle grazed lands. The western section of the conceptual and alternate conceptual alignments is located within this vegetation community. The state rarity ranking for this community is S5 which is secure due to its abundance.

Brittlebrush scrub (*Encelia (actonii, virginensis)* – Shrubland Alliance). This community is comprised of Virgen River brittlebrush (*Encelia virginensis*) as a dominant or co-dominant in the shrub canopy with cheesebush, rubber rabbitbrush, Mormon tea and paperbag bush. This community occurs along intermittently flooded arroyos, canyons, alluvial fans, and roads with alluvial and gravel substrates associated with the lower Sierra Mountains. The section of the conceptual alignment that crosses State Highway 58 is located within this vegetation community. Additionally, the LA Rose Creek drains into Cache Creek at this point and appears to flood and become inundated with water during heavy rainfall events. Observed pre-existing disturbances included roads, fencing, drainage enhancements, and Pacific Crest Trail.

Allscale scrub (*Atriplex polycarpa* Shrubland Alliance). This community is comprised of allscale (*Atriplex polycarpa*) as a dominant plant. This community occurs along washes and dissected alluvial fans with alkaline sandy soils. The pump station connection alignment is located within this vegetation community. Observed pre-existing disturbances included State Highway 58, UPRR ROW, roads, fencing, and drainage enhancements. The state rarity ranking for this community is S4 which is greater than 100 viable occurrences. The United States Fish and Wildlife Service (USFWS) Wetland Inventory recognizes this species as a facultative plant.

6.2.2 Arid Wash / Riparian Vegetation Communities

Scale broom scrub (*Lepidospartum squamatum* Shrubland Alliance). This community is comprised of scale broom (*Lepidospartum squamatum*) as a dominant shrub. This community occurs along washes and dissected alluvial fans with sandy soils. The pump station connection alignment is located within this vegetation community. Observed pre-existing disturbances included State Highway 58, UPRR ROW, roads, fencing, and drainage enhancements. The state rarity ranking for this community is S3 which is 21 to 100 viable occurrences. However, some associations are as rare as S1.1 which is 6 or fewer viable occurrences.

Red willow thicket (*Salix laevigata* Woodland Alliance). This community is comprised of red willow (*Salix laevigata*) as a dominant tree. This tree commonly grows with other riparian vegetation. The thicket is associated with a low gradient deposition south of Cache Creek. The western section of the conceptual alignment is located within this vegetation community. Observed pre-existing disturbances included fencing and cattle grazing. The state rarity ranking for this community is S3 which is 21 to100 viable occurrences. The USFWS Wetland Inventory recognizes this species as a facultative plant.

Sandbar willow thickets (*Salix exigua* Shrubland Alliance). This community is composed of only this one species of willow. It was observed in only one location, downstream of the Cameron Road bridge over Cache Creek. It was contiguous with the common tamarisk thicket vegetation community, and presumably the mapping completed for the biological resources report has these two polygons as part of the tamarisk community.

Tamarisk thicket (*Tamarix* spp. Shrubland Semi-Natural Alliance). This community is comprised of tamarisk (*Tamarix* spp.) as a dominant shrub. Tamarisk has invaded the area where dense, monotypic stands are associated with Cache Creek. The western section of the proposed and alternate conceptual alignments is located within this vegetation community. Observed pre-existing disturbances included roads, UPRR ROW, fencing, and cattle grazing. In some tamarisk-infested areas, native shrubs such as mulefat (*Baccharis salicifolia*) and red willow are present but never dominate.Tamarisk is identified as an invasive species by the BLM. Tamarisk is considered among the most invasive, widely distributed non-native plants to infest waters and wetlands.

Disturbed/Ruderal Herbaceous Vegetation. This community refers to the UPRR ROW, utility corridor, roads and adjacent areas with compacted soils and invasive plant species that are first to colonize the disturbed areas. These plants include redstem filaree (*Erodium cicutarium*), red brome (*Bromus rubens*), Russian thistle (*Salsola tragus*), and fivehook bassia (*Bassia hyssopifolia*). Ruderal plant species typically dominate the disturbed area for a few years, gradually losing competition to native species. Disturbed/Ruderal is generally a consequence of the activities associated with Hwy 58, UPRR ROW, roads, and utilities. Invasive plants comprise most of the vegetation of a ruderal community.

6.3 Soils and Geology

6.3.1 Soils

Soil types within the Study Area are shown in Table 6-2 below and in Figure 10. See Appendix F for soil information from Web Soil Survey. None of the mapped soils were hydric soils.

Table 6-2. Soils Data within Study Area and Impact Corridor.

Soil Type Code	Soil Description[1]	Buffer (acres)	Impact Corridor[3] (acres)
104	Arizo gravelly loamy sand, 2 to 9 percent slopes - *Flooding Frequency Class: Occasional* [2]	191.68	14.85
114	Cajon loamy sand, 0 to 5 percent slopes	0.90	--
124	Cinco gravelly loamy sand, 50 to 75 percent slopes	10.80	0.20
137	Garlock loamy sand, 2 to 9 percent slopes	10.00	1.04
156	Pajuela-Whitewolf association, steep	62.27	5.73
174	Steuber sandy loam, 0 to 2 percent slopes	9.35	0.79
185	Torriorthents-Rock outcrop complex, very steep	1.66	--
204	Whitewolf loamy sand, cool, 2 to 5 percent slopes	152.97	18.37
206	Xeric Torriorthents, very steep	5.53	0.08
		445.17	**41.05**

[1] Soil Survey Area: CA670. See Figure 10 map set, as well as attached soil information from Web Soil Survey (2018).
[2] All soils have a drainage class of "somewhat excessively drained" and "well drained," and most have a hydrologic soil grouping of A or B (high or moderate infiltration rate). None of these soils are considered hydric soils.
[3] For this table, impact corridor includes both the conceptual and alternative conceptual alignments.

6.3.2 Geology

The site is located within the United States Geological Survey (USGS) Monolith and Mojave 7.5 minute quadrangles. Davenport and others (2011), Diblee (1959), and Diblee and Louke (1970), mapped the geology of the site and the surrounding area (Appendix H). The site parallels Cache Creek, an arroyo with intermittent flow which drains the northeastern Tehachapi Mountains and southwestern Sierra Nevada. It empties into the northern Antelope Valley via an alluvial fan between Mojave and California City. The site lies in Tehachapi Pass, a narrow, 5 mile long canyon carved by Cache Creek southeast of Tehachapi and northwest of Mojave.

The Garlock Fault Zone, an active left lateral strike slip fault, passes along the north side of Tehachapi Pass and passes through the proposed pipeline route and Cache Creek at the west end of the site. Except at the far west end of the site, the entire route of the proposed pipeline is located south of the fault zone.

Rocks in the Tehachapi Pass consist of Mesozoic granitic and metamorphic rocks in the high relief areas north and south of Cache Creek. Quaternary alluvium deposited by Cache Creek and its tributaries covers the low areas of Tehachapi Pass. The proposed pipeline route passes close to several exposures of granite, but the route lies entirely on Quaternary alluvium consisting of unconsolidated to moderately consolidated sand, silt, gravel, cobbles, and boulders. Davenport and others (2011) mapped six sedimentary subunits along the pipeline route:

- Qt: Late Holocene sediments within the current Cache Creek streambed.

- Qf and Qa: Late Holocene sediments occurring within the Cache Creek flood plain. The Qf unit occurs within Tehachapi Pass and the Qa unit occurs at the far west end of the site and is the easternmost extent of similar deposits occurring within the Tehachapi Valley.
- Qof: Late to middle Pleistocene terrace deposits representing older alluvial deposits that have since been eroded leaving terraces and mesas.
- Qyf and Qyu: Holocene to late Pleistocene alluvial fan and alluvial wash sediments.

A large rainfall event on October 15, 2015, resulted in a flash flood / mudslide that closed Hwy 58 for at least a week (Appendix H). The mudflow buried approximately two miles of Hwy 58 with about six feet of mud. This occurred entirely within the project area, and mostly affected the north side of Hwy 58. Evidence of past flooding, and perhaps in an effort to make sure it would not be repeated, may be seen in the stand pipes and basins installed on the north side of Hwy 58 (see Figure 11C; also Photo No. 9b and 9c [Pages 5-6 of 23). Just north of the Cache Creek drainage and Hwy 58, there is a geological unit called “pKm” that is composed of metamorphic rock that is very erodible. This type of rock tends to fail more than other types (e.g., granite). In addition, there is a fault line that runs directly under the pKm rock type, located just north of Hwy 58 (Appendix H - Geologic Map; Page 2, close-up map). Thus, the steep slopes north of Hwy 58 in the area of Cameron Road are vulnerable to erosive events, which in turn supply sediment to the Cache Creek drainage. In Figures 11C and 11D, show the resulting disturbed areas to the north of Hwy 58.

6.4 Ephemeral Drainage Features within the Study Area

6.4.1 Study Area

Several ephemeral drainages including Cache Creek, La Rose Creek, and several small, unnamed washes North of Hwy 58 were observed along the ROW. The proposed Project is expected to impact several of these drainages within the alignment. Table A-1 provides the location of the proposed crossings and what type of crossing is proposed. Table 6-3 provides a summary of jurisdictional features within the study area. Table 6-4 provides a more detailed view of the data. The potentially jurisdictional features were classified according to arid stream types and vegetation communities in Table 6-5.

A. Cache Creek – The main creek that flows through the entire Study Area. It is mainly a single, trapezoidal-shaped channel upstream, and a large, wide floodplain downstream.

B. Tributary Drainage Ditch – A human created drainage ditch that receives flows captured by basins and culverts on the North side of Hwy 58.

C. La Rose Creek – A large tributary to Cache Creek that flows through the Study Area.

D. Tributaries (North of Hwy 58) – Higher gradient, small ephemeral drainages that are either single-thread channels or appear to be part of an alluvial fan and flow through the Study Area.

Cache Creek is an ephemeral drainage that supports minimal riparian vegetation, aside from areas of dense Tamarisk (*Tamarix* sp.). During wet years that result in a large snowpack in the nearby Tehachapi Mountains, water from snow melt may result in intermittent flow of several months. In addition, it may be subject to infrequent, very large flood events that carry a lot of sediment and debris flows. Upper Cache Creek (within the project area) is a trapezoidal-shaped channel (e.g., Photo No. 7; Page 4 of 23). Further downstream, Cache Creek is a broad, alluvial channel with multiple low flow channels and a well-developed scalebroom (*Lepidospartum squamatum*) vegetation community (Photo No. 33-40; Pages 19 – 23 of 23). At CC-4/WP-4, the entire floodplain area is considered both WoST (“active channel”), as CDFW

watercourse, and as scalebroom mapped area (see Appendix E, Figure 12). A historical photograph from 1952 shows Cache Creek in about the same position as it is found now (File *abl-1952_5k-71*; UCSB 2018). This may be due, in part, to its landscape position between two bridges (upstream, RR; downstream, Hwy 58).

Regarding the National Wetland Inventory (NWI) Map (Figure 9), most drainages show up as riverine wetlands, with only one wetland in the project vicinity. The NWI map shows a freshwater emergent wetland near Cameron Exit and bridge off Hwy 58, just south of Cameron Road. The landscape position of this feature suggests that it may have held runoff from Cache Creek, but a diversion project has re-routed Cache Creek under the RR (see Figure 11B). A historical aerial photograph from 1952 shows the diversion feature already in place (File *abl-1952_4k-159*; UCSB 2018), and the nearby RR bridge was stamped 1949. Thus, it seems the feature was more of a modern, temporary feature captured by the NWI mapping. This feature could be the "Wetlands/Cameron Canyon Road" feature that is listed in the RWQCB's Basin Plan, Chapter 2 - Beneficial Uses. During the delineation survey, though, the "basin" was found to be graded with only sparse ruderal vegetation. No indicators were observed; thus, it was not considered a wetland or any other ephemeral drainage feature. Sometime in the past, it may have held water and thus attracted wetland-type vegetation, but no longer does so. The wetland feature (shown on the NWI map) may have been disturbed by a past transportation-related project, or as part of a large flood/mudslide incident that occurred in 2015 (see Section 6.3.2 Geology of this report).

The Tributary Drainage Ditch (TDD) was likely constructed around the time the Cameron Road off-ramp and bridge were constructed. This feature does not appear in a 1952 historical aerial (UCSB 2018). Thus, it was a created feature, which captures runoff from the north side of the Hwy 58 in the area of the Cameron Road off-ramp (see Figure 11C; Photo No. 10a-10e; Pages 5-6 of 23). The TDD appears to end at Photo. No. 10e, as a connection with Cache Creek was not observed.

The largest of the tributaries of Cache Creek is La Rose Creek (Figure 11D,E; Photo No. 11-13; Page 7-8 of 23). This drainage flows north to south and flows under Hwy 58 and RR bridges before entering Cache Creek. The remaining drainage features were small, ephemeral drainages located along the north side of Hwy 58 (see Figures 11E – 11H; Appendix D, Photo No. 15 – 26; Page 9-15 of 23). Most are single-channel drainages that are only about a foot deep and three feet wide (e.g., Photo No. 15, 16; Page 9 of 23). Others are large, more incised, and are about 12 feet in width (see Appendix D, Photo No. 27, 31, 32; Pages 16-19 of 23). Tributaries 8 and 9 (TR-8, -9) are located within a large alluvial fan located north of Hwy 58 (see Figure 11G). This area supported small drainages with an evident OHWM, and adjacent floodplain areas with evidence of less-frequent flow (see Photo No. 19-25; Page 10-15). Thus, WoST was mapped as the smaller drainages (defined by OHWM), and the floodplain areas were designated as "watercourse" per the more expanded CDFW definition.

A non-jurisdictional, depression-like feature was found along the north side of Hwy 58 (see Figure 11D; Appendix D, Photo No. 14, Page 8 of 23). It showed signs of past evaporation of standing water, with minimal mud cracking and the presence of tumbleweed (*Salsola tragus*). The lack of actual hydrologic indicators, and sufficient mud cracking, suggested it was only wet for a short duration, and thus was considered a temporary feature (or "puddle"). No drainage directly flowed into the feature, though it was located at the bottom of a steep slope with erosional features (rather than ephemeral drainages).

Table 6-3. Ephemeral Drainage Features within Study Area.

	Waters of the State (acres)	Streambeds (acres)	Linear Feet
Buffer			
A. Cache Creek	7.82	17.39	11,313
B. Tributary Drainage Ditch	0.68	2.29	2,464
C. La Rose Creek	0.51	1.19	763
D. Tributaries (North of Hwy 58)	2.29	5.87	15,312
Total	**11.3**	**26.74**	**29,852**

Table 6-4. Summary of Waters of the State and Streambeds within the Study Area (250 ft Buffer).

Map Feature	Reach ID	Figure ID	Assumed Width (feet) or GIS Calc.	WoST - OHWM (RWQCB; acres)	Streambeds - TOB (CDFW; acres)	Active Channel / Watercourse (subset of TOB)	Linear Feet
Waters of the State and Streambeds							
Upper Cache Creek (within Study Area)[1]	CC-1- CC-3	11A-C	GIS	4.68	14.25	--	10,173
Lower Cache Creek (within Study Area)	CC-4; WP-4	11I	GIS	3.14*	3.14*	3.14*	1,140
Subtotal for Cache Creek				7.83	17.39	3.14	11,313
Tributary Drainage Ditch[2]	TDD	11B,C	GIS	0.68	2.29	--	2,464
La Rose Creek	LRC	11D,E	GIS	0.51	1.19	--	763
Subtotal for TDD, LRC				1.19	3.48	--	3,227
Tributaries (North of Hwy 58)	TR-1-TR-8a; TR-11; TR-12;	11D-H	3, 12, GIS	1.00	1.15	--	12,440
Tributaries (North of Hwy 58)	TR-8b,c; 9;10; WP-1, 2, 3	11G	GIS	1.29*	4.72*	4.72*	2,872
Subtotal for Tributaries (North of Hwy 58)				2.29	5.87	4.72	15,311
Total for all Waters of the State (RWQCB) and Streambeds (CDFW)				**11.3**	**26.74**	**7.86**	**29,852**
Riparian Habitat							
			Within Buffer Adjacent to Creeks	**OHWM (RWQCB; acres)**	**TOB (CDFW; acres)**	**Active Channel / Watercourse**	**Linear Feet**
Sandbar Willow (Along Cache Creek)	CC-2	11B	0.086	0.02	0.14	--	227
Scalebroom Scrub	CC-4; WP-4	11I	0.76**	n/a	n/a	3.14*	1,140
Red Willow (Buffer Only)	Near CC-2	11B	1.761	0	0	--	0
Tamarisk (Adjacent to Cache Creek)	CC-2, -3	11B,C,D	20.59	1.00	3.76	--	4,388
			22.44	**1.02**	**3.90**	**3.14**	**4,615** (Note: already accounted for with stream linear feet)

Map Feature	Reach ID	Figure ID	Assumed Width (feet) or GIS Calc.	WoST - OHWM (RWQCB; acres)	Streambeds - TOB (CDFW; acres)	Active Channel / Watercourse (subset of TOB)	Linear Feet
Non-Jurisdictional Feature							
			Size (acres)				
Temporary Ponded Water	Legend	Figure 11D	0.064	n/a	n/a	n/a	n/a

Definitions: RWQCB = Regional Water Quality Control Board; OHWM = Ordinary High Water Mark; CDFW = California Department of Fish and Wildlife; TOB = Top of Bank.

***** For WP-4, the entire Watercourse is jurisdictional to RWQCB and CDFW. This is not the case for WP-1, WP-2, WP-3. For WP-4, low flow channels (blue linear polygons within WP) = 0.31 acre.

******3.9 acres (from Table 6.1) – 3.14 acres (CC-4; this table) = the remaining portion of scalebroom mapped within study area.

Table 6-5. Classification of Waters of the State and Streambeds.

Map Feature	Reach ID	Figure ID	Assumed Width (feet) or GIS Calc.	Classification (Cowardin/ HGM)	Vegetation Community	Jurisdictional Unit
Waters of the State and Streambeds						
Upper Cache Creek (within Study Area)[1]	CC-1-CC-3	11A-C	GIS	R6 - Riverine, Ephemeral; HGM - Riverine	Non-vegetated Channel; Adjacent Riparian Habitat	RWQCB – OHWM; CDFW – TOB
Lower Cache Creek (within Study Area)	CC-4; WP-4	11I	GIS	R6 - Riverine, Ephemeral; HGM - Riverine	Non-vegetated, Low Flow Channels; Scalebroom Scrub (Watercourse)	RWQCB – Active Channel; CDFW – Watercourse
Tributary Drainage Ditch[2]	TDD	11B,C	GIS	R6 - Riverine, Ephemeral; Riverine	Ruderal	RWQCB – OHWM; CDFW – TOB
La Rose Creek	LRC	11D,E	GIS	R6 - Riverine, Ephemeral; Riverine	Non-vegetated Channel	RWQCB – OHWM; CDFW – TOB
Tributaries (North of Hwy 58)	TR-1 - TR-12	11D-H	3, 12	R6 - Riverine, Ephemeral; Riverine	Non-vegetated Channels or Upland Scrub	RWQCB – OHWM; CDFW – TOB
	WP-1, 2, 3	11G	GIS	R6 - Riverine, Ephemeral; Riverine	Non-vegetated, Low-Flow Channels; Scalebroom Scrub or Upland Scrub (Watercourse)	RWQCB – Active Channel; CDFW – Watercourse
Riparian Habitat						
Sandbar Willow	CC-2	11B	n/a	Palustrine (Adjacent to Channel)	Native Riparian Habitat; Sandbar Willow Thicket (*Salix exigua*)	Partial Overlap with RWQCB – OHWM; and CDFW – TOB
Scalebroom Scrub	CC-4; WP-4	11I	n/a	Riverine	Native Arid Stream Habitat; Scalebroom Scrub (*Lepidospartum squamatum*)	RWQCB – OHWM; and CDFW – TOB
Red Willow	Near CC-2	11B	n/a	Riparian (per Cowardin	Red Willow Thicket (*Salix laevigata*)	Upland

Map Feature	Reach ID	Figure ID	Assumed Width (feet) or GIS Calc.	Classification (Cowardin/ HGM)	Vegetation Community	Jurisdictional Unit
				Classification)		
Tamarisk	CC-2, -3	11B,C,D	n/a	Palustrine (Adjacent to Channel)	Non-Native Riparian Habitat; Tamrisk Scrub (*Tamarix* spp.)	Partial Overlap with RWQCB – OHWM; and CDFW – TOB

Definitions: USACE = U.S. Army Corps of Engineers; RWQCB = Regional Water Quality Control Board; CDFW = California Department of Fish and Wildlife; TOB = Top of Bank; CCC = California Coastal Commission.

Notes:

1. Although classified as ephemeral, the creek may also be classified as "R4SB - Riverine, Streambed, Intermittent" during very wet years, especially if groundwater was to support flows within Upper Cache Creek. Cache Creek would be considered a "Non-Relatively Permanent Water" (RPW; if not isolated), and it does not flow directly or indirectly into Traditional Navigable Water (TNW; i.e., Pacific Ocean) or a tributary thereof. Cache Creek is not a jurisdictional Waters of the U.S., but is considered a Water of the State by the RWQCB. Lower Cache Creek is likely always ephemeral, and the channel is spread out to form a large, sparsely vegetated floodplain.
2. Assumed to be a tributary of Cache Creek, even though an exact connection was not found (see Figure 11-B,C). Small, upstream watersheds flow through culverts to this ditch. Purpose of the ditch seems to be to reduce the chance of flooding of Hwy. 58.

6.4.2 Indicators of Episodic Stream Activity

As noted in Section 5 above, AECOM conducted a delineation of ephemeral (or episodic) streams on the Phase I Area using the MESA approach as utilized by CDFW. Four Watercourse elements were mapped within the MPUD Project Site (Figure 11). Four transects were walked during the site visits, and MESA data sheets were filled out for representative transects TR-1, TR-2, and TR-4.

The MESA method results are included in the Appendices:

- Appendix A. Figure 11G and 11I.
- Appendix C. Supplemental Data Table A-1, A-2.
- Appendix D. Site Photograph Logs .

Table 6-9 presents the indicators that were observed across the MPUD Project Site. In addition, with respect to WoST, Table 6-10 lists the geomorphic OHWM indicators also observed (Lichvar and McColley 2008). Watercourse Polygons (WP-1, WP-2, WP-3, WP-4) were also defined and shown in Table 6-11a and 6-11b.

Table 6-6. MESA Indicators Observed Within the Study Area
(Bold = Present; Gray = Not Present).

I. Upland: Terrestrial Processes	MESA Indicator
Terrestrial Soil Formation, Surface Deflation, Weathering	• Bioturbation • Relict Bar & Swale • Soil Development (Outside of drainages) • Woody Debris in Place

II. Watercourse: Fluvial Processes	*See Watercourse Polygons WP-1 through WP-4.*
Fluvial Transport, Deposition, Out-of-Channel Flow	• Bar Forms: Sand & Gravel • Drainage Swales • Levee Ridges: Sand & Gravel • Mud: Cracks & Curls & Drapes • Organic Drift • Out-of-Channel Flow • Secondary Channels • Sediment Plastering - Gravel • Sediment Sorting • Vegetation-channel Alignments • Wrack
Fluvial Erosion	• Cut Banks • Scour • Secondary Channels • Water-cut Benches • Water Level Marks

Source: AECOM (2018); adapted from CDFW MESA (2014).

Table 6-7. Geomorphic OHWM Indicators Observed within the Study Area (Bold = Present; Gray = Not Present).

Below Ordinary High Water	At Ordinary High Water	Above Ordinary High Water
▪ In-stream dunes ▪ Crested ripples ▪ Flaser bedding ▪ Harrow marks ▪ Gravel sheets to rippled sands ▪ Meander bars ▪ Sand tongues ▪ Muddy point bars ▪ Long gravel bars ▪ Cobble bars behind obstructions ▪ Scour holes downstream of obstructions ▪ Obstacle marks ▪ Stepped-bed morphology in gravel ▪ Narrow berms and levees	▪ Valley flat ▪ Active floodplain ▪ Benches: low, mid, most prominent ▪ Highest surface of channel bars ▪ Top of point bars ▪ Break in bank slope ▪ Upper limit of sand-sized particles ▪ Change in particle size distribution ▪ Staining of rocks ▪ Exposed root hairs below intact soil layer ▪ Silt deposits Litter (organic debris, small twigs and leaves)	▪ Desert pavement ▪ Rock varnish ▪ Clast weathering ▪ Salt splitting ▪ Carbonate etching ▪ Depositional topography ▪ Caliche rubble ▪ Soil development ▪ Surface color/tone ▪ Drainage development ▪ Surface relief ▪ Surface rounding

▪ Streaming lineations ▪ Dessication/mud cracks ▪ Armored mud balls ▪ Knick points	▪ Drift (organic debris, larger than twigs)	

Source: AECOM (2018); adapted from Lichvar and McColley (2008).

Table 6-8. Watercourse Polygons and Internal Low-Flow Channels (Study Area).

Reach ID	Assumed Width (feet) or GIS	RWQCB - OHWM (acres)	Streambeds - TOB (acres)	Linear Feet
CC-4	12	0.30*	n/a	1,140
WP-4	GIS	3.14*	3.14	n/a
Total		**3.14**	**3.14**	**1,140**
TR-8b	12	0.20	n/a	449
TR-8c	12	0.19	n/a	434
Subtotal		0.39	n/a	883
WP-1	GIS	n/a	0.90	n/a
Total		**0.39**	**0.90**	**883**
TR-9a	12	0.21	n/a	474
WP-2	GIS	n/a	0.53	n/a
Total		**0.21**	**0.53**	**474**
TR-9b	12	0.45	n/a	972
TR-9c	12	0.24	n/a	544
Subtotal		0.69	n/a	1,515
WP-3	GIS	n/a	3.29	n/a
Total		**0.69**	**3.29**	**1,515**
Total		**4.43**	**7.86**	**4,012**

* CC-4 represents the blue lines (low flow channels) within the overall WP-4 surrounding the lines. In this case, WP-4 is jurisdictional to both RWQCB and CDFW.

7.0 IMPACTS

7.1 Impact Corridors

The impact area for the project is a 40-foot wide area that will follow (for part of the alignment) an existing dirt access road. Use of existing access roads will reduce potential impacts. Table 6-9 through Table 6-12 show the acreage of WoST and Streambeds associated with the impact corridor.

Table 6-9a. Overview of Proposed Avoidance within Impact Corridor.

	Waters of the State (WoST) – OHWM (acres)	Streambeds - TOB (acres)	Linear Feet
Conceptual Alignment			
A. Cache Creek	0.05	0.18	196
B. Tributary Drainage Ditch	0	0	0
C. La Rose Creek	0.03	0.07	40
Avoidance (Boring)	**0.08**	**0.25**	**236**
Percent of Total Potential Impacts	33% of 0.25*	37% of 0.67*	19% of 1,222*
Alternate Conceptual Alignment			
A. Cache Creek	0.07	0.24	238
B. Tributary Drainage Ditch	0	0	0
C. La Rose Creek	0.51	1.19	763
Avoidance (Boring)	**0.58**	**1.43**	**1,001**
Percent of Total Potential Impacts	78% of 0.74*	77% of 1.85*	50 of 1,987*

*Represents total potential impacts of drainages A – D, Tables 9a and 9b.

Table 6-9b. Overview of Anticipated Impacts within Impact Corridor.

	Waters of the State (WoST) – OHWM (acres)	Streambeds - TOB (acres)	Linear Feet
Conceptual Alignment			
D. Tributaries (N. of Hwy 58)	0.17	0.42	986
Temporary Impacts (Trenching)	**0.17**	**0.42**	**986**
Percent of Total Potential Impacts	67% of 0.25*	63% of 0.67*	81% of 1,222*
Alternate Conceptual Alignment			
No Impacts Anticipated for Segment.	0	0	0

*Represents total potential impacts of drainages A – D, Tables 9a and 9b.

Table 6-10. Summary of Waters of the State and Streambeds within the Conceptual Alignment (Red Font = Actual Anticipated Impacts).

Map Feature	Reach ID	Figure ID	Assumed Width (feet) or GIS Calc.	WoST - OHWM (RWQCB; acres)	Streambeds - TOB (CDFW; acres)	Active Channel / Watercourse	Linear Feet
Waters of the State and Streambeds							
A1. Upper Cache Creek (within Study Area)[1]	CC-1-CC-3	11A-C	GIS	(0.05)*	(0.18)*	(0.35)*	(196)*
A2. Lower Cache Creek	CC-4; WP-4	11I	GIS	0	0	0	0
Subtotal for Cache Creek				0	0	0	0
B. Tributary Drainage Ditch[2]	TDD	11B,C	GIS	0	0	0	0
C. La Rose Creek	LRC	11D,E	GIS	(0.03)*	(0.07)*	0	(40)*
Subtotal for TDD, LRC				0	0	0	0
D1. Tributaries (North of Hwy 58; single drainages)	TR-1 - TR-8a; TR-11; TR-12;	11D-H	3, 12, GIS	0.06	0.07	0	758
D2. Tributaries (North of Hwy 58; alluvial fan)	TR-8b,c; 9;10; WP-1, 2, 3	11G	GIS	0.10	0.35	0.35	228
Subtotal for Tributaries (North of Hwy 58)				0.17	0.42	0.35	986
Total for all Waters of the State (RWQCB) and Streambeds (CDFW)				**0.17**	**0.42**	**0.35**	**986**
Riparian Habitat							
			Within Upland Buffer Adjacent to Creeks	**WoST - OHWM (RWQCB; acres)**	**Streambeds - TOB (CDFW; acres)**	**Active Channel / Watercourse**	**Linear Feet**
Sandbar Willow (Along Cache Creek)	CC-2	11B	0	0	0	0	0
Scalebroom Scrub	CC-4; WP-4	11I	0	0	0	0	1,140
Red Willow (Buffer Only)	Near CC-2	11B	0	0	0	0	0
Tamarisk (Along Cache Creek)	CC-2, -3	11B,C,D	0.23	0	0	0	0
			0.23	**0**	**0**	**0**	**0**

Definitions: RWQCB = Regional Water Quality Control Board; OHWM = Ordinary High Water Mark; CDFW = California Department of Fish and Wildlife; TOB = Top of Bank.

*Avoided by boring under the creek. Acreage in ( ) represents the area within the 40-foot impact corridor. Note total = 0.

Table 6-11. Summary of Waters of the State and Streambeds within the Alternate Conceptual Alignment (*Segment* has no gray highlight; see A1).

Map Feature	Reach ID	Figure ID	Assumed Width (feet) or GIS Calc.	WoST – OHWM (RWQCB; acres)	Streambeds - TOB (CDFW; acres)	Active Channel / Watercourse (subset of TOB)	Linear Feet
Waters of the State and Streambeds							
A1. Upper Cache Creek [1]	CC-1- CC-3	11A-C	GIS	(0.07) *	(0.24)	(0.35)	(238)
A2. Lower Cache Creek	CC-4; WP-4	11I	GIS	0	0	0	0
Subtotal for Cache Creek				0	0	0	0
B. Tributary Drainage Ditch[2]	TDD	11B,C	GIS	0	0	0	0
C. La Rose Creek	LRC	11D,E	GIS	(0.07) *	(0.24)	0	(238)
Subtotal for TDD, LRC				0	0	0	0
D1. Tributaries (North of Hwy 58)	TR-1 - TR-8a; TR-11; TR-12;	11D-H	3, 12, GIS	0.06	0.07	0	758
D2. Tributaries (North of Hwy 58)	TR-8b,c; 9;10; WP-1, 2, 3	11G	GIS	0.10	0.35	0.35	228
Subtotal for Tributaries (North of Hwy 58)				0.17	0.42	0.35	986
Total for all Waters of the State (RWQCB) and Streambeds (CDFW)				**0.17**	**0.42**	**0.35**	**986**
Riparian Habitat							
			Within Upland Buffer Adjacent to Creeks	**OHWM (RWQCB; acres)**	**TOB (CDFW; acres)**	**Active Channel / Watercourse**	**Linear Feet**
Sandbar Willow (Along Cache Creek)	CC-2	11B	0	0	0	0	0
Scalebroom Scrub	CC-4; WP-4	11I	0	0	0	0	1,140
Red Willow (Buffer Only)	Near CC-2	11B	0	0	0	0	0
Tamarisk (Along Cache Creek)	CC-2, -3	11B,C,D	3.2	0	0	0	0
			3.2	**0**	**0**	0	**0**

Definitions: RWQCB = Regional Water Quality Control Board; OHWM = Ordinary High Water Mark; CDFW = California Department of Fish and Wildlife; TOB = Top of Bank.

*Avoided by boring under the creek. Acreage in ( ) represents the area within the 40-foot impact corridor. Note total = 0.

Table 6-12. Watercourse Polygons and Internal Low-Flow Channels (Impact Corridor).

Reach ID	Assumed Width (feet) or GIS	OHWM (RWQCB; acres)	TOB (CDFW; acres)	Linear Feet
CC-4	12	0	0	0
WP-4	GIS	0	0	n/a
Total	--	**0**	**0**	**0**
TR-8b	12	0.02	n/a	51
TR-8c	12	0.03	n/a	56
Subtotal	--	0.05	n/a	107
WP-1	GIS	n/a	0.09	n/a
Total	--	**0.05**	**0.09**	**107**
TR-9a	12	0.02	n/a	41
WP-2	GIS	n/a	0.05	n/a
Total	--	**0.02**	**0.05**	**41**
TR-9b	12	0.02	n/a	41
TR-9c	12	0.02	n/a	40
Subtotal	--	0.04	n/a	81
WP-3	GIS	n/a	0.21	n/a
Total	--	**0.04**	**0.21**	**81**
Overall Total	--	**0.11**	**0.35**	**229**

7.2 Avoidance, Minimization, and Mitigation Measures

Mitigation measures are recommended as precautionary measures relevant to the protection of biological resources, and are required to offset potentially significant adverse project impacts. A reporting mechanism will be associated with the measures, in order to document mitigation completion and performance. Potential impacts to ephemeral drainages will be avoided, minimized, and/or mitigated by incorporation of project-specific mitigation measures.

1. *Limits of Disturbance*. All equipment and workers will remain within approved work limits. Work limits will be designated with lathe staking or a similar method. Vegetation outside of the approved 40-foot alignments will not be impacted. Junipers, Joshua trees, and cacti will be avoided when feasible.

2. *Water Quality*. Equipment and materials will be staged within the alignment and away from water drainages. Parked equipment will have secondary containment to prevent any fluid leaks coming into contact with the ground surface. Any hazardous waste spills will be immediately cleaned up and reported to the qualified biologist.

3. *Use of Disturbed Areas*. Wherever possible, construction personnel shall utilize existing access roads or previously disturbed areas to reach the project area or stage their vehicles and equipment.

4. *Regulatory Permits*. Prior to approval of the project plans and specifications, the County shall confirm that the plans and specifications stipulate that, prior to commencement of construction activities, the County shall coordinate with the RWCQB to obtain a WDR pursuant to the California Water Code.

Additionally, the County shall obtain a Streambed Alteration Agreement from the California Department of Fish and Game pursuant to Section 1602 of California Fish and Game Code. The RWQCB will likely require a letter from the U.S. Army Corps of Engineers regarding the applicability of Section 404 permits, and to verify that the watershed is indeed an "isolated watershed" where the USACE does not require a Section 404 permit.

5. *Best Management Practices at Ephemeral Drainage Crossings*.

General Procedures. The General WDR R6T-2003-0004[20] (discussed in Section 8.2 below) contains the requirement for "Attachment E – Best Management Practices Plan." The proposed project shall prepare such a plan if the applicant obtains authorization for impacts to WoST through this General WDR.

Specific Procedure (as applicable; recommended for TR-8, TR-9). Following construction installation of the following post-construction erosion/sediment control BMPs are suggested: Restore grade to pre-project conditions. Install fiber rolls on slopes with exposed soil. Align fiber rolls with slope contours and space 10 ft apart; at a minimum a roll should be installed at the top, toe and at grade breaks of the impacted sloped areas. There should be a minimum of 2 feet of lateral overlap where the fiber roll and contour intersects the new road edge and the next fiber roll to be installed downslope starts, to prevent concentrated flow. Fiber rolls should be composed entirely of biodegradable materials and be trenched in place and secured to the slope with wooden stakes per Caltrans 2015 Standard Plan RSP H51 (Fiber Roll Type 1). Fiber rolls should not be trenched through drainages to allow water to flow freely beneath the fiber rolls but still serve to control sediment transport. Following fiber roll installation, all impacted areas including non-sloped areas, should be hydroseeded with regionally appropriate species, followed by an application of weed-free straw and covered with plant-based tackifier.

8.0 DISCUSSION

8.1 Summary

The results include the description of the following jurisdictional features: main channel of Cache Creek; a Tributary Drainage Channel; large tributary La Rose Creek; numerous, small, ephemeral tributaries situated along a slope to the north of Hwy 58 (referred to as TR-1 through TR-12); and four floodplain areas called "watercourse polygons" (WP) mapped within the Study Area. One WP is located within lower Cache Creek (southeast corner of Study Area), and the other three WPs are located within an alluvial fan that is among the ephemeral tributaries to Cache Creek. Within the 250-foot buffer (or study area), the JD resulted in 11.3 acres of non-wetland waters of the State, 26.7 acres of CDFW streambeds, all with a linear feet of 29,852 feet (in total). The JD also presents an impact analysis for a 40-foot corridor, called the Conceptual Alignment. The impact analysis also evaluated an alternate segment called the Alternate Conceptual Alignment.

[20] https://www.waterboards.ca.gov/lahontan/water_issues/available_documents/misc/genera_permits4lahaontan.pdf

8.2 Regulatory Requirements

The project as proposed would potentially affect WoST/Streambeds subject to RWQCB and CDFW jurisdiction[21]. A Waste Discharge Application/Report (WDR) should be prepared and submitted to the Lahontan RWQCB[22] for review and a permit must be issued before project construction could begin.

Due to the isolated nature of the Antelope-Fremont Valleys subbasin, USACE is not expected to regulate Project activities under Section 404 of the CWA[23,24]; therefore, no application (or associated OHWM Data forms, Preliminary Jurisdictional Determination form) for a USACE CWA Section 404 dredge/fill permit will be required. It is recommended to obtain a letter from USACE confirming this conclusion.

In some cases where a CWA section 404 permit will not be issued by the Corps for the project, coverage under General WDRs (GWDRs) may be appropriate. This application can be used to apply for coverage under the following GWDRs:

WQO-2004-0004-DWQ
General Waste Discharge Requirements for Dredged or Fill Discharges to Waters Deemed by the U.S. Army Corps of Engineers to be Outside of Federal Jurisdiction
http://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2004/wqo/wqo2004-0004.pdf
Regulates minor discharges of dredged or fill material to waters of the State waters not subject to Clean Water Act Section 404. Waters of the state means any surface water or groundwater, including saline waters, within the boundary of the state, including wetlands and riparian areas. Usage for land development, disposal of dredged material, bed and bank modifications, and other similar projects is restricted to size limits in the order (must be less than 0.2 acre).

R6T-2003-0004
General Waste Discharge Requirements for Small Construction Projects, including Utility, Public Works, and Minor Streambed/Lakebed Alteration Projects Throughout the Lahontan Region, Excluding Lake Tahoe
http://www.waterboards.ca.gov/lahontan/board_decisions/adopted_orders/2003/docs/r6t-2003-0004_small_const_wdr.pdf

[21] Streambeds or watercourses jurisdictional per California Fish and Game Code 1600 *et seq*.
[22] Lahontan Regional Water Quality Control Board – South Lahontan Region, 15095 Amargosa Rd., Bldg. 2-Suite 210, Victorville, CA 92394; http://www.waterboards.ca.gov/lahontan/.
[23] For another project within the Western Mojave Desert region, the applicant received a jurisdictional determination letter from the USACE that determined that nearby drainages were part of an isolated system, and thus no waters of the US (WoUS) were technically present on site. Several predominantly ephemeral drainages are located within the overall facility footprint. While the majority of the drainages are ephemeral washes, there are approximately 4 intermittent stretches along Jawbone Creek. Drainages within the project area flow into two large washes (Jawbone Canyon and Pine Tree Canyon), then east into the Mojave Desert and ultimately into Koehn Lake. Koehn Lake is an inland lake approximately 12 miles north of California City. Koehn Lake has no distributary or other outlet. There are no docks or marinas in Koehn Lake and neither Koehn Lake nor any of its tributaries are navigable under current conditions. Several salt evaporation ponds exist at the lake. While the salt harvesting ponds may represent a potential interstate commerce nexus, we contend that the lack of navigability of the receiving waterbody (i.e., Koehn Lake) means that the drainages in the project area are isolated and therefore the USACE does not have jurisdiction.
[24] Another example is adjacent to the project area: SPL-2010-01014-BAH (Alta-Oak Creek Mojave and Alta Wind Projects) are not under USACE jurisdiction. Cited in CEQA document for adjacent wind farm project: Bureau of Land Management/County of Kern (BLM/Kern County). 2012. Alta East Wind Project (AEWP) Draft EIS/EIR. Prepared for Alta Windpower Development, LLC. June.

Regulates construction activity in specific high-elevation watersheds with land disturbance between 10,000 sq. ft. (0.20 acre) and 43,560 sq. ft. (one acre). It also may be used to regulate dredged and fill material discharges in State waters of the Lahontan Region when the federal Clean Water Act is not applicable (as determined by the US Army Corps of Engineers). Projects are typically non-recurring, short-term (completed within two construction seasons), and suitable for utility projects.

Application to the Lahontan Region utilizes the same application as for the 401 Certification:

Lahontan Application for CWA 401 and WDR for Dredge and Fill Projects.
https://www.waterboards.ca.gov/lahontan/water_issues/programs/clean_water_act_401/docs/401application.pdf;
https://www.waterboards.ca.gov/lahontan/water_issues/programs/clean_water_act_401/docs/401instructions2app.pdf

A Notification of Lake or Streambed Alteration should be prepared and submitted to CDFW South Coast Region No. 4 [25] for review and an agreement must be issued before project construction could begin.

Lake or Streambed Alteration Notification Form (PDF Form).
https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=3754;
https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=3773&inline

Along the conceptual alignment, impacts to Cache Creek and La Rose Creek were avoided by converting the construction method from trenching to directional boring below the potentially jurisdictional feature. The conceptual alignment specifically follows existing dirt roads to reduce the potential impacts that will result from the construction of the Project. In locations where both the conceptual and alternate alignments cross WoST, the impacted area will be returned to pre-existing contours. Applicant proposed measures, as well as additional avoidance, minimization, and mitigation measures for jurisdictional resources will be developed as part of the ongoing CEQA document preparation and agency coordination process.

[25] CDFW Central Region (Region 4); 1234 E. Shaw Avenue Fresno, CA 93710; (559) 243-4005 ext. 151.

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Appendix A

Figures 1 - 11



Legend

- Project Area
- County Boundary

0 5 10 Miles

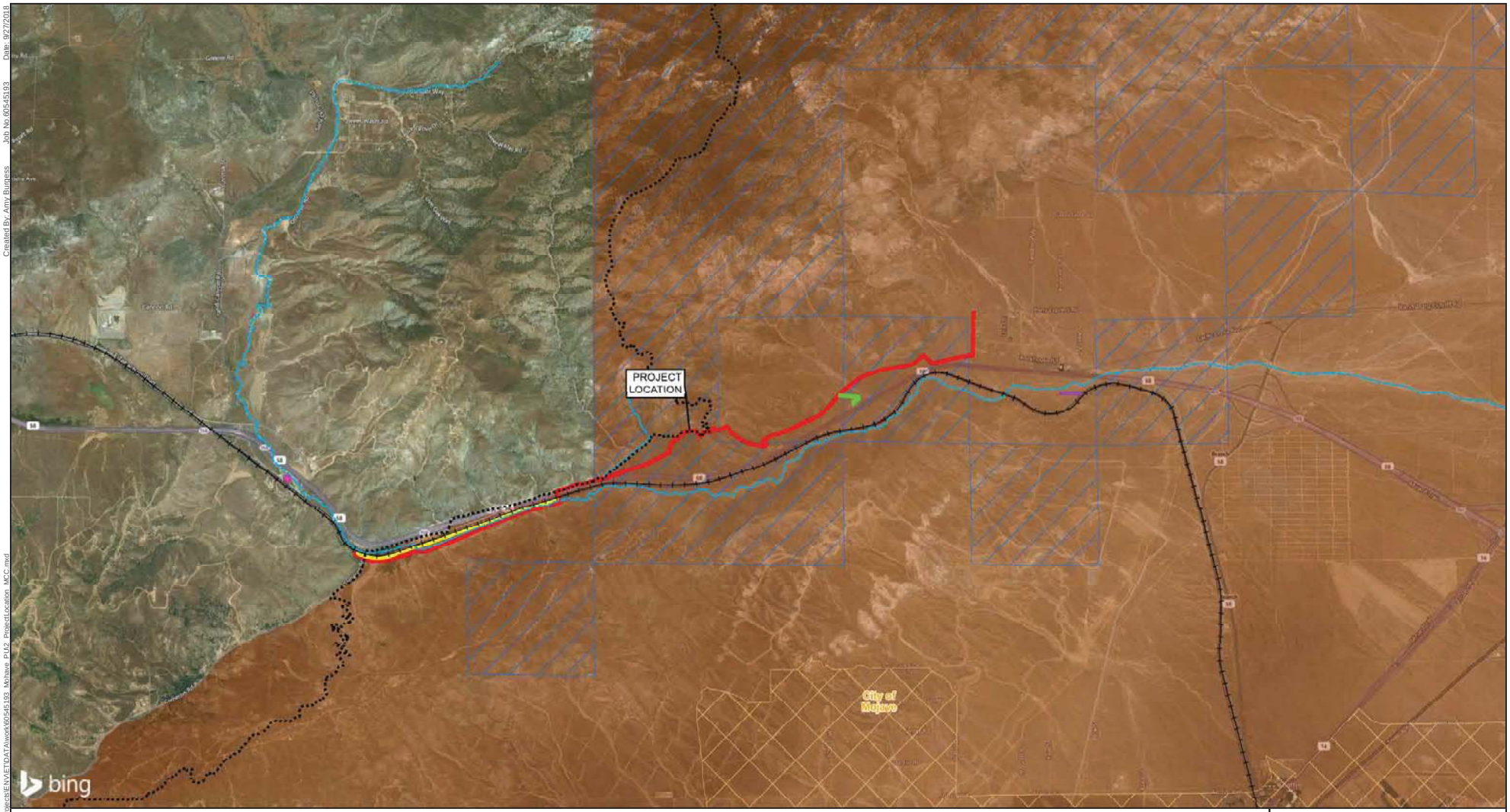
Base Map Source:
ESRI, ArcGIS Online
National Geographic World Map

FIGURE 1
PROJECT VICINITY

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 9/27/2018
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Legend

- Railroad
- Pacific Crest Trail
- Cache Creek
- Alternate Conceptual Alignment
- Conceptual Alignment
- Feeder to CHP Facility
- Pump Station Connection Alignment
- Well 9 Facility
- City Limits
- BLM Property
- West Mojave Plan Boundary (WEMO)

0 4,000 8,000 Feet

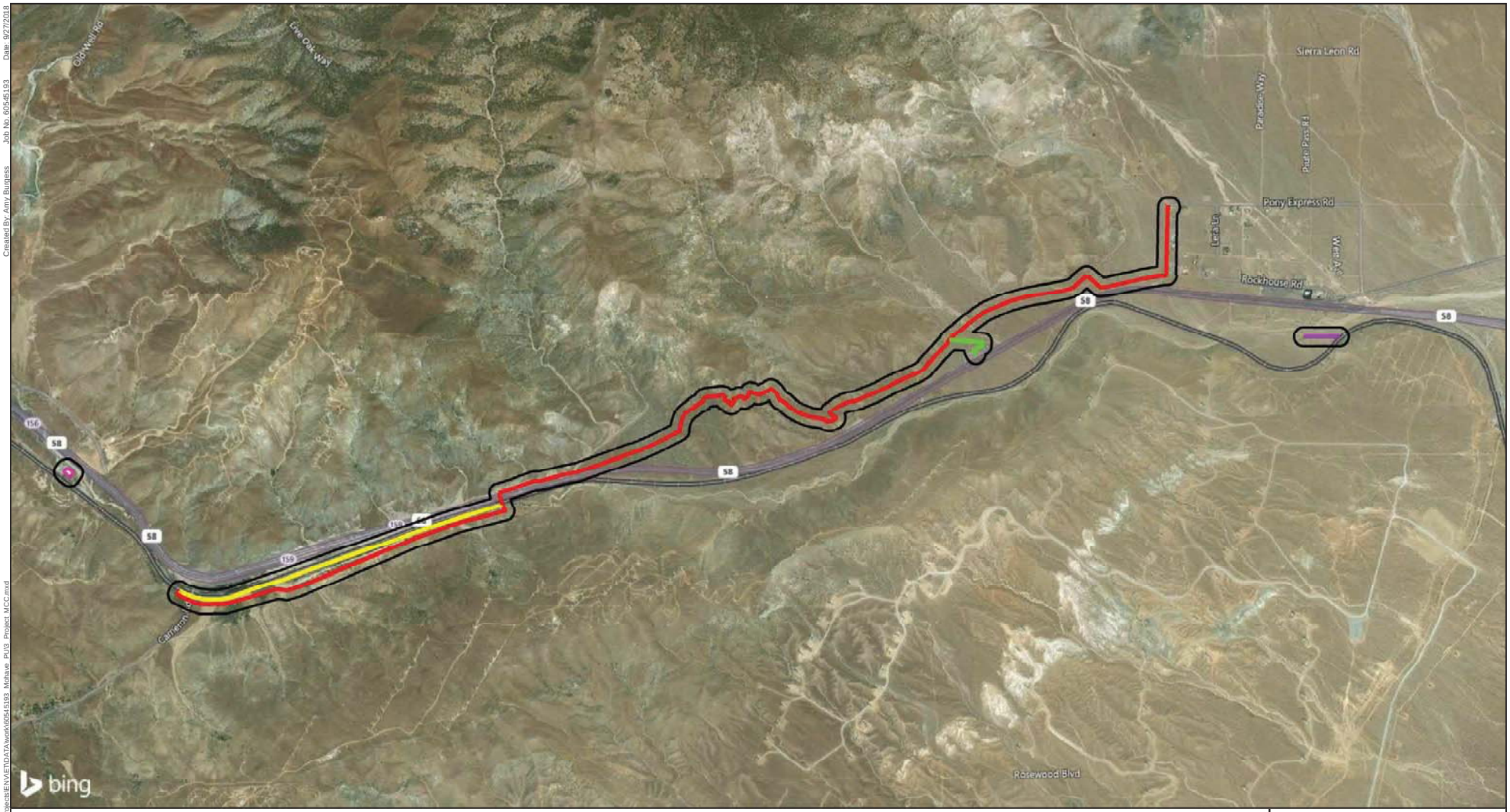
Base Map Source:
ESRI, ArcGIS Online
Bing Maps Hybrid

FIGURE 2
PROJECT LOCATION

Mojave Public Utility District
Cache Creek Project

AECOM

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Legend

- Alternate Conceptual Alignment
- Conceptual Alignment
- Feeder to CHP Facility
- Pump Station Connection Alignment
- Well 9 Facility
- 250-Foot Buffer

0 2,000 4,000 Feet

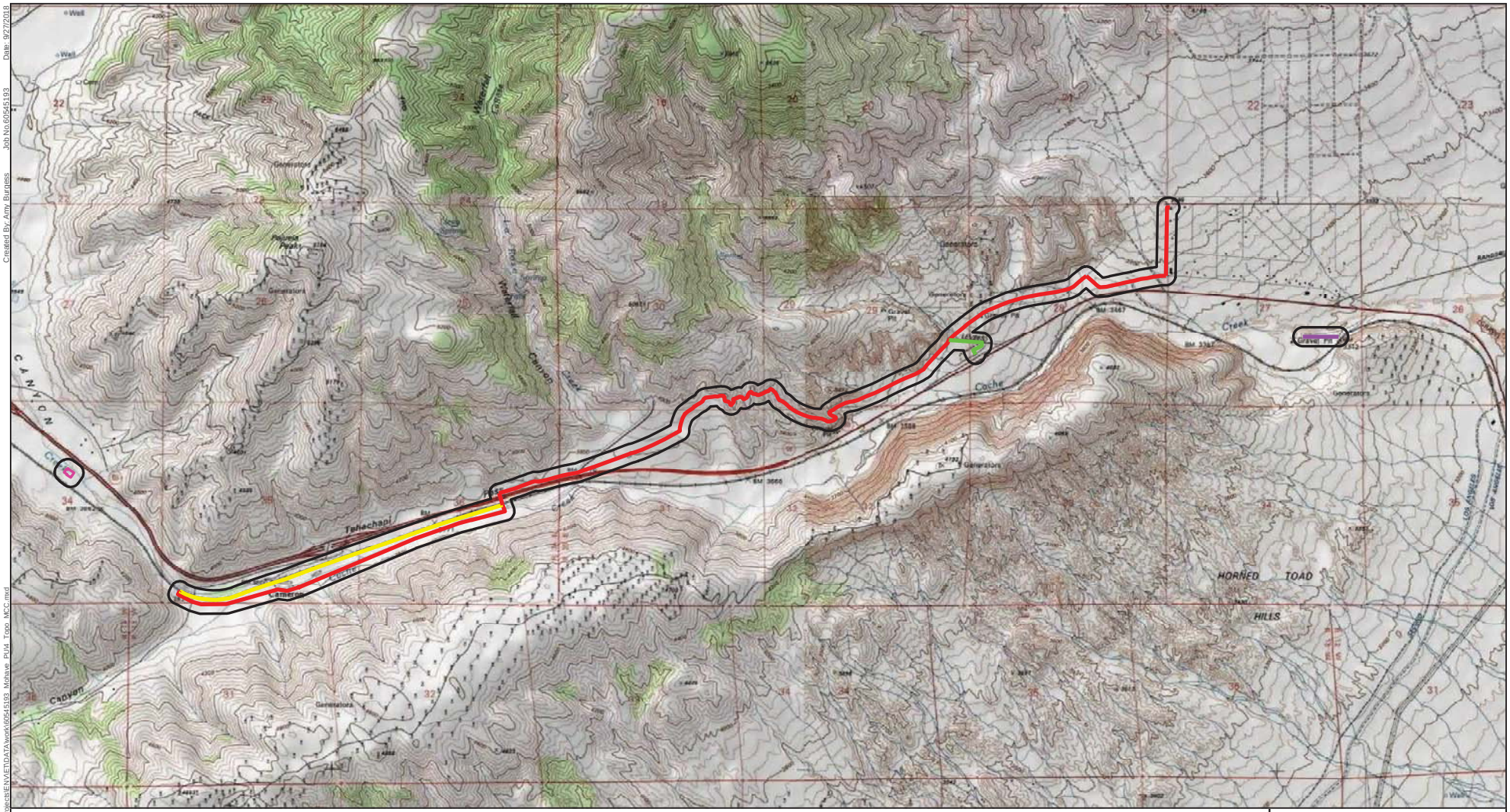
Base Map Source:
ESRI, ArcGIS Online
Bing Maps Hybrid

FIGURE 3
PROJECT OVERVIEW

Mojave Public Utility District
Cache Creek Project

AECOM

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Legend

- Alternate Conceptual Alignment
- Conceptual Alignment
- Feeder to CHP Facility
- Pump Station Connection Alignment
- Well 9 Facility
- 250-Foot Buffer

0 2,000 4,000 Feet

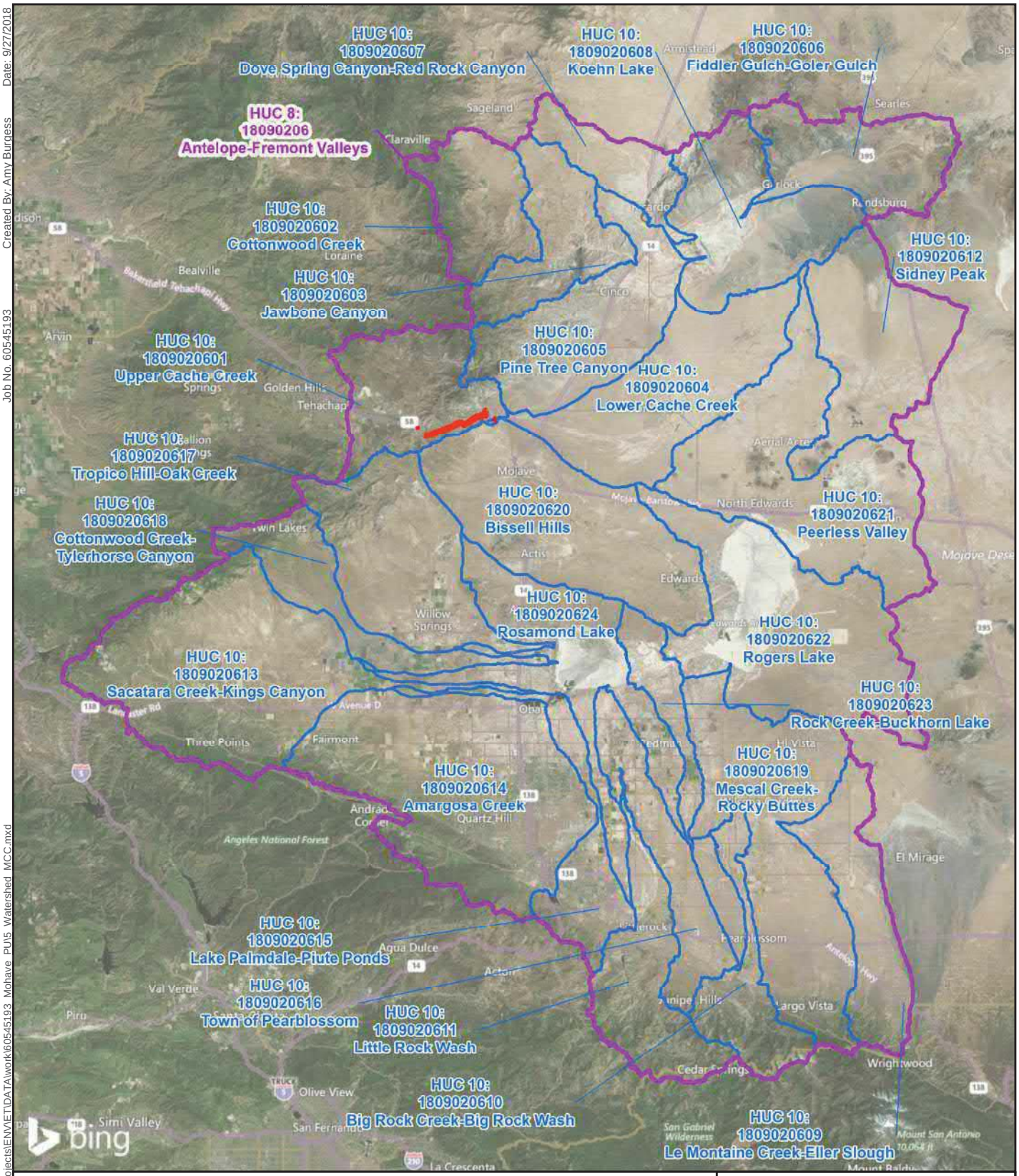
Base Map Source:
ESRI, ArcGIS Online - USA Topo Map
USGS 7.5' Quadrangles Monolith and Mojave, CA

FIGURE 4
USGS TOPOGRAPHIC QUADRANGLES

Mojave Public Utility District
Cache Creek Project

AECOM

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Legend

- Project Alignment
- Watershed Boundary HUC 8
- Watershed Boundary HUC 10

0 7 14 Miles

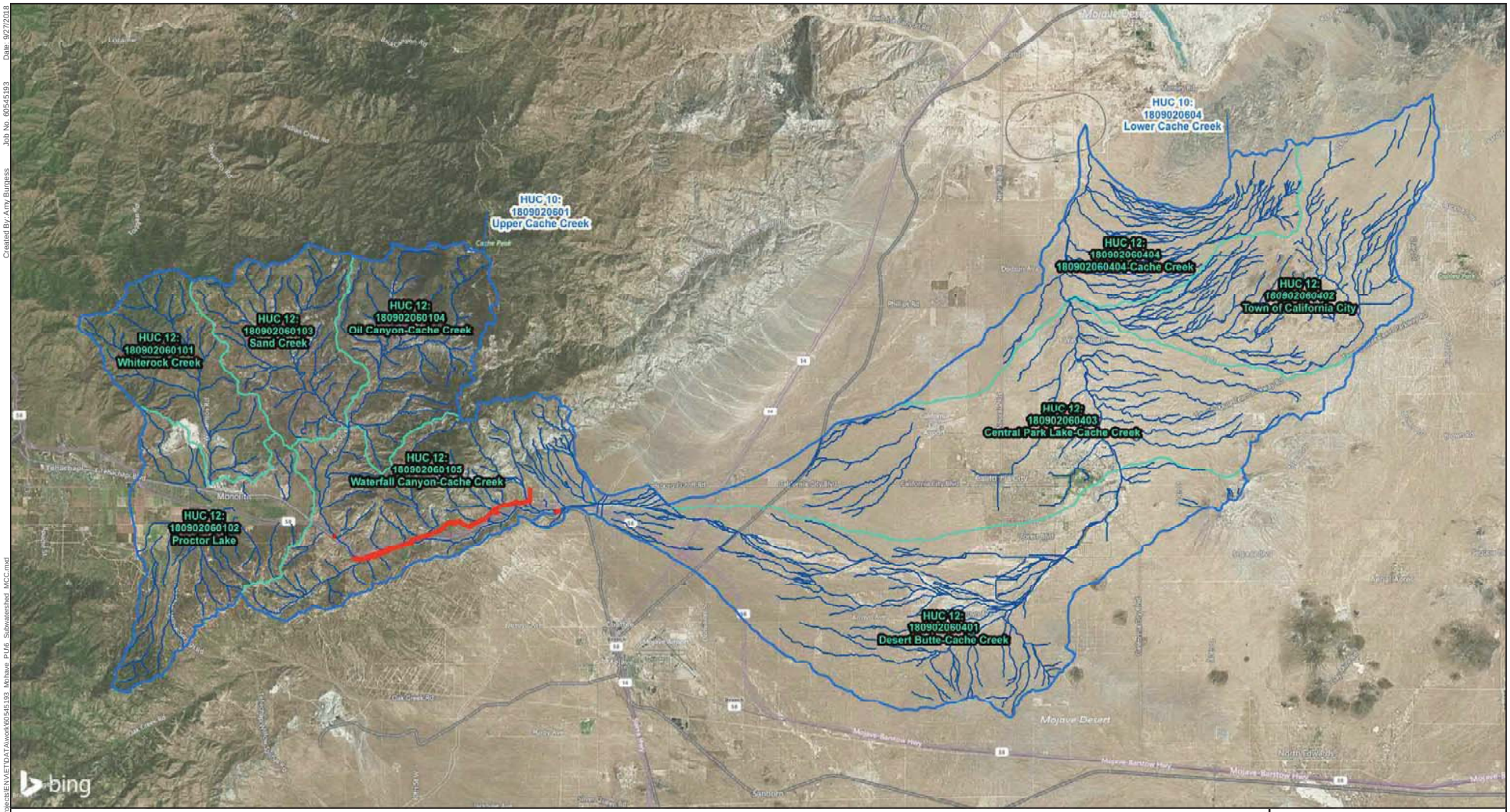
Base Map Source:
ESRI, ArcGIS Online
Bing Map Hybrid

FIGURE 5
WATERSHED MAP

Mojave Public Utility District
Cache Creek Project

AECOM

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Legend

- Project Alignment
- Watershed Boundary HUC 10
- Subwatershed Boundary HUC 12
- National Hydrography Dataset

0 11,000 22,000 Feet

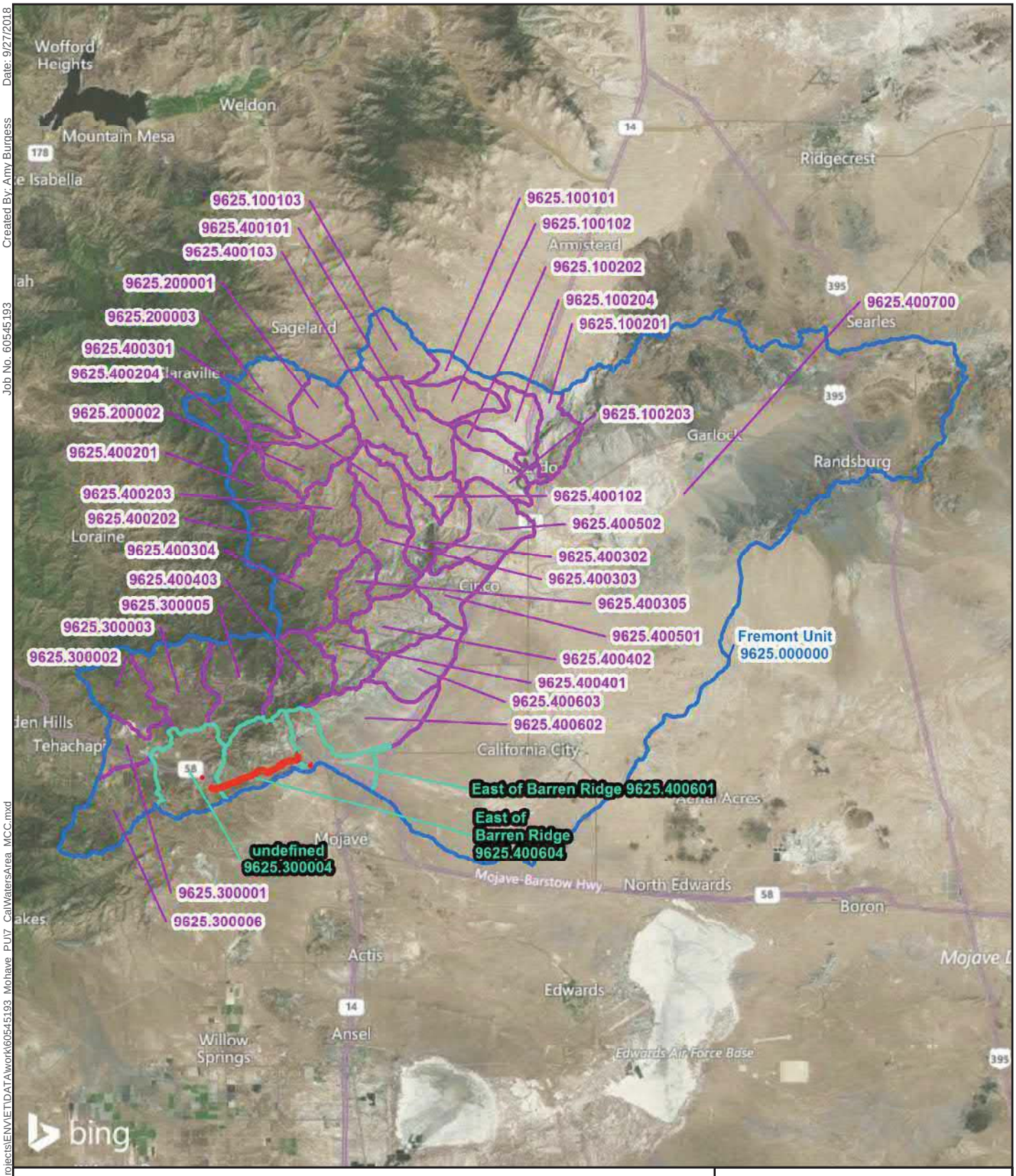
Base Map Source:
ESRI, ArcGIS Online
Bing Maps Hybrid

FIGURE 6
SUBWATERSHED MAP

Mojave Public Utility District
Cache Creek Project

AECOM

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Legend

- Project Alignment
- Hydrologic Sub-Area
- Hydrologic Area
- Hydrologic Unit

0 3 6 Miles

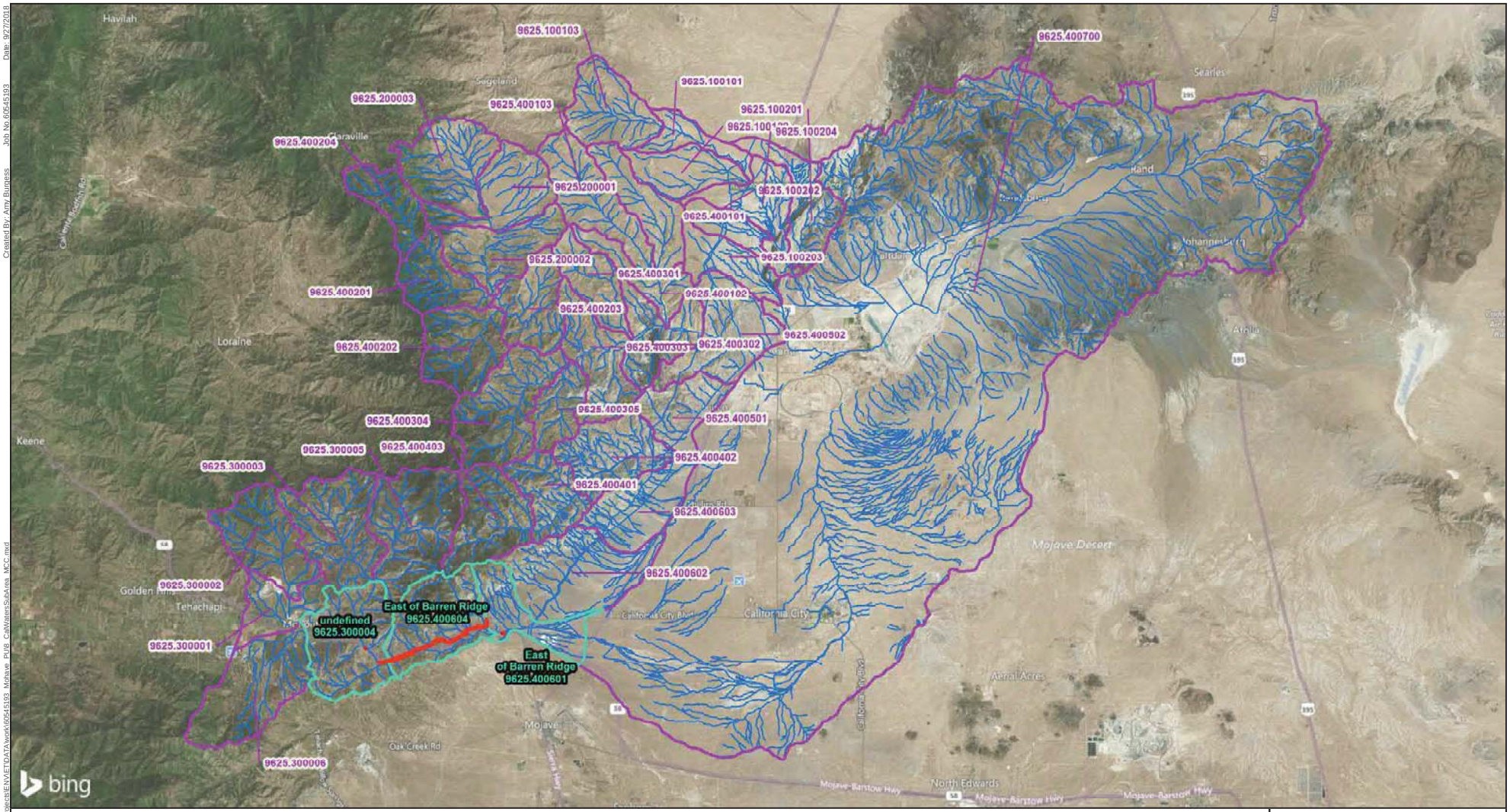
Base Map Source:
ESRI, ArcGIS Online
Bing Map Hybrid

FIGURE 7
CALWATERS HYDROLOGIC AREA MAP

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 9/27/2018 Created By: Amy Burgess Job No. 60545193 \\orange.na.aecomnet.com\Orange\DCS\Projects\ENV\ETLDATA\work\60545193_Mohave_PUD_CalWatersArea_MCC.mxd



Legend

- Project Alignment
- Hydrologic Sub-Area
- Hydrologic Area
- National Hydrography Dataset

0 20,000 40,000 Feet

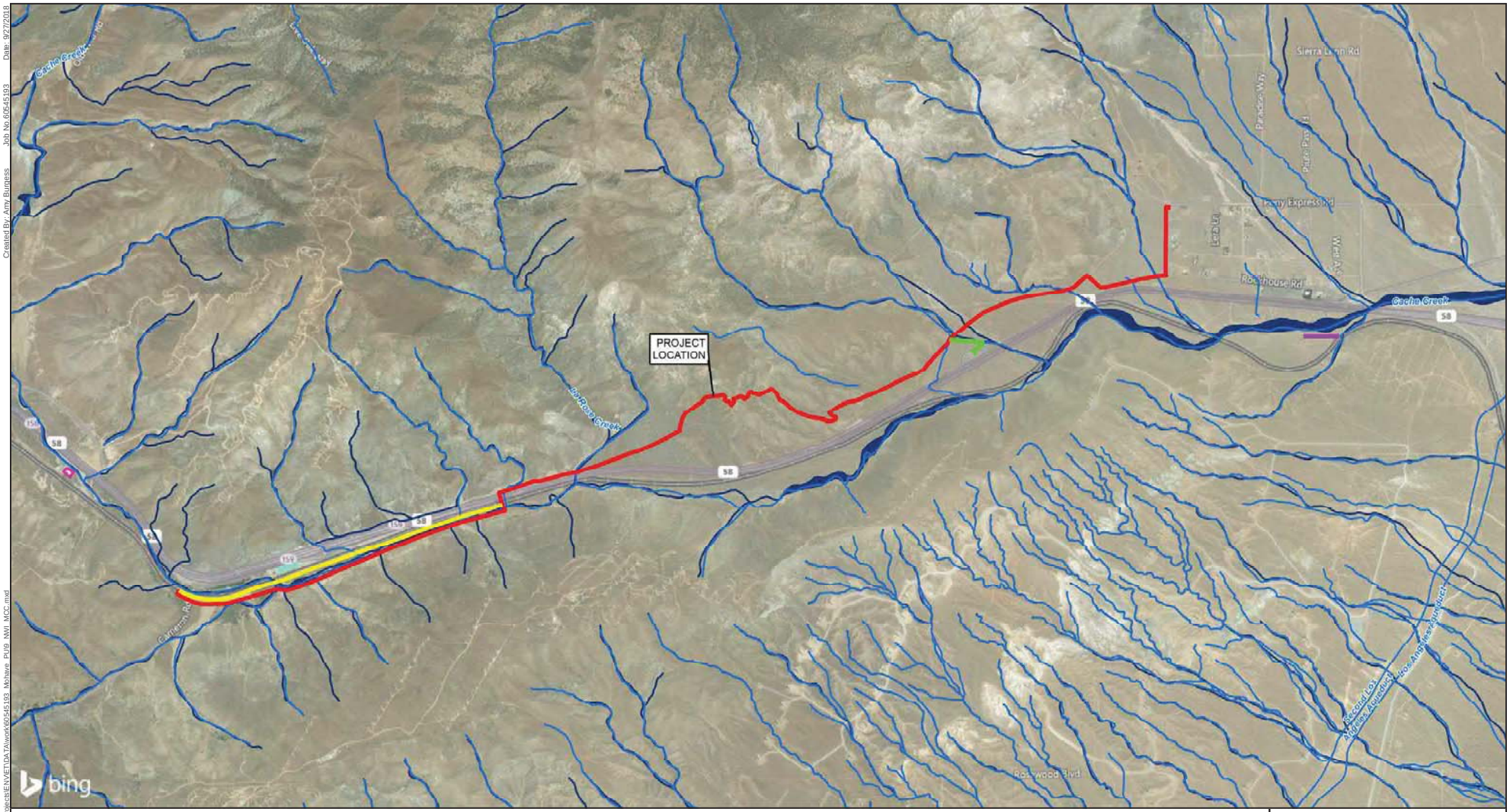
Base Map Source:
ESRI, ArcGIS Online
Bing Maps Hybrid

FIGURE 8
CALWATERS HYDROLOGIC SUBAREA MAP

Mojave Public Utility District
Cache Creek Project

AECOM

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Created By: Amy Burgess
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Legend

- Alternate Conceptual Alignment
- Conceptual Alignment
- Feeder to CHP Facility
- Pump Station Connection Alignment
- Well 9 Facility

Wetland Type

- Freshwater Emergent Wetland
- Riverine

- National Hydrography Dataset

0 2,000 4,000 Feet

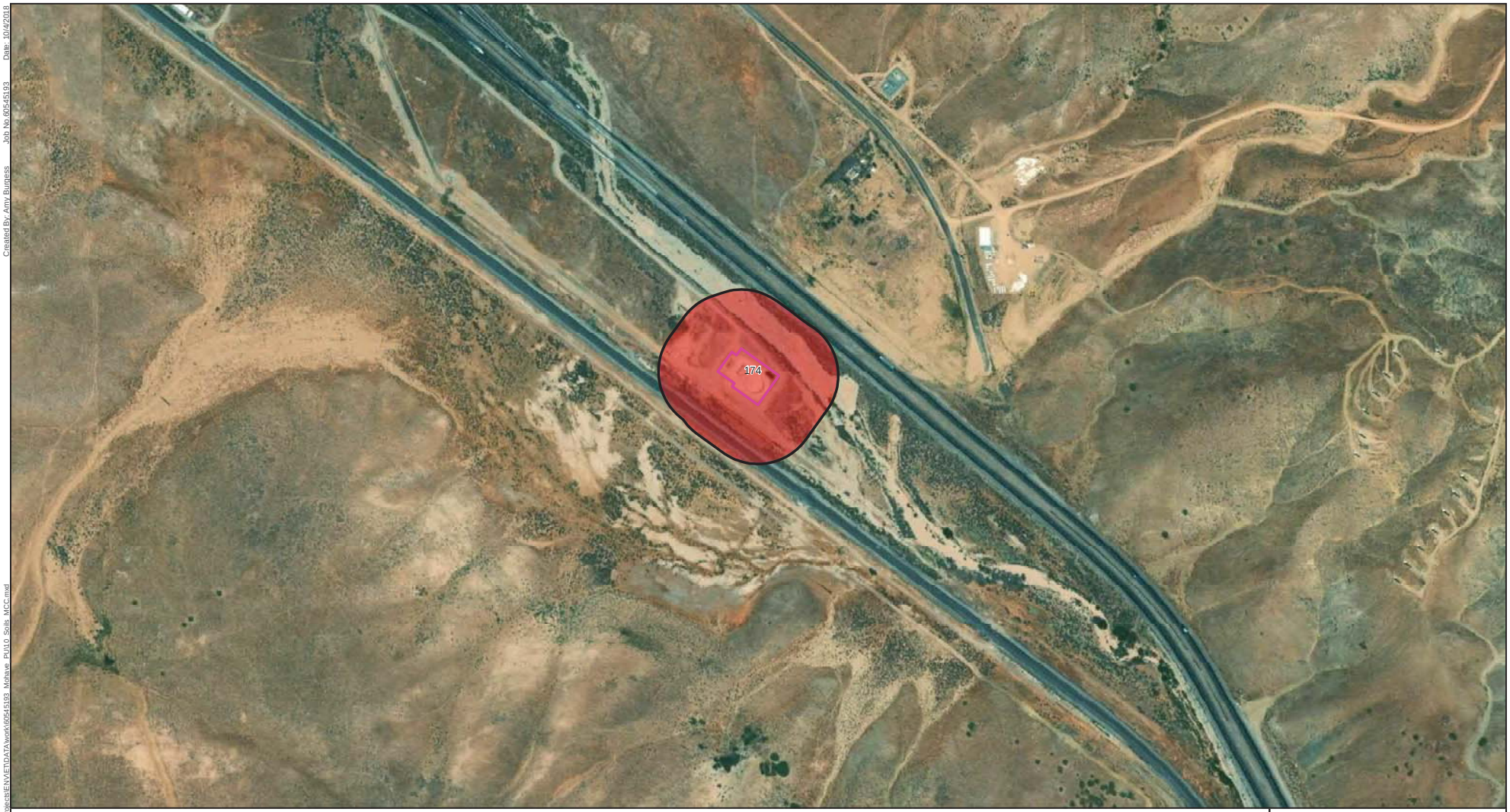
Base Map Source:
ESRI, ArcGIS Online
Bing Maps Hybrid

FIGURE 9
NATIONAL WETLAND INVENTORY MAP

Mojave Public Utility District
Cache Creek Project

AECOM

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Legend

- Well 9 Facility
- 250-Foot Survey Buffer
- 174:Steuber sandy loam, 0 to 2 percent slopes

0 400 800 Feet

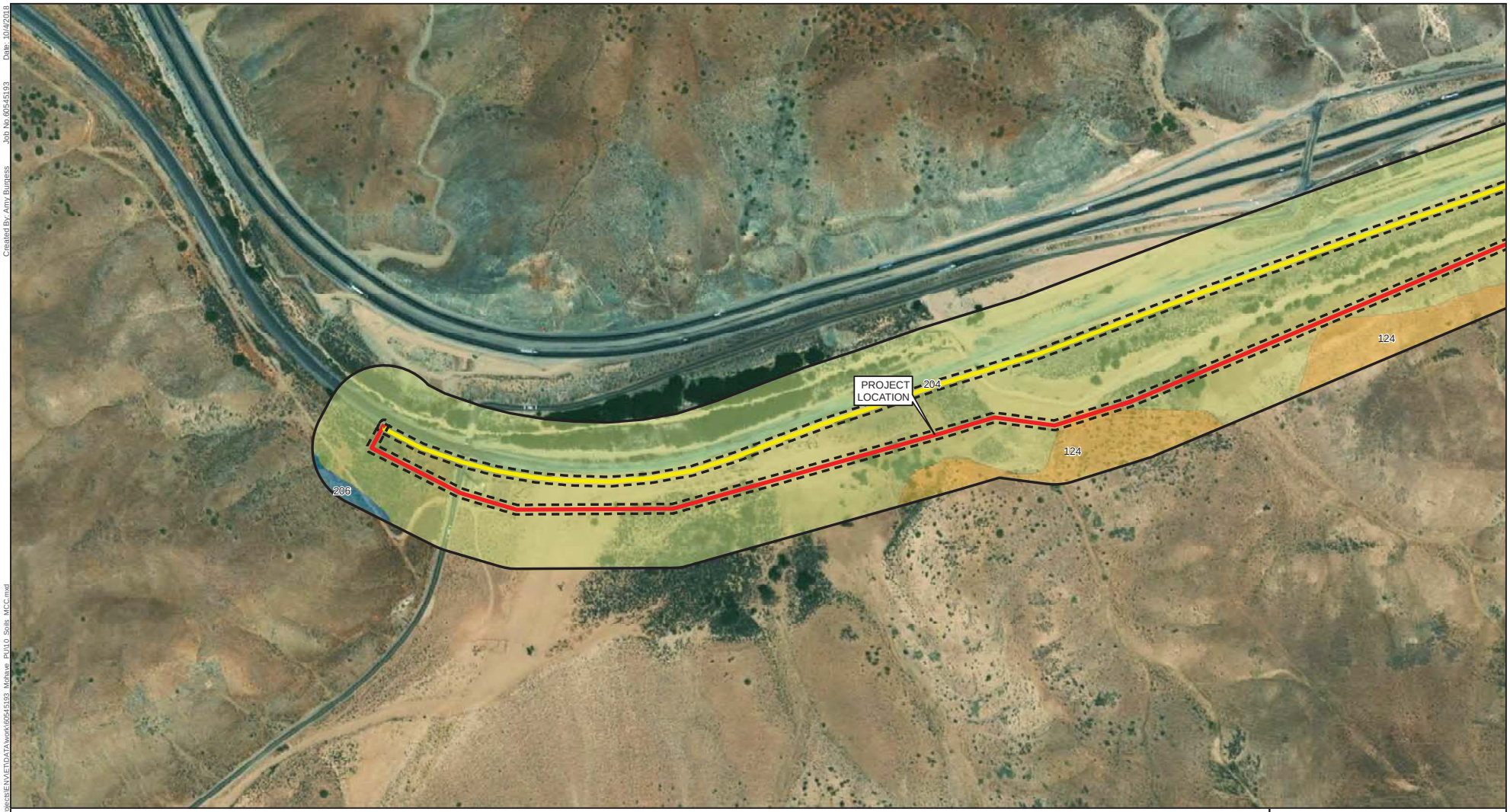
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 10A
SOILS MAP

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 10/4/2018
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Legend

- Alternate Conceptual Alignment
- Conceptual Alignment
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer
- 124:Cinco gravelly loamy sand, 50 to 75 percent slopes
- 204:Whitewolf loamy sand, cool, 2 to 5 percent slopes
- 206:Xeric Torriorthents, very steep

0 400 800 Feet

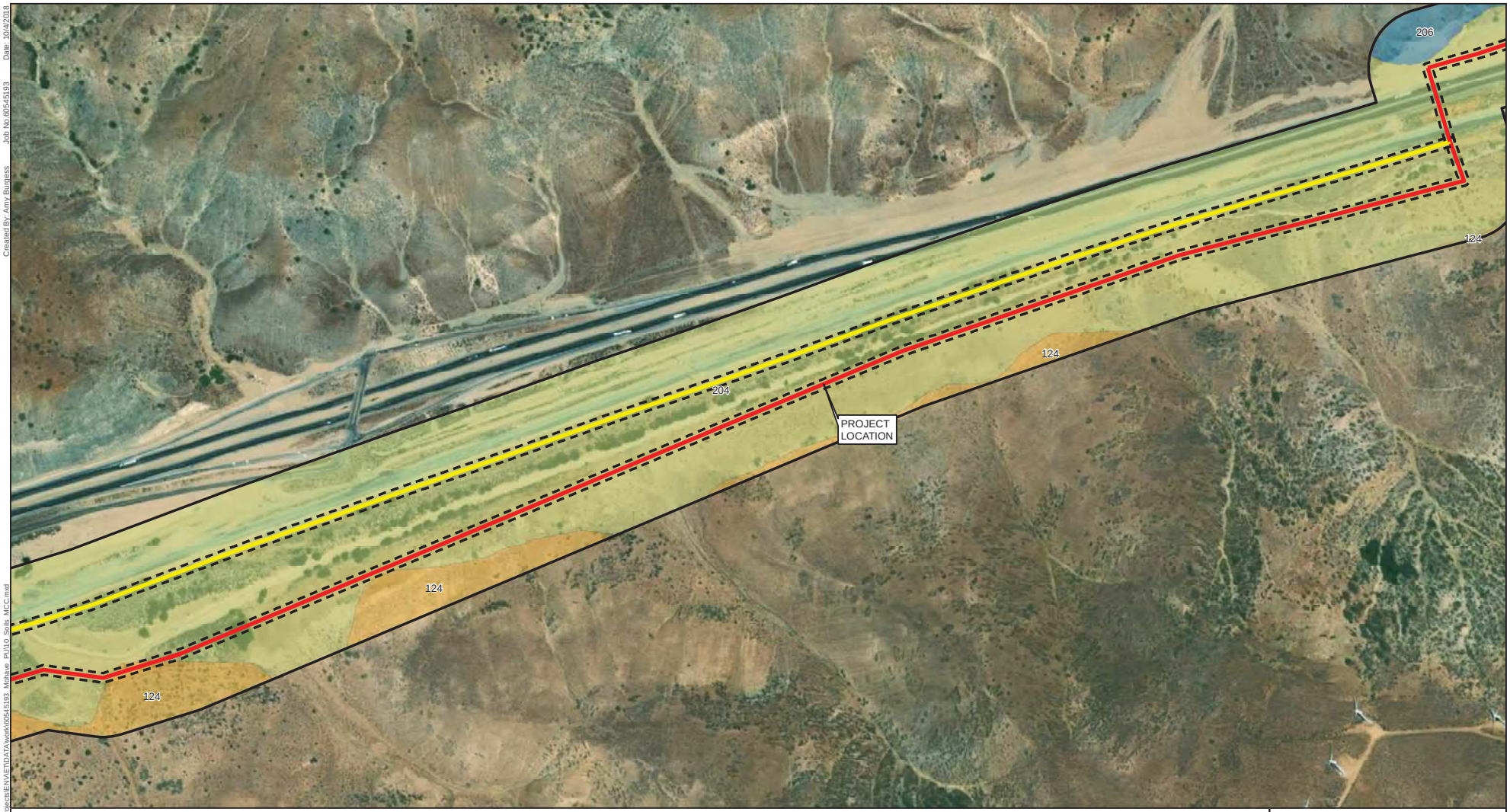
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 10B
SOILS MAP

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 10/4/2018
Job No.60545193
Created By: Amy Burgess
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Legend

- Alternate Conceptual Alignment
- Conceptual Alignment
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer
- 124:Cinco gravelly loamy sand, 50 to 75 percent slopes
- 204:Whitewolf loamy sand, cool, 2 to 5 percent slopes
- 206:Xeric Torriorthents, very steep

0 400 800 Feet

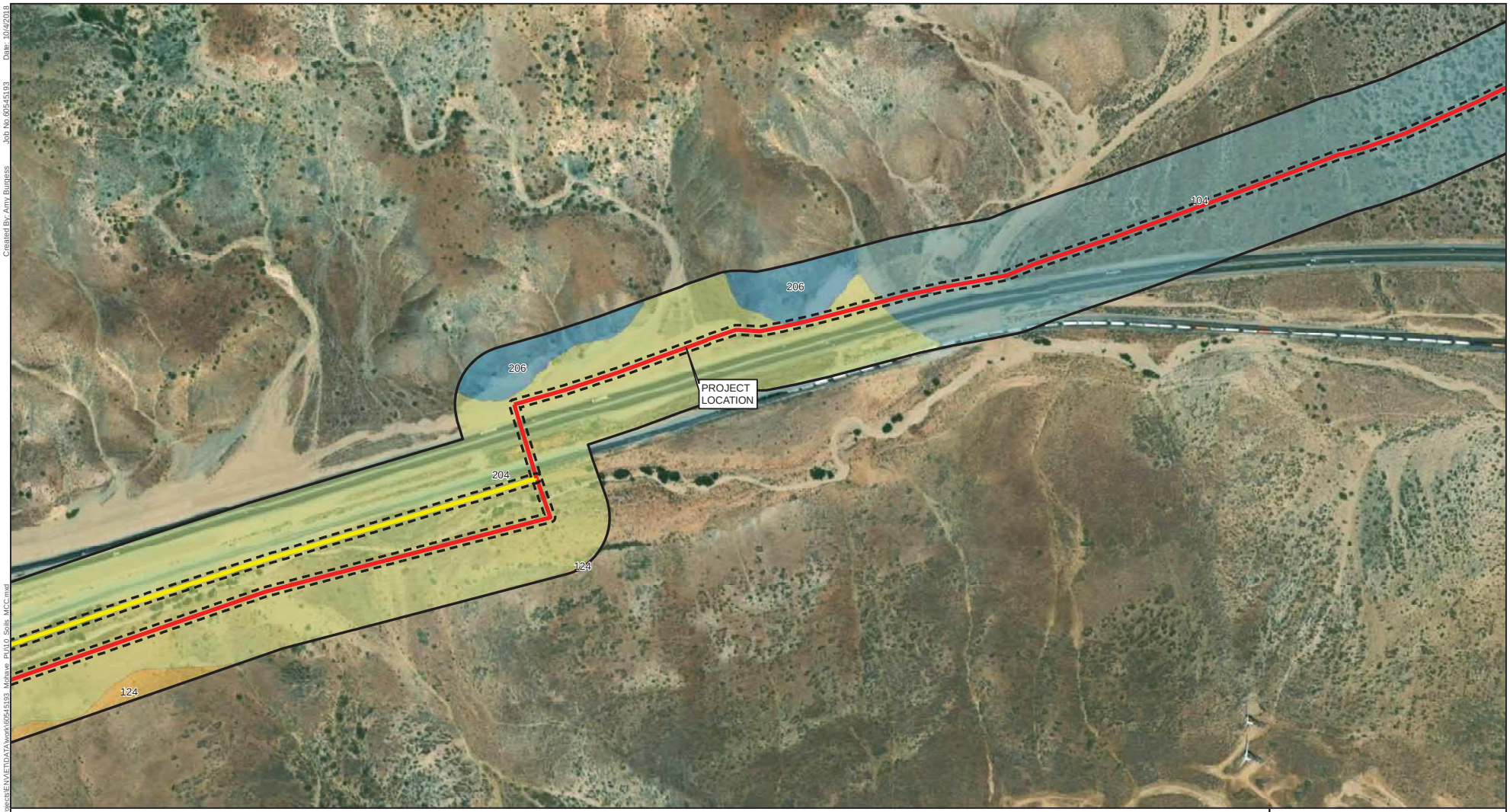
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 10C
SOILS MAP

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 10/4/2018
Job No.60545193
Created By: Amy Burgess
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Legend

- Alternate Conceptual Alignment
- Conceptual Alignment
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer
- 104:Arizo gravelly loamy sand, 2 to 9 percent slopes
- 124:Cinco gravelly loamy sand, 50 to 75 percent slopes
- 204:Whitewolf loamy sand, cool, 2 to 5 percent slopes
- 206:Xeric Torriorthents, very steep

0 400 800 Feet

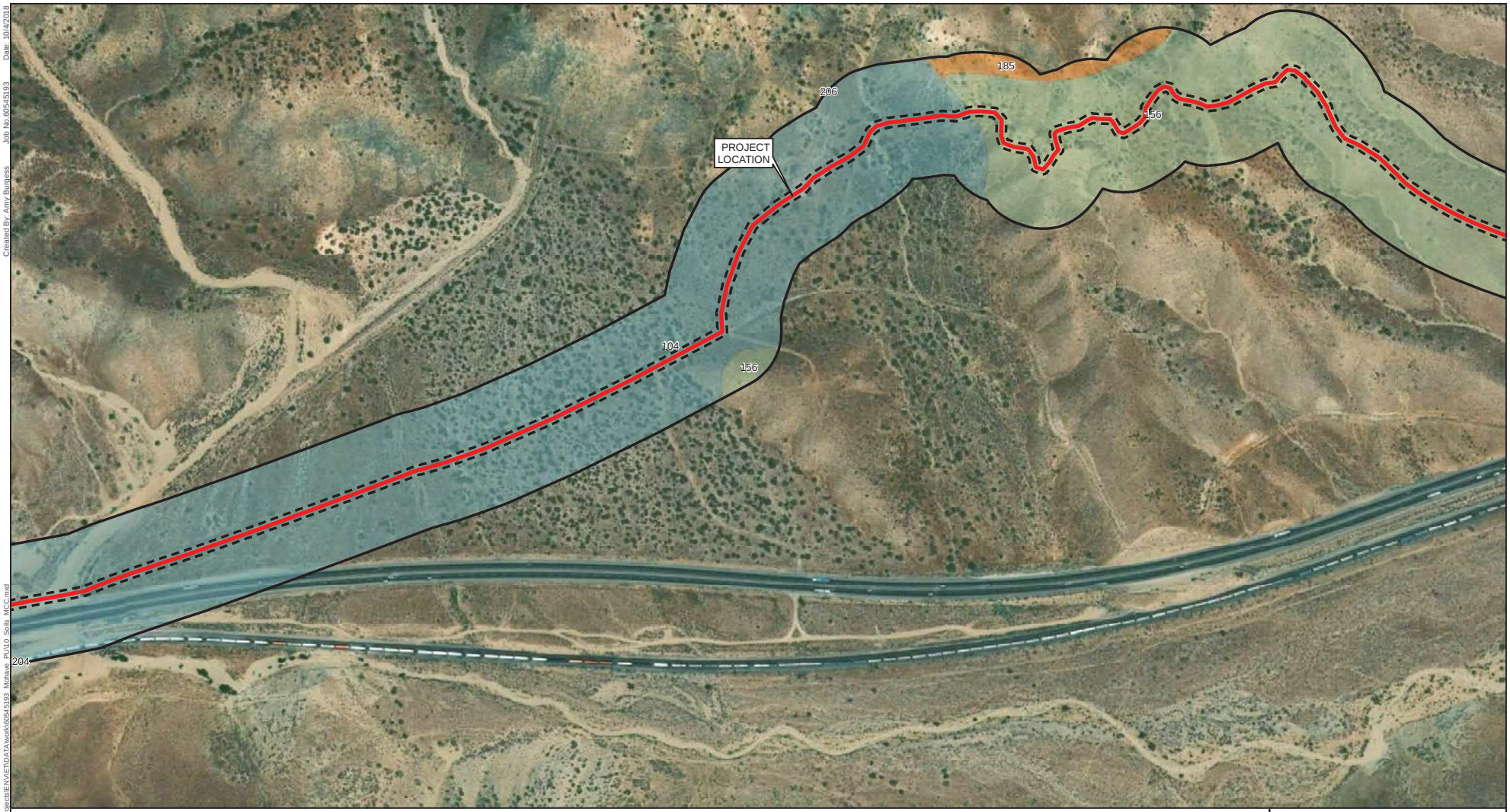
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 10D
SOILS MAP

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 10/4/2018
Job No.60545193
Created By: Amy Burgess
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Legend

- Conceptual Alignment
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer
- 104:Arizo gravelly loamy sand, 2 to 9 percent slopes
- 156:Pajuela-Whitewolf association, steep
- 185:Torriorthents-Rock outcrop complex, very steep
- 204:Whitewolf loamy sand, cool, 2 to 5 percent slopes
- 206:Xeric Torriorthents, very steep

0 400 800 Feet

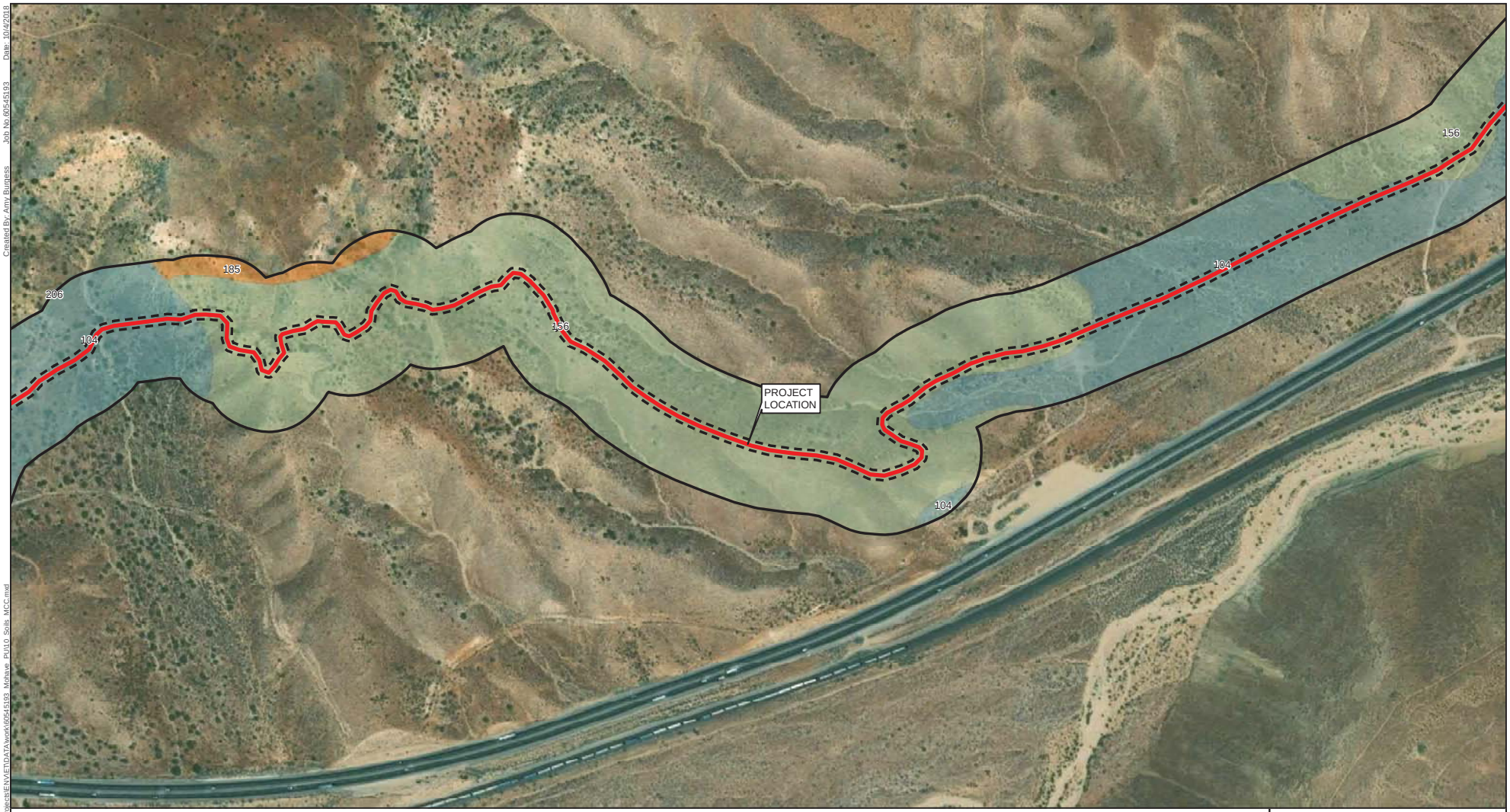
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 10E
SOILS MAP

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 10/4/2018
Job No.60545193
Created By: Amy Burgess
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Legend

- Conceptual Alignment
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer
- 104:Arizo gravelly loamy sand, 2 to 9 percent slopes
- 156:Pajuela-Whitewolf association, steep
- 185:Torriorthents-Rock outcrop complex, very steep
- 206:Xeric Torriorthents, very steep

0 400 800 Feet

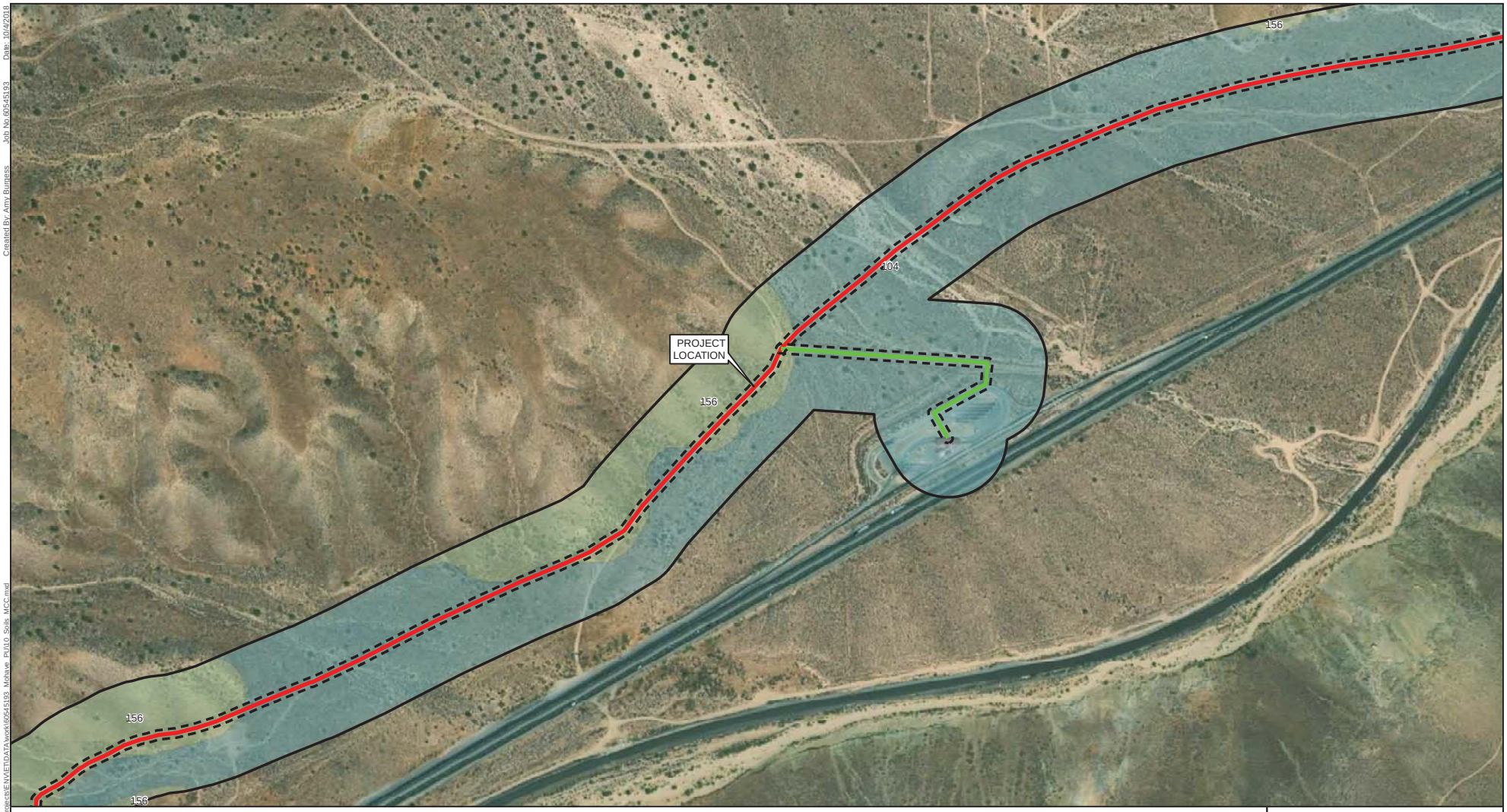
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 10F
SOILS MAP

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 10/4/2018
Job No.60545193
Created By: Amy Burgess
\\orange.na.aecomnet.com\Orange\DCS\Projects\ENV\ET\DATA\work\60545193 Mohave PUD\10 Soils MCC.mxd



Legend

- Conceptual Alignment
- Feeder to CHP Facility
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer
- 104:Arizo gravelly loamy sand, 2 to 9 percent slopes
- 156:Pajuela-Whitewolf association, steep

0 400 800 Feet

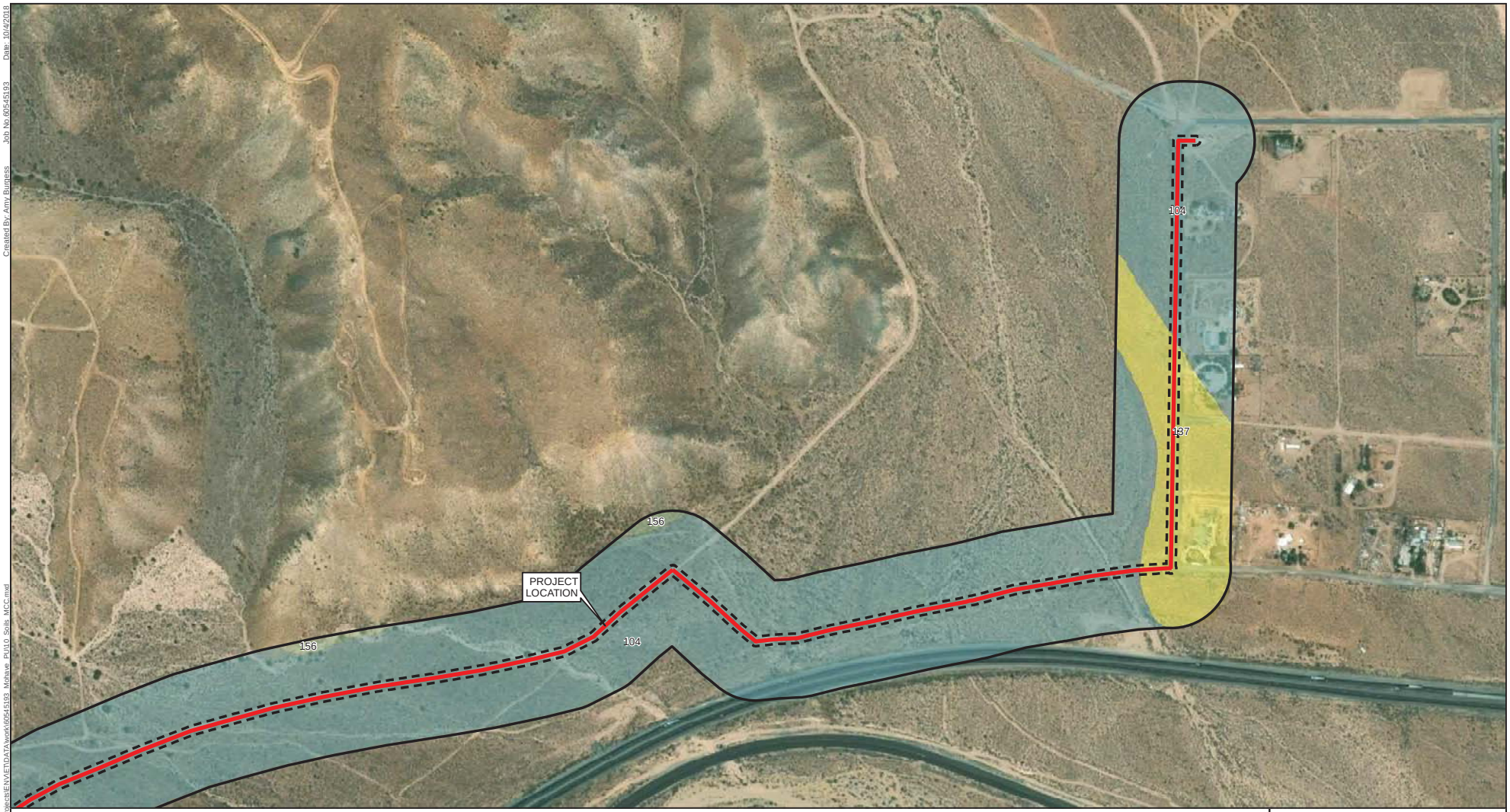
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 10G
SOILS MAP

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 10/4/2018
Job No.60545193
Created By: Amy Burgess
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Legend

- Conceptual Alignment
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer
- 104:Arizo gravelly loamy sand, 2 to 9 percent slopes
- 137:Garlock loamy sand, 2 to 9 percent slopes
- 156:Pajuela-Whitewolf association, steep

0 400 800 Feet

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 10H
SOILS MAP

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 10/4/2018
Job No.60545193
Created By: Amy Burgess
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Date: 10/4/2018
Job No.60545193
Created By: Amy Burgess
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Legend

- Pump Station Connection Alignment
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer
- 104:Arizo gravelly loamy sand, 2 to 9 percent slopes
- 114:Cajon loamy sand, 0 to 5 percent slopes
- 124:Cinco gravelly loamy sand, 50 to 75 percent slopes

0 400 800 Feet

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 10I
SOILS MAP

Mojave Public Utility District
Cache Creek Project

AECOM



Legend

- Well 9 Facility
- 250-Foot Survey Buffer
- Railroad
- Cache Creek (Outside Buffer)
- La Rose Creek (Outside Buffer)
- Photo Location
- Direction of Photo

Jurisdictional Feature

- OHWM (RWQCB; Waters of the State)
- Top Of Bank (CDFW; Streambed)

0 400 800 Feet

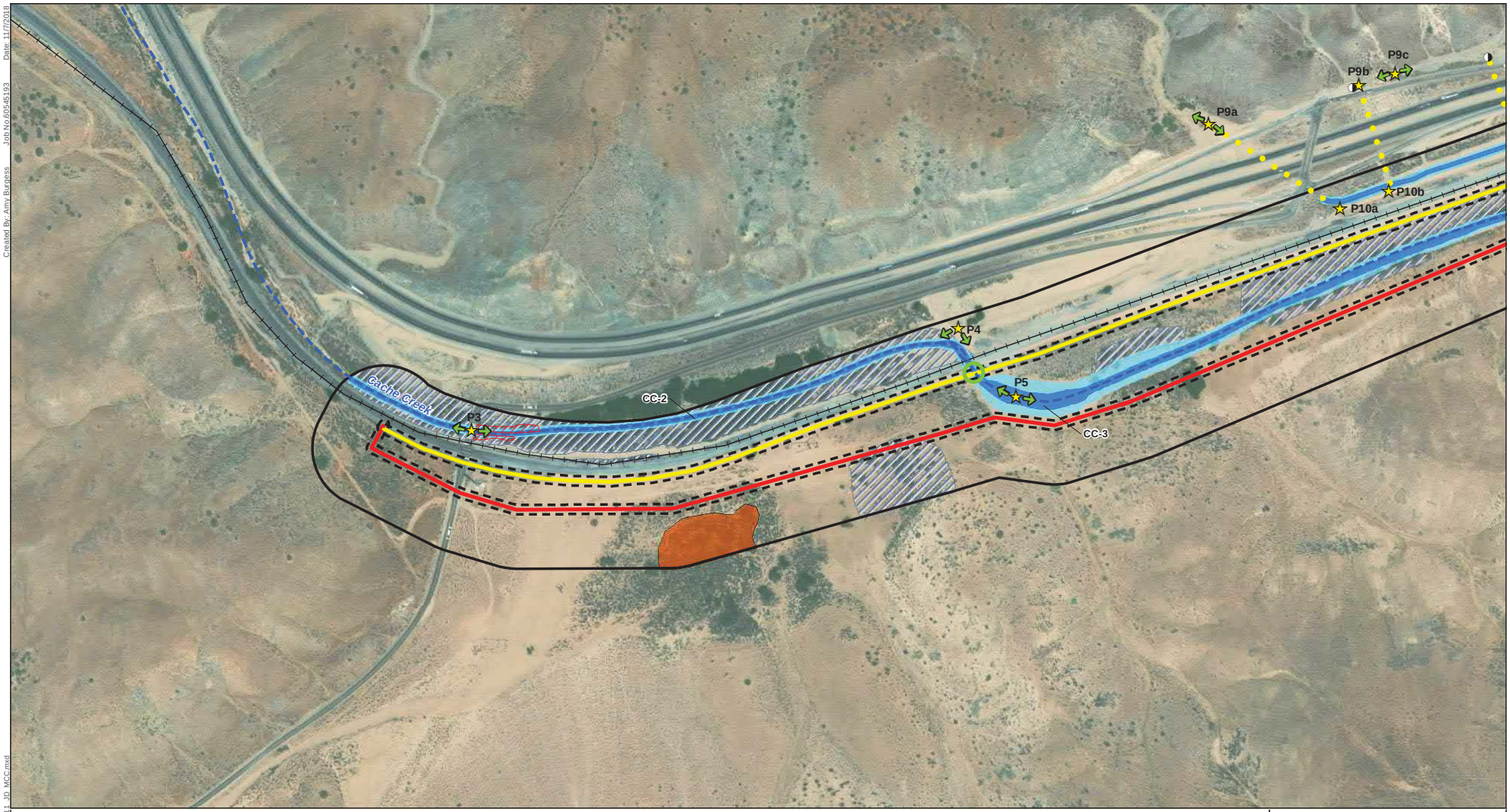
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 11A
JURISDICTIONAL DELINEATION

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 11/7/2018
Job No:60545193
Created By: Amy Burgess
X:\ET\DATA\work\60545193 Mohave PUD\11_JD_MCC.mxd



Legend

- Alternate Conceptual Alignment
- Conceptual Alignment
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer
- Sandbar Willow
- Tamarisk Thicket
- Red Willow Thicket
- Railroad
- Underground Culvert
- Cache Creek (Outside Buffer)
- La Rose Creek (Outside Buffer)
- Photo Location
- Direction of Photo
- Stand_Pipe

Jurisdictional Feature

- OHWM (RWQCB; Waters of the State)

Impacts

- Top Of Bank (CDFW; Streambed)
- Impact-Boring

0 400 800 Feet

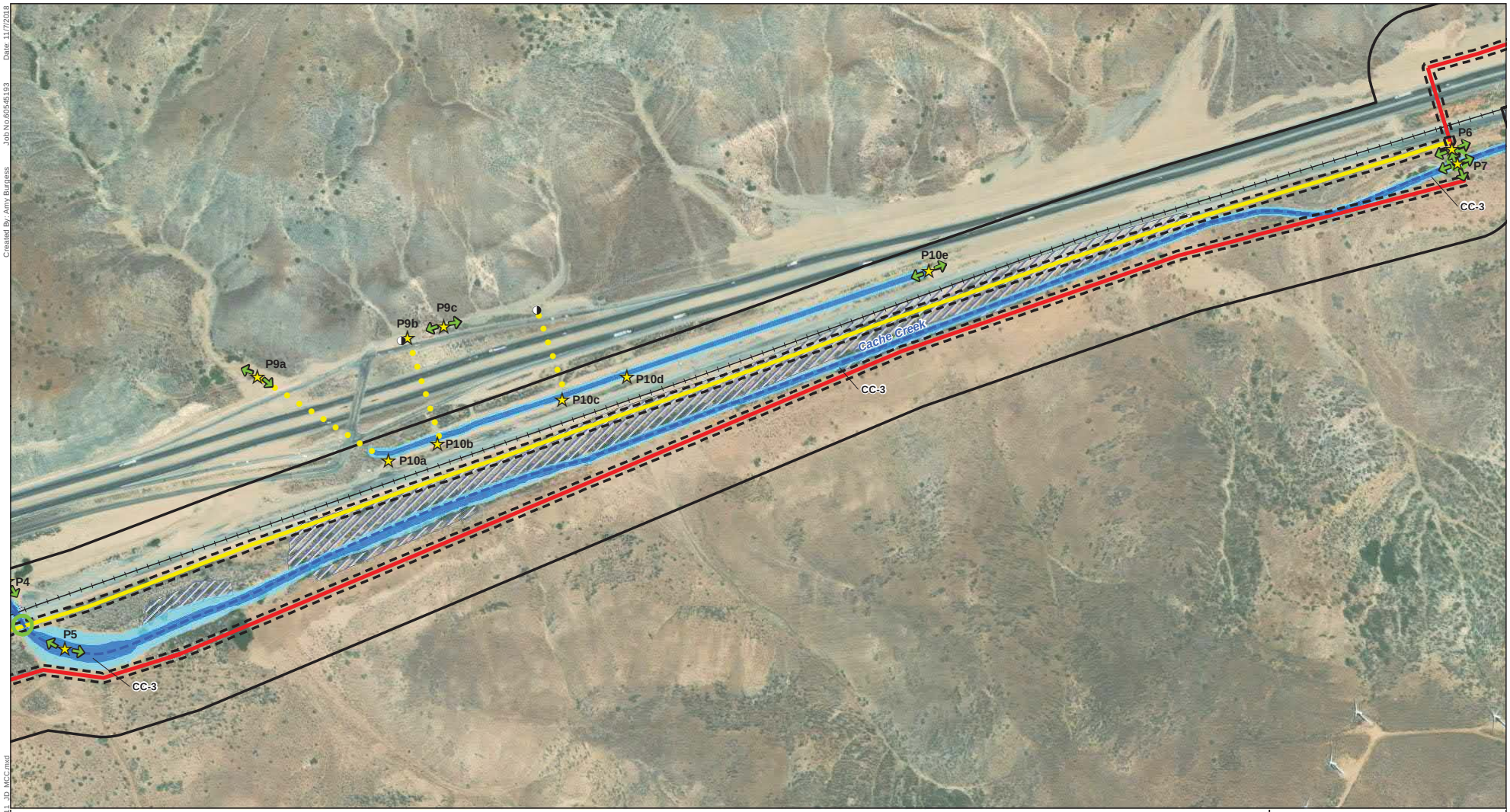
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 11B
JURISDICTIONAL DELINEATION

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 11/7/2018
Job No:60546193
Created By: Amy Burgess
X:\ETDATA\work\60545193 Mohave PUD\1 JD_MCC.mxd



Legend

- Alternate Conceptual Alignment
- Conceptual Alignment
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer
- Tamarisk Thicket
- Railroad
- Underground Culvert
- La Rose Creek (Outside Buffer)
- Photo Location
- Direction of Photo
- Stand_Pipe

Jurisdictional Feature

- OHWM (RWQCB; Waters of the State)
- Top Of Bank (CDFW; Streambed)

Impacts

- Impact-Boring

0 400 800 Feet

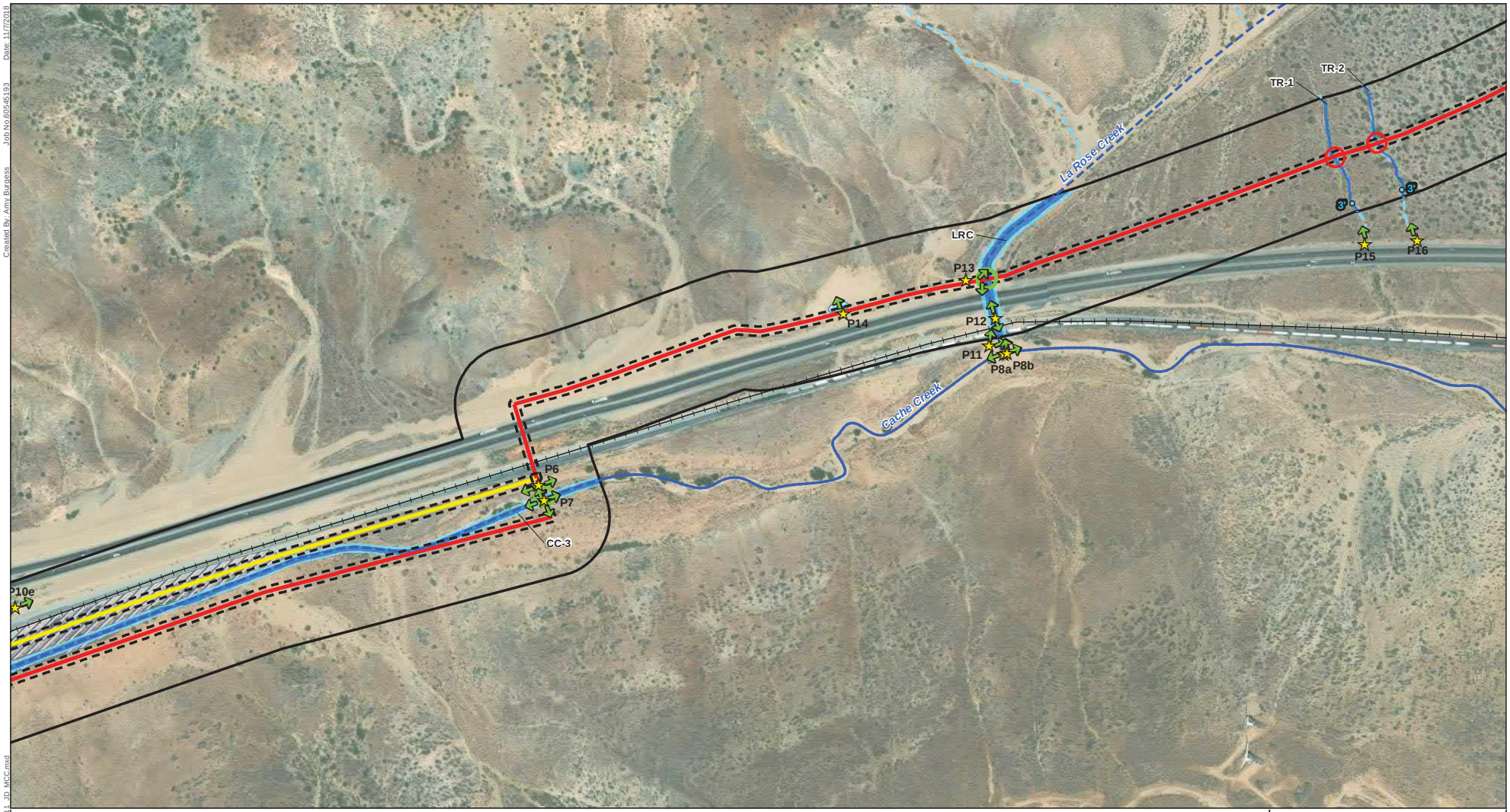
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 11C
JURISDICTIONAL DELINEATION

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 11/7/2018
Job No:60546193
Created By: Amy Burgess
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Date: 11/7/2018
Job No.60546193
Created By: Amy Burgess
X:\ETDATA\work\60545193 Mohave PUD\11_JD_MCC.mxd

Legend

- Alternate Conceptual Alignment
- Conceptual Alignment
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer
- Tamarisk Thicket
- Railroad
- Non-Jurisdictional Temporary Pond
- Cache Creek (Outside Buffer)
- La Rose Creek (Outside Buffer)
- Photo Location
- Direction of Photo
- Drainage Width

Jurisdictional Feature

- OHWM (RWQCB; Waters of the State)
- Ephemeral Low Flow Channel (Outside Buffer)
- Top Of Bank (CDFW; Streambed)

Impacts

- Impact-Boring
- Impact-Trenching

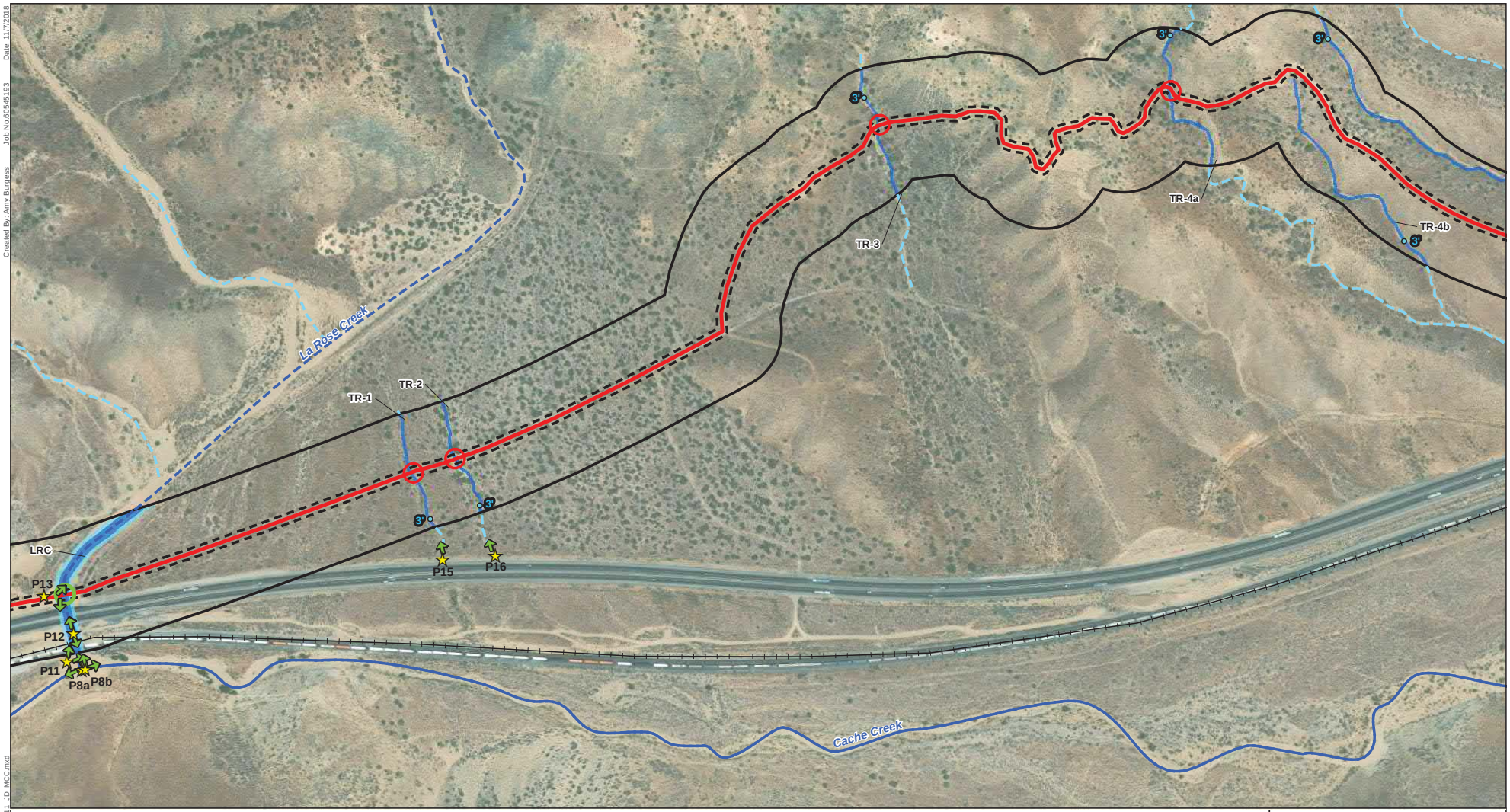
0 400 800 Feet

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 11D
JURISDICTIONAL DELINEATION

Mojave Public Utility District
Cache Creek Project

AECOM



Date: 11/7/2018
Job No:60546193
Created By: Amy Burgess
X:\ETDATA\work\60545193 Mohave PUD\1 JD_MCC.mxd

Legend

- Conceptual Alignment
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer
- Railroad
- Cache Creek (Outside Buffer)
- La Rose Creek (Outside Buffer)
- Photo Location
- Direction of Photo
- Drainage Width

Jurisdictional Feature

- OHWM (RWQCB; Waters of the State)
- Ephemeral Low Flow Channel (Outside Buffer)
- Top Of Bank (CDFW; Streambed)

Impacts

- Impact-Boring
- Impact-Trenching

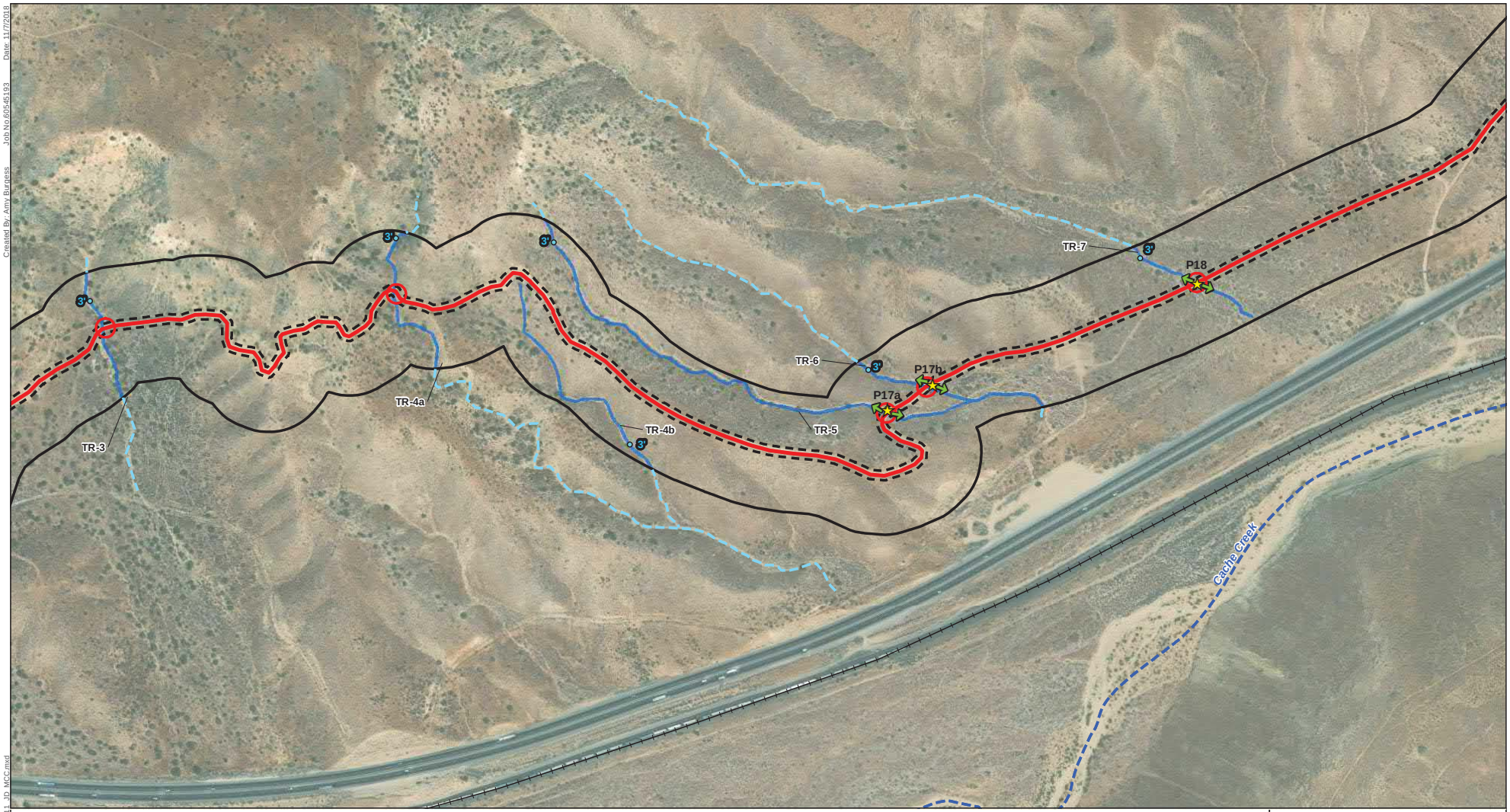
0 400 800 Feet

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 11E
JURISDICTIONAL DELINEATION

Mojave Public Utility District
Cache Creek Project

AECOM



Legend

- Conceptual Alignment
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer
- Railroad
- Cache Creek (Outside Buffer)
- La Rose Creek (Outside Buffer)
- Photo Location
- Direction of Photo
- Drainage Width

Jurisdictional Feature

- OHWM (RWQCB; Waters of the State)
- Ephemeral Low Flow Channel (Outside Buffer)

Impacts

- Impact-Trenching

0 400 800 Feet

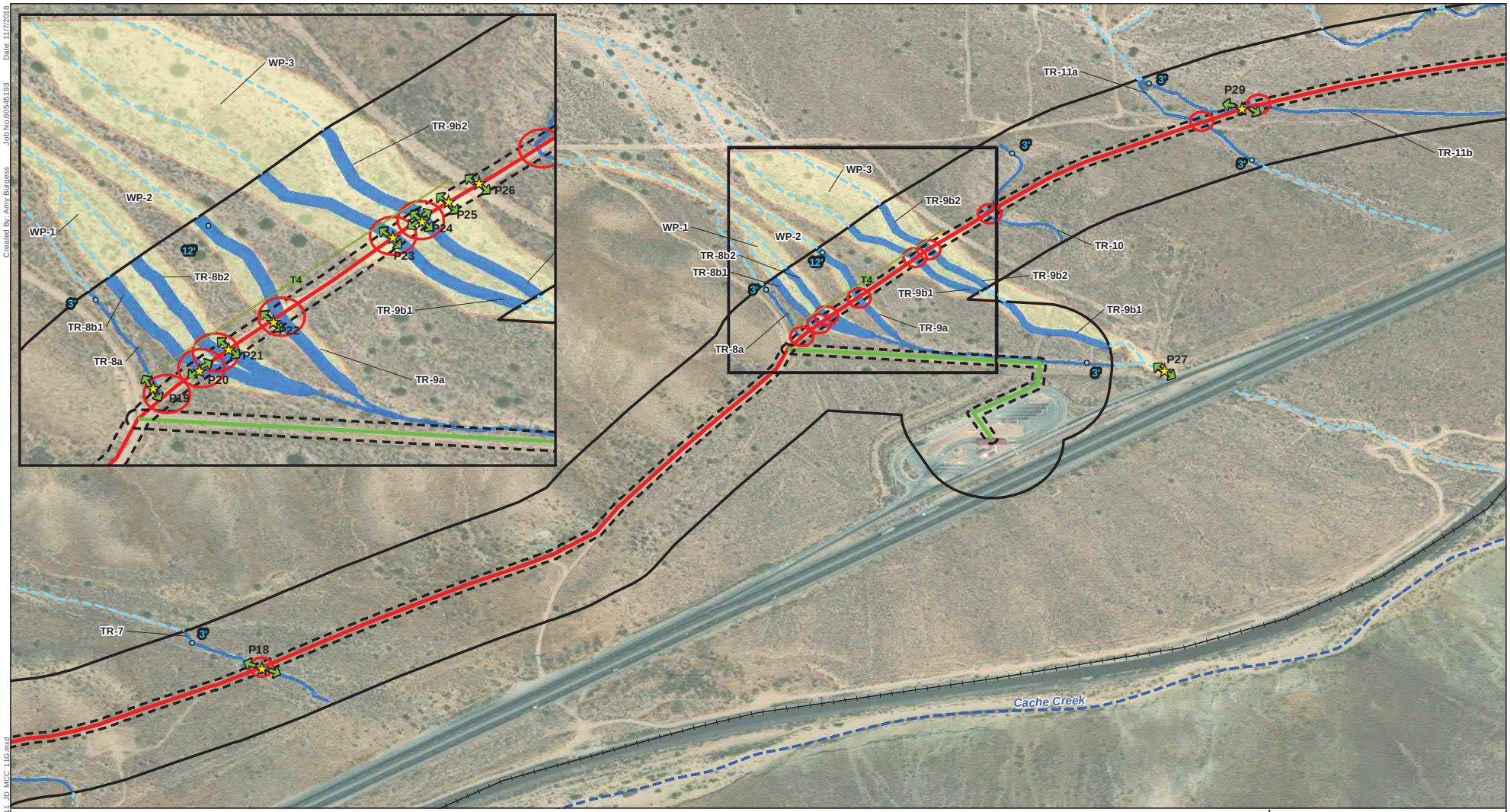
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 11F
JURISDICTIONAL DELINEATION

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 11/7/2018
Job No:60546193
Created By: Amy Burgess
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Date: 11/7/2018
Job No:60546193
Created By: Amy Burgess
X:\ETDATA\work\60545193 Mohave PUD\11 JD MCC 11G.mxd

Legend

- Conceptual Alignment
- Feeder to CHP Facility
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer
- Transect
- Railroad
- Cache Creek (Outside Buffer)
- La Rose Creek (Outside Buffer)
- Photo Location
- Direction of Photo
- Drainage Width

Jurisdictional Feature

- OHWM (RWQCB; Waters of the State)
- Ephemeral Low Flow Channel (Outside Buffer)
- Watercourse (CDFW)

Impacts

- Impact-Trenching

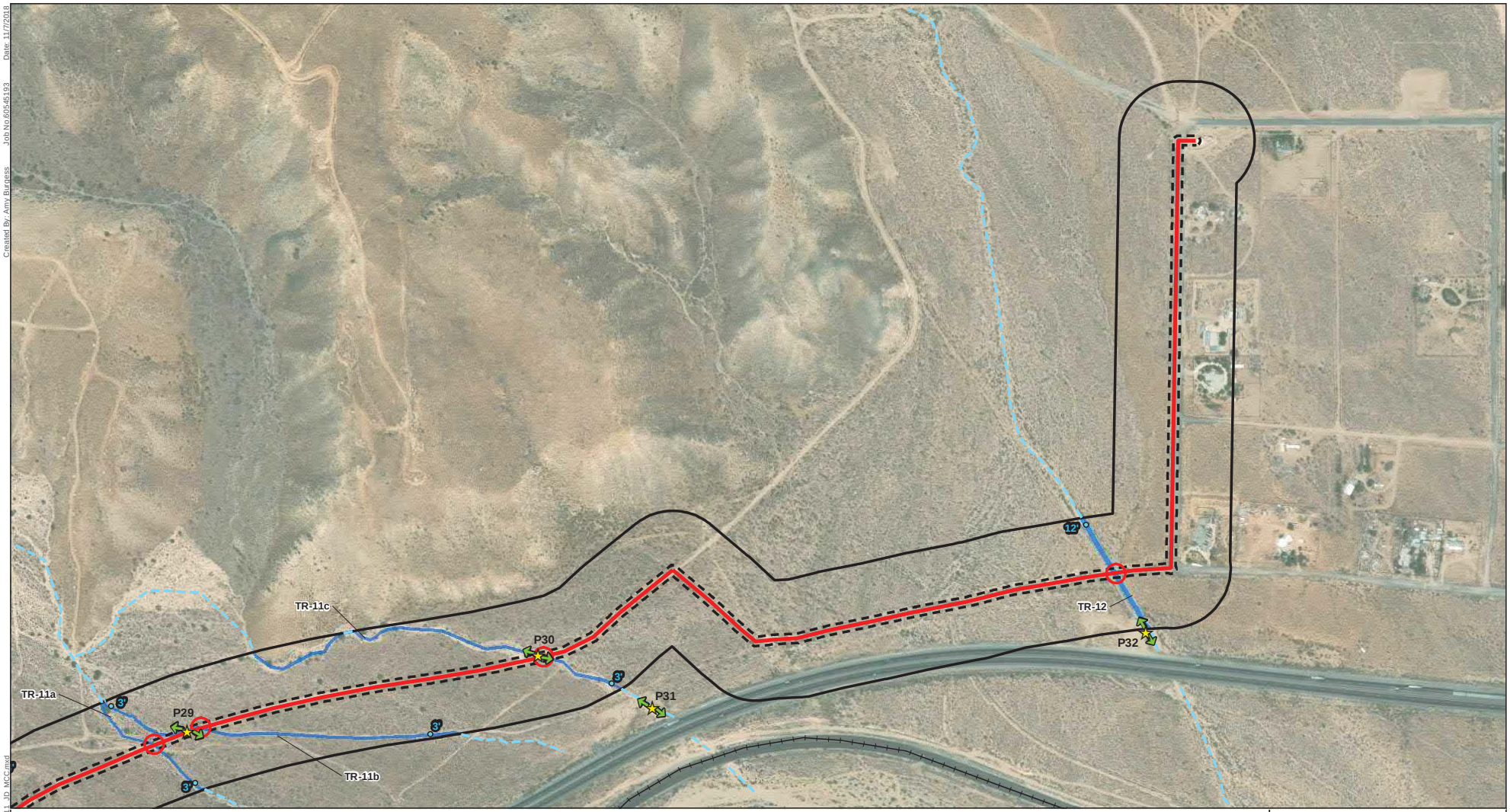
0 400 800 Feet

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 11G
JURISDICTIONAL DELINEATION

Mojave Public Utility District
Cache Creek Project

AECOM



Legend

- Conceptual Alignment
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer
- Railroad
- Photo Location
- Direction of Photo
- Drainage Width

Jurisdictional Feature

- OHWM (RWQCB; Waters of the State)
- Ephemeral Low Flow Channel (Outside Buffer)
- Top Of Bank (CDFW; Streambed)

Impacts

- Impact-Trenching

0 400 800 Feet

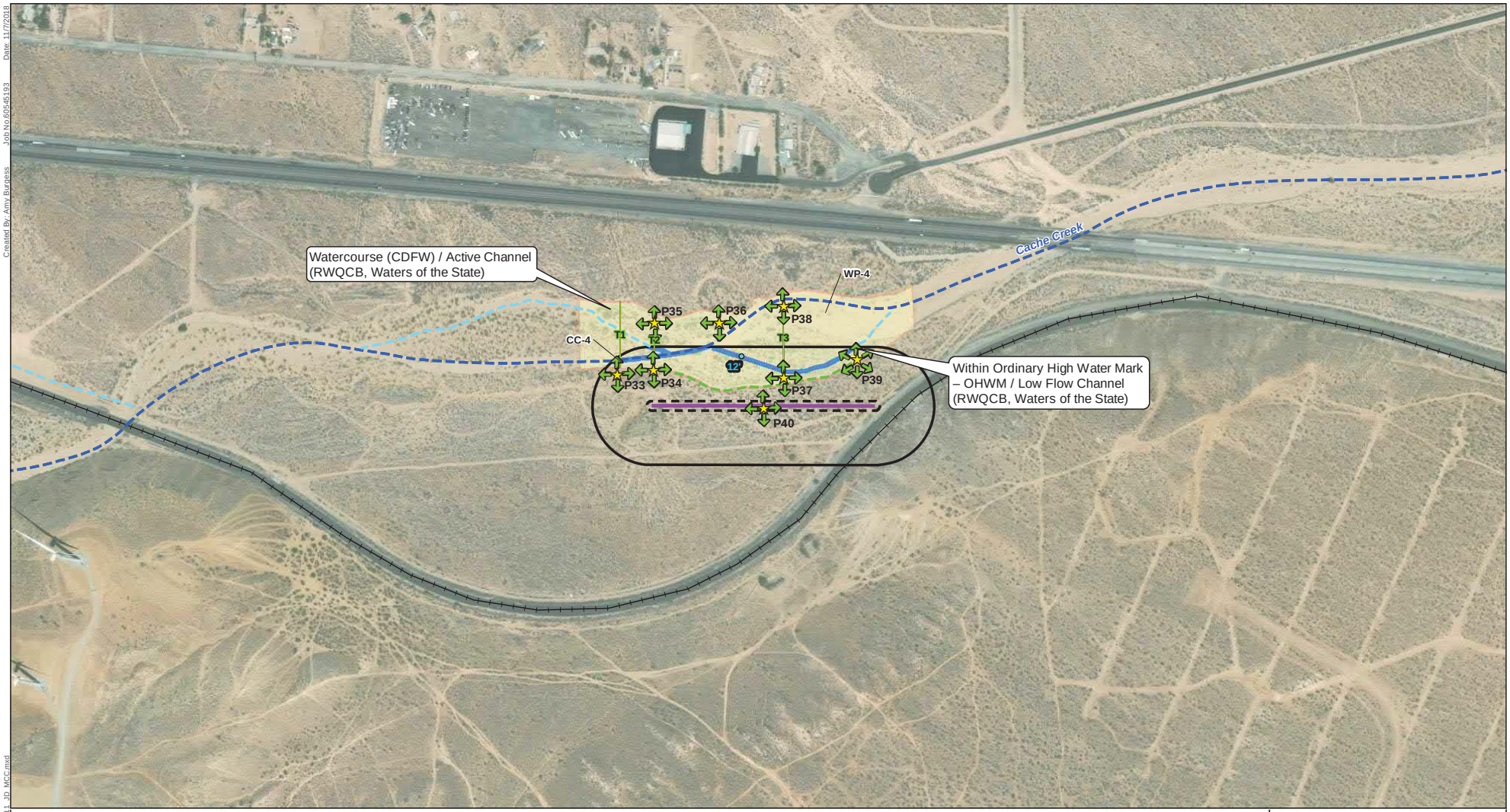
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 11H
JURISDICTIONAL DELINEATION

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 11/7/2018
Job No:60546193
Created By: Amy Burgess
X:\ETDATA\work\60545193 Mohave PUD\11 JD_MCC.mxd



Date: 11/7/2018
Job No.60546193
Created By: Amy Burgess
X:\ETDATA\work\60545193 Mohave PUD\1 JD_MCC.mxd

Legend

- Pump Station Connection Alignment
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer
- Transect
- Berm
- Railroad
- Cache Creek (Outside Buffer)
- La Rose Creek (Outside Buffer)
- Photo Location
- Direction of Photo
- Drainage Width

Jurisdictional Feature

- OHWM (RWQCB; Waters of the State)
- Ephemeral Low Flow Channel (Outside Buffer)
- Watercourse (CDFW)

0 400 800 Feet

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 11I
JURISDICTIONAL DELINEATION

Mojave Public Utility District
Cache Creek Project

AECOM

Appendix B

Regulatory Terminology

&

MESA Protocol

Appendix B.

A. Section 4.4.1 – CDFW MESA Terminology (Continued)

Bank - The land on the outermost edge of a stream that confines or otherwise defines the stream's boundary when its waters rise to the highest level of confinement.

Channel - A defined course along which water flows perennially or episodically. Channels may be active during every runoff event or spatially or temporally dormant elements within a larger watercourse that receives water periodically during higher flows.

> **Active channel -** A channel receiving frequent enough flow to have physical or biological evidence of fluvial activity on the landscape roughly within the last 200 years before the present. Indicators of flow present or existent connectivity to water source.
>
> **Braided channel -** A watercourse with multiple active shallow channels that divide and rejoin to form a pattern of gently curved channel segments separated by exposed ephemeral islands or channel bars.
>
> **Dormant channel -** A channel isolated from its principal water source by natural causes or human constructs such as roads, but that retains its potential for hydrologic reactivation and stream function.
>
> **Abandoned channel** - A channel along which stream flow no longer occurs (e.g., a channel isolated from its water source through faulting or stream capture, or by human constructs such as levees). With time and the absence of the processes responsible for its formation an abandoned channel will become relict. Not considered part of a modern channel system.
>
> **Relict channel -** An abandoned channel made by processes no longer locally operative (e.g., a stream that once drained a lake that is now permanently dry). Antiquity may be demonstrated by the presence of rock varnish, soil development, rock weathering, and the absence of recent fluvial activity.
>
> **Discontinuous channel** - A channel along which fluvial processes change from degradation to aggradation and a well-defined channel form is periodically lost along the stream length.
>
> **Distributary channels, flow, streams, or patterns** - Channels flowing away from the main stream and generally not rejoining it. The number of channel forks commonly exceeds the number of channel confluences, creating a divergent distributary, rather than convergent tributary drainage pattern.
>
> **Low-flow channel** - The topographically lowest stream channel or the dominant subchannel within a compound channel watercourse.

Floodplain - A relatively flat area of land associated with a stream and over which water and soil from the parent stream flows when the capacity of channel is exceeded. Floodplains parallel stream channels but may also occur at the terminal end of a stream where it joins a larger wash, transitions into a playa, or the channel ends and flow subsides into the ground.

Stream - A body of water that flows perennially or episodically during the historic hydrologic regime (ca. 1800 to present), and where the width of its course can reasonably be identified by resultant landforms or

other physical and biological indicators. A **stream** includes water sources and adjoining landscape elements that are byproducts of and affected by interactions with flowing water without regard to size, duration, or the timing of flow.

> **Ephemeral stream -** A stream that flows in direct response to and only during and shortly after precipitation events. Their beds are always above the elevation of the water table, and stormwater runoff is their primary source of water. Ephemeral streams include normally dry arid or semi-arid region desert washes and arroyos.
>
> **Episodic stream -** Streams having intermittent or ephemeral flow that are dry or have very low flow over decadal time scales. Large events that convey flow and/or sediment to affect channel morphology occur infrequently (i.e., once or twice per decade).
>
> **Intermittent stream -** A stream that flows only at certain times of the year, as when it receives water from groundwater, or from surface sources like springs or snow- melt. Runoff from rainfall is a supplemental source of water for streamflow.

Swale - A depression where runoff from the surrounding uplands concentrates to initiate stream flow; source areas considered integral to stream function.

Terrace - One of a series of level surfaces in a stream valley, flanking and paralleling the stream channel, originally occurring at or below, but now above the level of the stream, and representing the dissected remnants of an abandoned floodplain, stream bed, or valley floor produced during a former (and higher) stage of erosion or deposition. Planar surfaces representing infrequently or rarely flooded remnants of former floodplain.

Upland - The higher ground dominated by terrestrial processes above a watercourse.

Wash - A broad, shallow, sandy or gravelly, and normally dry bed of an intermittent or ephemeral stream.

B. Section 4.4.2 – Other USACE, RWQCB, and CDFW Terminology (Continued)

Riparian – Term used for areas within and adjacent to rivers, streams, and creeks that support plant species adapted to (or can tolerate) occasional or permanent flooding and/or saturated soils.

Proposed SWRCB Definition[1] (see also TAT 2009; 2010, 2011): Riparian areas exist between aquatic and non-aquatic areas and are distinguished by gradients in biophysical conditions, ecological processes, and biota. They are areas through which surface and subsurface hydrology interconnect aquatic areas and connect them with their adjacent non-aquatic areas. They can include wetland areas, non-wetland aquatic areas, and those portions of non-aquatic areas that significantly influence exchanges of energy and matter with aquatic areas (NRC 2002).

Riparian Habitat – Refers to habitat found in a riparian setting, and may include areas within the jurisdiction of both the Corps and CDFW. Riparian habitat may contain three-parameter wetlands (per the federal definition), but often does not. Typically, Corps jurisdiction is much less than that of CDFW jurisdiction, and the lateral extent varies according to watershed position, water availability, and

[1] Statewide Wetland and Riparian Area Protection Policy Initiative; http://www.swrcb.ca.gov/ water_issues/ programs/ cwa401/wrapp.shtml.

other factors (Larsen 2007). Unique attributes include hydrologic interaction (both laterally and longitudinally) and distinct geomorphic features (bankfull channel, floodplain, terrace).

Riparian Area may also be used in a more generic sense to mean a riparian corridor along a drainage, or isolated riparian vegetation with a particular area.

Riparian (Cowardin) - Plant communities contiguous to and affected by surface and subsurface hydrologic features of perennial or intermittent lotic (e.g., stream) and lentic (e.g., lakes an d ponds) water bodies. Riparian areas have one or both of the following characteristics: 1) distinctively different vegetative species than adjacent areas, and 2) species similar to adjacent areas but exhibiting more vigorous or robust growth forms. Riparian areas are usually transitional between wetland and upland. This is a similar but different classification to **Palustrine**.

C. MESA Protocol (Additional Information)

The protocol for **Mapping Episodic Stream Activity [MESA]** consists of three steps:

Step 1: Recognizing Dryland Episodic Stream Forms and Processes

- Aerial photo interpretation to determine preliminary channel forms and geomorphic units
- Select areas for reconnaissance transects (i.e., watercourse cross-sections)

Step 2: Documenting Indicators of Fluvial Activity and Inactivity

- Walk the selected reconnaissance transects (laid out perpendicular to the stream flow direction) to identify the boundaries of the geomorphic units, and document the presence and absence of all indicators of fluvial activity and inactivity on each unit.
- Walk a minimum distance of 100 feet upstream and downstream of the transect and note changes in the plant species composition between different geomorphic units.
- After walking the full length of each transect with the preliminary map of the watercourse boundary and geomorphic units, and documenting the fluvial (or upland) indicators in each unit, adjust the mapped unit boundaries as necessary.
- Photograph the points of transition between geomorphic units, and between the outer watercourse boundary and the adjacent upland.

Step 3: Mapping the Active Watercourse

- Using the information above, draw a watercourse cross-section that identifies the fluvially active and inactive geomorphic units.
- Use the *Guidance for Determining the Watercourse Boundaries*
    - For example, Upland; Terrace; Watercourse; Island; Floodplain; Secondary Channel.
- Use the *Definitions of Stream and Upland Landforms* to guide mapping of dormant, abandoned, or relict channels or terraces that are no longer functionally part of the watercourse.

Appendix C

Supplemental Data Tables

Table A-1

Table A-2

APPENDIX C.

Table A-1. Pipeline Crossing and Reach Mid-Point Locations (for Reaches with No Proposed Crossing).

Reach Mid-Point or Crossing ID*	Latitude (decimal degrees)	Longitude (decimal degrees)	Buffer Only	Impact Category – Trenching (Crossing ID) *	Impact Category – Avoidance via Boring
CC1 Midpoint	35.105138	-118.315416	X		
CC2 Midpoint	35.096396	-118.301175	X		
(CC2 to) CC3a (Western Edge of CC3)	35.096823	-118.297666			X (Alternate Conceptual Alignment)
CC3b (Eastern Edge of CC3)	35.102273	-118.277406			X (Conceptual Alignment)
CC4 Midpoint (Within WP-4)	35.115321	-118.205514	X		
LRC	35.104817	-118.271163			X (Both Alignments)
TR-01	35.106237	-118.266244		X1	
TR-02	35.106405	-118.265655		X2	
TR-03	35.110296	-118.259667		X3	
TR-04a	35.110698	-118.255556		X4	
TR-04b (Closest Point to Pipeline)	35.110794	-118.253826	X		
TR-05	35.109329	-118.248631		X5	
TR-06	35.109633	-118.24806		X6	
TR-07	35.110853	-118.244247		X7	
TR-08a	35.114684	-118.237986		X8	
TR-08b1 (Within WP-1)	35.114833	-118.237786		X8	
TR-08b2 (Within WP-1)	35.114923	-118.237702		X8	
TR-09a (Within WP-2)	35.115131	-118.237322		X9	
TR-09b1 (Within WP-3)	35.1156	-118.236677		X9	
TR-09b2 (Within WP-3)	35.11569	-118.236515		X9	
TR-10	35.116106	-118.235812		X10	
TR-11a	35.117178	-118.233355		X11	
TR-11b	35.117377	-118.232694		X11	
TR-11c	35.119185	-118.219769		X11	
TR-12	35.118204	-118.227857		X12	

* CC = Cache Creek; LRC = La Rose Creek; TR = Tributary ; "X[Tributary #] = crossing as indicated on Figure 11I.

Table A-2. Waters of the State and Streambeds within the Study Area (250 ft Buffer).

Creek Name	Reach ID*	Figure ID	Assumed Width (feet) or GIS Calc.	WoST - OHWM (RWQCB; acres)	Streambeds - TOB (CDFW; acres)	Linear Feet	Buffer Only	Impact Category-Trenching (Reach ID)*	Impact Category-Boring (Reach ID)*
Waters of the State and Streambeds									
Cache Creek	CC-1	11A	GIS	0.51	1.51	642.53	CC	--	--
	CC-2	11B	GIS	0.81	2.62	2987.53	CC	--	--
	CC-3	11B,C	GIS	3.36	10.12	6543.12	--	--	CC-1-CA, CC-2-ACA
	CC-4	11I	12	3.14*	3.14*	1,140	CC	--	--
	WP-4	**11I**	**GIS**	**3.14**	**3.14**	**n/a**	**CC**	**--**	**--**
Tributary Drainage Ditch	TDD	11B,C	GIS	0.68	2.29	2,464	TDD	--	--
La Rose Creek	LRC	11D,E	GIS	0.51	1.19	763	--	--	LRC-CA
Tributaries (North of Hwy 58)	TR-1	11D,E	3	0.04	0.04	515.52	--	TR-1	--
	TR-2	11D,E	3	0.04	0.04	526.35	--	TR-2	--
	TR-3	11E,F	3	0.04	0.04	572	--	TR-3	--
	TR-4a	11E,F	3	0.05	0.05	738.13	--	TR-4	--
	TR-4b	11E,F	3	0.08	0.08	1102.87	TR-4	--	--
	TR-5	11F,G	3	0.18	0.18	2586.07	--	TR-5	--
	TR-6	11F,G	3	0.04	0.04	516.45	--	TR-6	--
	TR-7	11F,G	3	0.04	0.04	602.18	--	TR-7	--
	TR-8a	11G	3	0.02	0.02	243.13	--	TR-8	--
	TR-8b	11G	12	0.2	n/a	448.63		TR-8	--
	TR-8c	11G	12	0.19	n/a	433.82		TR-8	--
	WP-1	**11G**	**GIS**	n/a	0.9	n/a		**TR-8**	**--**
	TR-9a	11G	12	0.21	n/a	473.71		TR-9	--
	WP-2	**11G**	**GIS**	n/a	0.53	n/a		**TR-9**	**--**
	TR-9b	11G	12	0.45	n/a	971.7		TR-9	--
	TR-9c	11G	12	0.24	n/a	543.71		TR-9	--
	WP-3	**11G**	**GIS**	n/a	3.29	n/a		**TR-9**	**--**
	TR-10	11G	12	0.05	0.05	672.01	--	TR-10	--
	TR-11a	11G,H	12	0.04	0.04	592.51	--	TR-11	--
	TR-11b	11G,H	12	0.11	0.11	1561.35	--	TR-11	--
	TR-11c	11G,H	12	0.12	0.12	1664.62	--	TR-11	--
	TR-12	11H	12	0.15	0.3	546.84	--	TR-12	--
Riparian Habitat									
			Within Buffer (Uplands)	**WoST**	**Streambeds**				
Sandbar Willow	CC-2	11B	0.086	0.02	0.14	227	RH	--	--
Scalebroom Scrub	CC-4, WP-4	11I	0.76	3.14	3.14	1,140	RH	--	--
Red Willow	CC-2	11B	1.761	0	0	n/a	RH	--	--
Tamarisk	CC-2, 3	11B,C,D	20.59	1.00	3.76	4388	RH	RH-X	--
Non-Jurisdictional Feature									
Temporary Ponded Water	Legend	11D	0.064	n/a	n/a	n/a	NJ	--	--

***** For WP-4, the entire Watercourse is jurisdictional to RWQCB and CDFW. This is not the case for WP-1, WP-2, WP-3. TDD = Tributary Drainage Ditch; CA = Conceptual Alignment; ACA = Alternate Conceptual Alignment.

Appendix D

Site Photograph Log

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
MPUD	Kern County, California	60545193

Photo No.	**Date:**
1	8/23/18

Direction Photo Taken:

Left: Southwest

Right: East

Description:

Figure 11A.

Near Well 9 Facility.

Cache Creek – Grouted rip rap banks.





Photo No.	**Date:**
1, 2	8/23/18

Direction Photo Taken:

(P1) Left: Southwest

(P2) Right: Southeast

Description:

Figure 11A.

Near Well 9 Facility.

Cache Creek – Grouted rip rap banks.





PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
MPUD	Kern County, California	60545193

Photo No.	**Date:**
3	8/23/18

Direction Photo Taken:

Left: West

Right: East

Description:

Figure 11B.

Upper Cache Creek.

Left: facing upstream towards P1 and P2, with *Tamarix* sp. along banks.

Right: facing downstream, with stand of *Salix exigua* along banks.





Photo No.	**Date:**
4	8/23/18

Direction Photo Taken:

Left: West

Right: South

Description:

Figure 11B.

Upper Cache Creek.

Left: facing upstream towards P1 and P2, with *Tamarix* sp. along banks.

Right: facing downstream; note wall within channel that directs flow under RR bridge.





PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
MPUD	Kern County, California	60545193

Photo No.	**Date:**
5	8/23/18

Direction Photo Taken:

Left: North

Right: East

Description:

Figure 11B.

Upper Cache Creek.

Left: facing upstream.

Right: facing downstream.





Photo No.	**Date:**
6	8/23/18

Direction Photo Taken:

Left: West

Right: East

Description:

Figure 11C.

Upper Cache Creek.

Left: facing downstream along berm that is located between Hwy 58 and Cache Creek (left side of photo).

Right: facing downstream along berm that is located between Hwy 58 and Cache Creek (right side of photo).





PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
MPUD	Kern County, California	60545193

Photo No. 7 | **Date:** 8/23/18

Direction Photo Taken:

Clockwise, starting with upper left: West, South, East, North.

Description:

Figure 11C.

Upper Cache Creek at crossing location.









Photo No. 8 | **Date:** 8/23/18

Direction Photo Taken:

Left: West

Right: East

Description:

Figure 11C.

Upper Cache Creek near confluence of La Rose Creek.





PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
MPUD	Kern County, California	60545193

Photo No. **9a, 10a** | **Date:** 8/24/18

Direction Photo Taken:
Clockwise, from upper left: South, Northwest, Norwest.

Description:

Figure 11C.

Tributary (P9a) that flows through culvert to P10a (lower photo).







Photo No. **9b, 10b** | **Date:** 8/24/18

Direction Photo Taken:

Left: West

Right: North

Description:

Figure 11C.

Basin and stand pipe (P9b) that flows through culvert to P10b (right photo).





PHOTOGRAPHIC LOG

Client Name: MPUD	**Site Location:** Kern County, California	**Project No.** 60545193

Photo No.	**Date:**
9c, 10c,d	8/24/18

Direction Photo Taken:

Upper: East

Lower: North

Description:

Figure 11C.

Basin and stand pipe (P9c) that flows through culvert to P10c,d (lower photos).







Photo No.	**Date:**
10e	8/24/18

Direction Photo Taken:

Left: West

Right: Northeast

Description:

Figure 11C.

Tributary Drainage Channel, with an unknown connection to Cache Creek (no evidence was found).

Vegetation: ruderal, with *Bassia* sp.





PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
MPUD	Kern County, California	60545193

Photo No.	**Date:**
11, 8b	8/23/18

Direction Photo Taken:
Clockwise, from upper left: Northeast, East, North.

Description:

Figure 11D.

La Rose Creek, a major tributary of Cache Creek. Confluence of two creeks is upper right photo.



Photo No.	**Date:**
12	8/23/18

Direction Photo Taken:

Left: North

Right: South

Description:

Figure 11D.

La Rose Creek under Hwy 58 (left) and under RR bridge (right).





PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No.	Date:
13	8/24/18

Direction Photo Taken:

Left: Northeast.

Right Southeast

Description:

Figure 11D.

La Rose Creek, facing upstream (left) and downstream (right, at Hwy 58 bridge).





Photo No.	Date:
14	8/23/18

Direction Photo Taken:

Left: North

Right: North

Description:

Figure 11D.

Non-jurisdictional temporary, isolated water.

Ruderal, upland vegetation, with small mud cracks. Sheet flow from hillsides likely pool at this location temporarily (but not enough to form a wetland).





PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No. 15, 16 | **Date:** 8/24/18

Direction Photo Taken:

Left: Northeast

Right: Northeast

Description:

Figure 11E.

Tributaries (TR) to Cache Creek, along the North side of Hwy 58.

TR-1 (left), TR-2 (right).





Photo No. 17a,b | **Date:** 8/24/18

Direction Photo Taken:
Left: Top-Northwest;
Bottom-Southeast

Right: Top-Northwest;
Bottom-Southeast.

Description:

Figure 11E.

Tributaries (TR) to Cache Creek, along the North side of Hwy 58.

TR-5 (left), TR-6 (right).









PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
MPUD	Kern County, California	60545193

Photo No.	**Date:**
18	8/24/18

Direction Photo Taken:

Left: North

Right: Southeast

Description:

Figure 11F.

TR-7.

Left, upstream; right, downstream.





Photo No.	**Date:**
19	8/24/18

Direction Photo Taken:

Left: North

Right: South

Description:

Figure 11G.

TR-8a.

Left, upstream; right, downstream.

Tributary ends before dirt access road, so alignment will not cross this ephemeral drainage.





PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No.	Date:
20	8/24/18

Direction Photo Taken:

Left: Southwest

Right: Northeast

Description:

Figure 11G.

TR-8.

Viewpoint near P8a and 8b1.

Right photo shows entire alluvial fan area along dirt access road. Note several ephemeral drainage crossings along the road. Flow is from left to right.





Photo No.	Date:
21	8/24/18

Direction Photo Taken:

Left: Northeast

Right: Southwest

Description:

Figure 11G.

TR-8b1.

Left, facing upstream; right, facing downstream across dirt access road.





PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
MPUD	Kern County, California	60545193

Photo No.	**Date:**
22	8/24/18

Direction Photo Taken:

Left: Northwest

Right: Southeast

Description:

Figure 11G.

TR-8b2.

Left, facing upstream; right, facing downstream across dirt access road.





Photo No.	**Date:**
23	8/24/18

Direction Photo Taken:

Left: Northwest

Right: Southeast

Description:

Figure 11G.

TR-9a.

Left, facing upstream; right, facing downstream across dirt access road.





PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No. 24a | **Date:** 8/24/18

Direction Photo Taken:

Left: Northwest

Right: Southeast

Description:

Figure 11G.

TR-9b2.

Left, facing upstream; right, facing downstream across dirt access road.





Photo No. 24b | **Date:** 8/24/18

Direction Photo Taken:

Facing East.

Description:

Figure 11G.

TR-9b2

Eastern floodplain; looking from drainage [OHWM, foreground] across watercourse.

Left, facing upstream; right, facing downstream across dirt access road.



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No. 25 | **Date:** 8/24/18

Direction Photo Taken:

Left: Southwest

Right: Northeast

Description:

Figure 11G.

TR-9b2.

Left: View down dirt access road, with ephemeral drainages with flow from right to left.

Right: View down dirt access road, with ephemeral drainages with flow from left to right.





Photo No. 24c | **Date:** 8/24/18

Direction Photo Taken:

Facing Southeast.

Description:

Figure 11G.

TR-9b2

Zoom in on downstream area of tributary. Note incision immediately downstream from dirt access road.



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No. 25 | **Date:** 8/24/18

Direction Photo Taken:

Left: Northwest

Right: Southeast

Description:

Figure 11G.

TR-9b2.

Edge of watercourse.

Left, facing upstream; right, facing downstream across dirt access road.





Photo No. 26 | **Date:** 8/24/18

Direction Photo Taken:

Left: Northwest

Right: Southeast

Description:

Figure 11G.

Near TR-9b2.

An old, unmaintained dirt road that crosses the main access road. This feature lacked hydrologic indicators and bed-bank-channel geomorphology.

Left, facing upstream; right, facing downstream across dirt access road.





PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No. 27 | **Date:** 8/24/18

Direction Photo Taken:

Left: Northwest

Right: South

Description:

Figure 11G.

TR-9.

Downstream near Hwy 58.

Upper left photo shows two tributaries: one flowing from upper left, and one from upper right.

Left, facing upstream; right, facing downstream.





Photo No. 28 | **Date:** 8/24/18

Direction Photo Taken:

Left: Northwest

Right: Southeast

Description:

Figure 11G.

TR-11a.

Left, facing upstream across dirt access road; right, facing downstream from dirt access road.





PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
MPUD	Kern County, California	60545193

Photo No.	**Date:**
29	8/24/18

Direction Photo Taken:

Left: Northwest

Right: Southeast

Description:

Figure 11H.

TR-11b.

Left, facing upstream across dirt access road; right, facing downstream along dirt access road.





Photo No.	**Date:**
30	8/24/18

Direction Photo Taken:

Left: West

Right: Southeast

Description:

Figure 11H.

TR-11c.

Left, facing upstream; right, facing downstream from dirt access road.





PHOTOGRAPHIC LOG

Client Name: MPUD	**Site Location:** Kern County, California	**Project No.** 60545193

Photo No. **31**	**Date:** 8/23/18

Direction Photo Taken:

Left: North

Right: Southeast

Description:

Figure 11H.

TR-11 (Downstream).

Left, facing upstream; right, facing downstream across dirt access road.





Photo No. **32**	**Date:** 8/23/18

Direction Photo Taken:

Left: North

Right: Southeast

Description:

Figure 11H.

TR-12 (Downstream).

Left, facing upstream; right, facing downstream towards Hwy 58.





PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No. 33 | **Date:** 8/23/18

Direction Photo Taken:

Clockwise, starting with upper left: West, South, North, East

Description:

Figure 11I.

Cache Creek, WP-4.

Transect-1, along South bank.

Upper left, upstream; lower left, downstream.






Photo No. 34 | **Date:** 8/23/18

Direction Photo Taken:

Clockwise, starting with upper left: West, South, North, East

Description:

Figure 11I.

Cache Creek, WP-4.

Transect-2, along South bank.

Upper left, upstream; lower left, downstream.






PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
MPUD	Kern County, California	60545193

Photo No. 35 | **Date:** 8/23/18

Direction Photo Taken:

Clockwise, starting with upper left: West, South, North, East

Description:

Figure 11I.

Cache Creek, WP-4.

Transect-2, second photo point along transect.

Upper left, upstream; lower left, downstream.






Photo No. 36 | **Date:** 8/23/18

Direction Photo Taken:

Clockwise, starting with upper left: West, South, North, East

Description:

Figure 11I.

Cache Creek, WP-4.

Upstream of Transect-3, near North bank.

Upper left, upstream; lower left, downstream.






PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No.	Date:
37	8/23/18

Direction Photo Taken:

Clockwise, starting with upper left: West, South, North, East

Description:

Figure 11I.

Cache Creek, WP-4.

Transect-3, along South bank.

Upper left, upstream; lower left, downstream.






Photo No.	Date:
38	8/23/18

Direction Photo Taken:

Clockwise, starting with upper left: West, East, North, South

Description:

Figure 11I.

Cache Creek, WP-4.

Transect-3, near North bank.

Upper left, upstream; upper right, downstream.






PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
MPUD	Kern County, California	60545193

Photo No. **39** | **Date:** 8/23/18

Direction Photo Taken:

Clockwise, starting with upper left: Northwest, West, Northeast

Description:

Figure 11I.

Cache Creek, WP-4.

View from berm along Southern edge of Cache Creek watercourse.

Upper left, upstream; lower, downstream.





Photo No. **39** | **Date:** 8/23/18

Direction Photo Taken:

Clockwise, starting with upper left: East, Southeast, Southwest

Description:

Figure 11I.

Cache Creek, WP-4, can be seen in upper left photo.

View from berm along Southern edge of watercourse; facing into project area.

Upper left, downstream.





PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
MPUD	Kern County, California	60545193

Photo No.	Date:
40	8/23/18

Direction Photo Taken:

Top: facing West

Bottom: facing South

Description:

Figure 11I.

Cache Creek, WP-4, is behind berm to the right of the upper photo, and not visible in lower photo.





Photo No.	Date:
40	8/23/18

Direction Photo Taken:

Top: facing East

Bottom: facing North

Description:

Figure 11I.

Cache Creek, WP-4 is behind berm to the left of the upper photo, and in background of lower photo.

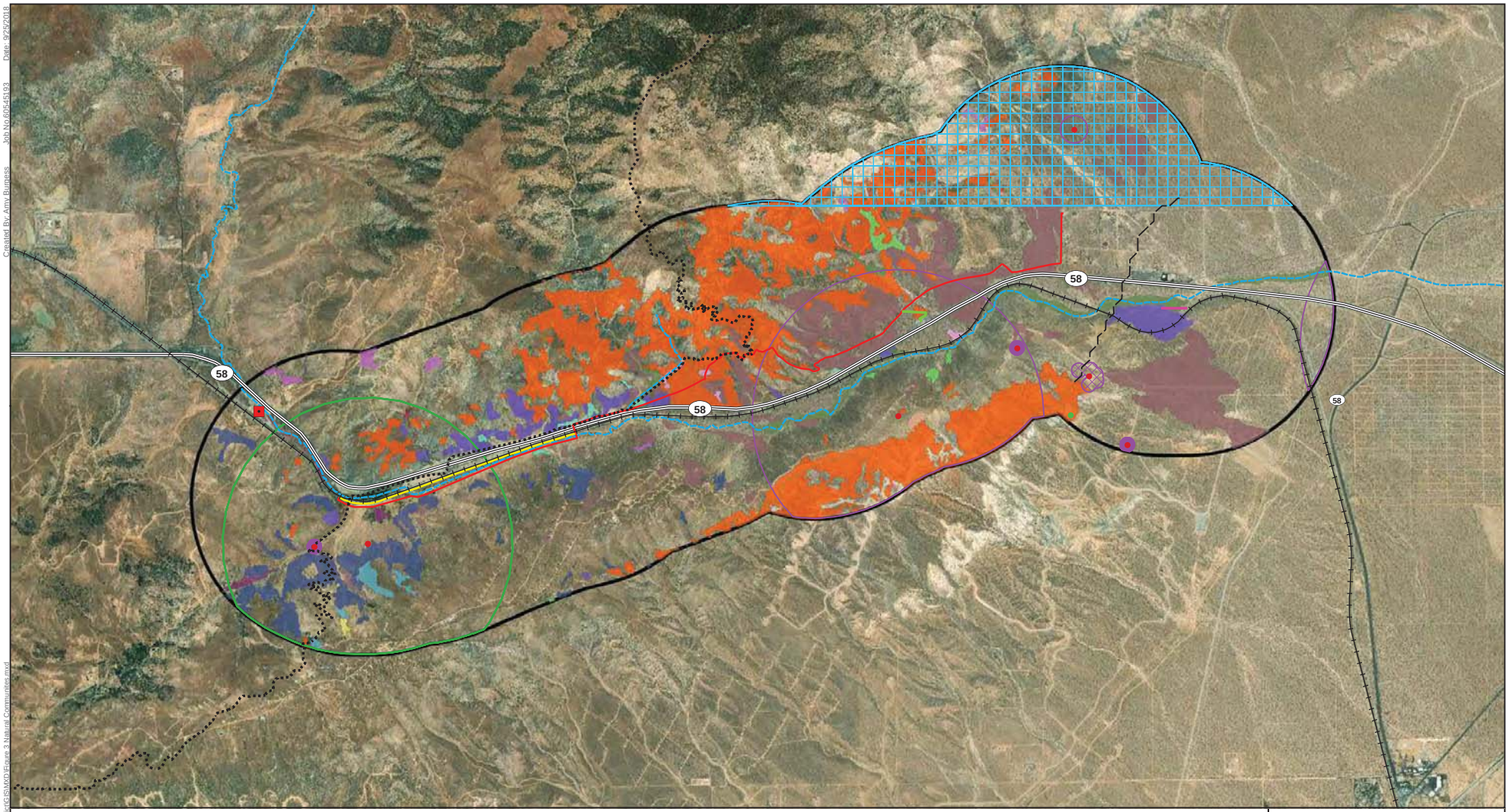




Appendix E

Vegetation Community Maps

(AECOM 2018)



Legend

- Well 9 Facility
- Cache Creek
- Railroad
- Pacific Crest Trail
- Alternate Conceptual Alignment
- Conceptual Alignment
- Feeder to CHP Facility
- Pump Station Connection Alignment
- 1-Mile Buffer

Sensitive Natural Community (State Rank)

- Ceanothus greggii (S3)
- Encelia (actoni, virginensis) (S3.2)
- Eriogonum wrightii (S3)
- Forestiera pubescens (S2)
- Grayia spinosa (S3)
- Gutierrezia sarothrae (S3)
- Juniperus californica (S4/S2)
- Lepidospartum squamatum (S3)
- Lycium andersonii (S3)
- Prunus fasciculata (S3)
- Purshia tridentata (S3)
- Salix laevigata (S3)
- Stipa speciosa (S2)
- Yucca brevifolia (S3)

CNDDB

- Plant
- Animal
- Tehachapi Pocket Mouse
- Desert Tortoise
- American Badger
- Tulare Grasshopper Mouse and San Joaquin Pocket Mouse
- Prairie Falcon

0 0.5 1 Miles

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 3
SENSITIVE NATURAL COMMUNITIES AND WILDLIFE

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 9/25/2018
Job No.60545193
Created By: Amy Burpess
J:\Client-Projects\Mojave Public Utility District\GIS\MXD\Figure 3 Natural Communities.mxd



Legend

- Photo (Direction)
- Creek
- Well 9 Facility
- 250-Foot Survey Buffer

Vegetation Community

- Rubber Rabbitbrush Scrub
- Disturbed / Ruderal

0 400 800 Feet

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 4
VEGETATION COMMUNITIES AND PHOTO POINTS

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 9/25/2018
Job No:60545193
Created By: Amy Burpess
J:\Client-Projects\Mojave Public Utility District\GIS\MXD\Figure 4-11_MPUD_VegetationCommunities.mxd



Legend

- Photo (Direction)
- Alternate Conceptual Alignment
- Conceptual Alignment
- Creek
- Pacific Crest Trail
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer

Vegetation Community

- Red Willow Thicket
- Rubber Rabbitbrush Scrub
- Tamarisk Thicket
- Disturbed / Ruderal

0 400 800 Feet

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 5
VEGETATION COMMUNITIES AND PHOTO POINTS

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 9/25/2018
Job No:60545193
Created By: Amy Burgess
J:\Client-Projects\Mojave Public Utility District\GIS\MXD\Figure 4-11_MPUD_VegetationCommunities.mxd



Legend

- Photo (Direction)
- Alternate Conceptual Alignment
- Conceptual Alignment
- Creek
- Pacific Crest Trail
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer

Vegetation Community

- Brittlebrush Scrub
- Rubber Rabbitbrush Scrub
- Tamarisk Thicket
- Disturbed / Ruderal

0 400 800 Feet

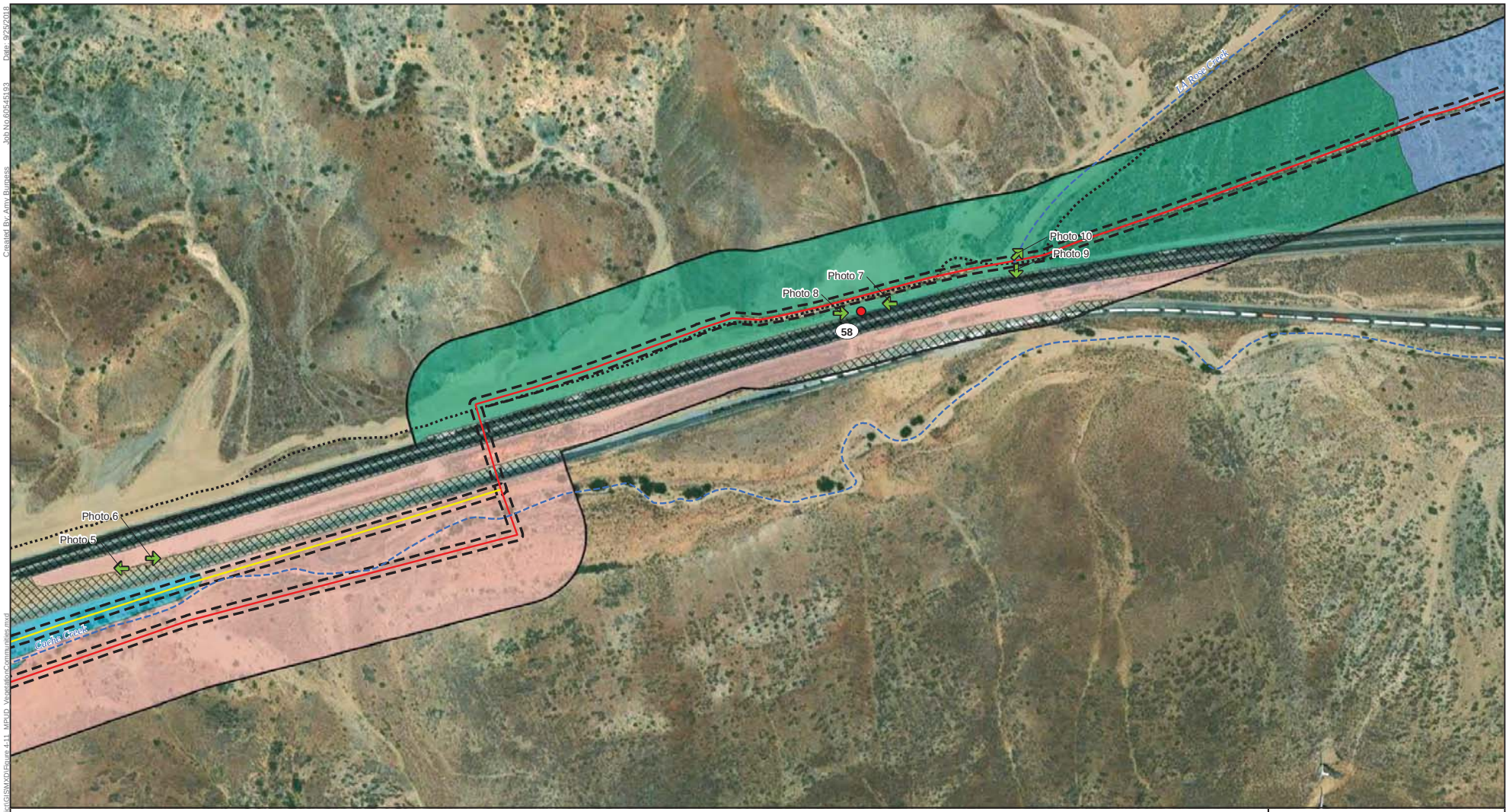
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 6
VEGETATION COMMUNITIES AND PHOTO POINTS

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 9/25/2018
Job No:60545193
Created By: Amy Burpess
J:\Client-Projects\Mojave Public Utility District\GIS\MXD\Figure 4-11_MPUD_VegetationCommunities.mxd



Legend

- Photo (Direction)
- Alternate Conceptual Alignment
- Conceptual Alignment
- Creek
- Pacific Crest Trail
- Gate
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer

Vegetation Community

- Brittlebrush Scrub
- California Juniper Woodland
- Rubber Rabbitbrush Scrub
- Tamarisk Thicket
- Disturbed / Ruderal

0 400 800 Feet

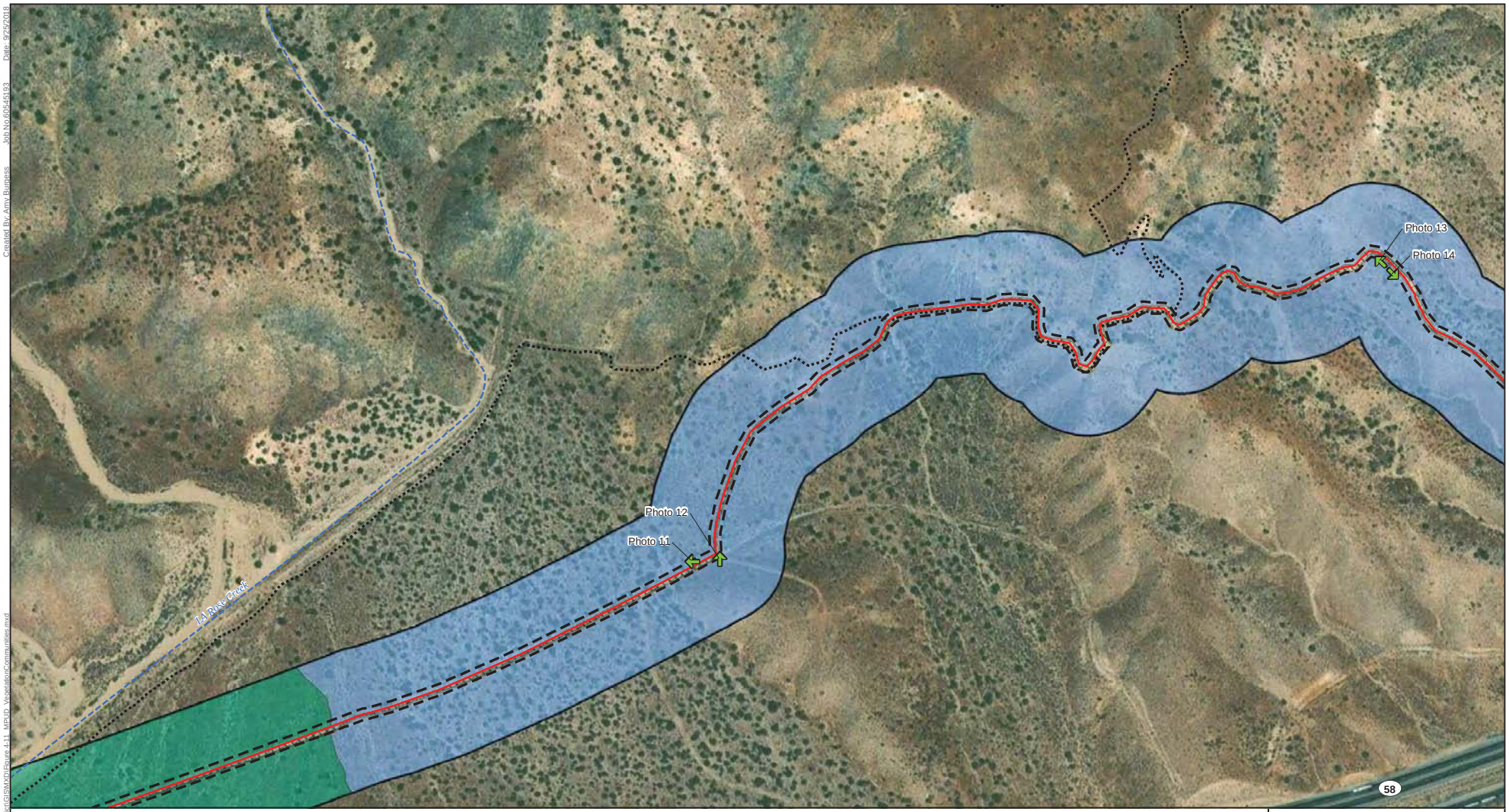
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 7
VEGETATION COMMUNITIES AND PHOTO POINTS

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 9/25/2018
Job No.60545193
Created By: Amy Burgess
J:\Client-Projects\Mojave Public Utility District\GIS\MXD\Figure 4-11_MPUD_VegetationCommunities.mxd



Legend

- Photo (Direction)
- Conceptual Alignment
- Creek
- Pacific Crest Trail
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer

Vegetation Community

- Brittlebrush Scrub
- California Juniper Woodland
- Disturbed / Ruderal

0 400 800 Feet

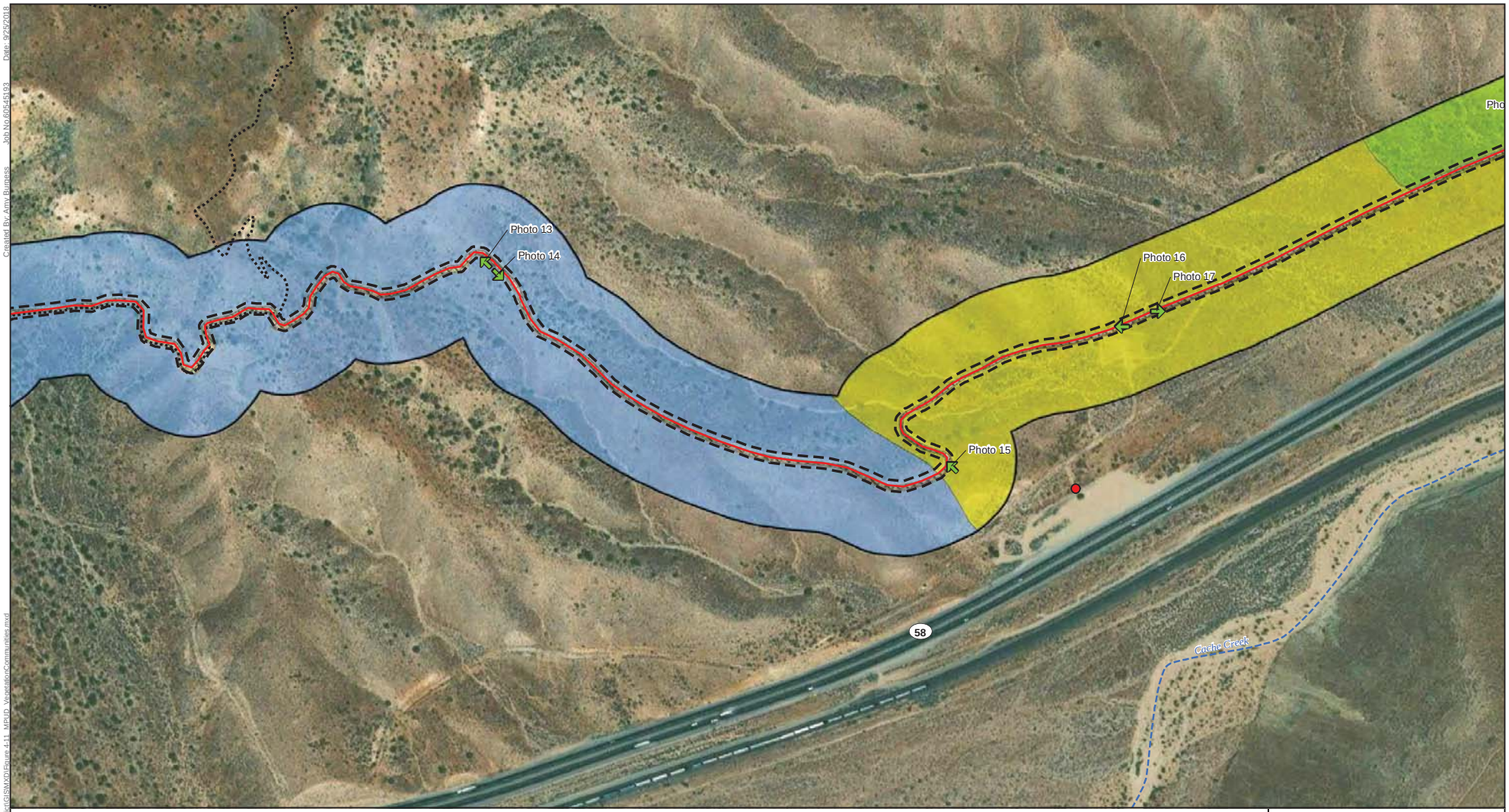
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 8
VEGETATION COMMUNITIES AND PHOTO POINTS

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 9/25/2018
Job No:60545193
Created By: Amy Burgess
J:\Client-Projects\Mojave Public Utility District\GIS\MXD\Figure 4-11_MPUD_VegetationCommunities.mxd



Date: 9/25/2018
Job No.60545193
Created By: Amy Burgess
J:\Client-Projects\Mojave Public Utility District\GIS\MXD\Figure 4-11_MPUD_VegetationCommunities.mxd

Legend

- Photo (Direction)
- Conceptual Alignment
- Creek
- Pacific Crest Trail
- Gate
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer

Vegetation Community

- California Juniper Woodland
- Creosote Bush Scrub
- Joshua Tree Woodland
- Disturbed / Ruderal

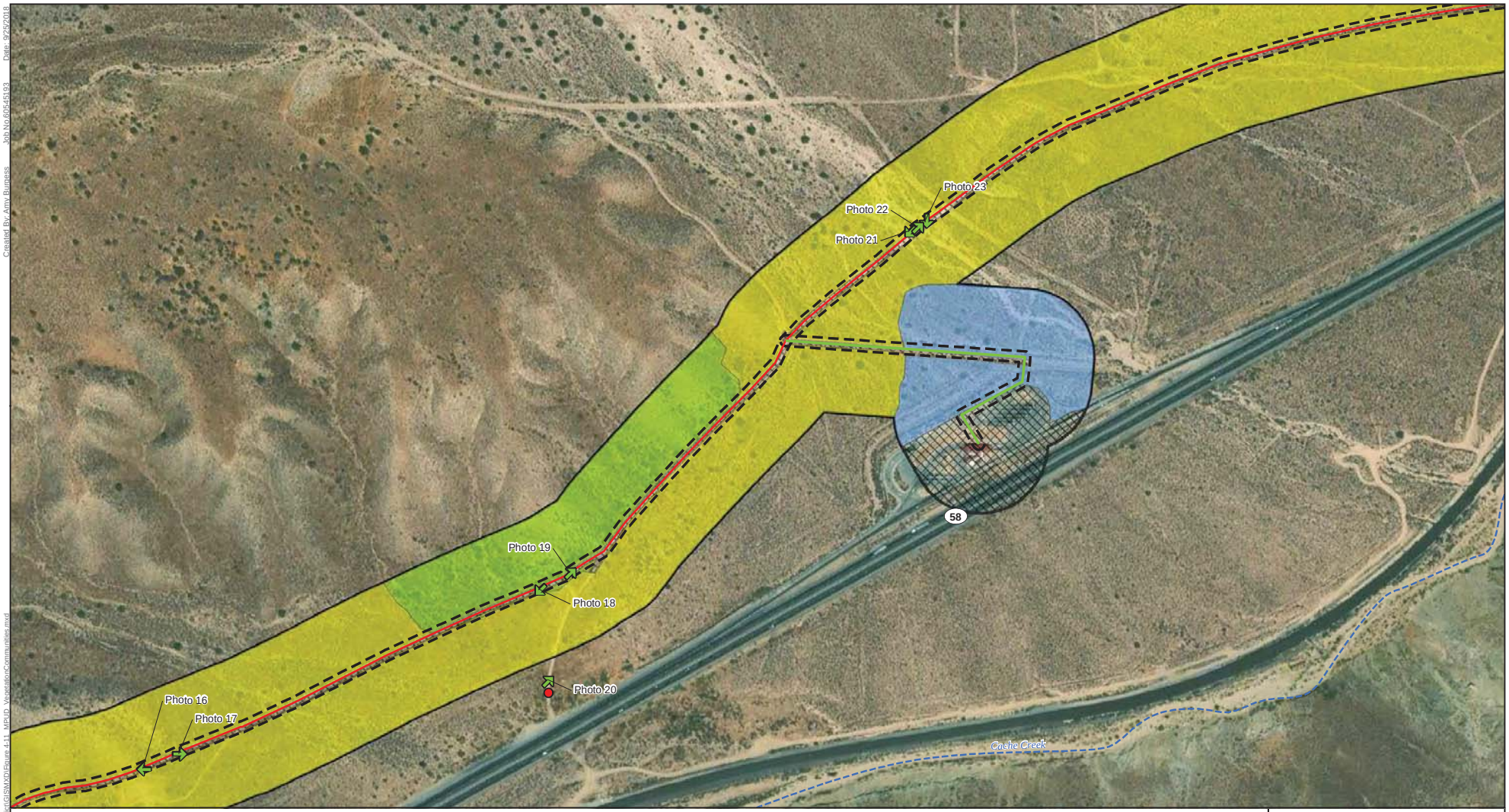
0 400 800 Feet

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 9
VEGETATION COMMUNITIES AND PHOTO POINTS

Mojave Public Utility District
Cache Creek Project

AECOM



Legend

- Photo (Direction)
- Conceptual Alignment
- Feeder to CHP Facility
- Creek
- Gate
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer

Vegetation Community

- California Juniper Woodland
- Creosote Bush Scrub
- Joshua Tree Woodland
- Disturbed / Ruderal

0 400 800 Feet

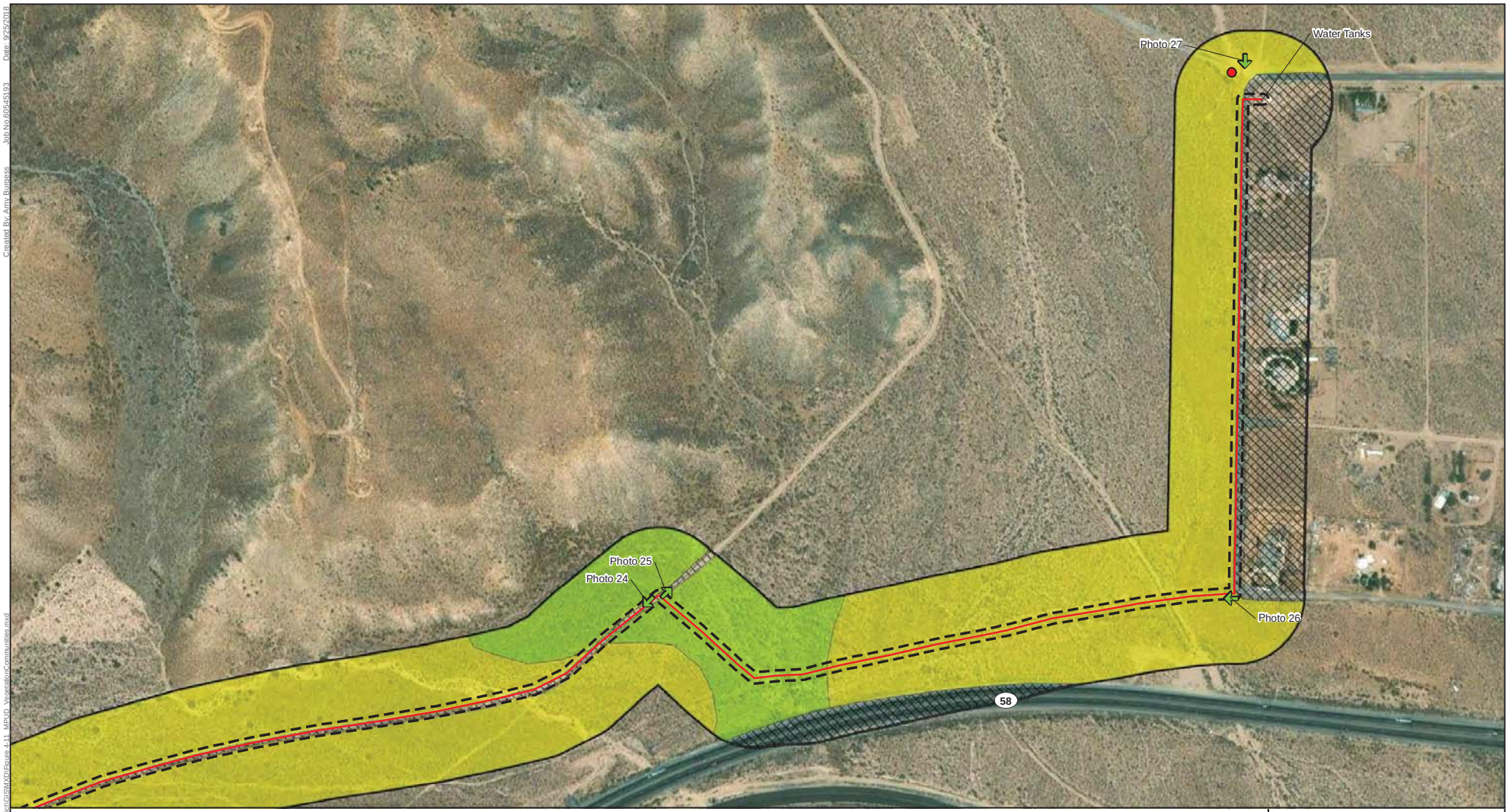
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 10
VEGETATION COMMUNITIES AND PHOTO POINTS

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 9/25/2018
Job No:60545193
Created By: Amy Burgess
J:\Client-Projects\Mojave Public Utility District\GIS\MXD\Figure 4-11_MPUD_VegetationCommunities.mxd



Legend

Photo (Direction)
Conceptual Alignment
Gate
40-Foot Disturbance Boundary
250-Foot Survey Buffer

Vegetation Community
Creosote Bush Scrub
Joshua Tree Woodland
Disturbed / Ruderal

0 400 800 Feet

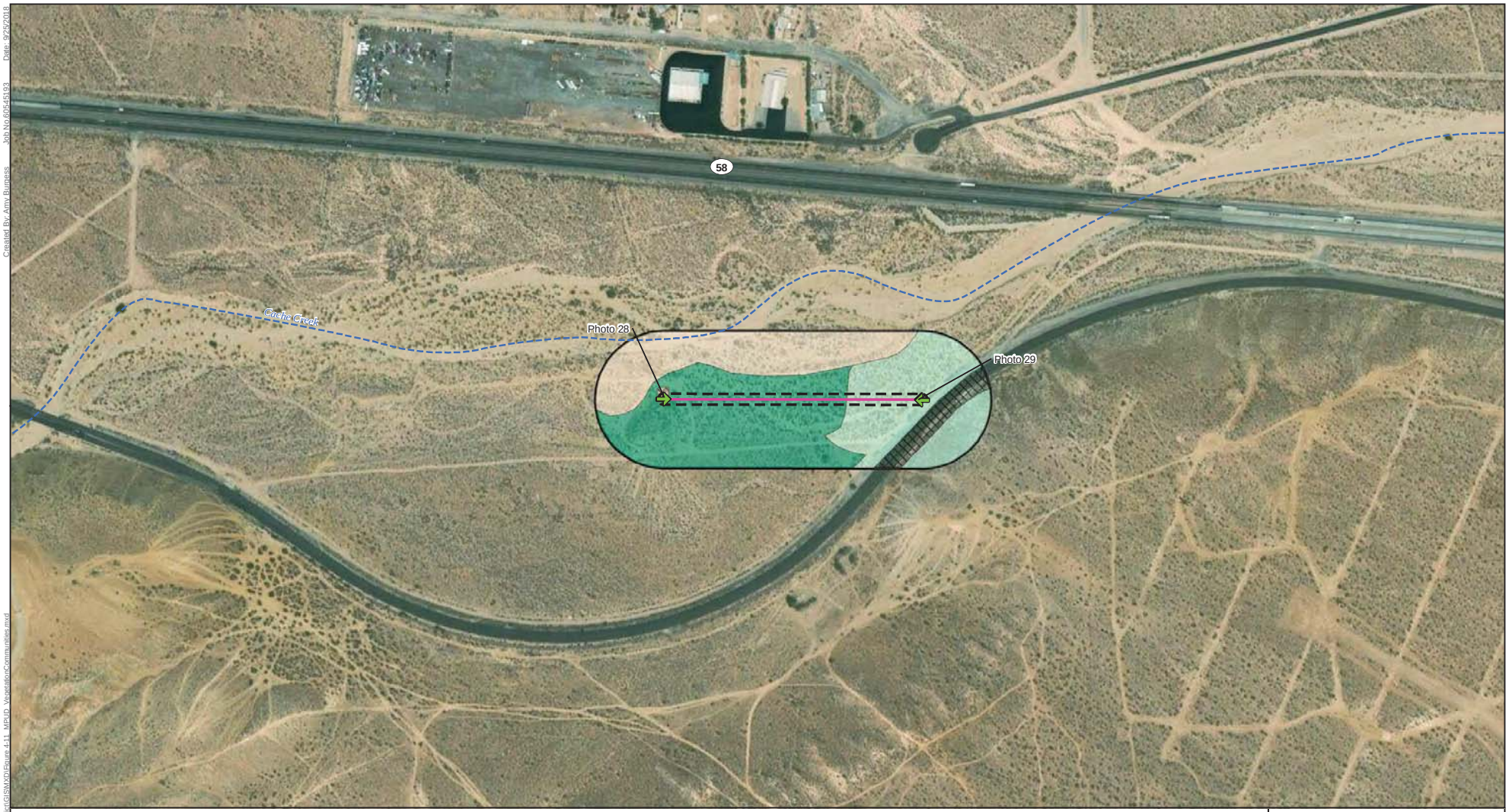
Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 11
VEGETATION COMMUNITIES AND PHOTO POINTS

Mojave Public Utility District
Cache Creek Project

AECOM

Date: 9/25/2018
Job No.60545193
Created By: Amy Burpess
J:\Client-Projects\Mojave Public Utility District\GIS\MXD\Figure 4-11_MPUD_VegetationCommunities.mxd



Date: 9/25/2018
Job No:60545193
Created By: Amy Burgess
J:\Client-Projects\Mojave Public Utility District\GIS\MXD\Figure 4-11_MPUD_VegetationCommunities.mxd

Legend

- Photo (Direction)
- Pump Station Connection Alignment
- Creek
- 40-Foot Disturbance Boundary
- 250-Foot Survey Buffer

Vegetation Community

- Allscale Scrub
- Brittlebrush Scrub
- Scale Broom Scrub
- Disturbed / Ruderal

0 400 800 Feet

Base Map Source:
ESRI, ArcGIS Online
World Imagery, Digital Globe 7/31/2016

FIGURE 12
VEGETATION COMMUNITIES AND PHOTO POINTS

Mojave Public Utility District
Cache Creek Project

AECOM

Appendix F

List of Observed Plants

Appendix F. MPUD – Cache Creek - List of Observed Plant Species

Family Scientific Name	Common Name	Native/ Non-native	Life Form	Wetland Indicator Rating
Agavaceae				
Hesperoyucca whipplei	Chaparral yucca	Native	Shrub	NL
Yucca brevifolia	Joshua tree	Native	Tree	NL
Apocynaceae				
Asclepias eriocarpa	Indian milkweed	Native	Perennial herb	NL
Asteraceae				
Artemisia dracunculus	Tarragon	Native	Perennial herb	NL
Encelia actoni	Acton encelia	Native	Shrub	NL
Encelia virginiensis	Virgin river encelia	Native	Shrub	NL
Ericameria linearifolia	Interior goldenbush	Native	Shrub	NL
Ericameria nauseosa var. mohavensis	Mojave rabbitbrush	Native	Shrub	NL
Ericameria teretifolia	Green rabbitbrush	Native	Shrub	NL
Grindelia hirsutula	Gumweed	Native	Perennial herb	FACW
Gutierrezia californica	Matchweed	Native	Perennial herb, Shrub	NL
Helianthus annuus	Common sunflower	Native	Annual herb	FACU
Lepidospartum squamatum	Scale-broom	Native	Shrub	FACU
Stephanomeria pauciflora	Wire lettuce	Native	Perennial herb	NL
Boraginaceae				
Amsinckia tessellate var. floriosa	Large flowered devil's fiddleneck	Native	Annual herb	NL
Heliotropium curassavicum	Seaside heliotrope	Native	Perennial herb	FACU
Brassicaceae				
Lepidium fremontii	Desert pepper grass	Native	Perennial herb	NL
Cactaceae				
Opuntia basilaris	Beavertail	Native	Shrub (stem succulent)	NL
Chenopodiaceae				
Atriplex canescens	Hoary saltbush	Native	Shrub	NL
Atriplex polycarpa	Cattle spinach	Native	Shrub	FACU
Krascheninnikovia lanata	Winter fat	Native	Shrub	NL
Salsola tragus	Russian thistle	Non-native, Invasive	Annual herb	FACU
Cleomaceae				
Peritoma arborea	Bladderpod	Native	Shrub	NL
Cucurbitaceae				

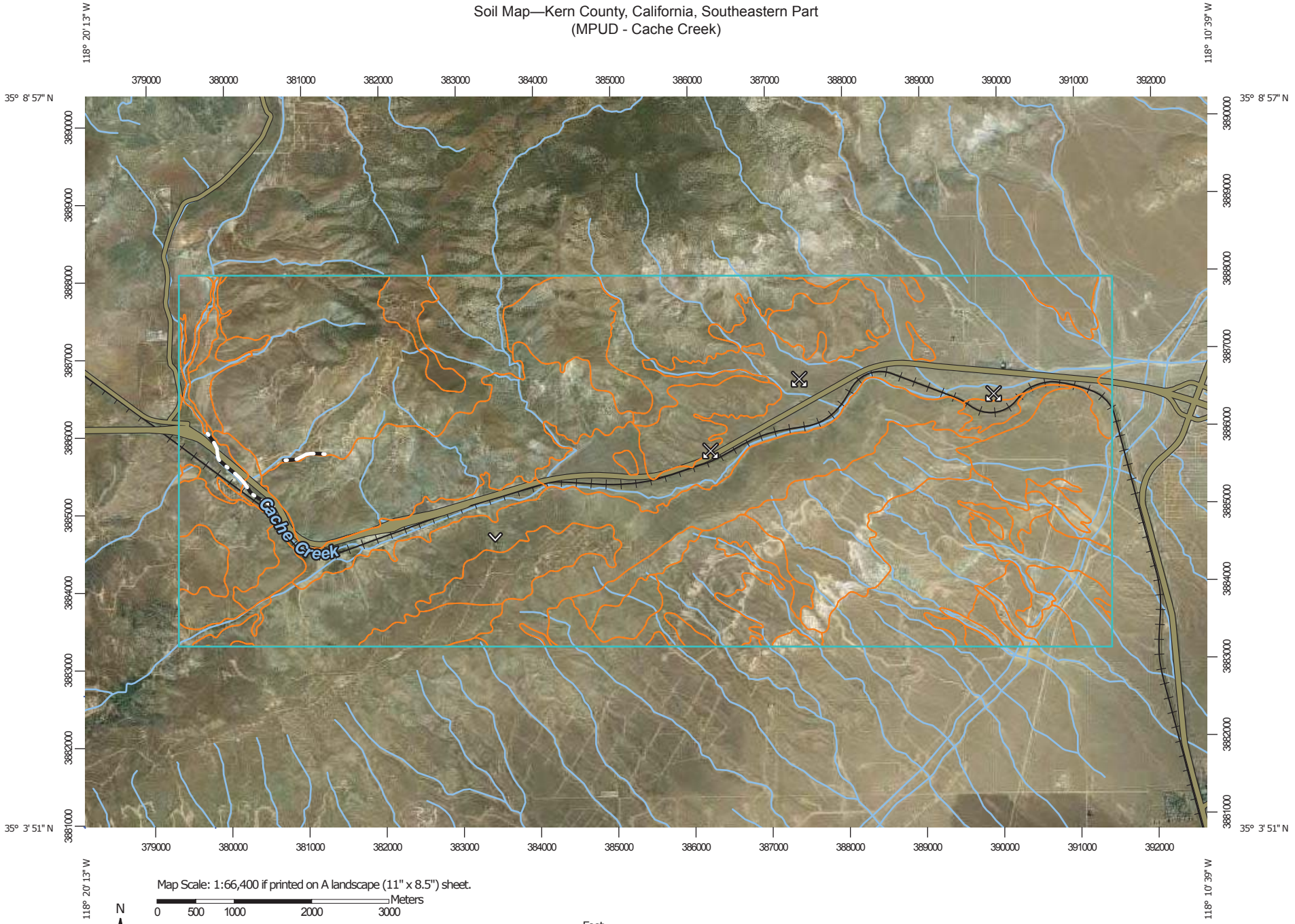
Family Scientific Name	Common Name	Native/ Non-native	Life Form	Wetland Indicator Rating
Cucurbita foetidissima	Buffalo gourd	Native	Perennial herb/vine	NL
Cupressaceae				
Juniperus californica	California juniper	Native	Shrub	NL
Ephedraceae				
Ephedra nevadensis	Nevada ephedra	Native	Shrub	NL
Ephedra viridis	Green ephedra	Native	Shrub	NL
Euphorbiaceae				
Ricinus communis	Castor bean	Non-native	Shrub	FACU
Lamiaceae				
Scutellaria mexicana	Mexican bladder sage	Native	Shrub	NL
Papaveraceae				
Argemone munita	Prickly poppy	Native	Annual, Perennial herb	NL
Plantaginaceae				
Penstemon incertus	Western desert penstemon	Native	Shrub	NL
Polemoniaceae				
Eriastrum densifolium	Giant eriastrum	Native	Perennial herb	NL
Polygonaceae				
Eriogonum fasciculatum	California buckwheat	Native	Shrub	NL
Eriogonum fasciculatum var. polifolium	California buckwheat	Native	Shrub	NL
Eriogonum gracile	Slender buckwheat	Native	Annual herb	OBL
Eriogonum inflatum	Desert trumpet	Native	Perennial herb	NL
Poaceae				
Bromus madritensis ssp. rubens	Red brome	Non-native	Grass	UPL
Leymus cinereus	Great basin wild rye	Native	Perennial grass	FAC
Stipa speciosa	Desert needle grass	Native	Grass	NL
Rosaceae				
Prunus fasciculate	Desert almond	Native	Shrub	NL
Solanaceae				
Datura wrightii	Jimsonweed	Native	Perennial herb	UPL
Nicotiana glauca	Tobacco tree	Non-native	Tree, Shrub	FAC
Tamaricaeae				
Tamarix parvilora	Tamarisk	Non-native, Invasive	Shrub	FAC
Zygophyllaceae				

Family Scientific Name	Common Name	Native/ Non-native	Life Form	Wetland Indicator Rating
Larrea tridentata	South american creosote bush	Native	Shrub	NL

Appendix G

Web Soil Survey Information

Soil Map—Kern County, California, Southeastern Part
(MPUD - Cache Creek)



Map Scale: 1:66,400 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 500 1000 2000 3000

Feet
0 3000 6000 12000 18000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kern County, California, Southeastern Part
Survey Area Data: Version 8, Sep 11, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 3, 2014—Mar 6, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
104	Arizo gravelly loamy sand, 2 to 9 percent slopes	1,898.0	13.2%
105	Arujo sandy loam, 9 to 15 percent slopes	162.4	1.1%
114	Cajon loamy sand, 0 to 5 percent slopes	771.1	5.4%
116	Cajon gravelly loamy sand, 0 to 9 percent slopes	416.5	2.9%
124	Cinco gravelly loamy sand, 50 to 75 percent slopes	4,026.3	28.1%
137	Garlock loamy sand, 2 to 9 percent slopes	473.4	3.3%
143	Havala sandy loam, 9 to 15 percent slopes	34.4	0.2%
147	Hi Vista sandy loam, 2 to 9 percent slopes	310.9	2.2%
150	Muroc sandy loam, 2 to 9 percent slopes	13.7	0.1%
156	Pajuela-Whitewolf association, steep	1,880.5	13.1%
157	Pits	8.2	0.1%
165	Psamments-Xerolls complex, nearly level	62.8	0.4%
174	Steuber sandy loam, 0 to 2 percent slopes	245.5	1.7%
176	Steuber sandy loam, 5 to 9 percent slopes	8.7	0.1%
185	Torriorthents-Rock outcrop complex, very steep	1,564.2	10.9%
186	Tujunga loamy sand, 2 to 5 percent slopes	85.6	0.6%
193	Walong sandy loam, 15 to 30 percent slopes	139.7	1.0%
195	Walong-Arujo sandy loams, 15 to 30 percent slopes	116.2	0.8%
196	Walong-Arujo sandy loams, 30 to 50 percent slopes	0.1	0.0%
204	Whitewolf loamy sand, cool, 2 to 5 percent slopes	420.4	2.9%
206	Xeric Torriorthents, very steep	1,294.3	9.0%
208	Xerolls-Rock outcrop complex, very steep	401.1	2.8%
211	Xerorthents-Rock outcrop complex, very steep	1.5	0.0%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Totals for Area of Interest		**14,335.6**	**100.0%**

Hydric Soils

This table lists the map unit components that are rated as hydric soils in the survey area. This list can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council, 1995; Hurt and others, 2002).

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others, 1979; U.S. Army Corps of Engineers, 1987; National Research Council, 1995; Tiner, 1985). Criteria for all of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

Map units that are dominantly made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units dominantly made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

The criteria for hydric soils are represented by codes in the table (for example, 2). Definitions for the codes are as follows:

1. All Histels except for Folistels, and Histosols except for Folists.
2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Historthels great group, Histoturbels great group, Pachic subgroups, or Cumulic subgroups that:
   A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
   B. Show evidence that the soil meets the definition of a hydric soil;
3. Soils that are frequently ponded for long or very long duration during the growing season.
   A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
   B. Show evidence that the soil meets the definition of a hydric soil;
4. Map unit components that are frequently flooded for long duration or very long duration during the growing season that:
   A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
   B. Show evidence that the soil meets the definition of a hydric soil;

Hydric Condition: Food Security Act information regarding the ability to grow a commodity crop without removing woody vegetation or manipulating hydrology.

References:
Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
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Federal Register. July 13, 1994. Changes in hydric soils of the United States.
Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
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Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.
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Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

Report—Hydric Soils

Hydric Soils–Kern County, California, Southeastern Part				
Map symbol and map unit name	**Component**	**Percent of map unit**	**Landform**	**Hydric criteria**
211—Xerorthents-Rock outcrop complex, very steep				
	Unnamed, wet	1	Drainageways	2

Data Source Information

Soil Survey Area: Kern County, California, Southeastern Part
Survey Area Data: Version 8, Sep 11, 2017

Hydric Soil List - All Components

This table lists the map unit components and their hydric status in the survey area. This list can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council, 1995; Hurt and others, 2002).

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others, 1979; U.S. Army Corps of Engineers, 1987; National Research Council, 1995; Tiner, 1985). Criteria for all of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

Map units that are dominantly made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units dominantly made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

The criteria for hydric soils are represented by codes in the table (for example, 2). Definitions for the codes are as follows:

1. All Histels except for Folistels, and Histosols except for Folists.
2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Historthels great group, Histoturbels great group, Pachic subgroups, or Cumulic subgroups that:
   A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
   B. Show evidence that the soil meets the definition of a hydric soil;
3. Soils that are frequently ponded for long or very long duration during the growing season.
   A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
   B. Show evidence that the soil meets the definition of a hydric soil;
4. Map unit components that are frequently flooded for long duration or very long duration during the growing season that:
   A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
   B. Show evidence that the soil meets the definition of a hydric soil;

Hydric Condition: Food Security Act information regarding the ability to grow a commodity crop without removing woody vegetation or manipulating hydrology.

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. Doc. 2012-4733 Filed 2-28-12. February, 28, 2012. Hydric soils of the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Vasilas, L.M., G.W. Hurt, and C.V. Noble, editors. Version 7.0, 2010. Field indicators of hydric soils in the United States.

Report—Hydric Soil List - All Components

Hydric Soil List - All Components–CA670-Kern County, California, Southeastern Part					
Map symbol and map unit name	**Component/Local Phase**	**Comp. pct.**	**Landform**	**Hydric status**	**Hydric criteria met (code)**
104: Arizo gravelly loamy sand, 2 to 9 percent slopes	Arizo	85	Alluvial fans,flood plains	No	—
	Cajon	15	—	No	—
105: Arujo sandy loam, 9 to 15 percent slopes	Arujo	85	Hillslopes,mountain slopes	No	—
	Walong	5	—	No	—
	Tunis	5	—	No	—
114: Cajon loamy sand, 0 to 5 percent slopes	Cajon	85	Alluvial fans,flood plains	No	—
	Arizo	3	—	No	—
	Garlock	3	—	No	—
	Neuralia	3	—	No	—
	DeStazo	3	—	No	—
116: Cajon gravelly loamy sand, 0 to 9 percent slopes	Cajon	85	Alluvial fans,flood plains	No	—
	Arizo	10	—	No	—
	Garlock	5	—	No	—
124: Cinco gravelly loamy sand, 50 to 75 percent slopes	Cinco	85	Hills,mountains	No	—
	Rock outcrop	10	—	No	—
	Cinco-Gentler slopes	3	—	No	—
	Whitewolf	2	—	No	—
137: Garlock loamy sand, 2 to 9 percent slopes	Garlock	85	Terraces,alluvial fans	No	—
	Cajon	5	—	No	—
	Neuralia	5	—	No	—
143: Havala sandy loam, 9 to 15 percent slopes	Havala	85	Alluvial fans,terraces	No	—
	Steuber	10	—	No	—
	Havala	5	—	No	—
147: Hi Vista sandy loam, 2 to 9 percent slopes	Hi Vista	85	Rock pediments	No	—
	Arizo	5	—	No	—
	Cajon	5	—	No	—
	Muroc	5	—	No	—
150: Muroc sandy loam, 2 to 9 percent slopes	Muroc	85	Rock pediments	No	—
	Cajon	5	—	No	—

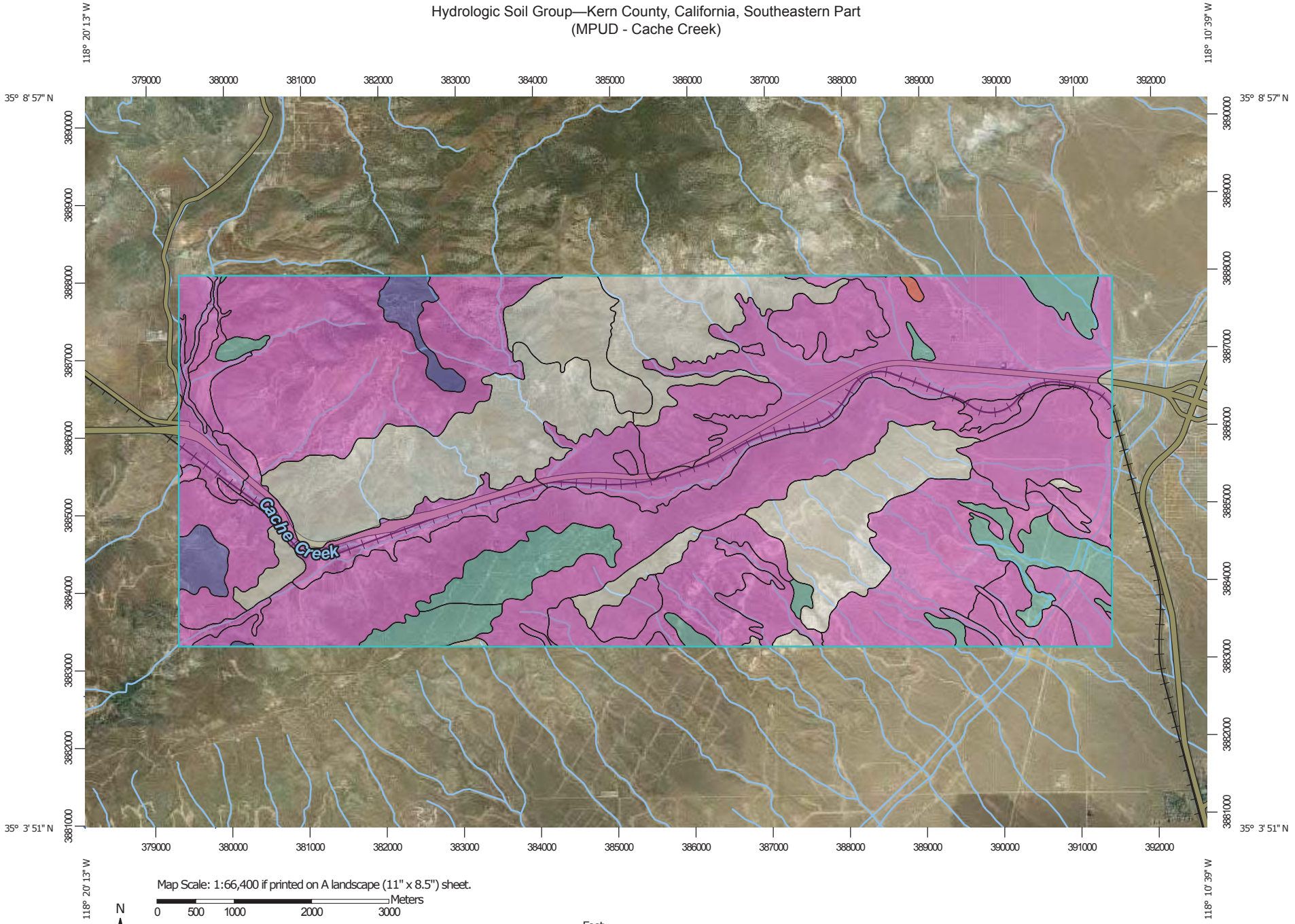
Hydric Soil List - All Components–CA670-Kern County, California, Southeastern Part					
Map symbol and map unit name	**Component/Local Phase**	**Comp. pct.**	**Landform**	**Hydric status**	**Hydric criteria met (code)**
	Hi Vista	4	—	No	—
	Randsburg	4	—	No	—
	Rock outcrop	1	—	No	—
	Muroc-Deep hardpan	1	—	No	—
156: Pajuela-Whitewolf association, steep	Pajuela	60	Stream terraces	No	—
	Whitewolf	35	Stream terraces	No	—
	Wasioja	3	—	No	—
	Unnamed-Very gravelly scl	2	—	No	—
157: Pits	Pits	100	—	No	—
165: Psamments-Xerolls complex, nearly level	Psamments	50	Drainageways	No	—
	Xerolls	30	Drainageways	No	—
	Unnamed-Clayey texture	5	—	No	—
174: Steuber sandy loam, 0 to 2 percent slopes	Steuber	85	Alluvial fans,flood plains	No	—
	Havala	5	—	No	—
	Tujunga	5	—	No	—
176: Steuber sandy loam, 5 to 9 percent slopes	Steuber	85	Alluvial fans,flood plains	No	—
	Havala	10	—	No	—
185: Torriorthents-Rock outcrop complex, very steep	Torriorthents	50	Mountains,hills	No	—
	Rock outcrop	30	Hills,mountains	No	—
	Unnamed-Gravelly to stony surface	5	—	No	—
	Unnamed-Soils on gentler slopes	5	—	No	—
186: Tujunga loamy sand, 2 to 5 percent slopes	Tujunga	85	Alluvial fans,flood plains	No	—
	Steuber	10	—	No	—
	Tujunga-Sandy loam overwash	5	—	No	—
193: Walong sandy loam, 15 to 30 percent slopes	Walong	65	Mountains,hills	No	—
	Walong-Deep to bedrock	20	Hills,mountains	No	—
	Arujo	5	—	No	—
	Tunis	5	—	No	—
	Rock outcrop	5	—	No	—

Hydric Soil List - All Components–CA670-Kern County, California, Southeastern Part					
Map symbol and map unit name	**Component/Local Phase**	**Comp. pct.**	**Landform**	**Hydric status**	**Hydric criteria met (code)**
195: Walong-Arujo sandy loams, 15 to 30 percent slopes	Walong	50	Mountains,hills	No	—
	Arujo	30	Hillslopes,mountain slopes	No	—
	Friant	7	—	No	—
	Tunis	7	—	No	—
	Arujo-Shallow to bedrock	6	—	No	—
196: Walong-Arujo sandy loams, 30 to 50 percent slopes	Walong	45	Hills,mountains	No	—
	Arujo	30	Mountain slopes,hillslopes	No	—
	Anaverde	9	—	No	—
	Rescue variant	8	—	No	—
204: Whitewolf loamy sand, cool, 2 to 5 percent slopes	Whitewolf	85	Alluvial fans,flood plains	No	—
	Whitewolf-Gravelly	5	—	No	—
206: Xeric Torriorthents, very steep	Xeric Torriorthents	85	Hills,mountains	No	—
	Rock outcrop	5	—	No	—
208: Xerolls-Rock outcrop complex, very steep	Xerolls	50	Hills,mountains	No	—
	Rock outcrop	30	Hills,mountains	No	—
	Rock outcrop-Steeper slopes	10	—	No	—
211: Xerorthents-Rock outcrop complex, very steep	Xerorthents	50	Mountain slopes,hillslopes	No	—
	Rock outcrop	30	Hills,mountain slopes	No	—
	Xerorthents-Deep	10	Mountain slopes,hillslopes	No	—
	Unnamed-Moist	8	Hillslopes,mountain slopes	No	—
	Unnamed-Flooded	1	Drainageways	No	—
	Unnamed-Wet	1	Drainageways	Yes	2

Data Source Information

Soil Survey Area: Kern County, California, Southeastern Part
Survey Area Data: Version 8, Sep 11, 2017

Hydrologic Soil Group—Kern County, California, Southeastern Part
(MPUD - Cache Creek)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Lines

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Points

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kern County, California, Southeastern Part
Survey Area Data: Version 8, Sep 11, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 3, 2014—Mar 6, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
104	Arizo gravelly loamy sand, 2 to 9 percent slopes	A	1,898.0	13.2%
105	Arujo sandy loam, 9 to 15 percent slopes	C	162.4	1.1%
114	Cajon loamy sand, 0 to 5 percent slopes	A	771.1	5.4%
116	Cajon gravelly loamy sand, 0 to 9 percent slopes	A	416.5	2.9%
124	Cinco gravelly loamy sand, 50 to 75 percent slopes	A	4,026.3	28.1%
137	Garlock loamy sand, 2 to 9 percent slopes	C	473.4	3.3%
143	Havala sandy loam, 9 to 15 percent slopes	C	34.4	0.2%
147	Hi Vista sandy loam, 2 to 9 percent slopes	C	310.9	2.2%
150	Muroc sandy loam, 2 to 9 percent slopes	D	13.7	0.1%
156	Pajuela-Whitewolf association, steep	A	1,880.5	13.1%
157	Pits		8.2	0.1%
165	Psamments-Xerolls complex, nearly level	A	62.8	0.4%
174	Steuber sandy loam, 0 to 2 percent slopes	A	245.5	1.7%
176	Steuber sandy loam, 5 to 9 percent slopes	A	8.7	0.1%
185	Torriorthents-Rock outcrop complex, very steep		1,564.2	10.9%
186	Tujunga loamy sand, 2 to 5 percent slopes	A	85.6	0.6%
193	Walong sandy loam, 15 to 30 percent slopes	B	139.7	1.0%
195	Walong-Arujo sandy loams, 15 to 30 percent slopes	B	116.2	0.8%
196	Walong-Arujo sandy loams, 30 to 50 percent slopes	B	0.1	0.0%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
204	Whitewolf loamy sand, cool, 2 to 5 percent slopes	A	420.4	2.9%
206	Xeric Torriorthents, very steep		1,294.3	9.0%
208	Xerolls-Rock outcrop complex, very steep		401.1	2.8%
211	Xerorthents-Rock outcrop complex, very steep	D	1.5	0.0%
Totals for Area of Interest			**14,335.6**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

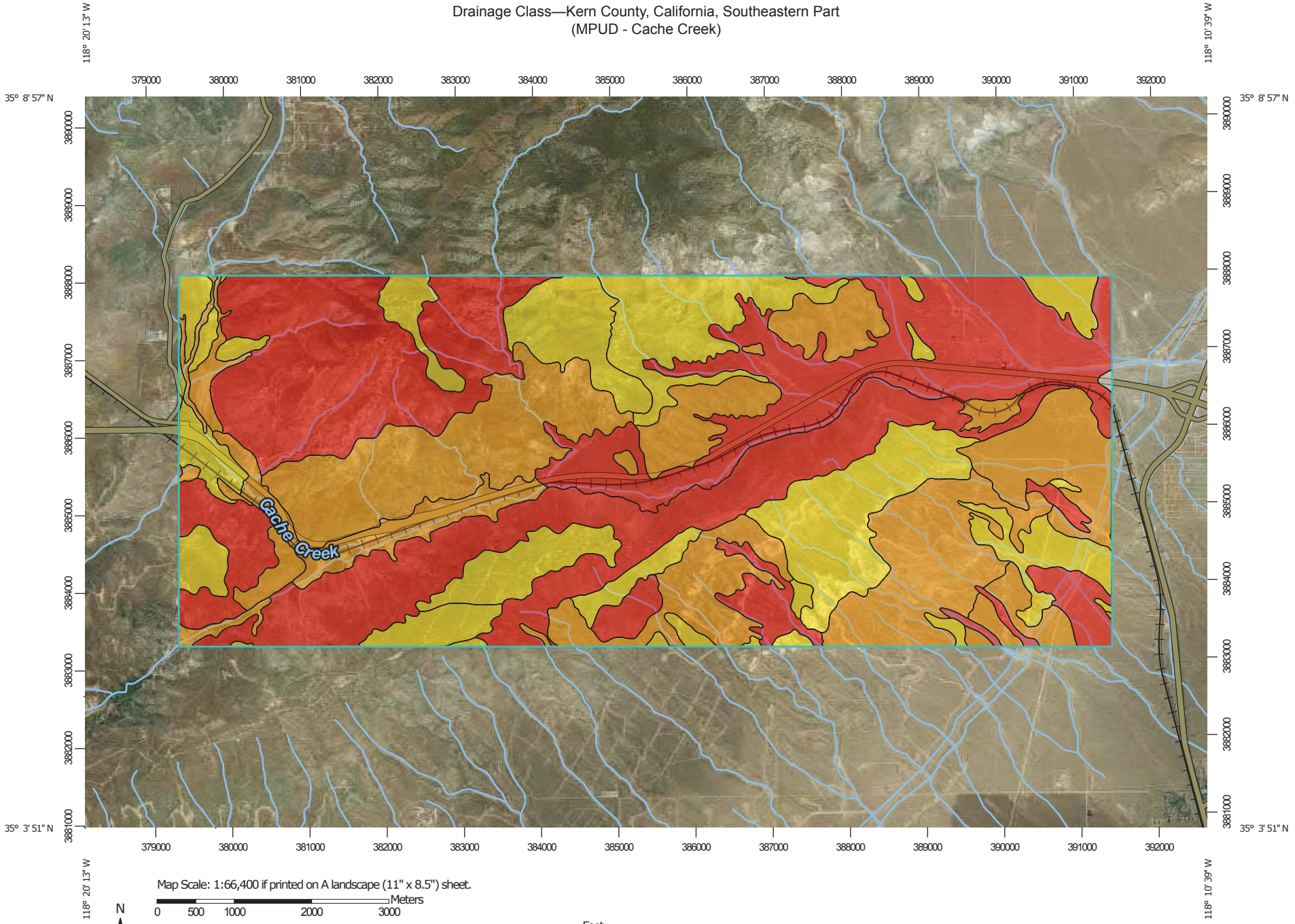
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Drainage Class—Kern County, California, Southeastern Part
(MPUD - Cache Creek)



Map Scale: 1:66,400 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 500 1000 2000 3000

Feet
0 3000 6000 12000 18000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Soil Rating Lines

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Soil Rating Points

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kern County, California, Southeastern Part
Survey Area Data: Version 8, Sep 11, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 3, 2014—Mar 6, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Drainage Class

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
104	Arizo gravelly loamy sand, 2 to 9 percent slopes	Excessively drained	1,898.0	13.2%
105	Arujo sandy loam, 9 to 15 percent slopes	Well drained	162.4	1.1%
114	Cajon loamy sand, 0 to 5 percent slopes	Somewhat excessively drained	771.1	5.4%
116	Cajon gravelly loamy sand, 0 to 9 percent slopes	Excessively drained	416.5	2.9%
124	Cinco gravelly loamy sand, 50 to 75 percent slopes	Excessively drained	4,026.3	28.1%
137	Garlock loamy sand, 2 to 9 percent slopes	Well drained	473.4	3.3%
143	Havala sandy loam, 9 to 15 percent slopes	Well drained	34.4	0.2%
147	Hi Vista sandy loam, 2 to 9 percent slopes	Well drained	310.9	2.2%
150	Muroc sandy loam, 2 to 9 percent slopes	Well drained	13.7	0.1%
156	Pajuela-Whitewolf association, steep	Somewhat excessively drained	1,880.5	13.1%
157	Pits		8.2	0.1%
165	Psamments-Xerolls complex, nearly level	Somewhat excessively drained	62.8	0.4%
174	Steuber sandy loam, 0 to 2 percent slopes	Well drained	245.5	1.7%
176	Steuber sandy loam, 5 to 9 percent slopes	Well drained	8.7	0.1%
185	Torriorthents-Rock outcrop complex, very steep	Well drained	1,564.2	10.9%
186	Tujunga loamy sand, 2 to 5 percent slopes	Somewhat excessively drained	85.6	0.6%
193	Walong sandy loam, 15 to 30 percent slopes	Well drained	139.7	1.0%
195	Walong-Arujo sandy loams, 15 to 30 percent slopes	Well drained	116.2	0.8%
196	Walong-Arujo sandy loams, 30 to 50 percent slopes	Well drained	0.1	0.0%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
204	Whitewolf loamy sand, cool, 2 to 5 percent slopes	Somewhat excessively drained	420.4	2.9%
206	Xeric Torriorthents, very steep	Somewhat excessively drained	1,294.3	9.0%
208	Xerolls-Rock outcrop complex, very steep	Well drained	401.1	2.8%
211	Xerorthents-Rock outcrop complex, very steep	Well drained	1.5	0.0%
Totals for Area of Interest			**14,335.6**	**100.0%**

Description

"Drainage class (natural)" refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized-excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."

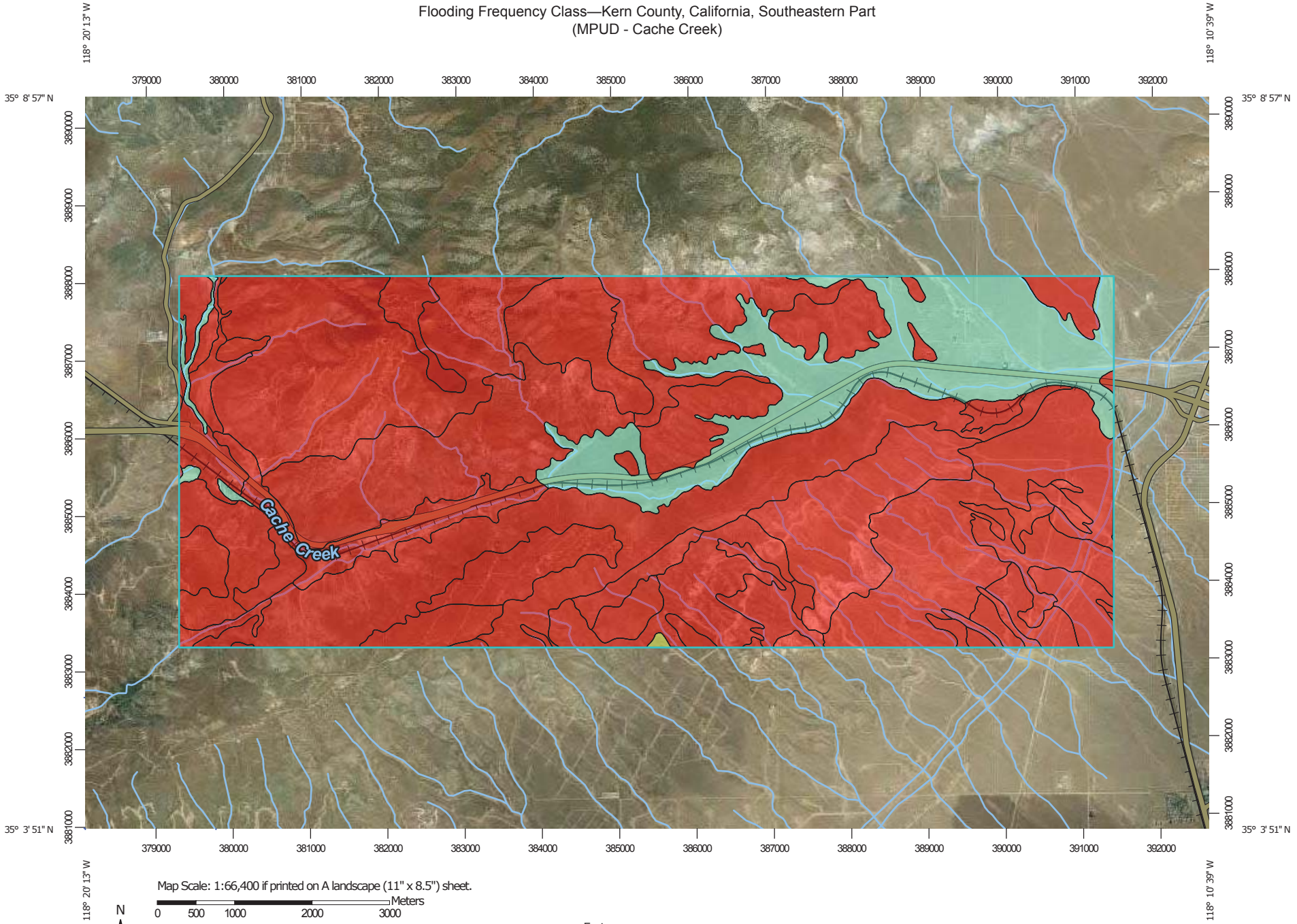
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Flooding Frequency Class—Kern County, California, Southeastern Part
(MPUD - Cache Creek)



Map Scale: 1:66,400 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 500 1000 2000 3000

Feet
0 3000 6000 12000 18000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- None
- Very Rare
- Rare
- Occasional
- Frequent
- Very Frequent
- Not rated or not available

Soil Rating Lines
- None
- Very Rare
- Rare
- Occasional
- Frequent
- Very Frequent
- Not rated or not available

Soil Rating Points
- None
- Very Rare
- Rare
- Occasional
- Frequent
- Very Frequent
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kern County, California, Southeastern Part
Survey Area Data: Version 8, Sep 11, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 3, 2014—Mar 6, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Flooding Frequency Class

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
104	Arizo gravelly loamy sand, 2 to 9 percent slopes	Occasional	1,898.0	13.2%
105	Arujo sandy loam, 9 to 15 percent slopes	None	162.4	1.1%
114	Cajon loamy sand, 0 to 5 percent slopes	None	771.1	5.4%
116	Cajon gravelly loamy sand, 0 to 9 percent slopes	None	416.5	2.9%
124	Cinco gravelly loamy sand, 50 to 75 percent slopes	None	4,026.3	28.1%
137	Garlock loamy sand, 2 to 9 percent slopes	None	473.4	3.3%
143	Havala sandy loam, 9 to 15 percent slopes	None	34.4	0.2%
147	Hi Vista sandy loam, 2 to 9 percent slopes	None	310.9	2.2%
150	Muroc sandy loam, 2 to 9 percent slopes	None	13.7	0.1%
156	Pajuela-Whitewolf association, steep	None	1,880.5	13.1%
157	Pits	None	8.2	0.1%
165	Psamments-Xerolls complex, nearly level	Occasional	62.8	0.4%
174	Steuber sandy loam, 0 to 2 percent slopes	None	245.5	1.7%
176	Steuber sandy loam, 5 to 9 percent slopes	Rare	8.7	0.1%
185	Torriorthents-Rock outcrop complex, very steep	None	1,564.2	10.9%
186	Tujunga loamy sand, 2 to 5 percent slopes	None	85.6	0.6%
193	Walong sandy loam, 15 to 30 percent slopes	None	139.7	1.0%
195	Walong-Arujo sandy loams, 15 to 30 percent slopes	None	116.2	0.8%
196	Walong-Arujo sandy loams, 30 to 50 percent slopes	None	0.1	0.0%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
204	Whitewolf loamy sand, cool, 2 to 5 percent slopes	None	420.4	2.9%
206	Xeric Torriorthents, very steep	None	1,294.3	9.0%
208	Xerolls-Rock outcrop complex, very steep	None	401.1	2.8%
211	Xerorthents-Rock outcrop complex, very steep	None	1.5	0.0%
Totals for Area of Interest			**14,335.6**	**100.0%**

Description

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent.

"None" means that flooding is not probable. The chance of flooding is nearly 0 percent in any year. Flooding occurs less than once in 500 years.

"Very rare" means that flooding is very unlikely but possible under extremely unusual weather conditions. The chance of flooding is less than 1 percent in any year.

"Rare" means that flooding is unlikely but possible under unusual weather conditions. The chance of flooding is 1 to 5 percent in any year.

"Occasional" means that flooding occurs infrequently under normal weather conditions. The chance of flooding is 5 to 50 percent in any year.

"Frequent" means that flooding is likely to occur often under normal weather conditions. The chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year.

"Very frequent" means that flooding is likely to occur very often under normal weather conditions. The chance of flooding is more than 50 percent in all months of any year.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: More Frequent

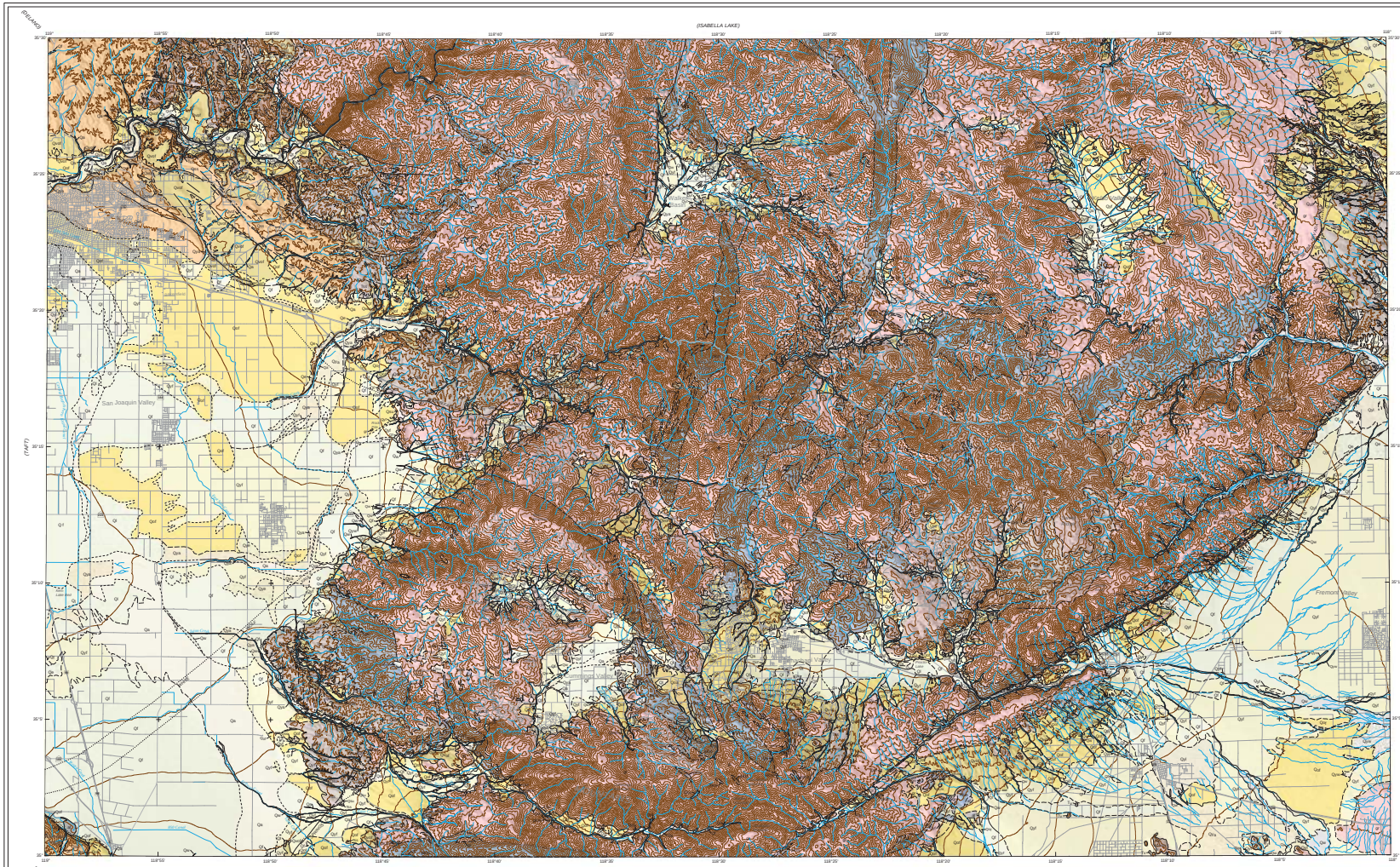
Beginning Month: January

Ending Month: December

Appendix H

(1) Geologic Map;

(2) Hwy 58 Flood of 2015



GEOLOGIC MAP OF QUATERNARY SURFICIAL DEPOSITS IN SOUTHERN CALIFORNIA
TEHACHAPI 30' X 60' QUADRANGLE

A Project for the Department of Water Resources by the California Geological Survey

by

Clifton W. Davenport, CEG, Timothy E. Dawson, PG, Wayne D. Haydon, CEG and Cheryl A. Hayhurst, PG

Digital preparation by

Solomon McCrea and Shannon Utley

December 2011

Projection: Universal Transverse Mercator, Zone 11 North, North American Datum of 1983.

Topographic contours derived from USGS 1/3 sec-second National Elevation Dataset (NED). Shaded topographic relief derived from USGS 1 arc-second NED. Base map of hydrography from National Hydrography Dataset Plus (NHDPlus) and California Department of Fish and Game. Base map of geographic names from USGS Geographic Names Information System (GNIS).

APPROXIMATE MEAN DECLINATION, 2011

MAP LOCATION

MAP EXPLANATION

This map of Quaternary surficial deposits of the Tehachapi 30' x 60' quadrangle was created by the California Geological Survey (CGS) for the Department of Water Resources (DWR) to assist in identifying where flooding and deposition of sediment occurred in the geologically recent past. The focus of this project is on Quaternary (Q) surficial deposits (less than 1.8 million years) on alluvial fans, floodplains, and basins where such deposits are subject to a number of geologic hazards including flooding, amplification of seismic shaking, liquefaction, and collapsible soils. In general, areas of most recent deposition during Late Holocene time (within the last 500 years) have a greater potential to be areas of future flooding and deposition than those underlain by older surficial deposits.

Project Overview

The Tehachapi 30' x 60' quadrangle represents one of several 100,000 scale quadrangles included in the detailed Geographic Information System (GIS) based geologic data set compiled by CGS from recent high resolution geologic mapping available for southern and central California. The GIS database merges more than 1400 geologic units from source maps published primarily by the U.S. Geological Survey (USGS) and by CGS (Source GIS Database) into a common format that depicts 40 derivative categories of surficial deposits and bedrock for the entire area (Derivative GIS Database). Because published source geologic mapping at the 100,000 scale was not available for the Tehachapi quadrangle, CGS used the derivative map units as a basis for new Quaternary mapping within the quadrangle. Quaternary surficial deposits are divided into 28 categories modified from the methodology of Matti and Cossette (2007), the Southern California Areal Mapping Project (SCAMP, 2000), and the USGS and CGS (2003). While specific variations in age and physical properties exist within each unit, CGS retained the basic premise of Matti and Cossette (2007) that surficial deposits within each of the Quaternary map units formed during a particular range of geologic time, have a similar origin, and have generally similar physical properties. Within the 28 Quaternary surficial units, progressively older surficial deposits are typically better consolidated and more highly dissected by erosion, have more developed and/or eroded soil profiles with stronger degrees of weathering and surface armoring, and occupy a higher topographic position within alluvial fan and floodplain terrains. Geologic bedrock formations are divided into 12 categories, based on age and rock type. The bedrock categories can be used to aid in a general understanding of the relative erodibility of the upland materials and the general character of the derived sediments. CGS also rectified inconsistencies along the boundaries of mapped areas to create a seamless Derivative GIS Database with other 30' x 60' quadrangles previously compiled under CGS Special Report 217. Correlation of equivalent deposits across the whole southern California project area is represented in the GIS table entitled Correlation of Derivative and Source Geologic Map Units.

Tehachapi Quadrangle

The Tehachapi quadrangle consists primarily of fault bound mountain ranges bordered by extensive alluvial fans and floodplains. Several large interior basins are also underlain by large alluvial fans and floodplains. The western portion of the quadrangle contains Quaternary age alluvial fan and floodplain sediments associated with the Kern River, Caliente Creek, Tunis/El Paso Creek and Tejon Creek drainage systems. As these drainages flow westward into the San Joaquin Valley, they form a series of early Pleistocene to late Holocene age alluvial fan and wash deposits in the vicinity of, and upstream from, the communities of Arvin and Bakersfield. Typically, the more recent Holocene age deposits are adjacent to the major drainages while the older Pleistocene age alluvial fans are located along the topographically higher margins of the valleys. Isolated remnants of the early Pleistocene fan deposits occupy the tops of numerous side ridges along many of the drainages (Barrow, 1984). Other Holocene deposits within the western portion of the quadrangle include wind-blown sands and lake bed deposits. Sand dunes are present in two places south of Arvin, between Caliente Creek and Tejon Creek. Lake bed deposits are present near the Kern Lake Bed and to the north along the western edge of the quadrangle. Late Tertiary to early Quaternary age non-marine rocks are also present along the northwest edge of the quadrangle, while pre-Quaternary sedimentary, granitic, volcanic, and metamorphic rocks of the southern Sierra Nevada and the Tehachapi Mountains form the majority of the central and eastern portions of the Tehachapi quadrangle. Several medium to large internal basins within the mountains are underlain by extensive Quaternary alluvial fan, lakebed, and wash deposits in the vicinity of Cummings Valley, Bear Valley, Tehachapi Valley, Kelso Valley, and Walker Basin. In places, the constrained nature of the basins contributes to variations in alluvial fan morphology and shapes characteristic of the typical alluvial fan profile. Large alluvial fans and floodplains containing Holocene age lake bed, eolian, and wash deposits are also present in the desert terrain of the Fremont Valley, in the southeast corner of the quadrangle near Mojave, and along the far eastern edge of the quadrangle. Quaternary-age faults within the quadrangle include the White Wolf, Edison, and Springs faults along the western edge of the mountains; the Breckenridge Fault to the north near Walker Basin; and the Garlock and Sierra Nevada faults along the southeastern and eastern edges of the mountains, respectively. Displacements along these faults have gradually uplifted the mountains, causing deposition, uplift, and erosion of the older fans and providing gradient and source materials for the younger fans.

In preparing this map of the Tehachapi quadrangle, CGS used geologic source data from: Barlow (1981, 1984, 1986a, 1986b); Bartow and Dibblee (1981a, 1981b); Bartow and Doukas (1976a, 1976b); Dibblee and Chesterman (1953, 1959); Dibblee and Warne (1970); Dibblee and Louke (1970); Dibblee and Minch (2005, 2008); Smith (1964); soil surveys (USDA, 2009; Cole and others, 1945); and aerial photography compiled in digital format (Google Earth Pro, 2011; NAIP, 2009; ESRI, 2011) to aid in the mapping of Quaternary surficial deposits. Areas with older alluvial fans were identified as being moderately to extensively dissected, indicating their relative age compared to the younger fan systems. The youngest fans were recognized by their distinct geomorphic shape, topography, lack of dissection, and usually were located immediately adjacent to modern washes and downhill from a distinct hydrologic break-in-slope. In many locations such as the San Joaquin Valley and Cummings Valley, agriculture has masked alluvial fan, river and wash features, and recognition was therefore dependant on indirect observations (e.g., soil surveys, topographic maps and digital orthorectified quadrangles). Qau (Quaternary sediments, undifferentiated) was mapped throughout the quadrangle, typically in linear valleys underlain by fan and fluvial materials indistinguishable at the mapping scale, along fault zones, or in colluvium-filled valleys or bowl-shaped depressions. Quaternary faults were compiled from Smith (1983, 1984a, 1984b), Wills (1989), California Division of Mines and Geology (1976, 1985a, 1985b, 1990), USGS and CGS (2011) and Bryant (2005). Quaternary surficial deposits are represented on this map by 20 of the 28 generalized project derivative units. Bedrock geology and faults were compiled primarily from Ross (1989) and Bartow (1984). Bedrock units identified in the study area are represented on this map by 6 of the 12 project derivative bedrock units (see Map Units and Correlation of Map Units).

This map, along with others in the Geologic Compilation of Quaternary Surficial Deposits in Southern California Derivative GIS Database, is regional in nature and should not be used as a substitute for detailed geologic studies in any specific area. It is intended only for rapid identification of areas subject to previous and potential future flooding and other geologic hazards on alluvial fans and floodplains.

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MAP UNITS

Late Holocene (Surficial Deposits)

af – **Artificial Fill** - deposits of fill resulting from human construction, mining, or quarrying activities; includes engineered fill for buildings, roads, dams, airport runways, harbor facilities, and waste landfills

Qou – **Undifferentiated Surficial Deposits** - includes colluvium, slope wash, talus deposits, and other surface deposits of all ages; generally unconsolidated but locally may contain consolidated layers

Qls – **Landslide Deposits** - may include debris flows and older landslides of various earth material and movement types; unconsolidated to moderately well-consolidated

Qw – **Alluvial Wash Deposits** - unconsolidated sandy and gravelly sediment deposited in recently active channels of streams and rivers; may contain loose to moderately loose sand and silty sand

Qf – **Alluvial Fan Deposits** - unconsolidated boulders, cobbles, gravel, sand, and silt recently deposited where a stream emerges from a confined valley or canyon; typically deposited in a fan-shaped cone; generally sediment generally more dominant than sandy sediment

Qva – **Alluvial Valley Deposits** - unconsolidated clay, silt, sand, and gravel recently deposited parallel to localized stream valleys and/or spread more regionally onto alluvial flats of larger river valleys; sandy sediment generally more dominant than gravelly sediment

Qt – **Terrace Deposits** - includes marine and stream terrace deposits; marine deposits include slightly to moderately consolidated and bedded gravel and conglomerate, sand and sandstone, and silt and siltstone; river terrace deposits consist of unconsolidated thin- to thick-bedded gravel

Q – **Lacustrine, Playa, and Estuarine (Paralic) Deposits** - mostly unconsolidated fine-grained sand, silt, mud, and clay from fresh water (lacustrine) lakes, saline (playa) dry lakes that are periodically flooded, and estuarine; deposits may contain salt and other evaporites

Qe – **Eolian and Dune Deposits** - unconsolidated, generally well-sorted wind-blown sand; may occur as dune forms or sheet sand

Holocene to Late Pleistocene (Surficial Deposits)

Young Alluvial Wash Deposits - unconsolidated to slightly consolidated, undissected to slightly dissected sandy and gravelly stream bed sediments in marginal parts of active and recently active washes and river channels

Qyf – **Young Alluvial Fan Deposits** - unconsolidated to slightly consolidated, undissected to slightly dissected boulder, cobble, gravel, sand, and silt deposits issued from a confined valley or canyon

Qyv – **Young Alluvial Valley Deposits** - unconsolidated to slightly consolidated, undissected to slightly dissected clay, silt, sand, and gravel along stream valleys and alluvial flats of larger rivers

Qyt – **Young Terrace Deposits** - unconsolidated to slightly consolidated, undissected to slightly dissected marine and stream terrace deposits

Qyl – **Young Lacustrine, Playa, and Estuarine (Paralic) Deposits** - unconsolidated to slightly consolidated, undissected to slightly dissected fine-grained sand, silt, mud and clay from lake, playa, and estuarine deposits of various types

Qye – **Young Eolian and Dune Deposits** - unconsolidated to slightly consolidated, undissected to slightly dissected wind-blown sands

Late to Middle Pleistocene (Surficial Deposits)

Old Alluvial Wash Deposits - slightly to moderately consolidated, moderately dissected sand and gravel; typically elevated above modern washes

Qof – **Old Alluvial Fan Deposits** - slightly to moderately consolidated, moderately dissected boulder, cobble, gravel, sand, and silt deposits issued from a confined valley or canyon

Qov – **Old Alluvial Valley Deposits** - slightly to moderately consolidated, moderately dissected clay, silt, sand, and gravel along stream valleys and alluvial flats of larger rivers

Qot – **Old Terrace Deposits** - slightly to moderately consolidated, moderately dissected marine and stream terrace deposits

Middle to Early Pleistocene (Surficial Deposits)

Qvof – **Very Old Alluvial Fan Deposits** - moderately to well-consolidated, highly dissected boulder, cobble, gravel, sand, and silt deposits issued from a confined valley or canyon

Quaternary (Bedrock)

Qm – **Coarse-grained formations of Pleistocene age and younger** - primarily sandstone and conglomerate

Tertiary (Bedrock)

Tcs – **Coarse-grained Tertiary age formations** - primarily sandstone and conglomerate

Tfs – **Fine-grained Tertiary age formations** - includes fine-grained sandstone, siltstone, mudstone, shale, siliceous and calcareous sediments

Tertiary age formations of volcanic origin

Mesozoic and Older (Bedrock)

pMzc – **Cretaceous and Pre-Cretaceous metamorphic formations of sedimentary and volcanic origin**

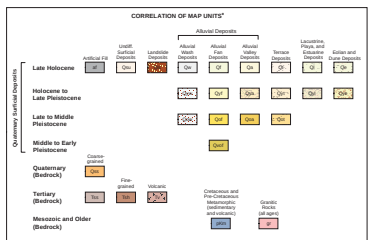
pGr – **Granitic and other intrusive crystalline rocks of all ages**

SYMBOL EXPLANATION

For geologic line symbols: lines are solid where location is accurate, long-dashed where location is approximate, short-dashed where location is inferred, dotted where location is concealed. Queries added where identity or existence may be questionable.

- Contact
- Gradational contact
- Fault – Includes strike-slip, normal, reverse, oblique, and unspecified slip
- Folds – Showing direction of plunge where appropriate
  - Anticline
  - Syncline
- Stream
- Spring
- Road
- County boundary

CORRELATION OF MAP UNITS*

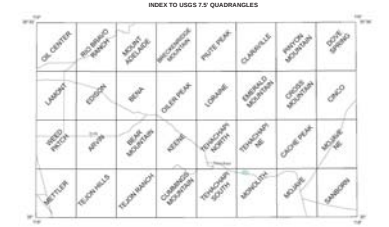


* Boundaries of Quaternary units are gradational and time transgressive in a regional sense.

SCALE 1:100,000

CONTOUR INTERVAL 50 METERS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

INDEX TO USGS 7.5' QUADRANGLES



www.conservation.ca.gov/cgs

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Information on this map is not sufficient to serve as a substitute for the geologic and geotechnical site investigations required under Chapters 7.5 and 7.8 of Division 2 of the California Public Resources Code.

GEOLOGIC MAP OF QUATERNARY SURFICIAL DEPOSITS IN SOUTHERN CALIFORNIA
TEHACHAPI 30' X 60' QUADRANGLE

A Project for the Department of Water Resources by the California Geological Survey

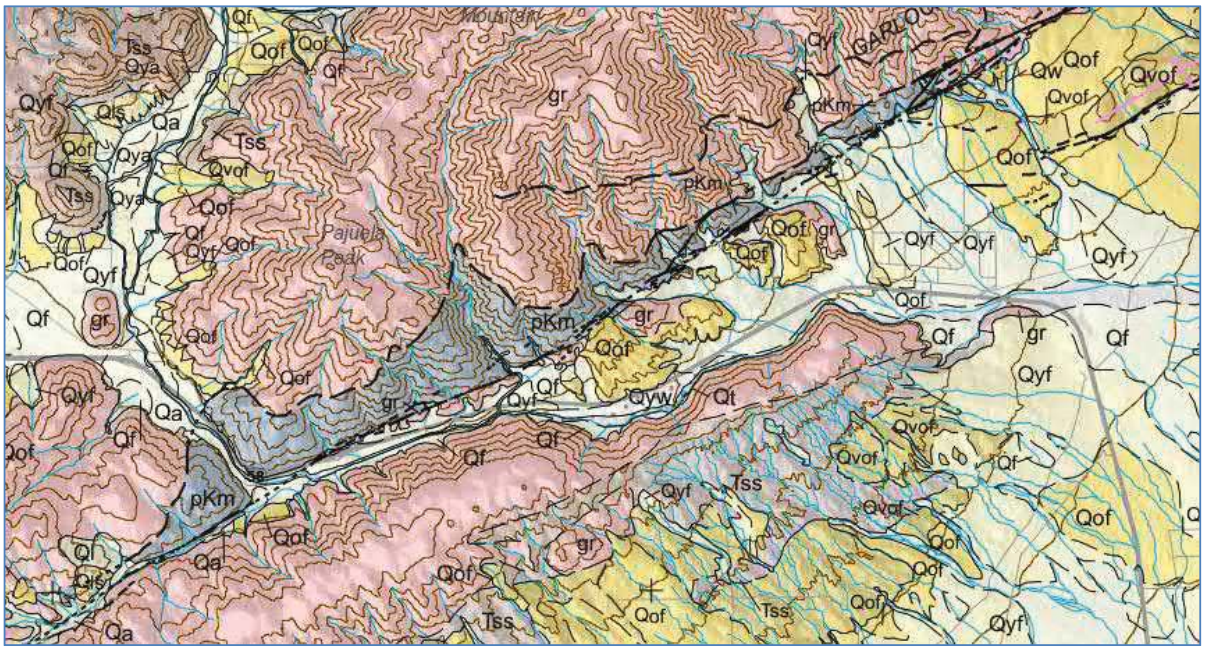
by

Clifton W. Davenport, CEG, Timothy E. Dawson, PG, Wayne D. Haydon, CEG and Cheryl A. Hayhurst, PG

Digital preparation by

Solomon McCrea and Shannon Utley

December 2011



MAP UNITS

Late Holocene (Surficial Deposits)

af — **Artificial Fill** - deposits of fill resulting from human construction, mining, or quarrying activities; includes engineered fill for buildings, roads, dams, airport runways, harbor facilities, and waste landfills

Qsu — **Undifferentiated Surficial Deposits** - includes colluvium, slope wash, talus deposits, and other surface deposits of all ages; generally unconsolidated but locally may contain consolidated layers

Qls — **Landslide Deposits** - may include debris flows and older landslides of various earth material and movement types; unconsolidated to moderately well-consolidated

Qw — **Alluvial Wash Deposits** - unconsolidated sandy and gravelly sediment deposited in recently active channels of streams and rivers; may contain loose to moderately loose sand and silty sand

Qf — **Alluvial Fan Deposits** - unconsolidated boulders, cobbles, gravel, sand, and silt recently deposited where a river or stream issues from a confined valley or canyon; sediment typically deposited in a fan-shaped cone; gravelly sediment generally more dominant than sandy sediment

Qa — **Alluvial Valley Deposits** - unconsolidated clay, silt, sand, and gravel recently deposited parallel to localized stream valleys and/or spread more regionally onto alluvial flats of larger river valleys; sandy sediment generally more dominant than gravelly sediment

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Qya — **Young Alluvial Valley Deposits** - unconsolidated to slightly consolidated, undissected to slightly dissected clay, silt, sand, and gravel along stream valleys and alluvial flats of larger rivers

Qyt — **Young Terrace Deposits** - unconsolidated to slightly consolidated, undissected to slightly dissected marine and stream terrace deposits

Qyl — **Young Lacustrine, Playa, and Estuarine (Paralic) Deposits** - unconsolidated to slightly consolidated, undissected to slightly dissected fine-grained sand, silt, mud and clay from lake, playa, and estuarine deposits of various types

Qye — **Young Eolian and Dune Deposits** - unconsolidated to slightly consolidated, undissected to slightly dissected wind-blown sands

Late to Middle Pleistocene (Surficial Deposits)

Qow — **Old Alluvial Wash Deposits** - slightly to moderately consolidated, moderately dissected sand and gravel; typically elevated above modern washes

Qof — **Old Alluvial Fan Deposits** - slightly to moderately consolidated, moderately dissected boulder, cobble, gravel, sand, and silt deposits issued from a confined valley or canyon

Qoa — **Old Alluvial Valley Deposits** - slightly to moderately consolidated, moderately dissected clay, silt, sand, and gravel along stream valleys and alluvial flats of larger rivers

Qot — **Old Terrace Deposits** - slightly to moderately consolidated, moderately dissected marine and stream terrace deposits

Middle to Early Pleistocene (Surficial Deposits)

Qvof — **Very Old Alluvial Fan Deposits** - moderately to well-consolidated, highly dissected boulder, cobble, gravel, sand, and silt deposits issued from a confined valley or canyon

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Tertiary (Bedrock)

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Tv — **Tertiary age formations of volcanic origin**

Mesozoic and Older (Bedrock)

pKm — **Cretaceous and Pre-Cretaceous metamorphic formations of sedimentary and volcanic origin**

gr — **Granitic and other intrusive crystalline rocks of all ages**

http://www.tehachapinews.com/news/tehachapi-mudslide-one-year-later/article_b48fb076-97bf-11e6-8dad-5fd80f3863b3.html

Tehachapi mudslide: one year later

BY J.W. BURCH IV jburch@tehachapinews.com Oct 21, 2016



The mudslide of 2015 stranded many vehicles along Highway 58.
Courtesy of the office of Supervisor Scrivner

A year after a massive mudslide buried two miles of Highway 58 for nearly a week, Caltrans crews are still working in the area to repair damage and strengthen infrastructure.

“It was a one-in-a-thousand-year event,” Caltrans District 9 Spokeswoman Florene Trainor said Friday.

Since the near catastrophic mudflow buried approximately two miles of Highway 58 between Highway 202 and Mojave last October, Caltrans crews have been working to repair damage.

“We have cleared thousands of cubic yards of mud, rock, debris and trees,” Trainor said.

A total of 190 vehicles, including 73 semi-trucks and two tour buses, were stuck in the mud on Oct. 15, 2015. The community came together to provide food for the workers through "The Mudslides Goodies Drive" and pilots flew stranded motorists between Tehachapi and Mojave.

All lanes were reopened nearly a week later, on the evening of Oct. 21.

“We were cut off from the free world for a couple days with everything that was going on,” Tehachapi Public Works Director Jon Curry said.

After the initial clean-up, which took nearly a week, the district spent approximately $2.5 million for ongoing projects.

Those projects aim to prevent such extensive damage if a mudslide should occur again.

“That whole section of the highway is a little bit low,” Trainor said. “The only way to ensure it wouldn't be effected is to build a bridge, which is far too expensive.”

Clogged culverts were cleared, flow lines were established and dykes were constructed “to help collect and divert water off highways” in the future.

Mountains have also been scaled to remove loose rocks to lessen the chance of debris.

“We obviously don't have a crystal ball and never know when this could happen again, but we do what we can to keep roadways clear and be prepared,” Trainor said.

The mudslide was the second largest disaster in the district's history, according to Trainor. The district covers eastern Kern County, as well as Inyo and Mono counties.

“The largest was a huge flood event in Mono County in the early '80s,” she said.

In his 20 years living in Tehachapi, Curry said, he “can't think of another time in my time here that we were isolated.”

Grocery store shelves began to empty and gas pumps started running dry, Curry said.

Curry said the department's role during the mudslide was to provide assistance.

“It's similar to what we do when there is a wildfire near,” Curry said. “We try to make sure when those resources are here and being used that we assist and don't just get in their way.”

In the past year, Curry said, public works crews have endeavored to “make sure our storm infrastructure can handle it” by removing trees and weeds from creeks and sumps in order to hold more water and ensure that pumps are operating correctly.

“We try to make sure our fuel is kept full, so the things we need to run like big equipment and back-up generators can be run,” Curry said. “It's really just a bigger version of what you should do at home.”

Indian Wells Valley Weather Blog - Weather stories for the Indian Wells Valley

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Tuesday, October 27, 2015

Highway 58 Flash Flood - Oct 2015

State Route 58 was closed on Thursday, October 15, 2015 due to a major mudslide located between Cameron Road overcrossing and post mile 166 at 6:07 pm. It was discovered that approximately 1 ½ miles of roadway was covered in 5-6 feet of mud. A total of 78 passenger vehicles, 2 buses, 36 trucks, 1 RV & 1 travel trailer were stuck in the mud. Emergency personnel were able to safely remove all travelers and move them to emergency shelters.

There were not any injuries or fatalities due to this mudslide on State Route 58. Caltrans removed up to 7,500 cubic yards of mud and debris equivalent to 23 full olympic-size swimming pools. The storm that hit the Tehachapi area was a 1,000-year event that triggered a flash flood that flowed down the canyons onto State Route 58.

This is the Radar of the storms that hit the area on Oct 15th 2015. Notice how the storms build around Lancaster, and head NNW towards the Lake Isabella area, but collapsed before reaching the lake. This path led the storms over the Mojave area, and caused the flash flood conditions that closed Highway 58.	

National Weather Service (NWS) Warnings:

Thursday, October 15, 2015

THE NATIONAL WEATHER SERVICE IN HANFORD CA HAS ISSUED A SEVERE THUNDERSTORM WARNING FOR SOUTHEASTERN KERN COUNTY IN CENTRAL CALIFORNIA...
* UNTIL 645 PM PDT
* AT 611 PM PDT...DOPPLER RADAR INDICATED A SEVERE THUNDERSTORM CAPABLE OF PRODUCING DAMAGING WINDS IN EXCESS OF 60 MPH. THIS STORM WAS LOCATED 14 MILES NORTH OF ROSAMOND...OR 26 MILES NORTH OF LANCASTER...AND MOVING NORTH AT 20 MPH.

* LOCATIONS IMPACTED INCLUDE...MOJAVE AND JAWBONE CANYON.

PRECAUTIONARY/PREPAREDNESS ACTIONS...
SEVERE THUNDERSTORMS PRODUCE DAMAGING WINDS...DESTRUCTIVE HAIL... DEADLY LIGHTNING AND VERY HEAVY RAIN. FOR YOUR PROTECTION...MOVE TO AN INTERIOR ROOM ON THE LOWEST FLOOR OF YOUR HOME OR BUSINESS. HEAVY RAINS FLOOD ROADS QUICKLY SO DO NOT DRIVE INTO AREAS WHERE WATER COVERS THE ROAD.

THE NATIONAL WEATHER SERVICE IN HANFORD CA HAS ISSUED A FLOOD WARNING FOR...CENTRAL KERN COUNTY IN CENTRAL CALIFORNIA...
* UNTIL 715 PM PDT
* AT 410 PM PDT...DOPPLER RADAR INDICATED AREAS OF THUNDERSTORMS PRODUCING HEAVY RAIN WHICH WILL CAUSE FLOODING.
* SOME LOCATIONS THAT WILL EXPERIENCE FLOODING INCLUDE...BAKERSFIELD...WASCO...ARVIN...SHAFTER...ROSAMOND...TEHACHAPI...TAFT...MARICOPA...WEEDPATCH...GOLDEN HILLS...ROSEDALE...VALLEY ACRES...SOUTH TAFT...EDWARDS AFB...LAMONT...METTLER...MCKITTRICK...STALLION SPRINGS...DUSTIN ACRES AND FORD CITY.

PRECAUTIONARY/PREPAREDNESS ACTIONS...
MOST FLOOD DEATHS OCCUR IN AUTOMOBILES. NEVER DRIVE YOUR VEHICLE INTO AREAS WHERE THE WATER COVERS THE ROADWAY. FLOOD WATERS ARE USUALLY DEEPER THAN THEY APPEAR. JUST ONE FOOT OF FLOWING WATER IS POWERFUL ENOUGH TO SWEEP VEHICLES OFF THE ROAD. WHEN ENCOUNTERING FLOODED ROADS MAKE THE SMART CHOICE...TURN AROUND...DONT DROWN.

EXCESSIVE RUNOFF FROM HEAVY RAINFALL WILL CAUSE FLOODING OF SMALL CREEKS AND STREAMS...HIGHWAYS AND UNDERPASSES IN URBAN AREAS. ADDITIONALLY...COUNTRY ROADS AND FARMLANDS ALONG THE BANKS OF CREEKS...STREAMS AND OTHER LOW LYING AREAS ARE SUBJECT TO FLOODING.



This is a map showing the area effected by the mudslide.







Posted by **Edward Czajka** at 3:31 PM on **Tuesday, October 27, 2015**

Email This BlogThis! Share to Twitter Share to Facebook Share to Pinterest

Labels: Flash Flood, Highway 58

http://iwvweather.blogspot.com/?_sm_au_=iVVvTstJ5NjftSjQ