

**FINAL**

# ENVIRONMENTAL ASSESSMENT

LCAD080-2013-071

## CALICO MINERAL EXPLORATION PROJECT SAN BERNARDINO COUNTY, CALIFORNIA

Prepared for:

Bureau of Land Management  
Barstow Field Office  
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**Section 1 Introduction/Purpose and Need.....1-1**

1.1 Introduction..... 1-1

1.2 Purpose and Need ..... 1-3

**Section 2 Description of the Alternatives .....2-6**

2.1 Alternative 1 – Proposed Action..... 2-6

2.1.1 Operational Elements of the Proposed Action (Tasks 1 and 2) ..... 2-7

2.1.2 Task 1 – Core Drilling and IP Geophysical Survey at the Mitchell/Lead Mountain Claim ..... 2-11

2.1.3 Task 2 – Core Drilling at the Lilly Claim ..... 2-12

2.1.4 Task 3 – Restoration/Reclamation of the Proposed Action ..... 2-12

2.2 Alternative 2 – No Action..... 2-14

**Section 3 Affected Environment.....3-15**

3.1 Field Surveys ..... 3-15

3.1.1 Biological Resources..... 3-15

3.1.2 Cultural Resources ..... 3-15

3.1.3 Paleontological Resources ..... 3-18

3.2 Geological resources..... 3-18

3.2.1 Geology and Seismicity ..... 3-19

3.2.2 Soils..... 3-19

3.2.3 Mineral Resources..... 3-20

3.3 Biology ..... 3-20

3.3.1 Vegetation ..... 3-20

3.3.2 Botanical Resources..... 3-21

3.3.3 Wildlife ..... 3-22

3.4 Hydrology ..... 3-26

3.4.1 Hydrological Setting ..... 3-26

3.5 Cultural Resources..... 3-27

3.6 Paleontology ..... 3-29

3.7 Recreation..... 3-29

3.8 Noise..... 3-31

3.8.1 Mitchell/Lead Mountain Area..... 3-31

3.8.2 Lilly Claims Area..... 3-31

3.9 Air Quality ..... 3-31

3.10 Visual Resources ..... 3-33

3.11 Livestock grazing..... 3-34

3.12 Traffic and Circulation ..... 3-34

3.12.1 Roadway Network..... 3-34

3.12.2 Mitchell/Lead Mountain Area Access ..... 3-35

3.12.3 Lilly Claims Area Access ..... 3-35

3.12.4 Railroad..... 3-35

3.12.5 Bicycle Routes and Pedestrian Circulation ..... 3-35

3.12.6 Airports ..... 3-35

3.13 Population and Housing..... 3-36

3.14 Environmental Justice..... 3-36

**Section 4 Environmental Impacts and Mitigation.....4-39**

4.1 Elements of the Environment ..... 4-39

4.1.1 Uses or Resources That Would Not Be Affected by the Proposed Action.....4-39

4.1.2 Uses or Resources That Are Present in the Project Area But Would Not Be Affected by the Proposed Action ..... 4-40

4.1.3 Uses or Resources That Are Present in the Project Area and May be Affected by the Proposed Action ..... 4-42

4.2 Cumulative Impacts ..... 4-52

4.2.1 Resources Not Present in Project Area and Not Affected by the Proposed Action..... 4-55

4.2.2 Resources Present in Project Area but Not Affected by the Proposed Action..... 4-55

4.2.3 Resources Present that May be Affected by the Proposed Action ..... 4-56

4.3 Residual Impacts..... 4-59

**Section 5 Consultation and Coordination.....5-1**

5.1 Consultation..... 5-1

5.2 List of Preparers and Reviewers ..... 5-1

5.2.1 Lead Agency - Bureau of Land Management, Barstow Field Office ..... 5-1

5.2.2 Consultant - URS ..... 5-1

5.2.3 Applicant - Calico ..... 5-2

**Section 6 References ..... 6-1**

### Tables

Table 1.1-1:	Calico Mining Claim Information
Table 1.1-2:	Proposed Temporary Access Routes
Table 2.1-1:	Proposed Action Temporary Disturbance
Table 2.1-2:	Equipment Required for Proposed Action
Table 3.1-1:	Previously Recorded Cultural Resources within the Project Area
Table 3.3-1:	Monthly Weather Conditions for Daggett-Barstow California, 2013.
Table 3.3-2:	Potential Sensitive Wildlife Species Occurring Within Project Area
Table 3.3-3:	Location of Active Desert Tortoise Burrows to Nearest Project Feature
Table 3.3-4:	Location of Burrowing Owl Burrows to Nearest Project Feature
Table 3.5-1:	Archaeological Sites in the Project Area
Table 3.7-1:	Primary Barstow Area Recreation Activities and Visit Counts, 2000 to 2002
Table 3.9-1:	Federal and State Attainment Status the Project Area
Table 3.9-2:	MDAQMD Federal Attainment Plans
Table 3.9-3:	General Conformity <i>De minimis</i> Emission Levels
Table 3.14-1:	Income and Poverty Level
Table 3.14-2:	Race Demographic Comparison
Table 3.14-3:	Hispanic or Latino Demographic Comparison
Table 4.1-1:	Estimated Project Emissions
Table 4.2-1:	Past, Present, and Reasonably Foreseeable Future Actions

### Figures

Figure 1-1	Proposed Action Mitchell/Lead Mountain Area
Figure 1-2	Proposed Action Lilly Claims Area
Figure 1-3	Site Vicinity Map
Figure 1-4	Public Land Survey System Overview
Figure 1-5	Multiple Use Classes
Figure 3.3-1	GPS Track Logs
Figure 3.3-2	Desert Tortoise Burrow Map
Figure 3.3-3	Desert Tortoise Carcass Map
Figure 3.3-4	Desert Tortoise Scat Map
Figure 3.3-5	Desert Tortoise Live Encounters
Figure 3.3-6	Burrowing Owl Burrow Map
Figure 3.4-1	Hydrologic Areas Mitchell/Lead Mountain Area and Lilly Claims Area
Figure 3.4-2	Surface Water Mitchell/Lead Mountain Area
Figure 3.4-3	Surface Water Lilly Claims Area
Figure 3.4-4	Groundwater Basins Mitchell/Lead Mountain Area and Lilly Claims Area

### Appendices

- Appendix A Spill Prevention Control Plan
- Appendix B Material Safety Data Sheets
- Appendix C Proof of Water Rights
- Appendix D Biological Resources Technical Report
- Appendix E Proposed Action Emissions Estimates

## List of Acronyms and Abbreviations

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303(d) List	Clean Water Act Section 303(d) List of Water Quality Limited Segments
6CA8	Depue Airport
afy	acre-feet per year
ACEC	Area of Critical Environmental Concern
APE	Area of Potential Effect
ARPA	Archaeological Resources Protection Act
ATV	All-Terrain Vehicle
BCC	Birds of Conservation Concern (USFWS)
BLM	Bureau of Land Management
BMPs	best management practices
BYS	Lake Army Airfield
CAAQS	California Ambient Air Quality Standard
Calico	Calico Exploration LLC
CCH	Consortium of California Herberia
CDCA	California Desert Conservation Area
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CGP	Construction General Permit
CH <sub>4</sub>	methane
Class C; L; M or I	Controlled (C), Limited (L), Moderate (M), or Intensive (I)
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CO	Carbon Monoxide
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> e	Carbon Dioxide Equivalent
CRHR	California Register of Historical Resources
DAG	Barstow-Daggett Municipal Airport
dBA	A-weighted decibel
DEHS	Division of Environmental Health Services
DM	Department Manual
DOF	Department of Finance
DOI	Department of the Interior
DPR	Department of Parks and Recreation
DWMA	Desert Wildlife Management Area
DWR	Department of Water Resources
EA	Environmental Assessment

## List of Acronyms and Abbreviations

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EDD	Employment Development Department
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FLPMA	Federal Land Policy Management Act
FMMP	Farmland Mapping and Monitoring Program
FT	Federally Threatened (Endangered Species Act)
FTA	Federal Transit Administration
GC	General Conformity
GHG	Greenhouse Gas
gpm	gallons per minute
GWP	Global Warming Potential
HA	Hydrologic Area
HUD	Housing and Urban Development
HVAC	heating, ventilating, and air conditioning
I-15	Interstate 15
I-40	Interstate 40
ID	identification
IP	induced polarization
L <sub>dn</sub>	Day-Night Sound Level
L <sub>eq</sub>	Equalized Sound Level
MCLB	United States Marine Corps Logistics Base
MBTA	Migratory Bird Treaty Act
MCLB	Marine Corps Logistics Base
MDAB	Mojave Desert Air Basin
MDAQMD	Mojave Desert Air Quality Management District
mph	miles per hour
MSDS	Material Safety Data Sheets
MTW	Machine Tool Wire
MUC	multiple use class
mya	million years ago
MWA	Mojave Water Agency
N <sub>2</sub> O	nitrous oxide
NAA	Non-Attainment Area
NAAQS	National Ambient Air Quality Standard

## List of Acronyms and Abbreviations

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NADB	National Archaeological Database
NAGPRA	Native American Graves Protection and Repatriation Act
NAHC	Native American Heritage Commission
NEPA	National Environmental Policy Act of 1969
NO <sub>x</sub>	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
O <sub>3</sub>	ozone
OHV	off-highway vehicle
PFYC	Potential Fossil Yield Classification
Plan	Plan of Operations
PM <sub>10</sub>	particulate matter
PM <sub>2.5</sub>	Fine Particulate Matter
Ppb	parts per billion
PSD	Prevention of Significant Deterioration
RCNM	Roadway Construction Noise Model
ROW	Right-of-Way
RV	recreational vehicle
RWQCB	Regional Water Quality Control Board
SBAIC	San Bernardino Archaeological Information Center
sf	square feet
SLF	Sacred Lands File
SMARA	Surface Mining and Reclamation Act of 1975
SO <sub>2</sub>	Sulfur Dioxide
SSC	Species of Special Concern (CDFW)
ST	State Threatened (California Endangered Species Act)
SVP	Society of Vertebrate Paleontology
SWRCB	State Water Resources Control Board
TCS	Total Corrected Sign
tpy	tons per year
U.S.	United States
URS	URS Corporation, Americas
USC	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	Volatile Organic Compounds

## **List of Acronyms and Abbreviations**

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VRI	Visual Resource Inventory
VRM	Visual Resources Management
WDR	Waste Discharge Requirements
WEMO	West Mojave Plan
WRCC	Western Regional Climate Center

**SECTION 1 INTRODUCTION/PURPOSE AND NEED****1.1 INTRODUCTION**

Calico Exploration LLC (Calico) has submitted a Plan of Operations (Plan) to the United States Department of the Interior (DOI) Bureau of Land Management (BLM), Barstow Field Office, for the Calico Mineral Exploration Project (Proposed Action). The Proposed Action would drill and collect samples from 10 different locations and perform an induced polarization (IP) geophysical survey. The Proposed Action would investigate the subsurface geology and mineralogy and the mineral value of the mineralized zone(s) known to exist in the area located in San Bernardino County, California. The Proposed Action was selected by Calico based on the development and evaluation of exploration alternatives suitable for mineral exploration in terms of yielding necessary subsurface geologic information and achieving compliance with BLM regulatory requirements. This Environmental Assessment (EA) is being prepared to assess the potential environmental impacts associated with the Proposed Action. The specific activities proposed in connection with the Proposed Action are described in this EA. The potential environmental impacts associated with a future mining operation would be assessed in a separate document prepared pursuant to the National Environmental Policy Act of 1969 (NEPA).

The BLM has determined that an EA is required to analyze and disclose the potential environmental and social consequences of conducting the Proposed Action. This EA has been prepared pursuant to the NEPA, Council on Environmental Quality (CEQ) implementing regulations (40 Code of Federal Regulations [CFR] 1500-1508), BLM’s surface-mining regulations (43 CFR 3802 and 3809), BLM NEPA Handbook (BLM Handbook H-1790-1), and DOI Department Manual (DM) Part 516: NEPA.

The Proposed Action is comprised of:

- drilling core holes at 10 different sites;
- collecting core samples for analysis;
- performing an IP geophysical survey; and
- temporary access roads.

**Background**

Calico may mine at the following locations in the future, as listed in Table 1.1-1.

**Table 1.1-1: Calico Mining Claim Information**

Claim Name	BLM Serial No.	Claim Type	Primary Commodity
Lilly 11-20	CAMC 290264 – CAMC 290273	Unpatented Lode	Silver
Calico 20	CAMC 302883	Unpatented Lode	Silver
Calico 127-130	CAMC 302990 – CAMC 302993	Unpatented Lode	Silver

The Proposed Action would be located on approximately 0.77 acres (rounded down from 0.772 acres; see Table 2.1-1) of undeveloped public land administered by the BLM located in the Superior-Cronese Desert

Wildlife Management Area (DWMA). The Proposed Action is a separate action from any future mining operation. The potential environmental impacts associated with a future mining operation project would be assessed in a separate document prepared pursuant to the NEPA.

The selection of the drilling sites was based on proximity to existing access roads and the ability to minimize potential impacts to the natural and human environment.

### ***Location***

The Proposed Action sites, as shown on Figures 1-1 and 1-2, are located from three to 12 miles northeast of the city of Barstow, in San Bernardino County, California. The Proposed Action would be located at the Mitchell/Lead Mountain Area and Lilly Claims Area.

The regional setting includes desert and mountain habitat to the north, east, and west and the Interstate 15 (I-15) freeway, Old Highway 58 (State Highway), and urban area (City of Barstow) to the southwest. The United States Marine Corps Logistics Base (MCLB), Barstow is located to the southeast. Calico Ghost town is located east and southeast of the Proposed Action. The Proposed Action is located in the southeast corner of the Superior-Cronese DWMA (Figure 1-3). There are historic signs of mining activity in the area.

The proposed core drilling, IP geophysical survey, and collecting of core samples would result in an approximate 0.77 acre area of temporary disturbance.

### ***Legal Description***

The legal description of the area for the Proposed Action is within San Bernardino County, California and is provided below. A map that depicts the township, range and sections is included as Figure 1-4.

The Proposed Action is located in Sections 23, 26, and 35, Township 10 North, Range 1 West and Section 8, Township 10 North, Range 1 East, San Bernardino Meridian in San Bernardino County, California. Hereafter, this area will be referred to as the Project Area.

### ***Existing Access Roads for Ingress and Egress to Proposed Action Sites***

The Project Area consists of public lands administered by the BLM and within the Superior-Cronese DWMA. The Proposed Action sites are located from three to 12 miles northeast of the City of Barstow, California. Access into the Project Area is via the Fort Irwin main access road (County right-of-way [ROW]) and various two track existing roads (Figures 1-1 and 1-2).

The Mitchell/Lead Mountain Area (approximately three miles northeast of Barstow) would be accessed from Old Highway 58 and Meadow Grove Road (existing dirt BLM "Open Route" MM7182) to BLM Open Routes MM7185 and MM7186 and approximately 429 feet of BLM Closed Route (Figure 1-1). The Lilly Claims Area would be accessed from Fort Irwin Road and existing dirt Open Routes CM7179 and CM7610 and approximately 5,554 feet of unspecified routes (Figure 1-2). Access to the Lilly Claims Area would cross a patented group of claims (APN 0517-251-05-0000) for which Calico has permission. This patented group of claims is shown on Figure 1-2.

Title 43 CFR Subpart 8341.1 states that the operation of off-road vehicles is permitted on those areas and trails designated as open to off-road vehicle use. Any person operating an off-road vehicle on those areas and trails designated as limited shall conform to all terms and conditions of the applicable designation

orders. Figures 1-1 and 1-2 indicate the route designations in the area of the Proposed Action. The Proposed Action would be accessed primarily on Open Routes. However, approximately 429 feet along a BLM Closed Route would be necessary to access three drilling locations (LM-1, LM-2, and LM-4). Additionally, the Proposed Action would require approximately 1,754 feet of cross-country travel on non-existent roads. Calico seeks permission from the BLM to use this portion of Closed Route and cross-country travel. Table 1 of the California Desert Conservation Area (CDCA) Plan indicates that in multiple-use class (MUC) Limited (L) access would be provided for mineral exploration and development (BLM 1980). Table 1.1-2 shows the length of BLM and proposed new temporary access routes. Portions of these new access routes would not be disturbed, as indicated in Section 2.1.2 and 2.1.3. See Section 3.8 (Recreation) and 3.13 (Traffic and Circulation), for additional discussion of motorized vehicle access in the Project Area.

**Table 1.1-2: Proposed Temporary Access Routes**

Road Type	Lilly Claims Area (linear feet)	Mitchel/Lead Mountain Area (linear feet)
BLM Open Route	6,210	20,605
BLM Closed Route	-	429
BLM Unspecified Route	5,554	1,298
Proposed Cross-Country Access	314	1,440

## 1.2 PURPOSE AND NEED

BLM's purpose for the Proposed Action is to provide Calico with legal access across public land managed by the BLM. The need for this action is established by the BLM's responsibility under the Federal Land Policy Management Act (FLPMA), Title III to respond to a request for a permit to conduct mineral exploration. The BLM will decide whether or not to grant the permit, and if so, under what terms and conditions.

Calico's purpose for the Proposed Action is to obtain geologic and mineralogic data from potential ore bodies to generate information for potential mining operations. The information would be used by Calico to determine the efficacy of mining at the Mitchell/Lead Mountain Area and Lilly Claims Area and to advance efforts to develop, construct, and operate a future mining operation. This EA examines potential effects the Proposed Action would have on the environment. The Proposed Action is independent from any BLM permit application for future mining operations, which would be the subject of a separate environmental analysis.

The information collected from the Proposed Action would be instrumental in supporting extraction of mining resources available in the Mojave Desert region of southern California. The BLM is committed to development of mineral resources in a manner which satisfies national and local needs and provides for economically and environmentally sound exploration, extraction, and reclamation processes. The BLM is committed to assure the availability of known mineral resource lands for exploration and development within the multiple-use management framework. The Proposed Action represents an opportunity for exploration of mineral resources within the CDCA, consistent with the CDCA Plan.

Under the General Mining Law of 1872 (May 10, 1872), as amended (30 United States Code [USC] 21-54), citizens of the United States or those intending to become citizens are provided the opportunity to explore for, discover, and purchase certain valuable mineral deposits on public domain lands in the United States. The law also set general standards and guidelines for “claiming” the mineral rights to minerals so “discovered.” Provisions are included to allow for local rules to be developed, consistent with Federal laws.

The proposed land use action is subject to and in conformance with the California Desert Conservation Area Management Plan of 1980 (as amended) (BLM 1980) (CDCA Plan of 1980) per Title 43 CFR 1610.5-3. Locatable mineral actions located within MUC-L are subject to Title 43 CFR 3809 Regulations and applicable State and local law. The Proposed Action is also subject to the March 2006 Record of Decision for adoption of the West Mojave Plan (BLM 2005), which resulted in a plan amendment to the CDCA Plan of 1980. Mining Plans of Operations must be reviewed for potential impacts on sensitive resources identified on lands in this class.

### ***Scope of this Environmental Analysis***

This EA examines the resources and locations that the Proposed Action could impact. As described in the Proposed Action, the subsurface exploration activities would include drilling up to three holes at each of the seven drill locations at the Mitchell/Lead Mountain Area, one hole at each of the three locations at the Lilly Claims Area, collecting core samples, and performing an IP geophysical survey. The maximum number of core holes at the 10 drill sites would be 24.

The subsurface exploration is independent from any permit application for mining operations. The authorization to conduct the Proposed Action establishes no right to development. Calico owns separate unpatented mining claims for the use of the land for future mining operations, which would be subject to a separate environmental analysis (see Table 1.1-1 for Calico’s mining claims).

The Proposed Action and a potential mining operation are not connected actions under CEQ NEPA regulations (40 CFR 1508.25) because the authorization of the Proposed Action does not automatically activate any mineral development project.

### ***Conformance with Land Use Plans***

All actions approved or authorized by the BLM must conform to the existing land use plan where one exists (43 CFR 1610.5-3 and 516 DM 11.5). A resource management action shall be specifically provided for in the plan, or if not specifically mentioned, shall be clearly consistent with the terms, conditions, and decisions of the approved plan or amendment (43 CFR 1601.0-5(b)).

The Proposed Action is subject to the 1980 CDCA Plan as amended. As part of 1976 FLPMA, the CDCA Plan was developed to guide land use management of BLM lands within this portion of California. The Proposed Action is entirely located on BLM-administered public lands in San Bernardino County, and is managed under the CDCA Plan, as amended (BLM 1980). Most of the lands administered under the CDCA Plan have been designated as one of four MUCs: Controlled (C), Limited (L), Moderate (M), or Intensive (I). The class designations govern the type and degree of development or management activities allowed within the boundaries of the classes, and must meet the guidelines given for that class.

The Proposed Action sites are located on land identified as MUC-L (Figure 1-5). Class L protects sensitive, natural, scenic, ecological, and cultural resource values. Public lands designated as Class L are managed to provide for generally lower-intensity, carefully controlled multiple use of resources, while

ensuring that sensitive values are not significantly diminished (BLM 1980). Mining activities are allowed in a Class L designation after NEPA requirements are met. Operations on mining claims are subject to the 43 CFR 3809 Regulations. BLM will review plans of operations for potential impacts on sensitive resources identified on lands in this class. The Proposed Action is a temporary use that would conform to the CDCA Plan after NEPA requirements are met.

The Proposed Action is located within the West Mojave Plan (WEMO Plan) area. The WEMO Plan is a federal land use plan amendment to the CDCA Plan. The Record of Decision for the WEMO Plan was signed in 2005. The WEMO Plan presents a comprehensive strategy to conserve and protect the Desert Tortoise, a listed Threatened species and over 100 other BLM sensitive plants and animals and the natural communities of which they are a part, and provides a streamlined program for complying with the requirements of the Federal Endangered Species Act.

The WEMO Plan area covers 9.3 million acres in the western portion of the Mojave Desert in southern California covering parts of San Bernardino, Los Angeles, Kern, and Inyo counties. The WEMO Plan applies to the 3.2 million acres of public lands.

### ***Applicable Regulatory and Policy Requirements***

Title III of the FLPMA authorizes the BLM to issue a permit for the Proposed Action. Part 3809 of Title 43 of the CFR contains the regulations relating to permits under FLPMA.

### ***Scoping***

Calico and the BLM engaged in internal scoping for this EA for the Proposed Action to determine analysis in this EA. Internal scoping refined the purpose and need, cumulative effects analysis, and other features of the Proposed Action. External scoping for EAs is optional in accordance with 40 CFR 1501.7 and was not initiated prior to the EA for the Proposed Action. However, per BLM NEPA policy, the EA must be posted for 30 days to allow public participation and comments.

**SECTION 2 DESCRIPTION OF THE ALTERNATIVES**

**2.1 ALTERNATIVE 1 – PROPOSED ACTION**

The purpose of the Proposed Action would be to investigate the subsurface geology and mineralogy and the mineral value of the mineralized zone(s) known to exist in the Project Area. Specifically, core samples would be evaluated to assist with determining efficacy of mining on the Mitchell/Lead Mountain Area and Lilly Claims Area. The Proposed Action would drill up to three holes at each of the seven drill locations at the Mitchell/Lead Mountain Area (up to 21 holes) and one hole at each of the three locations at the Lilly Claims Area (3 holes) (Figures 1-1 and 1-2) to obtain geologic and mineralogic data from potential ore bodies, as well as an IP geophysical survey. Core drilling would include a tracked diamond core rig with related support equipment at drilling locations within the Project Area and off of existing roads. The Proposed Action would consist of 10 drilling sites at Mitchell/Lead Mountain Area (LM-1, LM-2, LM-3, LM-4, M-1, M-2, and M-3) and Lilly Claims Area (L-1, L-2, and L-3). There would be a total of up to 24 drill holes at the 10 sites. Temporary surface disturbance of the drill sites would be 0.550 acre. Temporary road disturbance would be 0.222 acre. The total temporary surface disturbance of the Proposed Action is 0.772 acre, or approximately 0.77 acre (see Table 2.1-1).

The core rig and support vehicles would be mobilized and demobilized to the drilling sites along existing routes and temporary access roads. Drilling supplies, water, and service materials would be delivered, and core and cuttings removed, from drill sites either by pick-up truck or all-terrain vehicle (ATV) along existing routes. Figures 1-1 and 1-2 show the temporary access routes to each drill site and the drill site locations. Table 2.1-1 shows the disturbance calculations for new roads and each of the drill sites with total Proposed Action disturbance.

**Table 2.1-1: Proposed Action Temporary Disturbance**

Drill Site	New Access Road Length <sup>1</sup> (feet)	New Roads (square feet)	New Roads (acres)	Drill Pad Disturbance Area (acres) <sup>2</sup>	Total Drill Site Disturbance Area (acres)
L-1	284	1,704	0.039	0.055	0.094
L-2	0	0.0	0.000	0.055	0.055
L-3	0	0.0	0.000	0.055	0.055
<b>Lilly Claims Total</b>	<b>284</b>	<b>1,704</b>	<b>0.039</b>	<b>0.165</b>	<b>0.204</b>
M-1	0	0.0	0.000	0.055	0.055
M-2	12	72	Trace	0.055	0.055
M-3	423	2,538	0.058	0.055	0.113
LM-1	0	0.0	0.000	0.055	0.055
LM-2	0	0.0	0.000	0.055	0.055
LM-3	303	1,818	0.042	0.055	0.097
LM-4	606	3,636	0.083	0.055	0.138
<b>Mitchel/Lead Total</b>	<b>1,344</b>	<b>8,064</b>	<b>0.183</b>	<b>0.385</b>	<b>0.568</b>
<b>Proposed Action Total</b>	<b>1,628</b>	<b>9,768</b>	<b>0.222</b>	<b>0.550</b>	<b>0.772</b>

1 Road length portions shown in parenthesis are included within “Pad Disturbance Area” towards the total disturbance estimate.

2 Drill Pads may require blading if necessary. However, it is anticipated that several of the drill sites would not require any blading to operate the drill rig.

Calico anticipates initiating the Proposed Action as soon as regulatory approval is obtained. All Proposed Action activities would be completed approximately three months after initiation. The Proposed Action can be divided into three tasks:

- 1) conducting core drilling and IP geophysical survey at the Mitchell/Lead Mountain Claim,
- 2) conducting core drilling at the Lilly Claim, and
- 3) conducting restoration/reclamation of the Proposed Action.

### **2.1.1 Operational Elements of the Proposed Action (Tasks 1 and 2)**

#### ***Fuel Storage***

The tracked diamond core drill rig would have portable fuel tanks and fuel would be delivered by truck on a daily basis. The temporary fuel tanks would generally hold 100 and 150 gallons with secondary containment of 110 percent of the tank capacity. During fuel truck delivery, placement of absorbent blankets would be done to contain any spills. In the event of any accidental spill, contaminated soils would be removed and disposed of in a registered waste disposal facility. The contingency plan to contain and manage spills is attached as Appendix A, Spill Prevention Control Plan.

The first proposed response action is to investigate the site and stop the spill as necessary. After the spill has been stopped and the site assessed, chemical absorbent pads would be used to remove any free product. Material contaminated with spilled fuel would be removed and placed in a separate container and disposed of offsite.

Spill kits containing absorbent pads, shovels, disinfectant, and personal protection equipment would be stored at each drilling operation so that it is available in the event of an accidental spill. Drilling personnel would be trained to utilize the spill kits in the event of a spill.

#### ***Drill Rigs***

A tracked diamond core drill rig approximately eight feet wide and 23 feet long, such as a LF-90 (or equivalent) would be used for core drilling in the Project Area. For the Proposed Action, it is estimated that the core rig would be able to advance approximately 100 feet below surface during each 12 hour shift. The drill rig would also be supported by a separate supply truck and mechanic.

#### ***Proposed Action Support Vehicles***

A variety of Proposed Action support vehicles would be used to deliver and remove drilling supplies, materials, and personnel to the drilling operations. Vehicles would include, but are not limited to, standard pick-up trucks, a water truck, tracked diamond core drilling rig and support truck, pipe truck, crew van, and ATVs as permitted. All vehicles would be appropriately licensed for use on public roads. Vehicular travel within the Project Area would be restricted to Proposed Action vehicles only and no personal vehicles would be used within the Project Area. It is anticipated that no more than seven vehicles would be onsite during drilling activities.

**Expected Equipment and Personnel Details**

Table 2.1-2 provides a summary of equipment and staff needed during the Proposed Action. The core drilling and IP geophysical survey activities would require approximately three months to complete. The IP geophysical survey would require approximately 30 days within this three-month schedule to complete. The core drilling would be performed sequentially.

**Table 2.1-2: Equipment Required for Proposed Action**

Task	Equipment	Number of Survey Personnel	Number of Monitors
Drilling and IP Geophysical Survey	<ul style="list-style-type: none"> <li>• Truck-mounted diamond core drilling rig</li> <li>• Support truck</li> <li>• Pipe truck</li> <li>• Pick-up truck or ATV</li> <li>• 4,000 gallon water truck</li> <li>• Crew van</li> <li>• Monitor's vehicle (if required)</li> </ul>	9-11	1-3 (As Required by BLM)

Notes: Vehicular travel within the Project Area would be restricted to Proposed Action vehicles only and no personal vehicles would be used within the Project Area. It is anticipated that no more than seven vehicles would be onsite during drilling activities. Number of personnel onsite during the IP geophysical survey (5) is reflected in this table. The IP geophysical survey would take place during the 12-hour day shift. Nine to 11 personnel would be onsite during this 12-hour day shift to account for IP geophysical survey. Four to six personnel would be onsite during the 12-hour night shift. Monitors may be onsite during the Proposed Action as required by the BLM.

**Drilling Supplies and Servicing Materials**

Drilling requires a range of supplies and service materials. These materials would be delivered to and removed from the drill sites by the Proposed Action support vehicles. All supplies and service material stored at the drill site would be located on the support vehicle at the drill sites. Appropriate storage containers would be used for each individual or type of material.

Drilling additives may be needed for the Proposed Action. If drilling additives (polymers) are added to the drilling water, all recovered water that is not recycled would be containerized for off-site disposal in approved disposal sites. Material Safety Data Sheets are included for all potential drilling additives in Appendix B.

**Water Supply**

Proposed Action water supply would be pumped from the Langtry Well as shown on Figure 1-2. The water would be transported from the Langtry Well in a water truck to the Proposed Action sites. This water would be used for dust suppression only. Calico estimates that the Langtry Well would be drawn at a steady rate of 41 gallons per minute (gpm). At this rate a 4,000-gallon water truck could be filled in one hour. Calico anticipates up to two trips per day to the drill sites. The owner of the Langtry Well has agreed to sell water to Calico for three months during the Proposed Action. Calico has proof of water rights (Appendix C).

The Langtry Well is located in the adjudicated portion of the Mojave Basin. Based upon discussion with Mr. David Seielstad with the Mojave Water Agency (MWA) on November 25, 2013, Mr. Matt Moore at URS reviewed MWA's policies (including the 'Judgment After Trial,' January 10, 1996). According to

MWA's policies, temporary drilling activities and associated water use are not subject to review or permitting under the MWA requirements assuming water use does not exceed 10 acre-feet per year (afy) (Seielstad 2013; City of Barstow 1996). The Proposed Action would use less than 10 afy (3,260,000 gallons per year) of water. Therefore, the Proposed Action would not require notification to the MWA.

### ***Drill Cuttings, Core, and Water***

The drill cuttings, core, and water would be recovered from the drill hole during drilling. The core is collected separately from the water and cuttings. The core would be boxed and removed from the drill site for logging, mineral and assay analyses.

The water and cuttings would be separated by gravity in a 4'x8'x8' sump at each drill site. To prevent water loss, sumps would be lined with a biodegradable plastic that would remain in place after completion of each drill hole. The clean water would be re-circulated and re-used in the drilling process.

### ***Staff***

There would be one project coordinator onsite throughout the drilling program. The project coordinator would ensure that all aspects of the Proposed Action run smoothly and all contractors communicate effectively.

A geologist would be at each drill site throughout the drilling activities. The duties of the geologist normally include watching the drill rig, logging each hole according to the geologic features encountered, determining the maximum depth of each hole, and advising the drill operator as needed.

Depending on the shift, between nine and 11 people would be working onsite at any given time. The drill sites would require between four and six people per 12-hour shift. The IP geophysical survey would be performed during the 12-hour day shift and would require approximately five people. Additionally, there may be environmental monitor(s) onsite during drilling and IP survey activities if required by the BLM.

### ***Drill Cuttings Handling***

After separating the drill cuttings from the recyclable drilling fluid, all drill cuttings would be placed into a 4'x8'x8' sump at each drilling location. The drill cuttings not used for mineralogical samples would be collected in the sumps and buried during the reclamation process.

### ***Avoidance and Minimization Measures***

The following avoidance and minimization measures and best management practices (BMPs) would also be implemented as part of the Proposed Action to prevent unnecessary or undue degradation in the Project Area.

The design features of the Proposed Action are:

1. All drill sites would be flagged.
2. All equipment would be equipped with approved spark arrester or equivalent. All vehicles and equipment would be equipped with a shovel, a Pulaski, and an all-purpose type fire extinguisher with easy access.

3. Water used in drilling activities would be reused or collected. The drill cuttings not used for mineralogical samples would be collected in the sumps and buried during the reclamation process.
4. Only nontoxic fluids shall be used in the drilling process.
5. Public safety would be maintained throughout the life of the Proposed Action. All equipment would be maintained in a safe manner.
6. All solid wastes would be removed from the Project Area and disposed of in a licensed state, federal, or local designated site.
7. Hazardous substances employed at the Proposed Action sites would include diesel fuel, gasoline, hydraulic fluid, and lubricating grease. In the event that hazardous or regulated materials were spilled, measures would be taken to control the spill and the BLM would be notified as required. Any hazardous substance spills would be cleaned immediately and any resulting waste would be transferred offsite in accordance with all applicable local, state, and federal regulations. Contract drillers would maintain spill kits on site for use in case of a spill. See Appendix A for Spill Prevention Control Plan.
8. Drill sites and surrounding area would be inspected to ensure that any foreign materials are not inadvertently left on the site.
9. Prior to the start of any project work, all personnel associated with the project would be provided with Desert Tortoise Awareness Training. Additionally, the drilling program would be conducted in such a manner that would reduce the possibility of tortoises being impacted on drill sites or access roads. If any tortoises are encountered at drill sites or constructed access roads where they pose interference with operations, the United States Fish and Wildlife Service (USFWS) authorized biologist shall be contacted immediately to assist in the protection/movement of the tortoise(s) to a safe location. Only the authorized biologist may handle desert tortoises.
10. Monitors would be present during the Proposed Action. As required, prior to vehicle access, a biological and cultural monitor would survey the temporary access route, which would be wide enough to accommodate the drill rig. Monitors would use cones or flags to delineate access and work areas. The monitors also would oversee the movement of the drilling equipment and support vehicles from the access road to the Proposed Action sites. Up to seven vehicles (including one vehicle for monitors), including the drill rig would use the temporary access route flagged by the monitors. Vehicle speeds would be limited to 20 miles per hour (mph). The use of flagging and monitors is included as part of the Proposed Action to ensure avoidance of sensitive resources and compliance with access requirements.
11. The vehicles would approach the exploration location from a single direction, perform the work on the approved temporary access route, and continue in the same direction on the route to the next location. Vehicles would turn around to exit the site, following the same temporary access route used on the drive into the area. An appropriate turn-around area would be selected by the monitors.
12. The Proposed Action sites include space for the drill site, the drill rig, and sufficient room for equipment laydown. The work area (pad including sump) would encompass an area

approximately 40 feet by 60 feet. Support vehicles would be parked within the pad area or along the temporary access route.

13. A geologist would supervise the drilling, log the core samples, and collect representative soil samples. Drill holes would be abandoned and backfilled in accordance with current Department of Water Resources (DWR) Bulletins 74-81, 74-90, and the County of San Bernardino Division of Environmental Health Services (DEHS) regulations. If the geologist requires a drill hole to remain open upon completion of drilling for further analysis, a steel cover plate would be welded to the drill casing and the area around the hole would be fenced to avoid impacts to wildlife.
14. Other mitigation measures potentially required by BLM would be implemented.

The Proposed Action would take approximately three months to complete. Each drilling location would be completed prior to starting work on the next drilling location. See Appendix A, Spill Prevention Control Plan, and Section 4.1 for more avoidance and minimization measures.

### **2.1.2 Task 1 – Core Drilling and IP Geophysical Survey at the Mitchell/Lead Mountain Claim**

A total of seven drill locations are identified on Figure 1-1. A tracked diamond core drill and related support equipment would be used to drill one or more holes (maximum depth of 400 meters) at each of the seven drill locations (designated as LM-1 through LM-4 and M-1, M-2, and M-3).

Pads and sumps would be constructed at each drilling location. Drill pads including sumps would be approximately 40 feet by 60 feet. Total surface disturbance for the drill pads at the Mitchell/Lead Mountain Area is calculated as 0.385 acres (40'x60'x7'). Disturbance estimates are provided in Table 2.1-1.

Existing access roads and cross-country routes as shown on Figure 1-1 would be used to access the seven drill locations.

To access LM-4 and M-3, approximately 37 feet of wash would be crossed by the tracked drill rig and support vehicles (approximately 21 feet for LM-4 and 16 feet for M-3). Access through the 37 feet of wash would not require any blading of vegetation or grading of road access. Pads and sumps would not be constructed within the washes. The Proposed Action would not disturb these wash areas, except to drive across them. To minimize the vehicles crossing the wash, water would be pumped across the wash via a hose from the water truck. Furthermore, fieldwork and Google Maps revealed that the wash crossing to LM-4 was previously heavily disturbed by motorized vehicle use. Avoidance and minimization measures are in place (Section 2.1.1 and 4.1) that would lessen the effect of driving through the wash crossing to reach LM-4 and M-3.

Total surface disturbance for the Mitchell/Lead Mountain Area is 0.568 acres.

#### ***Induced Polarization Geophysical Survey***

A 1,000 by 2,000 meter IP survey is proposed for portions of Sections 23 and 26 as identified on Figure 1-1. Approximately thirteen 1,000 meter long wire lines (trending SW to NE) would be placed on the ground by personnel on foot. Stations would be at 100 meter intervals along each line. The IP geophysical survey line is a thin wire approximately 0.109 inches in diameter (14 Machine Tool Wire gauge wire). The survey would take approximately 30 days to complete and remove all lines and electrodes.

The survey locations would be accessed with a minimum of disturbance. The IP surveys would consist of laying the wire lines on top of the ground, with “electrodes” located approximately 100 meters apart. The electrodes are essentially shallow pots, about the size of a coffee cup, filled with water to intensify the charge and pushed about one inch into the ground. A set of voltage readings would be taken and recorded, then the electrodes and wire would be removed.

The IP geophysical survey would require five personnel, 12 hours per day, for approximately 30 days. The IP survey would be concurrent with drilling activities during the 12-hour day shift. During this 30-day period, the number of personnel in the Project Area would be nine to 11 during the 12-hour day shift, and four to six during the evening 12-hour shift. Once the IP geophysical survey is complete, the Proposed Action would require four to six people per shift.

### **2.1.3 Task 2 – Core Drilling at the Lilly Claim**

A total of three drill locations are identified on Figure 1-2. A tracked diamond core drill and related support equipment would be used to drill one or more holes (maximum depth of 200 meters) at each of the three drill locations (designated as L-1, L-2, and L-3).

Pads and sumps would be constructed at each drilling location. Drill pads including sumps would be approximately 40 feet by 60 feet. Surface disturbance is calculated as 0.165 acres (40’x60’x3’).

Existing access roads and a new temporary access route as shown on Figure 1-2 would be used to access the three drill locations. Disturbance estimates are provided in Table 2.1-1.

Access to L-1 would require Proposed Action vehicles to travel cross country for approximately 284 feet (0.039 acres). Avoidance and minimization measures are in place (Section 2.1.1 and 4.1) that would lessen the effect of driving cross country to reach L-1.

Total surface disturbance for the Lily Claims area is 0.204 acres.

### **2.1.4 Task 3 – Restoration/Reclamation of the Proposed Action**

Access to the Mitchell/Lead Mountain Area and Lilly Claims Area would be via BLM designated open roads. However, there would be approximately 1,754 feet of cross-country travel necessary to reach sites L-1, M-2, M-3, LM-3, and LM-4 (Figures 1-1 and 1-2). Off-route access to these sites shall be limited to one route (flagged) directly to the site and the same ingress/egress shall be used by all equipment/vehicles. Minimal vegetation crushing shall occur. Blading or clearing of vegetation is not permitted for access.

The extent of vegetation crushing and surface soil disturbance would be assessed following completion of all site work and the following restoration/reclamation actions would be taken on an as needed, site-by-site basis. Following completion of all site work, all disturbances shall be raked, filled in, and brushed out to near original state. Revegetation goals include the reestablishment of vegetation communities and plant species similar to pre-disturbance conditions, the minimization of any visual impacts, and the reduction of potential erosion. Restoration and reclamation activities in roads and drill pads are discussed below.

**2.1.4.1 Roads**

BLM designated Open roads and approximately 1,754 feet of cross-country travel (Mitchell/Lead Mountain—1,440 feet and Lilly Claims Area—314 feet) would be used to access the drill sites. Restoration and reclamation efforts would be conducted on all routes used for cross-country travel. Restoration and reclamation on BLM Open Routes and cross-country routes would consist of raking and restoration of pre-disturbance surface contours. Vertical mulching and seeding may be conducted in cross-country access routes to prevent off-highway-vehicle access to these areas. Vertical mulching is the process of covering roads or trails with vegetation to restore the natural look of an area, protect the area from further vehicle traffic, and promote vegetation growth.

Application of a native seed mix, consisting only of species documented on the Project site, would be undertaken using imprinting technology or a similar method within the areas containing the dominant vegetation community—Mojave creosote bush scrub. Un-vegetated desert pavement, rocky slopes and developed/disturbed areas are not proposed for active revegetation. The seed imprinting method may use a large knobbed roller that deposits seeds in indentations it creates in the soil as it is towed behind another vehicle. These indentations result in areas where water and plant material can collect, creating microclimates conducive to plant germination and development. Soil pitting may be used as a substitute or in addition to imprinting. Soil pitting consists of a surface modification, sometimes by hand, that results in soil indentations that capture blowing seeds and improve water infiltration and retention. Seeding would take place between November 1 and January 15, when seeds would have the best chance for germination.

Seed shall be provided by a qualified supplier and the seed mix shall be determined by a restoration specialist. All seed must be delivered to the site in sealed and labeled packaging along with a California State Agricultural Code seed certification including the supplier's name, geographic location and collection date, and the tested purity and germination percentage rates. The restoration specialist would inspect the seeds prior to its application onsite and shall reject seed lacking certified tags or not conforming to specifications.

**2.1.4.2 Drill Pads**

All pads would be approximately 40 feet by 60 feet including sump pits. Drill pads and sumps may have side-cast material as a result of construction methods using standard earth moving equipment (dozer and backhoes). Surface disturbance would be recontoured to an approximate pre-disturbance slope by pulling berms and side-cast material back onto the pads with a backhoe or excavator. All recontoured surfaces would re-establish the natural drainage patterns as closely as possible. Drill pad and sumps may also be entirely or partially constructed without generating side-cast material on some sites. Limited or minimal blading of vegetation may be used to create a temporary surface for drilling operations.

In addition to restoring drill pad contours to pre-disturbance conditions, the restoration/reclamation effort would also include the installation of vertical mulching and native seed application. Drill pads would be evaluated on a site-by-site basis to determine the type of restoration that is required (if any). Drill pads located in Mojave creosote bush scrub would be re-contoured and revegetated. Vertical mulching and seed imprinting, as described in Section 2.1.4.1, would be similarly conducted in drill pad areas.

**2.1.4.3 Hole Plugging**

Upon completion of drilling activities, all drill holes would be abandoned and backfilled in accordance with current California DWR Bulletins 74-81, 74-90, and the County of San Bernardino DEHS regulations.

Drill hole plugging methods in current use for diamond core holes utilizes slurry and pelletized bentonite. Slurry density is measured at the completion of the hole and bentonite is added to bring the density and viscosity to specification. The top 10 feet of the hole is then filled with cement.

Most drill holes would be plugged immediately after drilling is completed and samples have been collected. Calico may wish to keep one drill hole open at any time for geophysical surveying which would be covered or temporarily plugged.

**2.1.4.4 Topsoil Stockpiling**

Wherever possible, topsoil would be graded and stockpiled at the uphill margin of each drill pad site.

**2.1.4.5 Disposition of Miscellaneous Materials**

Upon termination of all drilling operations, all equipment, stockpiles, and refuse associated with the Proposed Action would be removed.

**2.2 ALTERNATIVE 2 – NO ACTION**

Under the No Action Alternative, a temporary permit would not be issued to Calico for the Proposed Action. The current condition of the Mitchell/Lead Mountain Area and Lilly Claims Area would remain unchanged by the temporary Proposed Action. Calico's mining claims would not be explored for future development. The mineral economic potential of this area of the CDCA would remain unknown.

**SECTION 3      AFFECTED ENVIRONMENT**

Discussion of the existing or affected environment is necessary to serve as the basis of comparison when analyzing the impacts of a project. The Affected Environment section describes the existing condition and issues related to elements of the environment that may be affected by implementing the Proposed Action. Resources or elements of the environment not present near the Proposed Action are not to be discussed as part of the affected environment, but are addressed in Section 4.

The Proposed Action sites were selected because they were determined to have the least environmental impacts based on several environmental resources surveys conducted within a larger Project Area. The number of proposed drill sites (ten) and associated activities have been minimized and were designed to avoid or minimize adverse effects to environmental resources. The Proposed Action would utilize the existing site access roads to the extent possible. The following is a brief summary of field survey results conducted on the larger Project Area followed by an analysis of potential impacts from the Proposed Action within the Project Area.

**3.1      FIELD SURVEYS****3.1.1      Biological Resources**

The biological resources assessment included a database review of the California Natural Diversity Database (CNDDDB) and USFWS to identify previous biological resource locations in the Project Area and determine survey needs. Based on the results of this database review and site conditions, qualified URS Corporation (URS) biologists conducted protocol-level field surveys for desert tortoise (*Gopherus agassizii*) and Burrowing Owl (*Athene cunicularia*) on May 6 through 9 and June 18 of 2013 (Figure 3.3-1). During these field surveys biologists noted all desert tortoise and/or burrowing owl live encounters, potential burrows, and sign such as scat or carcasses. Biologists also noted general Project Area conditions, vegetation, and suitability of habitat for various special-status species. Special attention was focused on special status plants and animals with the potential to occur in the Project Area as identified through literature review and database queries conducted prior to the field surveys. During the field surveys, data pertaining to habitat type and quality, wildlife and plant species observed, potential for special-status biological resources to occur, and other pertinent features or conditions of the Proposed Action sites and adjacent lands were recorded. Results of these surveys are shown on Figures 3.3-2, 3.3-3, 3.3-4, 3.3-5, and 3.3-6. No focused surveys for Mohave ground squirrel were conducted. No potential sign or ground squirrel individuals were detected during the biological field effort.

**3.1.2      Cultural Resources**

The section includes a brief discussion of the cultural resources record search and pedestrian survey results.

**3.1.2.1      Record Search Results**

URS archaeologists completed a record search and literature review conducted at the San Bernardino Archaeological Information Center (SBAIC) to determine previously recorded sites and cultural resource investigations of the Proposed Action sites and a 1-mile record search radius (Area of Potential Effect [APE]) for cultural resources. According to the SBAIC, 25 cultural resource studies have been conducted within the APE. Of these five are general regional overviews that include the APE, nine are survey investigations that occurred partially within the area of the Proposed Action sites, and the remaining 11

survey investigations occurred within the 1-mile record search radius. The previous surveys reported a total of 41 cultural resources within both the Proposed Action sites and one-mile search buffer. Of these 41, there are 11 previously recorded cultural resources within the APE (Table 3.1-1). None of the cultural resources previously recorded within the APE have been evaluated for National Register of Historic Places (NRHP) eligibility.

In addition to previously recorded cultural resources and previous studies, the SBAIC search also obtained a listing of National Archaeological Database (NADB) citations (as available), copies of associated or technical reports, and historic maps and addresses, and included a review of properties listed in: California Points of Historical Interest, California Historical Landmarks, Caltrans Historic Highway Bridge Inventory, California Historical Resources Inventory, local city and county registries of historic properties, the California Register of Historical Resources (CRHR), and the NRHP.

The Native American Heritage Commission (NAHC) was contacted on April 17, 2013, to search the Native American Sacred Lands File (SLF) as an aid in determining the presence of Native American sacred sites within the APE. A list of Native American contacts that may have knowledge of known cultural resources or sacred sites within the APE was also requested.

The NAHC responded on April 23, 2013, and indicated a records search of the SLF “failed to indicate the presence of Native American cultural resources in the immediate Project area.” In addition to the response letter, the NAHC also provided a Native American contact list. This NAHC response letter was provided to BLM who is the lead federal agency with regards to Native American consultation.

**Table 3.1-1:  
Previously Recorded Cultural Resources within the Project Area**

Primary (P-36) Number	Trinomial (CA-SBR)	Cultural Context (Prehistoric, Historic, or Multi-Component)	Date Recorded and Recorder/Evaluator	Site Description	NRHP/ CRHR Eligibility Status code
1968	CA-SBR-1968	Prehistoric	1987 T. Gonzalez and R. Apple; 1981 M.K. Lerch; 1968 Mrs. Wm. Keeling and Mrs. Robert Carlson	Flakes and cores of reddish colored fine-grain volcanic; Two or more possible hearth features and two or more cleared circles; Bifacial chert, one scraper, and axes and choppers of various materials.	Not Evaluated
4096	CA-SBR-4096/H	Historic	1980 Robert E. Reynolds	Mining site reported as the Langtry mine, which is composed of two parallel adits and associated levels and shafts, mine dumps, roads and trails, and rock walled structures and rock cairns.	Not Evaluated
4099H	CA-SBR-4099	Historic	1980 Robert E. Reynolds	Mining site that consist of two vertical shafts (15-50 foot deep) and prospects along mineralized zone, with two rectangular rock structures and a rock wall in the dump of the shaft of the 50' deep vertical shaft. A trail relates these to the Mulcahy trail complex (SBR-4100). Possibly associated with the Prosperity group claims.	Not Evaluated
4100	CA-SBR-4100/H	Historic	1980 Robert E. Reynolds	Mining features, consisting of a complex of trails that connect old mine tunnels and prospects with the Lamar and Grant claims	Not Evaluated

**Table 3.1-1:  
Previously Recorded Cultural Resources within the Project Area**

Primary (P-36) Number	Trinomial (CA-SBR)	Cultural Context (Prehistoric, Historic, or Multi-Component)	Date Recorded and Recorder/Evaluator	Site Description	NRHP/ CRHR Eligibility Status code
				(SBR 4092) to the southeast, and the Prosperity group (SBR 4099) to the northwest. The most recent claim notices by the Mulcahys are 1964, although workings and trails appear much older.	
4843	CA-SBR-4843	Prehistoric	1981 M.K. Lerch	Prehistoric jasper lithic scatter.	Not Evaluated
4845	CA-SBR-4845	Prehistoric	1981 M.K. Lerch	Prehistoric lithic scatter consisting of at least seven separate loci.	Not Evaluated
4846	CA-SBR-4846/H	Multi-component	1981 M.K. Lerch	Prehistoric lithic scatter consisting of at least three loci. At locus B there is also a military encampment which has produced a recent "intaglio," probably the result of a flagpole site. Several recent hearth features are also present at Locus B.	Not Evaluated
4848	CA-SBR-4848	Prehistoric	1981 M.K. Lerch	Prehistoric lithic scatter consisting of jasper and fine-grained volcanics.	Not Evaluated
21635	CA-SBR-13876/H	Multicomponent	2010 Christine McCollum	One prehistoric lithic locus, one prehistoric rock feature, one historic trash locus, and five artifacts dispersed throughout the site (one microcrystalline flake and four sanitary cans).	Not Evaluated
21641	N/A	Prehistoric	2010 Christine McCollum	Two isolated prehistoric cryptocrystalline silicate bifacial thinning flakes.	Not Evaluated
64542	N/A	Historic	2001 Kenneth M. Becker	Historic moderately well-developed dirt road; portion nearest Fort Irwin Road looks graded; heavily eroded.	Not Evaluated

### 3.1.2.2 Cultural Resources Pedestrian Survey

The Class III intensive field survey of the APE was conducted between May 6 and May 15, 2013 and on June 18, 2013. The Class III intensive field survey covered the entire Project Area. The principal survey method consisted of a systematic walk-over in parallel transect intervals no greater than 15 meters. Cultural resources identified and/or relocated in the course of this survey were documented on Department of Parks and Recreation (DPR) forms, and included eligibility recommendations where applicable. For the purpose of this study, cultural resources included both prehistoric and historical archaeological sites within the Project Area.

The URS team identified a total of 25 cultural resources within the APE, all of which are archaeological. Of these 22 are archaeological sites (one prehistoric, 18 historic, and three multi-component [including both prehistoric and historic elements]) and three are archaeological isolates.

Of the 25 total archaeological resources within the APE, three are updates to previously recorded resources. These sites include: CA-SBR-1968, CA-SBR-4099H, and CA-SBR-4846/H. Eight of the previously recorded cultural resources (archaeological sites) could not be relocated: P36-21635, P36-21641, P36-64542, CA-SBR-4096H, CA-SBR-4100, CA-SBR-4843, CA-SBR-4845, and CA-SBR-4848. The eight sites that were not relocated appear to have been misplotted or no longer exist.

### **3.1.3 Paleontological Resources**

The section includes a brief discussion of the paleontological resources record search and pedestrian survey results.

#### **3.1.3.1 Paleontological Record Search**

URS sent a map of the Proposed Action footprint with a 1-mile buffer zone to the San Bernardino County Museum with a request for a paleontological resources records search for any paleontological localities known within that footprint and buffer on April 15, 2013. Eric Scott, of the San Bernardino County Museum, sent the report on April 18, 2013. The report indicates that there are no known paleontological localities within one mile of the Proposed Action sites, but that there are known Miocene localities nearby in the Calico Mountains. The report also states that the mapped geology of the Project Area includes Waterman Gneiss, hornblend diorite, Miocene Barstow Formation, unnamed Miocene continental sediments, intrusive Miocene rocks, undifferentiated Neogene and Quaternary sediments, Pleistocene older alluvium, and Holocene or Recent alluvium. Mr. Scott rated the Barstow Formation and the Pleistocene older alluvium as having high paleontological sensitivity under the Society of Vertebrate Paleontology (SVP) sensitivity rating system, and rated the unnamed Miocene and Neogene/Quaternary sediments as having undetermined paleontological sensitivity. The other formations present along the Proposed Action sites he assigned low paleontological sensitivity. Under the Potential Fossil Yield Classification (PFYC) system, he assigned the Barstow Formation a Class 5a (very high sensitivity) rating, and the Pleistocene older alluvium a Class 4a (high sensitivity) rating.

#### **3.1.3.2 Paleontological Pedestrian Survey**

URS paleontologists began the survey of the Project Area footprint and regulatory buffer on May 8, 2013 searching for fossils and insights into the local geology. The survey team walked four abreast separated by intervals of 15 yards. The survey continued until May 14, 2013. Changes in some of the proposed drilling locations and need to collect sediments samples occasioned a supplementary survey on June 17, 2013.

URS paleontologists surveyed the access roads and proposed drill sites for paleontological resources. No paleontological resources were found in the Waterman Gneiss, hornblend diorite, Barstow Formation, unnamed Miocene continental sediments, intrusive Miocene rocks, undifferentiated Neogene and Quaternary sediments, and Holocene or Recent alluvium. Within the Pleistocene older alluvium, however, two fragments of mammalian bone were recovered on the Lead Mountain Area. One belongs to a rabbit.

## **3.2 GEOLOGICAL RESOURCES**

This section includes a brief discussion of regional and site geologic setting, seismicity, soils, and mineral resources. Geologic information reviewed included published geologic maps from the California Geological Survey and the United States Geological Survey, including the Geologic Map of San Bernardino (Rogers 1967) and the WEMO Plan Map 3-20 (BLM 2005). Soils information was gathered

primarily from the “Soil Survey of San Bernardino County California, Mojave River Area” (United States Department of Agriculture [USDA] 1986).

### **3.2.1 Geology and Seismicity**

The Project Area is located in the Mojave Desert Geomorphic Province, which is characterized by broad expanses of desert with localized mountains and dry lakebeds. The physiographic province is bounded by the San Bernardino Mountains and the Pinto fault to the south, San Andreas Fault Zone to the west, Garlock Fault Zone to the north, and Basin and Range Province to the east. The Project Area lies near the western part of the “eastern Mojave.” While the “western Mojave” is primarily gently sloping with isolated areas of greater topography, the “eastern Mojave” is characterized by alluvial basins between mountain ranges. The mountain ranges are generally northwest-trending in the vicinity and south of the Project Area, but are without a typical orientation further to the north (BLM 2005).

The stratigraphy of the Mojave Desert region can be divided into two groups according to their inferred age: Pre-Cenozoic rocks (approximately 65 million years ago [mya] and older) and Cenozoic rocks (present to approximately 65 mya). The Pre-Cenozoic rocks represent the basement rocks of the present day Mojave Desert region and are typically represented as mountains and rock outcrops. The Pre-Cenozoic rocks were subsequently overlain by Cenozoic rocks which are typically represented as volcanic mountains and flows, alluvial basins and valleys, and lacustrine lakebed deposits (BLM 2005).

The area between the San Andreas Fault Zone and Garlock Fault is structurally referred to as the Mojave Block. In the Project Area, the Mojave Block is cut by a series of northwest to southeast striking faults including the Gravel Hills fault, Calico fault, Black Water fault, and Harper Lake fault. The Proposed Action at the Lilly Claims Area is very close to the Calico fault; the Mitchell/Lead Mountain Area is east of the Harper Lake fault, although associated strands of the fault are within the claim area.

The Lilly Claims Area and Mitchell/Lead Mountain Area are located in parallel mountain ranges separated by an alluvial valley. The rock types found in the vicinity of the Proposed Action sites are highly variable, and include Precambrian igneous and metamorphic rock, Miocene sedimentary rock, and Tertiary intrusive rock. Along the margins of the rock outcrops are Pleistocene-age unconsolidated colluvial deposits, which are primarily granular in nature. Pleistocene alluvial and lake bed deposits are present in the valley between the two claim areas (Rogers 1967).

### **3.2.2 Soils**

The “Soil Survey of San Bernardino County California, Mojave River Area” (USDA 1986) provides general and detailed soil mapping within the Mitchell/Lead Mountain Area. Mapped soil data is not available for the Lilly Claims Area, although it can be inferred based on the topography and geology. Soils that are present on the broad alluvial fans in the Project Area are mapped as the Cajon-Manet soil association. These soils are very deep and somewhat excessively drained and well drained. The Cajon soil unit is a gravelly sand formed in granitic alluvium. At slightly higher elevation on old terraces and alluvial fans is the Mirage-Joshua soil association. These are very deep and moderately deep, well drained soils that have a desert pavement. The Mirage-Joshua soil association includes the Nebona and Cuddleback soils, which are specifically mapped in the area; these soils have an indurated, silica-cemented hardpan. The rocky ridges and hills in the Project Area are primarily mapped as the Rock Outcrop-Lithic Torriorthents-Sparkhule soil association. These are shallow and very shallow soils that are well drained, formed mainly in residuum derived from granitic and volcanic rock. The rock outcrops may have little to no soil development.

### **3.2.3 Mineral Resources**

As discussed above, the Project Area encompasses a large diversity of rock types, including marine and nonmarine sedimentary rocks, a wide variety of volcanic and intrusive igneous rocks, and is characterized by associated geologic events related to plate collision, metamorphism, and faulting. These factors have resulted in the formation of a wide variety of mineral assemblages and the concentration of mineral assemblages to form the ore deposits that are present in the Project Area.

The WEMO Plan compiled mineral resource information from various sources, including the BLM, California Department of Conservation (Mineral Resource Zones from the Surface Mining and Reclamation Act of 1975 [SMARA] classifications), United States Geological Survey (USGS) and the United States Bureau of Mines. Specifically, the WEMO Plan provides a map showing mineral potential, active and inactive mines, and mining claim density within and adjacent to the Superior-Cronese DWMA. The WEMO Plan Map 3-20 indicates the areas surrounding the Mitchell/Lead Mountain Area and Lilly Claims Area are classified as “high mineral potential” by the BLM. Numerous inactive mines are mapped within the claim areas, with Mineral Claim Density ranging from 1 to 16 claims per section. No active mines are mapped within the Project Area. The primary mineral resources in the Project Area are barite and silver. Other minerals mapped in the vicinity include gold, chlorine and chlorite, and chromium.

Minerals are typically grouped into four categories including metallic minerals, industrial/nonmetallic minerals, energy minerals, and construction materials. On public lands, mineral resources are categorized by the disposal categories of locatable, leasable, and saleable. Leasable minerals include energy-related mineral resources such as oil, natural gas, coal, and geothermal, and some non-energy minerals, such as potash, salt, phosphate, and sulfur. Saleable minerals, or mineral materials, are common varieties of minerals and building materials such as sand, gravel, stone, aggregate, silica, clay, and volcanic rock products. Locatable minerals are those that are not leasable or saleable, and include minerals such as gold, silver, copper, lead, zinc, barite, gypsum, molybdenum, gemstones, and certain varieties of high calcium limestone.

The locatable minerals barite and silver have been mined in the Project Area, as discussed above. The Project Area has a low potential for the occurrence of leasable minerals such as oil and gas. Saleable minerals, primarily construction materials such as stone, sand, gravel and clay, are known to locally occur in the vicinity.

## **3.3 BIOLOGY**

### **3.3.1 Vegetation**

The Project Area is composed primarily of Mojave Desert creosote bush scrub with a smaller area of Mojave wash scrub and un-vegetated desert pavement, rocky slopes and developed/disturbed as defined by the Holland (1986) classification of plant communities.

Mojave creosote bush scrub (Holland Code 34100; *Larrea tridentata*-*Ambrosia dumosa* Shrubland Alliance) is a community dominated by creosote bush (*Larrea tridentata*) and white bur-sage (*Ambrosia dumosa*). Shrubs are typically widely spaced with bare ground between them. A diverse annual herb layer may flower in late March and April with sufficient winter rains. Other common plant species in this habitat include smoke tree (*Senna armata*), Nevada ephedra (*Ephedra nevadensis*), cheesebush (*Ambrosia salsola*), encelia (*Encelia spp.*), ratany (*Krameria spp.*), and various cactus species (e.g., *Opuntia spp.*). This plant community is usually found on well-drained secondary soils with very low water-holding

capacity on slopes, fans, and valleys. This vegetation type makes up the majority of the acreage within the Project Area.

Mojave wash scrub (Holland Code 34250; *Acacia greggii*-*Bebbia juncea* Shrubland Association) is an open-to-dense, drought-deciduous, small-leaved riparian thorn scrub woodland 10 to 30 feet tall, dominated by several fabaceous trees. This vegetation community occurs in sandy or gravelly washes and arroyos of the lower Mojave and Colorado Deserts, largely in frost-free areas. These washes typically have braided channels that are substantially rearranged following every surface flow event. This vegetation community can have many different components species. In the Project Area the dominant shrub species include: catclaw acacia (*Acacia greggii*), cheesebush (*Ambrosia salsola*), brittlebush (*Encelia farinose*), bebbia (*Bebbia juncea*) and small amounts of big galleta grass (*Hilaria ridgida*) mixed in.

Developed lands (Holland Code 12000) include roads, built structures, and associated infrastructure. Within the Project Area, these included dirt roads, abandoned mine shafts, and other built environment. Un-vegetated habitat (Holland Code 13000) occurs on steep rocky areas and little vegetation is associated with this rocky habitat.

**3.3.2 Botanical Resources**

No spring special status plant surveys were performed due to poor weather conditions in the months leading up to the survey window for spring blooming plants.

Special status plant surveys are conducted at the time of year when species are both evident and identifiable (i.e., flowering and/or fruiting). This can involve multiple visits to the same site (i.e. during fall, early spring and/or late spring survey for flowering plants) to capture the floristic diversity at a level necessary to determine if special status plants are present. The timing and number of visits are determined by geographic location, natural communities present, and weather patterns of the year in which the surveys are conducted. Nearby weather station precipitation records were monitored for rainfall activity in the months preceding potential spring rare plant surveys at the Daggett-Barstow weather station (Table 3.3-1). Precipitation records from this weather station show that the Project Area received too little rain in the months preceding potential rare plant surveys. This low rainfall results in a lower incidence of plant growth and seed germination. Although several sensitive species have been documented nearby in the CNDDDB, their relatively low density may be an under-representation of their actual presence had greater precipitation occurred in late winter and early spring.

**Table 3.3-1: Monthly Weather Conditions for Daggett-Barstow California, 2013.**

Month	Avg. Temp (F)	Avg. High (F)	Avg. Low (F)	Total Rainfall (inches)
January	45	57	29	0.28
February	51	60	44	0.02
March	63	76	44	0.11
April	69	84	56	0.00
May	75	85	62	0.01
June	86	94	73	0.00

Notes: 2013 Weather History information available at [www.wunderground.com](http://www.wunderground.com).

Based on CNDDDB, CalFlora, and Consortium of California Herberia (CCH) record searches, there are five California Native Plant Society (CNPS) list 1 and 2 level plants that have been documented within a five mile radius of the Project Area with high to moderate potential to occur. These are creamy blazing star (*Mentzelia tridentata*), spiny-hair blazing star (*Mentzelia tricuspis*), Mojave monkeyflower (*Mimulus mohavensis*), Indian breadroot (*Pediomelum castoreum*), and Barstow woolly sunflower (*Eriophyllum mohavense*). A complete list of all special status plants with potential to occur in the Project Area, are listed in Appendix D, Biological Resources Technical Report. These CNPS plants are described below.

**Creamy Blazing Star**

Regulatory Status; CNPS 1B.3

Creamy blazing star is an annual herb found mostly in rocky, gravelly, and sandy soils within Creosote bush scrub. This plant prefers elevations of 700 to 900 meters and has a short bloom period from April to May.

**Spiny-hair Blazing Star**

Regulatory Status; CNPS 2.1

Spiny-hair blazing star is an annual herb found mostly in sandy and gravelly slopes and washes in Creosote bush scrub. This plant prefers elevations of 150 to 1,280 meters and blooms from March to May.

**Mojave monkeyflower**

Regulatory Status; CNPS 1B.2

Mojave monkeyflower is an annual herb found mostly on gravelly banks of desert washes in Creosote bush scrub and Joshua tree woodland. This plant prefers elevations of 600 to 1,000 meters and blooms from April to June.

**Indian breadroot**

Regulatory Status; CNPS 1B.2

Indian breadroot is a perennial herb that grows in sandy washes and road-cuts in open areas within Creosote Bush Scrub or Joshua tree woodland. This plant prefers elevations that are less than 1,750 meters and has a short bloom period from April to May.

**Barstow woolly sunflower**

Regulatory Status; CNPS 1B.2

Barstow woolly sunflower is an annual herb that grows in habitats of Creosote bush scrub, Shadscale scrub, Alkali sinks, and playas. This plant prefers elevations from 500 to 800 meters and has a short bloom period from April to May.

None of these plants were observed during reference population checks or focused surveys for desert tortoise and Burrowing Owl.

**3.3.3 Wildlife**

Based on CNDDDB records there are four sensitive wildlife species that have been documented within a five-mile radius of the Proposed Action sites with moderate potential to occur (Table 3.3-2). Two of these species have been documented to occur in the Project Area based on live encounters or sign (desert tortoise and Burrowing Owl). Focused surveys were conducted for these species within the Project Area and results are given below and in Appendix D.

**Table 3.3-2: Potential Sensitive Wildlife Species Occurring Within Project Area**

Species		Sensitivity Status		Habitat Associations	Potential to Occur
Common Name	Scientific Name	Federal	State		
Mohave ground squirrel	<i>Xerospermophilus mohavensis</i>	none	ST	Mojave desert scrub west of Barstow.	moderate (at the edge of species' range)
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	none	SSC	Desert scrub and coniferous forests, roosts in caves, abandoned mines, and buildings.	moderate
Burrowing Owl	<i>Athene cunicularia</i>	BCC	SSC	Found in open grasslands and agricultural areas with suitable fossorial mammal burrows for nesting.	present (sign and burrows)
Desert Tortoise	<i>Gopherus agassizii</i>	FT	ST	River washes, rocky hillsides, and flat desert having sandy or gravelly soil with creosote bush, burro bush, saltbush, Joshua tree, Mojave yucca, cacti, other shrubs, grasses, and wildflowers.	present (sign, burrow and live encounters)

ST - State Threatened (California Endangered Species Act)      FT- Federally Threatened (Endangered Species Act)  
 BCC - Birds of Conservation Concern (United States Fish and Wildlife Service)    SSC - Species of Special Concern (California Department of Fish and Wildlife)

**3.3.3.1 Desert tortoise**

Regulatory Status: Federal: USFWS: (Threatened); State: California Department of Fish and Wildlife (CDFW): (Threatened)

Desert tortoise is a widely distributed species in the deserts of California, southern Nevada, extreme southwestern Utah, western and southern Arizona, and throughout most of Sonora, Mexico. Typical tortoise habitat consists of creosote bush scrub between 2,000 and 3,300 feet with firm but not hard ground, usually soft sandy loams and loamy sands that allow for burrow construction (Karl 1983). Lower densities occur in Joshua tree woodland, saltbush scrub and occasionally in desert habitats above 4,100 feet (Karl 1983).

Desert tortoise populations are declining because of various factors, including the spread of a respiratory disease, increases in raven populations that prey on juvenile tortoises, and habitat loss and degradation from various extensive and intensive land uses. Currently, only the Mojave population of desert tortoise is both Federal and State-listed as threatened. Desert tortoise primarily occurs in four subpopulations in the California Mojave Desert (Ord-Rodman, Superior-Cronese, Fremont-Kramer, and Joshua Tree DWMA). Outside of these DWMA's, tortoises tend to occur at much lower densities.

The diet of desert tortoises consists mainly of annual plants and grasses, but also contains perennial plants such as cacti and native forbs. When available, certain non-native plant species are also eaten (West Mojave Planning Team 1999). Desert tortoises are most active when plants are available for forage or when pooled water is available for drinking, usually from March through early June and again between September and early November (Marlow 1979). They typically have overlapping home ranges averaging between five and 131 acres, which can fluctuate in size on a year-to-year basis based on several factors such as sex of the tortoise, rainfall, availability of resources, and other factors (Berry 1986). Individuals commonly traverse 1,500 to 2,600 feet per day within their home range, and males have been recorded traveling up to 3,200 feet within their home range. Mojave desert tortoises are also known to disperse over more extended distances (1.9 miles in 16 days and 4.5 miles in 15 months; Berry 1986).

The results of the focused survey included the observation of 42 burrows (5 confirmed active) (Figure 3.3-2), 25 carcasses (Figure 3.3-3), 29 instances of scat (Figure 3.3-4), and seven live desert tortoise (Figure 3.3-5). Observations of desert tortoise and desert tortoise sign in the Project Area are shown in Figures 3.3-2 through 3.3-5 and in Appendix D.

No active burrows are within 100 feet of drill sites or proposed access roads. All active burrows are located within 100 feet of the proposed IP geophysical survey lines. For an estimate of the distance in feet these burrows are from the nearest IP geophysical survey line see Table 3.3-3, Figure 3.3-2, and Appendix D. Impacts to these burrows would be minimized through project design features discussed in Section 4.1.3.

**Table 3.3-3: Location of Active Desert Tortoise Burrows to Nearest Project Feature**

Label	Latitude	Longitude	Closest Feature	Distance (feet)
Desert Tortoise Burrow 14	34.927503	-116.941877	IP Line	26.310
Desert Tortoise Burrow 19	34.93652503	-116.949854	IP Line	56.770
Desert Tortoise Burrow 22	34.93953899	-116.951889	IP Line	2.585
Desert Tortoise Burrow 32	34.930026	-116.94615	IP Line	57.860
Desert Tortoise Burrow 36	34.932963	-116.954132	IP Line	30.452

Source: Appendix D, Biological Resources Technical Report.

### 3.3.3.2 Mohave Ground Squirrel

Regulatory Status: Federal: None, State: CDFW (Threatened)

The Mohave ground squirrel is a relatively small species that is active in the spring and summer. They are restricted to the western Mojave Desert, and feed on the leaves, fruits, and seeds of native plants. Mohave ground squirrels can be found in a variety of desert scrub habitats, including creosote bush scrub, desert saltbush scrub, and desert sink scrub. The primary cause of the decline of the species is loss of habitat from the urban development occurring within its range (Gustafson 1993). No Mohave ground squirrel trapping surveys were conducted and no Mohave ground squirrels or their sign were observed during as incidental observations during surveys for other special-status species where habitats overlapped. The nearest documented detections of Mohave ground squirrel is 1.5 to 3 miles from the nearest proposed project activity.

**3.3.3.3 Burrowing Owl**

Regulatory Status: Federal: BLM (Sensitive), USFWS (Birds of Conservation Concern); State: CDFW (Species of Special Concern)

The Burrowing Owl is a small, ground-dwelling bird that inhabits open spaces such as grasslands, agricultural fields, and disturbed areas in the western half of the U.S. south into Baja California and central Mexico (Johnsgard 1988). Burrowing Owls use burrows throughout the year for shelter from weather and predators, and for nesting during the breeding season (February 1 to August 31). In southern California, the most commonly used rodent burrow is that of the California ground squirrel (*Spermophilus beecheyi*). Burrowing Owl nesting distribution is strongly correlated to local ground squirrel burrow distribution (Collins 1979). Burrowing Owls form short-term pair bonds. Not all individuals capable of breeding do so every year. Burrowing Owls have declined through much of their range because of habitat loss resulting from urbanization, agricultural conversion, and destruction of ground squirrel colonies (Remsen 1978; Shuford and Gardali 2008). The incidental poisoning of Burrowing Owls and the destruction of their burrows during eradication programs aimed at rodent colonies has also been a large factor in their population decrease (Collins 1979; Remsen 1978; and Zarn 1974).

There were no observations of Burrowing Owls in the Project Area during the focused surveys; however, three old vacant burrows suitable for Burrowing Owl were identified with historic signs of use. Both burrows had white wash and old pellets (likely from use in the winter). Observations of Burrowing Owl burrows in the Project Area are shown in Figure 3.3-6 and Appendix D. No burrows are within 100 feet of drill sites or proposed access roads. For an estimate of the distance in feet these burrows are from the nearest IP geophysical survey lines see Table 3.3-4, Figure 3.3-6, and Appendix D. Impacts to these burrows would be minimized through project design features discussed in Section 4.1.3.

**Table 3.3-4: Location of Burrowing Owl Burrows to Nearest Project Feature**

Label	Latitude	Longitude	Closest Feature	Distance (feet)
Burrowing Owl Burrow 1	34.93994996	-116.956851	IP Line	67.328
Burrowing Owl Burrow 2	34.93526003	-116.952473	IP Line	26.142
Burrowing Owl Burrow 3	34.941621	-116.952473	IP Line	103.819

Source: Biological Resources Technical Report, Appendix D.

**3.3.3.4 Superior-Cronese Desert Wildlife Management Area**

The CDCA is a 25-million acre expanse of land in southern California designated by Congress in 1976 through the Federal Land Policy and Management Act for protection and use of the California Desert. The CDCA Plan designates distinct multiple use classes for the lands involved, and it establishes a framework for managing the various resources within these classes. A major element of the CDCA Plan is the designation of DWMA's. These DWMA's have been established to protect high quality habitat for the threatened desert tortoise and serve as recovery areas for desert tortoise. The DWMA's are currently split into six recovery units. With the exception of 2,460 feet of existing access road in the southwestern corner of the Project Area (Meadow Grove Road, existing dirt BLM "Open Route" MM7182), the Proposed Action would be located on undeveloped public land administered by the BLM in the Superior-Cronese DWMA (see Figure 1-3). The Mitchell/Lead Mountain Area is located within habitat designated as critical habitat for desert tortoise under the Western Mojave DWMA recovery unit. The Lilly Claim Area is primarily outside of designated critical habitat, however, is located within the Superior-Cronese

DWMA (see Figure 1-3). As described in Section 4.1.3, measures would be incorporated into the project description to ensure that the Proposed Action would have a negligible effect on desert tortoise within this DWMA.

### **3.4 HYDROLOGY**

This section describes existing hydrologic and water quality conditions. This assessment includes an evaluation of surface water runoff, surface water beneficial uses, and any 303(d)-listed impaired waterbodies, as well as the identification of existing conditions of concern onsite. The information provided in this section draws extensively on information from the California State Water Resources Control Board (SWRCB), DWR, local Regional Water Quality Control Board (RWQCB), Federal Emergency Management Agency (FEMA), and United States (U.S.) Environmental Protection Agency (EPA). An evaluation of potential environmental impacts associated with Project activities on water resources, including the significance of the Proposed Action's impact on the resource, substantiation for the impacts, and, if appropriate, Proposed Action design features that can be implemented to reduce the impacts are discussed in Section 4.

#### **3.4.1 Hydrological Setting**

The Project Area lies within the western Mojave Desert, which is an arid area noted for its high summer temperatures and low humidity. Data from the Western Regional Climate Center (WRCC), National Weather Service, and DWR indicate that the annual average precipitation is approximately four to six inches in the Project Area. Average maximum temperatures range from approximately 60 to 102 degrees Fahrenheit in winter and summer, respectively. Average minimum temperatures range from approximately 31 to 67 degrees Fahrenheit in winter and summer, respectively.

The Proposed Action is located within the South Lahontan RWQCB Hydrologic Basin (Region 6), in the Lower Mojave Hydrologic Area (HA) 628.50. The watershed covers an area of approximately 1,545 acres. The closest major water body is the Mojave River. According to the 2010 U.S. EPA approved 303(d) List, the segment of the Mojave River that runs through HA 628.50 is not impaired. No waterbodies in this HA are listed on the 303(d) List of impaired water bodies.

The Lower Mojave HA 628.50 is made up of small, broad valleys or closed basins, separated by isolated hills, groups of hills, or low mountains. The bottoms of the closed basins are playas, which contain water only following heavy rainfall.

The Mojave River is the major surface water in HA 628.50. The river originates in the foothills of the San Bernardino Mountains at the junction of the West Fork and Deep Creek and flows north 30 miles to Helendale, where it turns northeast and continues past Barstow (south of the Project Area). The flow of the Mojave River is gaged at Barstow and consists entirely of storm flow, 96-percent of which occurs from January through April. Surface flow in the river comes from the San Bernardino Mountains. If storm runoff from the mountains is low, the river at Barstow has no flow. Therefore, runoff from the Project Area generally has a negligible effect on the Mojave River.

Surface flow in the Project Area comes exclusively from storm water runoff from precipitation. The only beneficial uses listed for HA 628.50 are for minor unnamed surface waters and wetlands; no receiving water is identified. The beneficial uses of minor surface waters in the Project Area are (potentially) municipal, domestic, and agricultural supplies and recreation, and (presently) groundwater recharge, and cold freshwater and wildlife habitat.

Surface water in the Mitchell/Lead Mountain Area trends from the northwest to the southeast on the northern half of the area and from the southeast to the northwest on the southern half of the area. A currently unnamed wash runs through the center of the site collecting a large percentage of the flow during heavy rains. The wash flows in an easterly direction across most of the Mitchell/Lead Mountain Area (east of the existing roadway), and in a southwesterly direction on the western edge of the area. No additional drainage features have been identified onsite or in the near vicinity as shown on Figure 3.4-1. Surface flow around the proposed drill sites would be limited to sheet flow during storm events. The Proposed Action sites would not occur in areas with the potential for concentrated flow. Additional BMPs would be implemented where the IP lines cross the wash with regard to erosion and sediment control following any soil disturbing activities.

Surface water in the Lilly Claims Area trends from the northeast to the southwest. No named drainage features have been identified onsite or in the near vicinity as shown on Figure 3.4-2. Surface flow around the proposed borings would be limited to sheet flow during storm events. Proposed Action sites would not occur in areas with the potential for concentrated flow.

A flood map search (<http://msc.fema.gov/>) for FEMA Flood Insurance Rate Map (FIRM) panel ID numbers 06071C3935H and 06071C3937H confirms the Project Area has not been mapped by FEMA for flood zone hazards. The closest mapped area is FEMA FIRM panel identification (ID) numbers 06071C3936H and 06071C3975H, showing the floodplain area associated with the Mojave River. The Mitchell/Lead Mountain Area is over a mile from the river; while the Lilly Claims Area is almost six miles from the river. Therefore, the Project Area does not encroach upon any FEMA-designated flood areas.

The Project Area lies within the Lower Mojave River Valley Groundwater Basin (Basin 6-40). The basin location is shown on Figure 3.4-3. Basin 6-40 is a 447-square-mile basin drained by the Mojave River, which underlies an elongate east-west valley. Beneficial uses for groundwater in Basin 6-40 are listed as: municipal, domestic, agricultural, and industrial service supplies; freshwater replenishment; and aquaculture.

There are no wetlands or riparian zones present near the Proposed Action sites.

### **3.5 CULTURAL RESOURCES**

The URS team identified a total of 25 cultural resources within the Project Area, all of which are archaeological. Of these 22 are archaeological sites (one prehistoric, 18 historic, and three multi-component [including both prehistoric and historic elements]), and three archaeological isolates. Evaluation and thorough documentation of these sites has revealed that these resources are unable to provide additional data that would contribute to the current body of archaeological data. As a result, these 22 archaeological sites and three archaeological isolates within the Project Area are recommended not eligible for listing on the NRHP, and therefore, do not constitute historic properties.

**Table 3.5-1: Archaeological Sites in the Project Area**

Site Designation	Cultural Context	Site Taxonomy	Potential for Buried Deposits	URS NRHP Recommendations	BLM Concurrence
CA-SBR-1968 UPDATE (CALEXP-MNLT-013)	Historic / Prehistoric	Cairns/Rock Features Mines / Quarries / Tailings Lithic Reduction Scatters	Very Low	Not Eligible	
CA-SBR-4099/H	Historic	Mines / Quarries / Tailings, Cairns / Rock Features	Very Low	Not Eligible	
CA-SBR-4846/H UPDATE	Historic / Prehistoric	Hearth, Lithic Tool	Very Low	Not Eligible	
CALEXP-MNLT-001	Historic	Cairns / Rock Features	Very Low	Not Eligible	
CALEXP-MNLT-002	Historic	Cairns / Rock Features	Very Low	Not Eligible	
CALEXP-MNLT-003	Historic	Cairns / Rock Features	Very Low	Not Eligible	
CALEXP-MNLT-004	Historic	Cairns / Rock Features	Very Low	Not Eligible	
CALEXP-MNLT-005	Historic	Mines / Quarries / Tailings	Very Low	Not Eligible	
CALEXP-MNLT-006	Historic	Cairns / Rock Features	Very Low	Not Eligible	
CALEXP-MNLT-007	Historic	Privies / Dumps / Trash Scatters	Very Low	Not Eligible	
CALEXP-MNLT-008	Historic	Cairns / Rock Features	Very Low	Not Eligible	
CALEXP-MNLT-009	Historic	Cairns /Rock Features	Very Low	Not Eligible	
CALEXP-MNLT-010	Historic / Prehistoric	Cairns / Rock Features, Trash Scatter, Lithic Isolate	Very Low	Not Eligible	
CALEXP-MNLT-011	Historic	Trash Scatter	Very Low	Not Eligible	
CALEXP-MNLT-012	Prehistoric	Lithic Reduction Scatter	Very Low	Not Eligible	
CALEXP-MNLT-014	Historic	Trash Scatter	Very Low	Not Eligible	
CALEXP-MNLT-015	Historic	Trash Scatter, Cairns / Rock Features	Very Low	Not Eligible	
CALEXP-MNLT-016	Historic	Trash Scatter	Very Low	Not Eligible	
CALEXP-MNLT-017	Historic	Trash Scatter	Very Low	Not Eligible	
CALEXP-MNLT-020	Historic	Mines / Quarries / Tailings	Very Low	Not Eligible	

**Table 3.5-1: Archaeological Sites in the Project Area**

Site Designation	Cultural Context	Site Taxonomy	Potential for Buried Deposits	URS NRHP Recommendations	BLM Concurrence
CALEXP-MNLT-021	Historic	Mines / Quarries / Tailings, Cairns / Rock Features	Very Low	Not Eligible	
CALEXP-RNSM-001	Historic	Trash Scatter	Very Low	Not Eligible	

**3.6 PALEONTOLOGY**

The geologic mapping of Bortugno and Spittler (1986) shows the following geologic units within the Project Area: the Waterman Gneiss, Jurassic hornblende diorite, the Barstow Formation, unnamed Miocene continental outcrops, intrusive Miocene dacitic and rhyolitic rocks, undifferentiated Neogene and Quaternary sediments, Pleistocene older alluvium, and Holocene or Recent alluvium. The Waterman Gneiss is a metamorphic unit that has no potential to yield paleontological resources, due to the deformation, temperature, and pressure to which it has been subjected. The hornblende diorite and the intrusive Miocene dacitic and rhyolitic rocks have no potential to yield paleontological resources due to their igneous origins. Little is known of the Miocene continental outcrops, but they could have potential to produce paleontological resources. The Barstow Formation has an extensive history of producing significant paleontological resources from many horizons and localities. Fossil mammalian faunas from this rock unit serve as the definitive basis for the Barstovian Land Mammal Age. The Pleistocene older alluvium has produced significant paleontological resources in many parts of California (Jefferson, 1991a, 1991b). The Holocene or Recent alluvium is too young to produce significant fossil resources.

**3.7 RECREATION**

Many of the recreational activities in the Mojave Desert center on vehicle play and speed events or activities that require a great deal of acreage and separation from other visitors. These include motorcycle activities, four-wheel drive exploring, sightseeing, target shooting, hunting, experimental vehicles/aircraft, model rocketry, and dry land wind sailing. Many other recreational pursuits that don't revolve around the recreational aspect of vehicle use are by necessity (due to the distances involved) dependent upon motorized vehicles. Examples of this include endurance equestrian rides and support vehicles, hiking, mountain biking, bird watching, botany, rockhounding, camping, and picnicking, for which vehicles are a means to access various destinations (BLM 2005).

The WEMO Plan, Table 3-55, highlights the recreational uses in Barstow. The Project Area is known for sport utility vehicle touring, off-highway vehicle (OHV) events, four wheel drive and motorcycle play, rock hounding, and mining exploration. OHV use in the area nearby Barstow is considered high (BLM 2005). Appendix T, Table T-1, of the WEMO Plan lists the recreation visitor use and counts in the WEMO planning area from 2000 to 2002. The main recreational uses indicated in Table 3-55 of the WEMO Plan near Barstow are highlighted in Table 3.7-1, below.

**Table 3.7-1: Primary Barstow Area Recreation Activities and Visit Counts, 2000 to 2002**

Recreation Activity	Number of Visits	Number of Visitor Days
OHV—Cars, Trucks, and Sport Utility Vehicles	339,242	112,834
OHV—All-Terrain Vehicle	42,290	10,573
OHV—Motorcycle	95,833	33,079
Rockhounding and Mineral Collection	39,437	9,859

Source: BLM 2005 (Table T-1).

Table T-1 of the WEMO Plan lists other frequent recreation opportunities dispersed around the Barstow area: camping, climbing, driving for pleasure, hiking, hunting, photography, picnicking, target practice, and wildlife viewing (BLM 2005).

The Proposed Action is located in the southeastern end of the Superior-Cronese DWMA which is a limited use area. Table 3-52 of the WEMO Plan provides a summary of recreational activities in the WEMO Planning Area. The Project Area of the Superior-Cronese DWMA is not listed by the BLM as a recreation area.

The Motorized Vehicle Access Element of the CDCA Plan provides a system and set of rules governing access to the CDCA. Currently, OHV access in the Superior-Cronese DWMA is limited to “Open” routes of travel only. The current WEMO Plan amended supplemental maps show the motorized vehicle access routes for the Project Area. The supplemental map includes the current legal motorized road and trail network in limited use areas on BLM public lands in the WEMO Planning Area. Motorized use is permitted only on routes carsonite-signed “Open.” Any route that does not have an Open sign is not legal for motorized use. The Mitchell Mountains Subregion and Calico Mountains Subregion OHV Route Supplement maps show the Open routes in the Project Area (BLM 2011). These are reproduced on Figures 1-1 and 1-2.

The Proposed Action is located in a limited use area that would not be designated for motorized vehicle recreation uses. Based on field work for the Proposed Action, there is some evidence of recreational vehicle use in the Project Area. Near the Mitchell/Lead Mountain Area evidence of vehicle “doughnuts” suggests heavy OHV use. However, this OHV activity is unlawful. Map 3-14 of the WEMO Plan shows the distribution of recreational and residential vehicle impact regions from 1998 to 2002. The Project Area is located east of an area of “Residential Vehicle Impact Areas.” The Proposed Action is also directly east of an area of “Higher Density TCS Areas.” The “TCS” is Total Corrected Sign and is used in the WEMO Plan to determine relative desert tortoise abundance and distribution. According to the WEMO Plan, the Project Area is adjacent to an above-average vehicle impact area (BLM 2005).

There are camping opportunities at the Calico Ghost Town (approximately 2.5 miles southeast of the Lilly Claims Area) provided by San Bernardino County Regional Parks. The City of Barstow also has many recreational opportunities, none of which are near the Proposed Action.

### **3.8 NOISE**

#### **3.8.1 Mitchell/Lead Mountain Area**

The closest noise-sensitive receivers to the Mitchell Lead Mountain Area of the Proposed Action appear to be residences near the intersection of Fern Drive and Balsa Avenue in Barstow, California at a distance of over 9,000 feet (2,744 meters) southwest from the nearest core drilling location (LM-3) and 7,000 feet (2,134 meters) from the nearest IP station. There is also the Skyline Drive-in Theater, on the north side of Highway 58, which is slightly more distant from these Proposed Action features than the aforementioned residences located on the south side of the roadway.

At a closest perpendicular distance of approximately 1,500 feet (457 meters) from I-15, and per coarse estimation guidance provided by the Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment* document (FTA 2006), these residences would be expected to currently experience ambient outdoor sound levels of 50 A-weighted decibel (dBA) daytime  $L_{eq}$  ( $L_d$ ) and 40 dBA nighttime  $L_{eq}$  ( $L_n$ ), respectively. The Skyline Drive-in Theater is about 1,000 feet (328 meters) more distant from I-15, a likely dominant noise source, and might thus be expected to experience existing ambient sound levels that are 5 dBA less (i.e., 45 dBA  $L_d$  and 35 dBA  $L_n$ ) and would include acoustical contribution from the nearby residences (i.e., human activities and operating equipment such as air-conditioning) and occasional roadway traffic on Highway 58.

#### **3.8.2 Lilly Claims Area**

The three core drilling locations associated with this area of the Proposed Action appear to be approximately 9,000 feet (2,744 meters) distant from the Calico Ghost Town Regional Park to the southeast and similarly distant from what may be residential and/or commercial land uses to the south near the Y-intersection of Yermo Cutoff and Ghost Town Road. Both occupied land uses are north of I-15 by at least two miles of distance, and would therefore have existing ambient sound environment dominated instead by local road traffic, human activities and operating equipment (e.g., air-conditioning and other HVAC, portable generators, pumps, etc.). Given the large distance to I-15, existing ambient sound levels at these land uses might be better estimated with FTA guidance on the basis of population density, which suggests 35 to 40 dBA  $L_d$  and 25 to 30 dBA  $L_n$  for capita per square mile of up to 300. Since the Calico Ghost Town Regional Park is a tourist attraction with shops, recreational vehicle (RV) parking and campgrounds, existing ambient sound levels could be substantially higher and correspond with the quantity of visitors, frequency of hosted special events, vehicle traffic, etc.

### **3.9 AIR QUALITY**

The Project Area is located in the Mojave Desert Air Basin (MDAB), within the jurisdiction of the Mojave Desert Air Quality Management District (MDAQMD). The MDAQMD jurisdiction includes the desert portion of San Bernardino County and far eastern end of Riverside County. Air quality is generally fair to good within the Project Area. Light to moderate winds sweep the valleys, resulting in clear views of the mountains across the valley; however, high winds produce dust that may obscure views and contribute to particulate matter ( $PM_{10}$ ) levels. Winter inversions hold smoke in the valleys, further degrading air quality.

Table 3.9-1 presents the attainment status of the Project Area for each criteria pollutant with either a National Ambient Air Quality Standard (NAAQS) or California Ambient Air Quality Standard (CAAQS).

**Table 3.9-1: Federal and State Attainment Status the Project Area**

Criteria Pollutant and Standard	Federal Attainment Status*	California Attainment Status
Ozone – 1-hour	Nonattainment (Severe-17)	Nonattainment
Ozone – 8-hour	Nonattainment (Severe-17)	Nonattainment
PM <sub>10</sub>	Nonattainment (Moderate)	Nonattainment
PM <sub>2.5</sub>	Unclassified/attainment	Nonattainment
Carbon Monoxide	Attainment	Attainment
Nitrogen Dioxide	Attainment	Attainment
Sulfur Dioxide	Attainment	Attainment
Lead	Attainment	Attainment
Visibility Reducing Particles	No Federal Standard	Unclassified
Sulfates	No Federal Standard	Attainment
Hydrogen Sulfide	No Federal Standard	Unclassified

\*Classification provided in parentheses, where applicable.

MDAB currently is non-attainment for both state and federal 24-hour and the state annual average PM<sub>10</sub> standards, the state 1-hour and 8-hour ozone (O<sub>3</sub>) standards, and both the revoked 1-hour federal O<sub>3</sub> and the 1997 8-hour federal O<sub>3</sub> standards. It is expected to be non-attainment for the relatively new 8-hour O<sub>3</sub> standard (75 parts per billion [ppb]) (MDAQMD 2009).

The MDAQMD has adopted a variety of attainment plans aimed at bringing the region into compliance with the NAAQS and/or CAAQS, as summarized in Table 3.9-2.

**Table 3.9-2: MDAQMD Federal Attainment Plans**

Name of Plan	Date of Adoption	Standard(s) Targeted	Applicable Area	Pollutant(s) Targeted	Attainment Date*
Federal 8-Hour Ozone Attainment Plan (Western Mojave Desert Non-attainment Area)	9-Jun-08	Federal eight hour ozone (84 ppb)	Western Mojave Desert Non-attainment Area (MDAQMD portion)	NOx and VOC	2021
2004 Ozone Attainment Plan (State and Federal)	26-Apr-04	Federal one hour ozone	Entire District	NOx and VOC	2007
Triennial Revision to the 1991 Air Quality Attainment Plan	22-Jan-96	State one hour ozone	Entire District	NOx and VOC	2005
Mojave Desert Planning Area Federal Particulate Matter Attainment Plan	31-Jul-95	Federal daily and annual PM10	Mojave Desert Planning Area	PM10	2000

\*Note: A historical attainment date given in an attainment plan does not necessarily mean that the affected area has been re-designated to attainment.

The Federal General Conformity (GC) Rule (40 CFR 93) stipulates that “No department, agency or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity which does not conform to an applicable implementation plan.” The GC rule applies to federal nonattainment or maintenance areas.

A conformity determination is required for each pollutant where the total of direct and indirect emissions caused by the Federal action in a non-attainment or maintenance area would equal or exceed any of the *de minimis* rates specified in the regulation. The *de minimis* levels that apply are provided as Table 3.9-3 and can be compared to estimated construction and/or operational emissions in order to show compliance.

**Table 3.9-3: General Conformity *De minimis* Emission Levels**

Pollutant	Precursor	Designation	Classification/ Location	<i>De minimis</i> level (tons/year)
O <sub>3</sub>	NO <sub>x</sub>	NAA	Severe-17	25
	VOCs	NAA	Severe-17	25
PM <sub>10</sub>	<i>Direct/Indirect Emissions</i>	NAA	Moderate	100

Notes:

NAA = non-attainment area

VOCs = volatile organic compounds

Greenhouse gases (GHGs) emitted as a result of human activity is implicated in global climate change or global warming. The principal greenhouse gases that enter the atmosphere as a result of human activities are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and fluorinated gases. Proposed Action activities associated with heavy equipment operation, and worker commute trips would temporarily generate GHGs. Ambient air quality standards have not been established for GHGs, thus there are no means by which to designate an area as attainment or non-attainment in regards to GHGs. Moreover, since the potential effects of GHG emissions are global in nature, a discussion of the local GHG baseline is not meaningful. Federal regulations require mandatory reporting of GHG emissions if annual emissions are greater than 25,000 metric tons per year (tpy). Projects with GHG emissions greater than 100,000 metric tpy are considered a major source under the Prevention of Significant Deterioration (PSD) program of the Clean Air Act.

**3.10 VISUAL RESOURCES**

The regional setting includes desert and mountain habitat to the north, east, and west and the I-15 and urban area (City of Barstow) to the southwest and the MCLB, Barstow to the southeast. The area to the north, east, and west of the Proposed Action is mountainous and is located within the Superior-Cronese DWMA. There are historic signs of mining activity in the area.

The Project Area is located on undeveloped desert landscape within the Mojave Desert. Portions of the surrounding viewshed have been modified by existing transmission lines, I-15 infrastructure, and the anthropogenic development associated with the City of Barstow. However, less developed, open desert views may be experienced from the Project Area, especially looking east, see Figure 1-3.

### **3.11 LIVESTOCK GRAZING**

Livestock grazing is an allowable use within MUC-L subject to the protection of sensitive resources. The Proposed Action is located adjacent to the Superior Valley sheep grazing allotment. According to WEMO Map 2-14, the eastern portion of this allotment (near the Proposed Action) is closed.

Table 1 of the CDCA Plan states that agricultural uses (excluding livestock grazing) are not allowed on public land managed by the BLM (BLM 1980). According to the California Department of Conservation, Farmland Mapping and Monitoring Program (FMMP), there are no farmlands of Prime, Statewide, Unique, or Local importance near the Proposed Action.

### **3.12 TRAFFIC AND CIRCULATION**

The transportation network within the Project Area is composed of a mix of interstate, county highways, and local roadways. The circulation system plays a major role in the movement of goods originating from both interstate and international sources. The agricultural and mining communities in San Bernardino County rely on the state and county roadways for access as well recreational and tourist oriented trips on public land. This trend and use of the transportation network will continue as new developments occur within San Bernardino County as well as the surrounding communities.

#### **3.12.1 Roadway Network**

Several regionally and locally significant roadways are within the vicinity of the Project Area. As point of reference and in context to the regional roadway system, the Proposed Action sites are located three to 12 miles, northeast of the City of Barstow within an unincorporated area of San Bernardino County.

Key characteristics of the roadway circulation system within the Project Area are:

#### **Interstate 15**

I-15 is a five-lane interstate freeway located to the south of the Proposed Action and provides north-south regional access between San Bernardino, Riverside and San Diego counties. The freeway segment in the vicinity of the interchange with Old Highway 58 provides for two lanes eastbound and two lanes southbound plus a truck lane. Old Highway 58 connects to I-15 via a new and upgraded interchange in the City of Barstow. Other freeway connections to I-15 provide regional linkage to Kern County, Los Angeles County and Orange County.

#### **Interstate 40**

Interstate 40 (I-40) is an east-west interstate freeway located south of the Proposed Action. It originates from the west at the I-15 interchange in the City of Barstow, in San Bernardino County, and heads east towards Arizona and continental U.S.

#### **Old Highway 58**

Old Highway 58 is a two-lane roadway located southwest of the Mitchell/Lead Mountain Area. This roadway segment was initially the primary connection of State Route (SR)-58 originating from Kern County to I-15 in San Bernardino County. The majority of traffic on this segment has since shifted to the

new State Highway 58 connection with to I-15. This segment still provides the same traffic connection with I-15 but with passage through the old town in Barstow.

### **Meadow Grove Road**

Meadow Grove Road is a north east meandering County roadway that provides access to the Mitchell/Lead Mountain Area. The road is generally unpaved and with no roadway name signage at the intersection with Old Highway 58.

### **Fort Irwin Road**

Fort Irwin Road is a north-south County Road connecting I-15 and Fort Irwin Military Reservation located northeast of the Lilly Claims Area. The roadway north of I-15 is generally one lane in each direction then widens to two northbound and one southbound lane to the north of Old Yermo Cutoff Road.

#### **3.12.2 Mitchell/Lead Mountain Area Access**

Originating from the southwest, access to the Mitchell/Lead Mountain Area would be via northbound I-15, then west on Old Highway 58, then northeast on Meadow Grove Road towards the Mitchell/Lead Mountain Claim Area.

#### **3.12.3 Lilly Claims Area Access**

Originating from the south, access is provided via northbound Fort Irwin Road, then northeast on existing unpaved dirt roads towards Lilly Claims Area.

#### **3.12.4 Railroad**

A Union Pacific railroad line operates south of the Project Area. The rail alignment is generally on the south side and parallel to I-15 and a rail switchyard near the Marine Corps Facility in Yermo. There are no active train tracks near the Proposed Action sites.

#### **3.12.5 Bicycle Routes and Pedestrian Circulation**

Due to the remoteness of the Project Area, bicycle routes and pedestrian facilities (sidewalks) are non-existent.

#### **3.12.6 Airports**

The following lists of local airports were identified near the Project Area, and includes their approximate distances in context to the Mitchell/Lead Mountain Area:

- Barstow-Daggett Municipal Airport (DAG) – approximately 11 miles southeast of the Mitchell/Lead Mountain Area.
- Depue Airport (6CA8) – privately owned airport approximately 11 miles southwest of the Mitchell/Lead Mountain Area.

- Lake Army Airfield (BYS) – approximately 32 miles northeast of the Mitchell/Lead Mountain Area.

These airports are beyond the 20,000 foot horizontal distance criteria to warrant Federal Aviation Administration (FAA) notification requirements.

### **3.13 POPULATION AND HOUSING**

The Proposed Action sites are approximately three and twelve miles northeast of the City of Barstow, the closest community to the Proposed Action. The MCLB, Barstow is located approximately four miles southeast of the Proposed Action.

The estimated population of the City of Barstow in January 2013 was 23,168 (CA Department of Finance [DOF] 2013). There were approximately 10,386 total housing units in the City of Barstow in 2011, of which approximately 16.4 percent were vacant (U.S. Census 2011a). In April 2013, the City of Barstow had an unemployment rate of 12 percent (CA Employment Development Department [EDD] 2013).

### **3.14 ENVIRONMENTAL JUSTICE**

The following from the U.S. EPA *Final Guidance for Incorporating Environmental Justice Concerns* in the EPA's NEPA Compliance Analyses criteria may be used during environmental justice screening and impact assessment:

- A minority or low-income population may be identified for the affected area if the minority or low-income population of the affected area is greater than 50 percent of the affected area's general population.
- The minority or low-income population percentage of the area is “meaningfully greater” than the minority population percentage in the general population or other appropriate unit of geographic analysis.
- Whether potential environmental impacts attributable to the project would fall disproportionately on the minority or low-income residents of the community.

#### **Low-Income Populations**

In the following analysis, the percentages of low-income populations (below poverty level) were assessed for the City of Barstow and compared with data for San Bernardino County (representing the general population) as a whole. The City of Barstow is the nearest community to the Proposed Action, located from three to 12 miles to the southwest.

Information regarding income and poverty level was derived from the 2007-2011 American Community Survey 5-Year Estimates. Table 3.14-1 provides a summary of the findings for the City of Barstow and San Bernardino County.

**Table 3.14-1: Income and Poverty Level**

	City of Barstow	San Bernardino County
Per Capita Income	\$20,571	\$21,932
Median Household Income	\$45,417	\$55,853
Median Family Income	\$55,403	\$61,525
Percentage of Individuals Below Poverty Level	22.2%	16.0%
Percentage of Families Below Poverty Level	20.4%	12.7%

Source: Census Bureau, 2011d

As the table indicates, the population of the City of Barstow had a slightly lower per capita income than San Bernardino County, and lower median household and family incomes. The percentage of individuals and families living in the City of Barstow below the poverty level is greater than San Bernardino County. However, this percentage is not meaningfully greater than San Bernardino County, nor is it above the EPA threshold of 50 percent.

**Minority Populations**

In the following analysis, the percentages of minority populations were assessed for the City of Barstow and compared with data for San Bernardino County (representing the general population) as a whole.

Information presented in Table 3.14-2 and 3.14-3, below, was derived from the 2010 Census. Table 3.14-2 summarizes the minority population percentage by race and Table 3.14-3 summarizes the minority population percentage by Hispanic or Latino Origin. Hispanic or Latino is considered an origin not a race by the U.S. Census Bureau. The definition of Hispanic or Latino Origin used in the 2010 Census refers to a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture regardless of race. The federal government considers race and Hispanic or Latino Origin to be two separate and distinct concepts. People who identify their origin as Hispanic or Latino may be any race. Therefore, those who identify themselves as Hispanic or Latino are counted in one or more race categories shown in Table 3.14-2.

**Table 3.14-2: Race Demographic Comparison**

Study Area	Total Population	White	Minority Populations						
			Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some Other Race	Two or More Races	Minority Population
City of Barstow	22,639	11,840	3,313	477	723	278	4,242	1,766	48 %
San Bernardino County	2,035,210	1,153,161	181,862	22,689	128,603	6,870	439,661	102,364	43 %

Source: U.S. Census 2010a.

As indicated in Table 3.14-2, the City of Barstow and San Bernardino County had similar percentages of minority populations. While the City of Barstow had a racial minority population near the 50 percent EPA threshold, it is not a population that is meaningfully greater than San Bernardino County.

**Table 3.14-3: Hispanic or Latino Demographic Comparison**

<b>Study Area</b>	<b>Total Population</b>	<b>Hispanic or Latino</b>	<b>Minority Population</b>
City of Barstow	22,639	9,700	43%
San Bernardino County	2,035,210	1,001,145	49%

Source: U.S. Census 2010b.

As indicated in Table 3.14-3, the City of Barstow had a Hispanic or Latino population below San Bernardino County and below the 50 percent EPA threshold. The Hispanic or Latino population of the City of Barstow does not represent a population that is meaningfully greater than San Bernardino County.

**SECTION 4 ENVIRONMENTAL IMPACTS AND MITIGATION****4.1 ELEMENTS OF THE ENVIRONMENT**

Elements of the environment have been reviewed to determine if they would be affected by the Proposed Action. “Critical” elements are subject to requirements specified in statute, regulation, or by executive order and have been considered in the development of this EA.

The “critical” elements are: Air Quality, Area of Critical Environmental Concern (ACEC), Cultural Resources, Paleontology, Farmlands - Prime/Unique, Floodplains, Native American Religious Concern, Threatened or Endangered Species of Plants and Wildlife, Invasive Species, Wastes - Hazardous or Solid, Water Quality (Surface or Ground), Wetlands/Riparian Zones, Wild and Scenic Rivers, Wilderness, Environmental Justice, and Noise.

The analyses of impacts associated with elements of the environment, including the critical elements, are addressed under three categories:

1. Resources that are not present in the Project Area and not affected by one of the alternatives,
2. Resources that are present in the Project Area but would not be affected by one of the alternatives, and
3. Resources that are present and that may be affected by one of the alternatives (Resources with the Potential for Impacts).

**4.1.1 Uses or Resources That Would Not Be Affected by the Proposed Action****Farmlands – Prime/Unique**

The Proposed Action would not take place in designated or proposed farmlands. The Proposed Action is located on public land managed by the BLM. Agricultural uses (excluding grazing) are not allowed on BLM land. This element is not considered further in this document.

**Wild and Scenic Rivers**

There are no waterways designated under the Federal Wild and Scenic Rivers Act of 1968 in or near the Proposed Action. This element will not be considered further in this document. The Proposed Action would have no impact on Wild and Scenic Rivers.

**Wilderness**

The Proposed Action is not in or near a designated Wilderness Area or Wilderness Study Area. This element is not considered further in this document. The Proposed Action would have no impact on Wilderness areas.

**Wetlands/Riparian Zones**

The Proposed Action sites are not located in wetland or riparian areas. Therefore, this element will not be considered further in this document. The Proposed Action would not impact wetland or riparian zones.

**Floodplains**

The Project Area is not in or near a floodplain according to the current FEMA 100-year floodplain boundary information. The ephemeral washes in the Project Area represent the greatest potential hazard areas for flooding. However, there are no proposed drilling locations in areas with the potential for concentrated stormwater flow. Therefore, this element is not considered further in this document. The Proposed Action would have no impact on floodplains.

**Population and Housing**

There are no residences located near the Proposed Action. The nearest residences are located at the intersection of Fern Drive and Balsa Avenue in Barstow, California at a distance of over 9,000 feet (2,744 meters) southwest from the nearest core drilling location (LM-3) and 7,000 feet (2,134 meters) from the nearest IP station. The Proposed Action would not displace an existing community. While personnel may relocate to the Barstow area during the three-month duration, or a portion thereof, the Proposed Action would not require a large workforce. This temporary relocation to the Barstow area would have a negligible effect on temporary housing. The Proposed Action would have no effect on existing human populations or housing and would not induce growth in the Project Area. This element is not considered further in this document.

**Public Utilities and Services**

The Proposed Action would not disrupt or cause additional demand on public utilities, schools, police, or fire and search and rescue. The Proposed Action is temporary and would not require relocation of workers to the local area causing a strain on local services. This element is not considered further in this document.

**Environmental Justice**

There are no communities of concern for environmental justice impacts near the Proposed Action. Therefore, the Proposed Action would not disproportionately affect minority or low-income populations. This element is not considered further in this document.

**4.1.2 Uses or Resources That Are Present in the Project Area But Would Not Be Affected by the Proposed Action****Geological Resources (Geology, Seismicity, and Minerals)**

The Proposed Action would not affect the geology or seismicity in the Project Area. While mineral resources are present in the Project Area, the Proposed Action would not preclude or allow energy and mineral resource exploration and/or development. The Proposed Action would have negligible effects to geology, seismicity, and mineral resources.

**Livestock Grazing**

The Proposed Action is located east of the Superior Valley sheep grazing allotment. However, according to WEMO Map 2-14, the eastern portion of this allotment (near the Proposed Action) is closed. Therefore, the Proposed Action would have no impact on livestock grazing. This element is not considered further in this document.

**Wastes - Hazardous or Solid**

The drill rig and vehicles would be operated using oil, fuel, lubricating grease, coolants and hydraulic fluids. Additional sources of pollutants may include drilling fluids, borehole plugging materials, solvents, trash and other debris. These pollutants are not expected to come into contact with onsite soils or surface waters. In the event that hazardous or regulated materials were spilled, measures would be taken to control the spill and the BLM would be notified as required. Any hazardous substance spills would be cleaned immediately and any resulting waste would be transferred offsite in accordance with all applicable local, state, and federal regulations. Contract drillers would maintain spill kits on site for use in case of a spill. Hazardous materials spills are not anticipated, and if spills do occur, a Spill Prevention Control Plan is in place (Appendix A).

All solid wastes would be removed from the Project Area and disposed of in a licensed state, federal, or local designated site. Therefore, Proposed Action would not introduce solid wastes to the Project Area.

BMPs are included in the Proposed Action that would lessen effects from hazardous or solid wastes to negligible levels. There are no anticipated effects from hazardous or solid wastes.

**Recreation**

The Proposed Action would be temporary and completed within three months. OHV activities are limited to Open Routes only because the Proposed Action is on public land administered by the BLM in the Superior-Cronese DWMA. There are no BLM-designated recreation opportunities near the Proposed Action. The Proposed Action could temporarily interfere with nature viewing, rockhounding, and hiking. However, due to the temporary nature of the Proposed Action impacts would have a negligible effect on recreation. If any BLM Open Routes require temporary closure, Calico would work with the BLM to post temporary closure signage at the appropriate locations. The Proposed Action would have a negligible effect on recreation.

**Visual Resources**

During the Proposed Action, project activities, materials, equipment, trucks, and vehicles would be visible to surrounding areas due to the flat, open viewing conditions surrounding the Project Area. The Proposed Action activities may contrast with the existing natural character of the area as the Project Area is undeveloped. However, while drilling at the Mitchell/Lead Mountain Area and Lilly Claims Area would introduce new activities and visible presence of equipment, the Proposed Action would be conducted within a three month period. Therefore, visual impacts are considered temporary. Indirect effects associated with the Proposed Action may include temporary impacts associated with fugitive dust, visible ground disturbance and the presence of heavy equipment. Construction activities would be conducted in a manner that minimizes (visible) dust emissions. Areas disturbed by the Proposed Action would be restored and nothing would physically remain in the Project Area after the Proposed Action is completed. As such, the degree of change expected would be negligible and therefore be consistent with the designated Visual Resources Management (VRM) Class.

**4.1.3 Uses or Resources That Are Present in the Project Area and May be Affected by the Proposed Action****Geological Resources (Soils)**

The Proposed Action would disturb surficial soils in the Project Area. Loss or disturbance of vegetation or physical or biological crusts can lead to accelerated wind and water erosion, fugitive dust generation, increased sediment loads, and/or degraded water quality. To minimize the effects of the Proposed Action, upon completion of field activities, disturbed areas (drill sites, IP survey sites, and access routes) would be restored to pre-activity conditions by the appropriate earth moving equipment and manual labor. Pads and access roads would be recontoured to their natural grade, as necessary. Appropriate BMPs would be part of the Proposed Action (see Water Quality discussion below). These processes (described in Section 2.1.4) would be supervised by onsite biologists as described in Section 2.1.4 and below.

**Biological Resources**

Long-term adverse effects to vegetation and wildlife within the Project Area from the Proposed Action are expected to be negligible due to the temporary nature of the Proposed Action and with proposed mitigation. The Proposed Action may result in short-term temporary impacts to wildlife at the drill locations and IP geophysical survey locations. All of the drilling locations and IP geophysical survey locations have been located to avoid and minimize environmental effects to wildlife and vegetation. The work areas, associated with the Proposed Action, shown on Figures 1-1 and 1-2 include space for the boring site, the drill rig, and sufficient room for equipment laydown. BMPs are given below to minimize impacts to biological resources.

To access LM-4, approximately 21 feet of disturbed desert wash channel would be crossed by the tracked drill rig and support vehicles. Access through the 21 feet of wash channel would not require any blading of vegetation or grading for access. Pads and sumps would not be constructed within the wash. Avoidance and minimization measures are in place (Section 2.1.1 and below) that would lessen the effect of driving through the wash crossing to reach LM-4.

Reclamation/restoration efforts would be conducted on drill pad sites, routes used for cross-country travel, and lay-down areas. As described in Section 2.1.4, pads and access roads would be recontoured to their natural grade, as necessary. Vertical mulching techniques would be used to restore the natural look of disturbed areas, to protect the area from further vehicle traffic, and to promote vegetation growth. Vegetation growth may be further encouraged by the application of native seeds in disturbed Mojave creosote bush scrub-dominated areas. The technique for reclamation/restoration would be determined on a site-by-site basis.

**Special Status Species**

During focused surveys, use of the Project Area by desert tortoise was confirmed by both live encounters and sign (burrows, scat, and carcasses). Use of the Project Area by Burrowing Owl was confirmed only by sign (burrows and pellets). No Burrowing Owls or active owl burrows were detected.

**Desert Tortoise**

Desert tortoise has been detected in the Project Area. The BLM determined that implementation of the Proposed Action may adversely affect the desert tortoise (*Gopherus agassizii*) and its designated critical

habitat. The desert tortoise is federally listed as threatened. The project would also occur in the Superior Cronese DWMA. However, the following stipulations included from the Biological Opinion for Small Mining and Exploration Operations in the California Desert (1-6-92-F-28) into the Proposed Action would minimize the effect on desert tortoise and their habitat. The measures are as follows:

1. The mine operator shall designate a field contact representative (FCR) who would be responsible for overseeing compliance with protective stipulations for the desert tortoise and for coordination on compliance with the BLM. The FCR shall have the authority to halt all mining activities that are in violation of the stipulations. The FCR shall have a copy of all stipulations when work is being conducted on the site. The FCR may be the mine operator, the mine manager, any other mine employee, or a contracted biologist.
2. An employee education program must be received, reviewed, and approved by the BLM at least 15 days prior to the presentation of the program. The program may consist of a class or video presented by a qualified biologist (BLM or contracted) or a video. Wallet-sized cards with important information for workers to carry are recommended. All mine employees shall participate in the desert tortoise education program prior to initiation of mining activities. The operator is responsible for ensuring that the education program is developed and presented prior to conducting activities. New employees shall receive formal, approved training prior to working on-site. The program shall cover the following topics at a minimum:
  - a. Distribution of the desert tortoise,
  - b. General behavior and ecology of the desert tortoise,
  - c. Sensitivity to human activities,
  - d. Legal protection,
  - e. Penalties for violations of State or Federal laws,
  - f. Reporting requirements, and
  - g. Project protective mitigation measures.
3. Only biologists authorized by the USFWS and BLM shall handle desert tortoises. The BLM or mine operator shall submit the name(s) of the proposed authorized biologist(s) to the USFWS for review and approval at least 15 days prior to the onset of activities. No mining activities shall begin until an authorized biologist is approved. Authorization for handling shall be granted under the Section 7 consultation.
4. The authorized biologist shall be required on-site during all construction activities. This biologist shall have authority from the operator to halt any action that might result in harm to a desert tortoise.
5. The area of disturbance shall be confined to the smallest practical area, considering topography, placement of facilities, location of burrows, public health and safety, and other limiting factors. Work area boundaries shall be delimited with flagging or other marking to minimize surface disturbance associated with vehicle straying. Special habitat features, such as burrows, identified by the qualified biologist shall be avoided to the extent possible. To the extent possible, previously disturbed areas within the mining site shall be utilized for the stockpiling of excavated materials, storage of equipment, digging of slurry pits, location of office trailers, and parking of vehicles. The qualified biologist, in consultations with the project proponent, shall ensure compliance with this measure.

6. Where practical, no access road shall be bladed for exploratory work. Cross-country access shall be the standard for temporary activities. To the extent possible, access to the mine site shall be restricted to designated “open” routes of travel. A qualified biologist shall select and flag the access route, whether cross-country or bladed, to avoid burrows and to minimize disturbance of vegetation.

Except when absolutely required by the operation and as explicitly stated in the plan of operations, cross-country vehicle use by mine employees is prohibited during work and non-work hours.

7. To prevent desert tortoise from falling in, test holes shall be either fenced or covered as much of the time as possible and at all times when not attended.
8. Desert tortoises shall be handled only by the authorized biologist and only when necessary. New latex gloves shall be used when handling each desert tortoise to avoid the transfer of infectious disease between animals. Any desert tortoise moved shall be placed in the shade of a shrub in the direction in which it was facing when found or at the entrance to a burrow if hibernating. In general, desert tortoises should be moved the minimum distance possible to ensure their safety.
9. The authorized biologist shall maintain a record of all desert tortoises handled. This information shall include for each desert tortoise:
  - a. The locations (narrative and maps) and dates of observations;
  - b. General condition and health, including injuries and state of healing and whether animals voided their bladders;
  - c. Location moved from and location moved to; and
  - d. Diagnostic marking (i.e., identification numbers or marked lateral scutes).
10. No later than 90 days after completion of construction or termination of exploration activities, the FCR and authorized biologist shall prepare a report for the BLM. The report shall document the effectiveness and practicality of the mitigation measures, the number of desert tortoises excavated from burrows, the number of desert tortoises moved from the site, the number of desert tortoises killed or injured, and the specific information for each desert tortoise as described in measure 9. The report shall make recommendations for modifying the stipulations to enhance desert tortoise protection or to make it more workable for the operator. The report shall provide an estimate of the actual acreage disturbed by various aspects of the operation.
11. Upon locating a dead or injured desert tortoise, the operator is to immediately notify the BLM. The BLM must then notify the appropriate field office (Carlsbad or Ventura) of the USFWS by telephone within three days of the finding. Written notification must be made within 15 days of the finding. The information provided must include the date and time of the finding or incident (if known), location of the carcass, a photograph, cause of death (if known), and other pertinent information. Desert tortoise remains shall be collected, delivered to the BLM, and frozen as soon as possible. Injured animals shall be transported to a qualified veterinarian for treatment at the expense of the project proponent. If an injured animal recovers, the USFWS should be contacted for final disposition of the animal.
12. Except county-maintained roads, vehicle speeds shall not exceed 20 miles per hour through desert tortoise habitat.

13. If it is necessary for a worker to park temporarily outside of the cleared enclosure, the worker shall inspect for desert tortoises under the vehicle prior to moving it. If a desert tortoise is present, the worker shall carefully move the vehicle only when necessary or shall wait for the desert tortoise to move out from under the vehicle.
14. All dogs shall be restrained either by enclosure in a kennel or by chaining to a point within the desert tortoise-proof enclosure.
15. All trash and food items shall be promptly contained within closed, raven-proof containers. These shall be regularly removed from the project site to reduce the attractiveness of the area to ravens and other desert tortoise predators.

### Burrowing Owl

The Proposed Action may affect Burrowing Owl and their habitat. Burrowing Owl sign have been detected in the Project Area and may use the areas proposed for the Proposed Action. However, the following measures incorporated into the Proposed Action description would minimize the effect on Burrowing Owl:

1. A qualified biologist would conduct pre-construction surveys for Burrowing Owl prior to initiation of disturbance activities if needed. Surveys shall be focused exclusively on detecting active Burrowing Owl burrows. Potentially active owl burrows shall be monitored for a two hour period in early morning (after sunrise) and late evening (before sunset) as required by the BLM. The survey area shall include potentially active owl burrows located within 250 feet of the Proposed Action sites.
2. The qualified monitor shall establish and mark a 250 foot non-disturbance buffer circle around an active burrow if necessary. The buffer shall be staked and roped-off prior to initiating any activity. A noise attenuation barrier would be installed adjacent to the drill site if an active owl burrow is present within 250 feet of the drill site.
3. If an active, non-breeding Burrowing Owl burrow is detected, the Proposed Action drill sites should be located beyond a 160-foot distance, as determined by a qualified biologist. The non-disturbance buffer would be established with flagging by the biological monitor prior to activities. A noise attenuation barrier would be installed adjacent to the drill site if an active owl burrow is present within 160 feet of the drill site.

### Other Special Status Species

Potential impacts to special status bird species other than Burrowing Owl are anticipated to be negligible. A qualified biologist would determine the presence or absence of nesting birds in the work area. If an active nest is identified, a biological monitor would establish and mark a 250 foot setback buffer. The biological monitor would monitor the nest to ensure that the birds are not disturbed. Monitoring of the nest would continue until the birds have fledged. Nesting activity observed within the Project Area would be documented and reported to the BLM.

Disturbance to vegetation would be limited. The following measures have been incorporated into the project description to minimize effects on biological resources:

1. Worker Education Program: Personnel working onsite would attend special training for environmental awareness. The training shall cover the following: 1) potential presence of sensitive species and their habitats; 2) requirements and boundaries of the Proposed Action (e.g., areas delineated by flags or cones); 3) importance of complying with avoidance measures; 4) environmentally responsible construction practices; and 5) identification of sensitive resources in the field, if present.
2. General entry and exit points for the Proposed Action and their work areas would be marked with traffic cones or flagging to avoid additional disturbance.
3. All activities must comply with the Migratory Bird Treaty Act (MBTA). Active nests (i.e., nests with eggs or chicks) are protected by the MBTA. Proposed Action related vegetation disturbance would avoid active nests.
4. Support vehicles would have standard tires. In wet or soft conditions, off-road work would be limited to the drilling rig, and no tracked vehicles would be used.

### **Cultural Resources**

The Class III intensive pedestrian survey identified a total of 25 cultural resources within the Project Area, all of which are archaeological. Of these, 22 are archaeological sites (one prehistoric, 18 historic, and three multi-component [including both prehistoric and historic elements]), and three are archaeological isolates. Evaluation and thorough documentation of these sites has revealed that these resources are unable to provide additional data that would contribute to the current body of archaeological data. As a result the 22 archaeological sites and three archaeological isolates within the Project Area are recommended not eligible for listing on the NRHP, and therefore, do not constitute historic properties. However, 18 (15 sites and three isolates) of these resources would not be directly impacted during the operation of the Proposed Action because these occur within the buffer zone and are not planned for any ground disturbing work. The two remaining archaeological sites that are subject to direct effects would only involve work within previously disturbed areas, and based on the geology has a very low-likelihood for buried archaeological materials. Therefore, it is anticipated that the Project would have no adverse effects on historic properties per 36 CFR 800.5(1) with conditions provided below. The use of existing access roads and proposed temporary access routes is not anticipated to affect cultural resources within the Project Area. The drill rigs and associated vehicles shall be confined to those areas identified as void of cultural resources.

Even though the overall potential for buried resources is low, monitoring of ground-disturbing activities by a qualified archaeologist have been incorporated in the Proposed Action description to ensure avoidance of resources. The archeological monitor shall have the authority to halt the Proposed Action immediately if a previously undiscovered cultural resource (not consisting of an isolate) is identified in the area of the Proposed Action. Should a resource be identified, the BLM archaeologist shall be notified immediately.

The following measures have been incorporated into the Proposed Action to minimize effects to archeological resources:

1. A qualified archaeological monitor would accompany drilling crews and would conduct a pre-activity survey at all locations to be accessed during the Proposed Action prior to beginning work on each location.

2. Where ground disturbing activities are conducted, the archaeological monitor would examine backdirt or drilling spoils for the presence of subsurface cultural resources if required.
3. Existing roads or tracks would be used to the maximum extent possible. New tracks or routes would involve minimal disturbance. If turn-around areas are required for vehicles, then biological and cultural monitors would assist with selecting a location.
4. All discovered human remains shall be treated with respect and dignity. California state law (California Health & Safety Code 7050.5) and federal law and regulations ([Archaeological Resources Protection Act (ARPA) 16 USC 470 & 43 CFR 7], [Native American Graves Protection & Repatriation Act (NAGPRA) 25 USC 3001 & 43 CFR 10] and [Public Lands, Interior 43 CFR 8365.1-7]) require a defined protocol if human remains are discovered in the state of California regardless if the remains are modern or archaeological.
5. Upon discovery of human remains in California, all work in the area must cease immediately, nothing disturbed and the area is to be secured. The County Coroner's Office of the county where the remains were located must be called. The Coroner has two working days to examine the remains after notification. The appropriate land manager/owner or the site shall also be called and informed of the discovery. If the remains are located on federal lands, federal land managers/federal law enforcement/federal archaeologist are to be informed as well because of complementary jurisdiction issues. It is very important that the suspected remains and the area around them remain undisturbed and the proper authorities called to the scene as soon as possible as it could be a crime scene. Disturbing human remains is against federal and state laws and there are criminal/civil penalties including fines and/or time in jail up to several years. In addition, all vehicles and equipment used in the commission of the crime may be forfeited. The Coroner would determine if the bones are historic/archaeological or a modern legal case. If the Coroner's Office determines the remains are of modern origin, the appropriate law enforcement officials would be called by the Coroner and conduct the required procedures. Work would not resume until law enforcement has released the area. If the remains are determined to be archaeological in origin and there is no legal question, the protocol changes depending on whether the discovery site is located on federally or non-federally owned/managed lands.
6. *Remains discovered on federally owned/managed lands:* After the Coroner has determined the remains are archaeological or historic and there is no legal question, the appropriate Field Office Archaeologist must be called. The archaeologist would initiate the proper procedures under ARPA and/or NAGPRA. If the remains can be determined to be Native American, the steps as outlined in NAGPRA, 43 CFR 10.6 Inadvertent discoveries, must be followed.
7. *Remains discovered on non-Federally owned/managed lands:* After the Coroner has determined the remains on non-federally owned/managed lands are archaeological and there is no legal question, the Coroner would make recommendations concerning the treatment and disposition of the remains to the person responsible for the excavation, or to his or her authorized representative. If the Coroner believes the remains to be those of a Native American he/she shall contact by telephone within 24 hours, the California NAHC. The NAHC would immediately notify the person it believes to be the most likely descendent of the remains. The most likely descendent has 48 hours to make recommendations to the land owner for treatment or disposition of the human remains. If the descendent does not make recommendations within 48 hours, the land owner shall reinter the remains in an area of the property secure from further disturbance. If

the land owner does not accept the descendant's recommendations, the owner or the descendent may request mediation by the NAHC.

### **Paleontological Resources**

The Proposed Action sites may be monitored if required by the BLM. Monitors would identify and recover paleontological resources encountered intact, as well as their stratigraphic context. The BLM would determine if and when a paleontological monitor is required.

The following measures have been incorporated into the Proposed Action to minimize effects on paleontological resources:

1. A qualified paleontological monitor would accompany crews if required by the BLM.
2. Where ground disturbing activities are conducted, the paleontological monitor would examine backdirt or drilling spoils for the presence of subsurface paleontological resources.
3. Existing roads or tracks would be used to the maximum extent possible. If new tracks or routes are required, a paleontological monitor would monitor all ground disturbing activities, and take sediment samples as considered necessary.
4. If vertebrate or invertebrate fossils are detected they would be analyzed and prepared for curation.

### **Water Quality (Surface and Ground)**

Water quality would be protected through the implementation of water quality BMPs during activities associated with the Proposed Action. The Proposed Action is not subject to the NPDES general permit addressing stormwater discharges associated with construction activities because the total disturbance area is less than one acre. Projects that disturb one or more acres of soil are required to obtain coverage under the National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP), Water Quality Order 2009-0009-DWQ as amended by Orders 2010-0014-DWQ and 2012-0006-DWQ.

SWRCB Water Quality Order No. 2003-0003-DWQ, Statewide General Waste Discharge Requirements (WDRs) for Discharges to Land with a Low Threat to Water Quality (General WDRs) applies to discharges of well/boring wastes to the land surface. As indicated in Section 2.1, the drill cuttings, core, and water would be recovered from the drill hole during drilling. The water and cuttings would be separated by gravity (in a 4'x8'x8' sump) at each drill site. Return water from the drill hole would be circulated into a portable container. If necessary, recovered water would be re-circulated and re-used in the drilling process.

Standard water quality BMPs implemented during project activities would prevent and minimize potential effects to surface water and groundwater quality. Water quality related BMPs may consist of:

1. Erosion and Sediment Control BMPs (fiber rolls, gravel bags, or silt fences)
2. Wind Erosion Control (dust control)
3. Non-stormwater BMPs (vehicle equipment and operations BMPs)
4. Waste-Management BMPs (good housekeeping, material use, spill prevention and control, solid waste management, sanitary/septic waste management, liquid waste management)

With implementation of water quality BMPs, the Proposed Action would have negligible effects to surface water or groundwater quality.

### **Air Quality**

The main sources of fugitive dust (PM<sub>10</sub>) and/or fuel combustion emissions (including nitrogen oxides [NO<sub>x</sub>] and some VOCs) associated with the Proposed Action include, but are not limited to, the following:

- Grading and soil disturbance during blading of drill pads;
- Performance of exploratory drilling (including drilling rig and support equipment emissions);
- Site access and travel on unpaved road surfaces;
- Travel on paved roads by all appropriate vehicles; and
- Worker commuting.

Project design features would incorporate the latest approved MDAQMD methods for fugitive PM<sub>10</sub> emissions control. Key project design features for emission control include:

1. Mobile equipment would meet California standards.
2. Travel on dirt roads will be limited to 15 mph.
3. Dust control during all operations would be accomplished through the use of the following:
  - Short-term dust control by a water truck and/or available water source on or near the drilling rig;
  - Minimize and cleanup trackout onto paved roads;
  - Cover haul trucks;
  - Stabilize (chemical or vegetation) site upon completion of grading when subsequent development is delayed;
  - Rapid cleanup of project-related trackout or spills on paved roads; and
  - Minimize grading and soil movement when winds exceed 30 miles per hour.

Proposed Action emissions were conservatively estimated assuming the drilling activities occur on a daily basis for three months. Drilling operations are not likely to be performed on a continuous basis, thus the estimated emissions are greater than the anticipated actual emissions. As presented in Table 4.1-1, estimated project emissions of PM<sub>10</sub> are well below the federal conformity *de minimis* threshold of 100 tpy. Similarly, the estimated project emissions of the ozone precursors, NO<sub>x</sub> and VOCs, are each well below their respective federal conformity *de minimis* threshold of 25 tpy.

**Table 4.1-1: Estimated Project Emissions**

**TOTAL EMISSIONS- 3 MONTHS**

Equipment/ Vehicles	(pounds per 3 months)						(metric tons per 3 months)			
	VOC	CO	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO <sub>2</sub>	N <sub>2</sub> O	CH <sub>4</sub>	CO <sub>2e</sub> <sup>1</sup>
<b>Off-road Equipment</b>										
Cat D6 Dozer	32.2	91.3	291.0	0.3	75.0	41.1	13.8	-	0.0013	13.8
Tracked drill rig	279.4	1,190.6	2,529.0	6.6	137.7	77.7	304.7	-	0.0114	305.0
RT HOE 710 (backhoe)	12.5	63.5	82.1	0.1	31.9	8.8	4.2	-	0.0005	4.2
HD truck to haul equipment	8.2	23.9	67.2	0.1	31.3	5.5	4.6	-	0.0003	4.7
<b>Portable Equipment</b>										
Air compressor	9.1	26.6	102.4	0.1	3.1	2.9	5.4	-	0.0004	5.4
Welder	7.7	23.6	90.7	0.1	2.7	2.5	4.9	-	0.0003	4.9
<b>On-road Vehicles</b>										
Pick-up trucks	1.2	23.9	2.5	0.0	655.7	67.5	1.4	0.0003	0.0002	1.5
WATER TRUCK 4000 GAL	4.7	17.5	72.0	0.1	281.2	41.9	5.0	0.0000	0.0000	5.0
Service Truck	0.8	7.2	31.9	0.1	452.8	53.6	3.3	0.0002	0.0002	3.3
IP survey 2 pickup trucks	0.2	3.2	0.3	0.0	95.2	9.6	0.2	0.0000	0.0000	0.2
Worker vehicles	1.5	42.6	4.8	0.1	27.0	6.9	3.6	0.0012	0.0010	4.1
Pipe truck	0.4	1.7	7.4	0.0	10.1	2.5	0.5	0.0000	0.0000	0.5
Total (pounds)	357.9	1,515.5	3,281.2	7.7	1,803.8	320.4				
Total (tons)	0.18	0.76	1.64	0.00	0.90	0.16				
Total (metric tons)							351.6	0.0	0.0	352.4

Notes:

1. Greenhouse Gas Global Warming Potential (GWP) - Intergovernmental Panel on Climate Change, Second Assessment Report (1996)

VOC = volatile organic compounds; CO = carbon monoxide; NO<sub>x</sub> = nitrogen oxides; SO<sub>2</sub> = sulfur dioxide; PM<sub>10</sub> = particulate matter; PM<sub>2.5</sub> = fine particulate matter; CO<sub>2</sub> = carbon dioxide; N<sub>2</sub>O = nitrous oxide; CH<sub>4</sub> = methane; CO<sub>2e</sub> = CO<sub>2</sub> equivalent, converted using GWP.

GHG emissions would be released as a result of combustion emissions from equipment used during the Proposed Action and from vehicles used for worker commute. GHG exhaust emissions for the off-road equipment and on-road vehicles were conservatively estimated assuming the drilling activities occur on a daily basis for three months. As presented in Table 4.1-1, worst-case GHG emissions from the Proposed Action are estimated to be 352 metric tons per year of carbon dioxide equivalent (CO<sub>2e</sub>). Detailed calculations of all estimated Proposed Action emissions are presented in Appendix E.

Based on the estimated emissions, the Proposed Action would have negligible effects on air quality.

**Noise**

Noise levels from the anticipated core drilling activities, considered “construction” and of a temporary nature (i.e., as opposed to the “operation” of stationary equipment installed at a site, such as heating, ventilating, and air conditioning (HVAC) for a building, or transformers for a power generation project), were estimated at the identified closest residential receiver with respect to each of the Mitchell Lead Mountain Area and Lily Claims Area. At approximately 9,000 feet (2,744 meters) from the closest of the core drilling sites, the estimated noise level from continuous operation of a Boart Longyear LF90D drilling rig (or comparable equipment) would be no greater than 32 dBA  $L_{eq}$ . This estimate uses a reference sound level of 86 dBA  $L_{max}$  at a distance of 50 feet (based on the Federal Highway Administration [FHWA] Roadway Construction Noise Model [RCNM] User’s Guide, Table 1) and applies only geometric divergence and atmospheric acoustical absorption for attenuation with distance. Ground surface acoustical absorption and the noise-reducing effects of linearly occluding terrain features between the drilling operation and the receiver have conservatively been neglected. At 32 dBA  $L_{eq}$ , this sound pressure is less than all of the following impact indicators and guidance thresholds:

1. San Bernardino County Code 83.01.080(c)(1) nighttime residential noise limit of 45 dBA  $L_{eq}$ ; and,
2. Environmental Protection Agency and Housing and Urban Development (HUD) outdoor guidance level of 55 dBA day-night sound level ( $L_{dn}$ ), which would equate to 49 dBA  $L_{eq}$  for a continuous sound source like the anticipated core drilling operation.

Because neither of these noise thresholds would be exceeded, the Proposed Action would have negligible effects on noise from either daytime or nighttime drilling operation at the Project Area.

**Traffic and Circulation**

The Proposed Action would entail exploratory trips at the claims sites within a three month survey period. Vehicle travel within the Project Area would be restricted to Proposed Action vehicles only and no personal vehicles would be used within the Project Area. It is anticipated that no more than seven vehicles would be onsite during drilling activities.

The equipment required for the Proposed Action would include the following:

- Tracked diamond core drilling rig
- Support truck
- Pick-up Truck for Pipe
- Passenger Pick-up truck or ATV
- 4,000 Gallon Water truck
- Crew Van (10 passenger van or smaller)
- Monitor’s vehicle (if required)

During the Proposed Action short term increases in project added traffic would be experienced at the roadway circulation system directly and indirectly serving the exploration sites. Calico does not intend to close any Open Routes. However, if it becomes necessary to close a BLM Open Route, BMPs are provided below.

The following Proposed Action measures would reduce effects to transportation and traffic:

1. If a BLM Open Route needs to be closed, Calico would notify the public of potential short-term roadway closures. Prior to any exploration activity that constrict travel of vehicles Calico would notify the public of the potential for Open Routes to be temporarily closed and where this closures occur via visual posting at Open Route entrances and intersection with major highways and local roadways.
2. Signs would be posted at Open Routes if explorations would temporarily constrict the travel of vehicles and public access. The temporary closures must be in conformance with the requirements of agencies (e.g. BLM and County of San Bernardino), responsible for stewardship/management of public land and maintenance of County roadways.
3. Prior to any exploration activity all key first responders in the area shall be notified of access restriction and properly identify the areas that would have Open Route closures. The temporary restriction of emergency vehicle access must be in conformance with the requirements of agencies (e.g. BLM and County of San Bernardino) responsible for stewardship/management of public land and maintenance of County roadways.
4. Restore affected project access roads and Open Routes to pre-activity conditions.

If routes are temporarily closed, impacts associated with temporary disruption of access considered negligible because the primarily recreational users of the Open Routes would be aware of any roadway closures ahead and in advance of the Proposed Action. Due to the minimal number of vehicles used in the exploration activities, roadway wear and tear is not anticipated to occur at the Open Routes serving exploration sites. Based on the short-term duration, limited number of vehicles and non-recurring usage of the roadways, no extensive roadway rehabilitation would be required.

## **4.2 CUMULATIVE IMPACTS**

Cumulative impacts are defined in 40 CFR 1508.7 as the effects that could result from incremental impacts of an action when added to past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time. Analyses of cumulative effects consider geographic (space) limits, time (temporal) limits, and the characteristics of the resource being evaluated. The geographic area of cumulative effect varies by resource; therefore, the geographic scope for this Proposed Action would be identified by each resource with the potential for cumulative impacts. These are the resources or elements of the environment that are present and that may be affected by one of the alternatives (Geological Resources—Soils, Biological Resources, Cultural Resources, Paleontological Resources, Water Quality—Surface and Ground, Air Quality, Noise, and Traffic and Circulation).

Direct effects of the Proposed Action are temporary and only expected to last for the duration of the drilling activities and restoration. Duration of the Proposed Action was determined to be an approximately three-month period in 2015. As such, the actions that have the potential to be cumulatively considerable would be limited to those under construction during the same time period as the Proposed Action. Each element of the environment that is present and may have cumulative effects from the Proposed Action is evaluated below for cumulative effects. Each element of the environment that is analyzed below is based on potential resources, ecosystems, and human communities that may have potential to be affected by the Proposed Action and that have the potential to combine with reasonably

foreseeable future actions. This may be different depending on the geographic boundary within which each resource may be affected.

Table 4.2-1, contains a list of projects in San Bernardino County near Barstow in the vicinity of the Proposed Action, and the reason they were or were not analyzed as past, present, or reasonably foreseeable future actions with the potential for cumulative effects. This list was compiled from the BLM website, CEQANet database, City of Barstow website, and WEMO Plan and represents the most current list of projects in the vicinity of the Proposed Action. Projects are listed first that could be in construction during 2015 and therefore could represent cumulatively considerable reasonably foreseeable future actions. Projects that are in the application stage, early stages, or are known not to be in construction during 2015 are excluded and are not evaluated for cumulative effects.

**Table 4.2-1: Past, Present, and Reasonably Foreseeable Future Actions**

Project Name	Description of Project	Location	Status	Reason for Inclusion or Exclusion
<b>Past Projects</b>				
Mining Operations: Various	Past Inactive Mining Claims	Project Area in Superior-Cronese DWMA	Past operations or Abandoned Mine Lands	Excluded: Past operations and/or Abandoned Mine Lands. According to West Mojave Plan Map 3-20 nearest active mining claims are south of Highway 58 and I-15.
<b>Present Projects</b>				
Desert Xpress High-Speed Passenger Train Project.	The project entails construction and operation of a privately financed, fully-grade separated, dedicated double-track passenger only railroad along an approximately 200 mile corridor between Victorville, California and Las Vegas, Nevada.	Approximately 200-mile linear facilities parallel I-15 from Victorville, CA and Las Vegas, NV.	Approved March 2011 – under construction.	Included: Construction could coincide with Proposed Action. Segment 2A and 2C along I-15 near Barstow.

**Table 4.2-1: Past, Present, and Reasonably Foreseeable Future Actions**

Project Name	Description of Project	Location	Status	Reason for Inclusion or Exclusion
Residential Subdivision Tentative Tract Map 17800 in Barstow	The proposed project involves the development of 77.15-acre planned residential community site in Barstow. The Department of Fish and Game, as responsible agency, is issuing an Incidental Take Permit for the desert tortoise, which is protected by the California Endangered Species Act and could be taken as a result of the project.	City of Barstow	Final EIR completed. May be under construction.	Included: Not in Proposed Action Vicinity. Project located opposite Highway 58. However, cumulative effects to Desert Tortoise Habitat could occur.
Hillcrest West Tentative Tract Map 18553	The proposed project is the development of the approximate 69-acre site into 219 single-family residential lots, roadways, and related appurtenances.	City of Barstow at cross streets Jasper Road, near Agate Road. Located approximately 6 miles from Proposed Action opposite Highway 58.	Mitigated Negative Declaration Received.	Included: May be in construction. Opposite Highway 58 put could have cumulative effects together with the Proposed Action.
Abengoa Mojave Solar Project		Under construction, but outside of area of environmental effect (approx. 20 miles away).	Under construction	Excluded: Not in Proposed Action Vicinity
Calico Solar Project	A 663.5 MW solar power project located on public land administered by the BLM.	Outside of area of environmental effect (approx. 26 miles away).	Revised project under environmental review; not expected to be approved until after completion of the proposed Project. Applicant submitted a request to withdraw amendment and terminate the California Energy Commission Decision.	Excluded: Project no Longer Under Environmental Review
Lockhart Substation Project		Outside of area of environmental effect (approx. 20 miles away).	Under construction	Excluded: Not in Proposed Action Vicinity

**Table 4.2-1: Past, Present, and Reasonably Foreseeable Future Actions**

Project Name	Description of Project	Location	Status	Reason for Inclusion or Exclusion
Barstow Sanitary Landfill Expansion	The proposed project consists of expanding the existing Barstow Landfill by 11.5 acres to its currently permitted 47-acre footprint.	The site is located on the east side of State Route 247 approximately 3 miles south of the City of Barstow.	Supplemental EIR submitted to San Bernardino County	Excluded: Under Environmental Review
<b>Reasonably Foreseeable Future Projects</b>				
CalNev Expansion Project	The proposed pipeline would cross lands under the jurisdiction of the United States Forest Service, BLM, the United States Navy, Marine Corps Logistics Base, the Counties of San Bernardino, California and Clark, Nevada, and various cities along the Interstate 15 corridor from Colton, California to Las Vegas, Nevada.	Approximately 3.5 miles from Proposed Action	Under environmental review	Excluded: Not expected to be approved until after completion of the Proposed Action.

Sources: BLM Barstow Field Office Projects, <http://www.blm.gov/ca/st/en/fo/barstow.html>; CEQANet list of projects in San Bernardino County, <http://www.ceqanet.ca.gov/>; West Mojave Plan Map 3-20, "Mineral Potential, Active and Inactive Mines, and Mining Claim Density Superior-Cronese DWMA."

**4.2.1 Resources Not Present in Project Area and Not Affected by the Proposed Action**

Farmlands, Wild or Scenic Rivers, Wilderness, Wetlands/Riparian Zones, and Floodplains do not occur in the Project Area and would not be impacted by the Proposed Action. The Proposed Action cannot contribute to cumulative effects on these resources.

**4.2.2 Resources Present in Project Area but Not Affected by the Proposed Action**

Geological resources (geology, seismicity, and minerals), livestock grazing, recreation, and visual resources occur in the Project Area but would not be impacted by the Proposed Action. The analysis of effects of the Proposed Action on population, housing, public services, utilities, environmental justice, and hazardous or solid wastes revealed that these elements would not be affected by the Proposed Action. The Proposed Action cannot contribute to cumulative impacts geological resources (geology, seismicity, and minerals), livestock grazing, recreation, visual resources, population, housing, public services, utilities, environmental justice, and hazardous or solid wastes because the Proposed Action would have no effect on these resources and elements.

### **4.2.3 Resources Present that May be Affected by the Proposed Action**

The Proposed Action may affect soils, biological resources, cultural and paleontological resources, water quality (surface and ground), air quality, noise, and traffic and circulation. Affects to these resources are evaluated for cumulative impacts below.

#### **4.2.3.1 *Geologic Resources (Soils)***

The Proposed Action includes drilling activities and ground disturbance with the potential to impact soils within the Proposed Action area through accelerated wind and water erosion, fugitive dust generation, increased sediment loads, and/or degraded water quality. The geographic scope for cumulatively considerable reasonably foreseeable future actions that have the potential to affect geologic resources is the regional vicinity surrounding the proposed action area. Therefore, reasonably foreseeable future projects within this area were considered for cumulative effects to soils. Three projects have the potential to contribute to cumulative effects when combined with the Proposed Action. Desert Xpress High-Speed Passenger Train Project, Residential Subdivision Tentative Tract Map 17800 in Barstow, and Hillcrest West Tentative Tract Map 18553 could possibly be under construction concurrently with the Proposed Action. The Proposed Action would protect geologic resources through the implementation of Proposed Action design features intended to reduce accelerated wind and water erosion, fugitive dust generation, increased sediment loads, and/or degraded water quality. Other reasonably foreseeable future actions would employ similar project features, BMPs, and/or mitigation measures. Considered cumulatively, impacts to geologic resources would be fully mitigated through project design, BMPs, and/or mitigation measures and are not expected to be cumulatively considerable.

#### **4.2.3.2 *Biological Resources***

##### *Special Status Species*

The Proposed Action sites are located within the Superior-Cronese DWMA, and, therefore has potential for desert tortoise, Western Burrowing Owl, and other special status species. The geographic scope for cumulatively considerable reasonably foreseeable future actions that have the potential to affect desert tortoise, Western Burrowing Owl and other special status species in the Superior-Cronese DWMA, the area south of the Proposed Action to Old Highway 58 and I-15, and east to Calico Ghost Town. This area was used as the geographic scope for cumulatively considerable reasonably foreseeable future actions that have the potential to affect desert tortoise and Western Burrowing Owl. The area south of the Proposed Action is bisected by highways, which act as a barrier to species movement. However, reasonably foreseeable future projects within the Barstow area were considered for cumulative effects to desert tortoise, Western Burrowing Owl, and other special status species. The analysis of effects of the Proposed Action on biological resources was limited to projects located in these areas that may be under construction during 2015. Three projects have the potential to contribute to cumulative effects when combined with the Proposed Action. Desert Xpress High-Speed Passenger Train Project, Residential Subdivision Tentative Tract Map 17800 in Barstow, and Hillcrest West Tentative Tract Map 18553 could possibly be under construction concurrently with the Proposed Action. As indicated in Table 4.2-1, the Residential Subdivision Tentative Tract Map 17800 in Barstow has the potential for impacts to desert tortoise. If in construction concurrently with the Proposed Action, there may potentially be cumulative effects to desert tortoise. However, the Proposed Action would result in minimal ground disturbance and would last for only three months. Therefore, no permanent effects are anticipated from the Proposed Action. Similarly, measures to avoid and reduce the potential effects from the Proposed Action have been incorporated in the project description and result in negligible impacts to biological resources. Similar

mitigation measures and project features have been incorporated into the other reasonably foreseeable future actions. Therefore, the Proposed Action would not contribute to the effects of construction occurring concurrently with the Proposed Action because biological resources would be avoided.

#### *Desert Wildlife Management Area*

The Proposed Action is located within the Superior-Cronese DWMA. Therefore, the Superior-Cronese DWMA would be the geographic constraint in consideration of reasonably foreseeable future actions. There are no projects under construction during 2015. There are inactive and abandoned mine lands throughout the DWMA (BLM 2005 Map 3-20). The Proposed Action would result in minimal ground disturbance and would last for approximately three months. The Proposed Action description incorporates measures to avoid and reduce the effects from the Proposed Action to the Superior-Cronese DWMA.

#### **4.2.3.3 Cultural and Paleontological Resources**

With regard to establishing the proper geographic scope for cultural and paleontological resources, guidance provided by the U.S. EPA states that “For non-ecological resources, other geographic areas, such as historic districts (for cultural resources) or metropolitan areas (for economics), should be used” (U.S. EPA 1999). The geographic scope for the analysis of cumulative impacts related to cultural and paleontological resources is the region surrounding the project site. Reasonably foreseeable future projects within this area that may be under construction during 2015 were analyzed for cumulatively considerable effects to cultural and paleontological resources. Three projects have the potential to contribute to cumulative effects when combined with the Proposed Action. Desert Xpress High-Speed Passenger Train Project, Residential Subdivision Tentative Tract Map 17800 in Barstow, and Hillcrest West Tentative Tract Map 18553 could possibly be under construction concurrently with the Proposed Action. The Proposed Action would result in minimal ground disturbance and would last for three months. No permanent effects are anticipated from the Proposed Action as it has been designed to avoid cultural resources. Therefore, the Proposed Action would not contribute to the effects of construction occurring concurrently with the Proposed Action because cultural and paleontological resources would be avoided.

#### **4.2.3.4 Water Quality**

The Proposed Action includes drilling activities and operation of machinery with the potential to impact surface and ground water quality. The geographic scope for cumulatively considerable reasonably foreseeable future actions that have the potential to affect water quality are the watershed and ground water basin, respectively. Therefore, reasonably foreseeable future projects within this area were considered for cumulative effects to water quality. Three projects have the potential to contribute to cumulative effects when combined with the Proposed Action. Desert Xpress High-Speed Passenger Train Project, Residential Subdivision Tentative Tract Map 17800 in Barstow, and Hillcrest West Tentative Tract Map 18553 could possibly be under construction concurrently with the Proposed Action. The Proposed Action would protect water quality through the implementation of water quality BMPs, which include the abandonment and backfilling of drill holes in accordance with current DWR Bulletins 74-81, 74-90, and DEHS regulations. Other reasonably foreseeable future actions would employ similar project features, BMPs, and/or mitigation measures. Considered cumulatively, impacts to geologic resources would be fully mitigated through project design, BMPs, and/or mitigation measures and are not expected to be cumulatively considerable.

**4.2.3.5 Air Quality**

The Proposed Action includes vehicles moving across dirt roads and may result in a temporary effect to air quality from fugitive dust and exhaust emissions. Reasonably foreseeable future projects that are immediately adjacent to the Proposed Action and have the potential to be under construction during 2015 were considered for cumulative effects to air quality. This geographic scope was determined based on the limited area in which the Proposed Action could cause effects to air quality. Impacts from the Proposed Action would be highly localized and would not be expected to extend past the Project Area. The field work associated with the Proposed Action is anticipated to only last for approximately three months and require minimal staff and vehicles. Dust would be controlled during all operations by ensuring that vehicles travel at no more than 15 mph and by ceasing work during high wind conditions. The Proposed Action would not produce a substantial amount of dust as no intensive soil-moving activities would be required. Three projects have the potential to contribute to cumulative effects when combined with the Proposed Action. Desert Xpress High-Speed Passenger Train Project, Residential Subdivision Tentative Tract Map 17800 in Barstow, and Hillcrest West Tentative Tract Map 18553 could possibly be under construction concurrently with the Proposed Action. The three projects combined with the Proposed Action could cause effects to air quality if all three were to be under construction concurrently. However, the Proposed Action would be temporary and minimization measures incorporated in the project description would limit effects to air quality. Therefore, cumulative impacts to air quality would be negligible.

**4.2.3.6 Noise**

The nearest noise-sensitive receptor with respect to each of the two areas (Mitchell/Lead Mountain Area and Lily Claims Area) is located approximately 9,000 feet from the Proposed Action. The geography of areas immediately surrounding both areas and the corresponding nearest potentially sensitive receptors in the vicinity of the Proposed Action would be considered likely constraints of reasonably foreseeable future actions. Such constraining geographic features include rugged desert and mountain landscape, as well as significant existing infrastructure like I-15. There are no projects that would be in construction during the Proposed Action timeframe within this area. Furthermore, the relatively short duration of the Proposed Action's temporary construction activities reduce the likelihood of concurrency with other significant and nearby noise-producing projects that might produce a cumulative noise effect. Therefore, the Proposed Action would be expected to have a negligible cumulative noise impact.

**4.2.3.7 Traffic and Circulation**

The Proposed Action includes increased traffic to and on the project site with the potential to impact traffic and circulation within the Proposed Action area. The geographic scope for cumulatively considerable reasonably foreseeable future actions that have the potential to affect geologic resources is the regional vicinity surrounding the Proposed Action area. Therefore, reasonably foreseeable future projects within this area were considered for cumulative effects to traffic and circulation. Three projects have the potential to contribute to cumulative effects when combined with the Proposed Action. Desert Xpress High-Speed Passenger Train Project, Residential Subdivision Tentative Tract Map 17800 in Barstow, and Hillcrest West Tentative Tract Map 18553 could possibly be under construction concurrently with the Proposed Action. The Proposed Action would implement project features intended to reduce impacts from short term increases in traffic. Minimal traffic would be experienced because of the Proposed Action at the roadway circulation system directly and indirectly serving the exploration sites. Other reasonably foreseeable future actions would employ similar project features, BMPs, and/or mitigation measures. Considered cumulatively, impacts to traffic and circulation would be temporary and

fully mitigated through Proposed Action design, BMPs, and/or mitigation measures and are not expected to be cumulative considerable.

### **4.3 RESIDUAL IMPACTS**

The scale and duration of the Proposed Action has been designed to limit impacts to resources. The Proposed Action would take approximately three months to complete. The Proposed Action was designed with minimal drilling locations. Additionally, measures have been incorporated into the design of the Proposed Action to ensure that impacts on resources would have negligible effects. Therefore, there would be no residual effects or adverse impacts that would remain after measures incorporated into the Proposed Action design are implemented.

**SECTION 5 CONSULTATION AND COORDINATION****5.1 CONSULTATION**

On June 26, 2013 Calico and URS met with the BLM Barstow Field Office to discuss the EA for the Proposed Action. At this meeting and at previous meetings with Calico, the BLM indicated the need for an EA for the Proposed Action to comply with NEPA regulations. In addition, URS consulted with the BLM to determine the scope of cumulative impacts for the Proposed Action. Calico and URS consulted with the BLM on other projects in the area of the Proposed Action which may cause past, present, or reasonably foreseeable future cumulative impacts as associated with the Proposed Action. These projects were concluded as not being a factor for cumulative impacts and described in Table 4.2-1.

In April 2014, the BLM formally consulted with the U.S. Fish and Wildlife Service, Ventura Field Office regarding the proposed action qualifying under the Small Mining Action to be approved under the Auspices of the Programmatic Biological Opinion for Small Mines and Exploratory Projects (1-8-94-F28R).

**5.2 LIST OF PREPARERS AND REVIEWERS****5.2.1 Lead Agency - Bureau of Land Management, Barstow Field Office**

- Jaime Livingood, Geologist
- Jim Shearer, Archeologist
- Lorenzo Encinas, Biologist
- Anthony Chavez, Soil/Air/Water/Botany Specialist
- Joan Patrovsky, Resources Specialist/Realty

**5.2.2 Consultant - URS**

- Eric Carlson, Air Quality
- Rachael Nixon, Cultural Resources
- Joe Stewart, Paleontological Resources
- Mark Storm, Noise
- Matt Moore, Water Resources
- Noel Casil, Traffic and Circulation
- Corinne Lytle Bonine, Visual Resources and Cumulative Effects
- Anne Runnalls, Senior Review
- Darin Neufeld, Manager
- Pat Mock, Biological Resources
- Diana Smith, GIS

**5.2.3 Applicant - Calico**

- Peter Cheesbrough, President
- Garry Southard, Vice President
- Richard Moorhead
- Larry Buchanan

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**Legend**

**Proposed Action Features**

- Proposed Boring (with ID)
- Proposed IP Geophysical Survey Line

**Access Routes with BLM Status**

- Open
- Closed
- Unspecified
- Existing (Non-BLM)
- Nonexistent

Note: Routes Include BLM Route IDs as Interpreted from Off-Highway Vehicle Route Supplement (BLM, 2011).

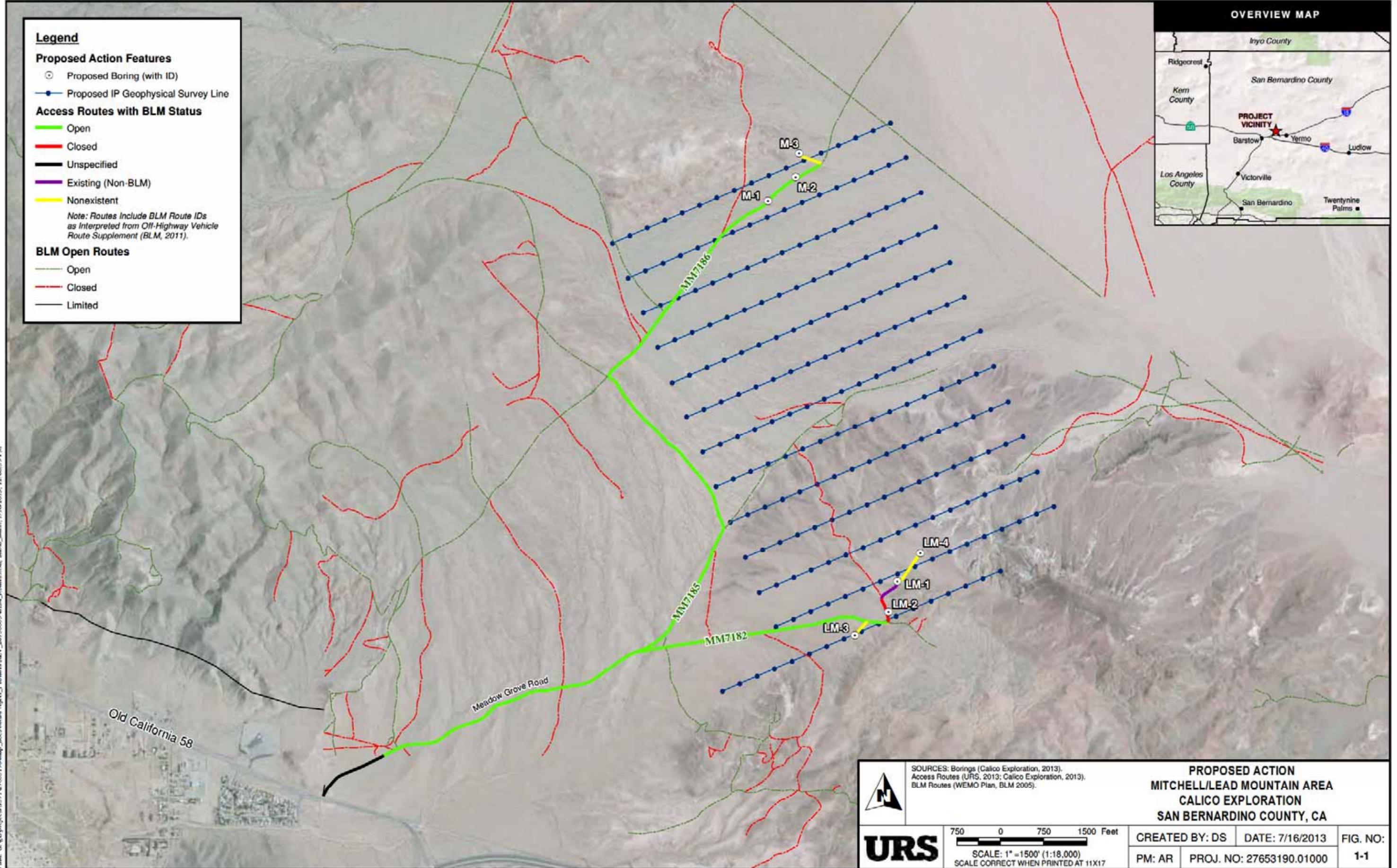
**BLM Open Routes**

- Open
- Closed
- Limited

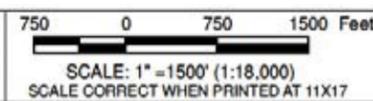
**OVERVIEW MAP**



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SOURCES: Borings (Calico Exploration, 2013).  
Access Routes (URS, 2013; Calico Exploration, 2013).  
BLM Routes (WEMO Plan, BLM 2005).



**PROPOSED ACTION  
MITCHELL/LEAD MOUNTAIN AREA  
CALICO EXPLORATION  
SAN BERNARDINO COUNTY, CA**

CREATED BY: DS	DATE: 7/16/2013	FIG. NO:
PM: AR	PROJ. NO: 27653190.01000	1-1

**Legend**

**Proposed Action Features**

- Proposed Boring (with ID)

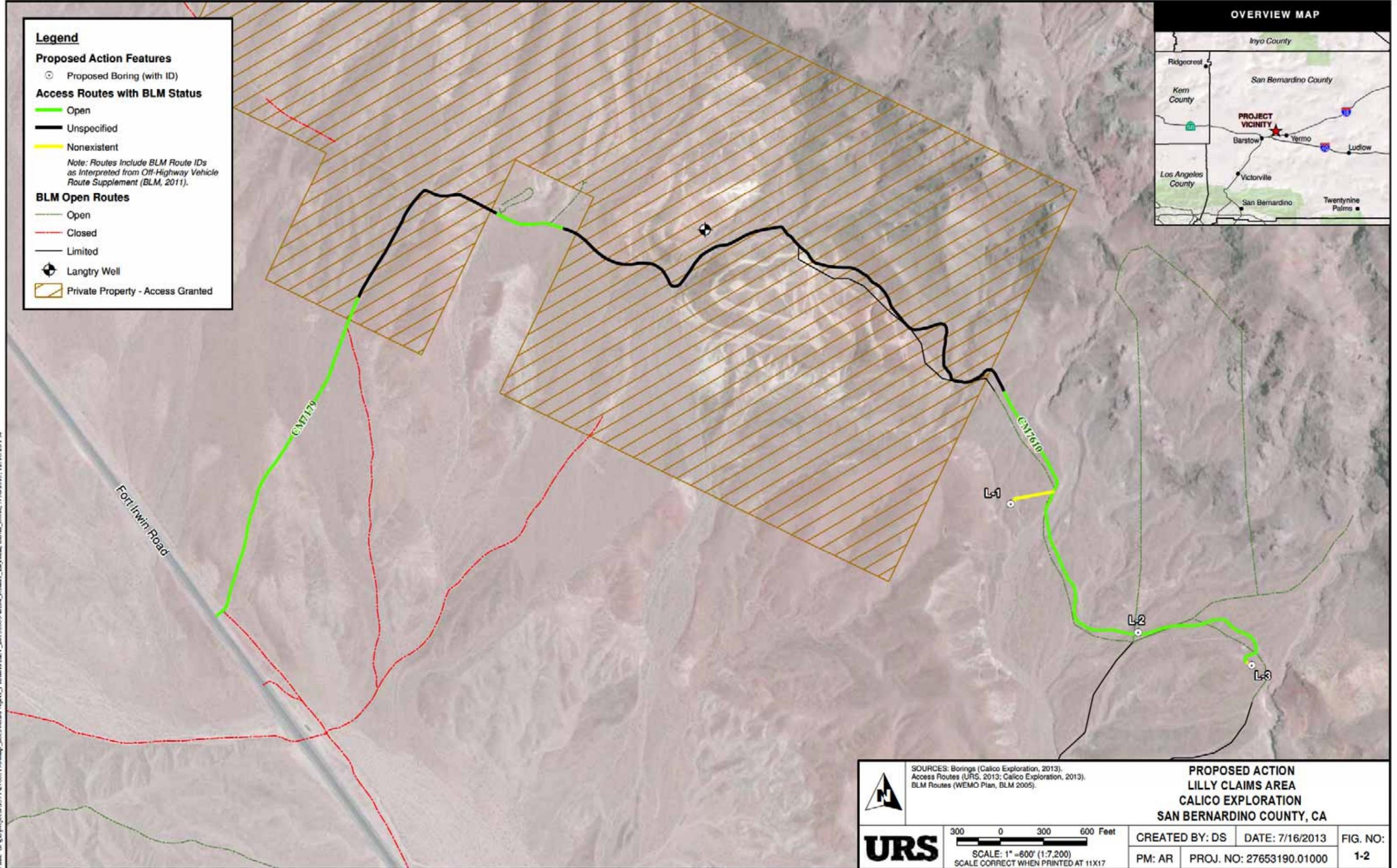
**Access Routes with BLM Status**

- Open
- Unspecified
- Nonexistent

*Note: Routes Include BLM Route IDs as Interpreted from Off-Highway Vehicle Route Supplement (BLM, 2011).*

**BLM Open Routes**

- Open
- Closed
- Limited
- Langtry Well
- Private Property - Access Granted



**PROPOSED ACTION**  
**LILLY CLAIMS AREA**  
**CALICO EXPLORATION**  
**SAN BERNARDINO COUNTY, CA**

SOURCES: Borings (Calico Exploration, 2013).  
 Access Routes (URS, 2013; Calico Exploration, 2013).  
 BLM Routes (WEMO Plan, BLM 2005).

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300 0 300 600 Feet  
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 SCALE CORRECT WHEN PRINTED AT 11X17

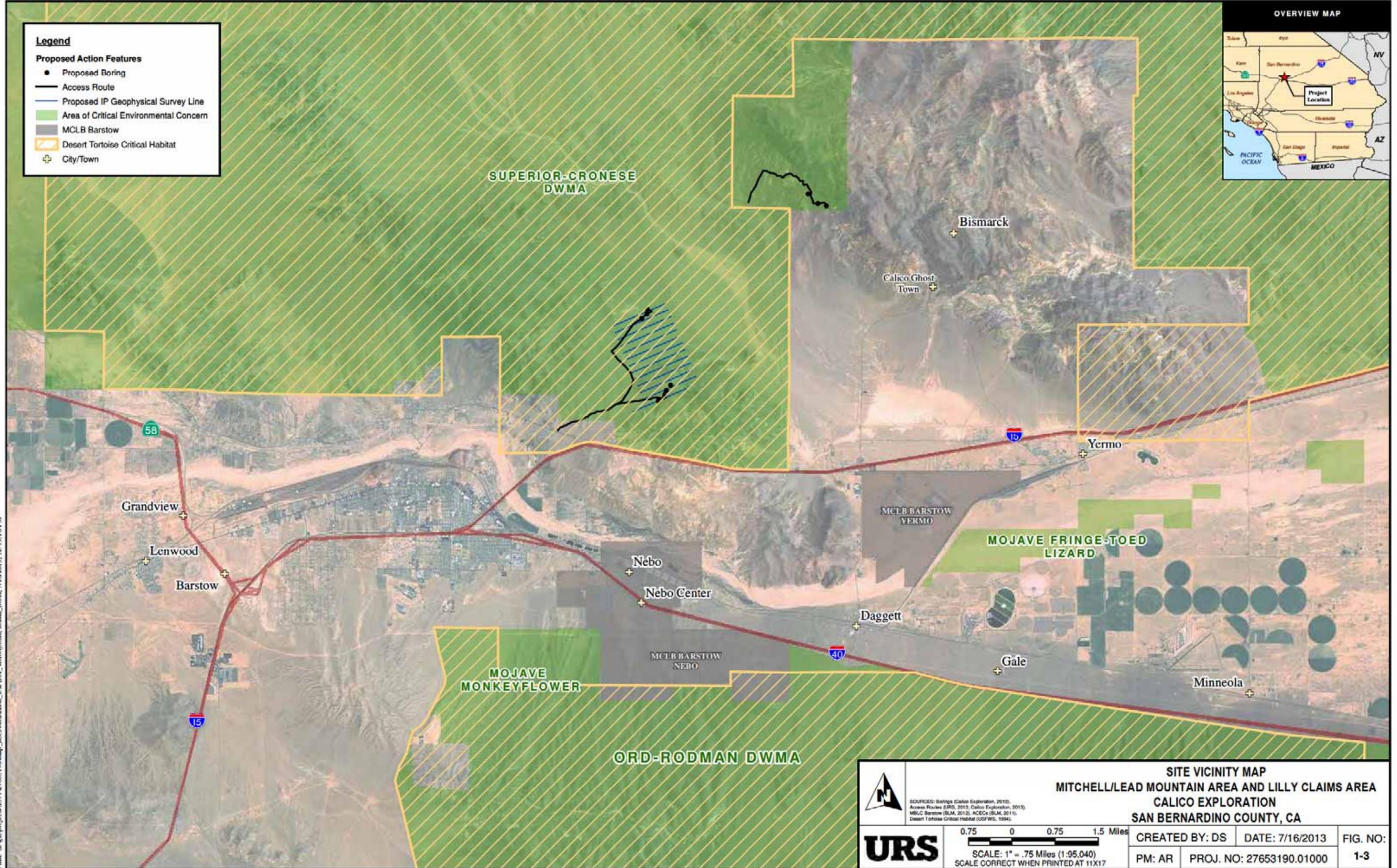
CREATED BY: DS	DATE: 7/16/2013	FIG. NO:
PM: AR	PROJ. NO: 27653190.01000	1-2

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**Legend**

**Proposed Action Features**

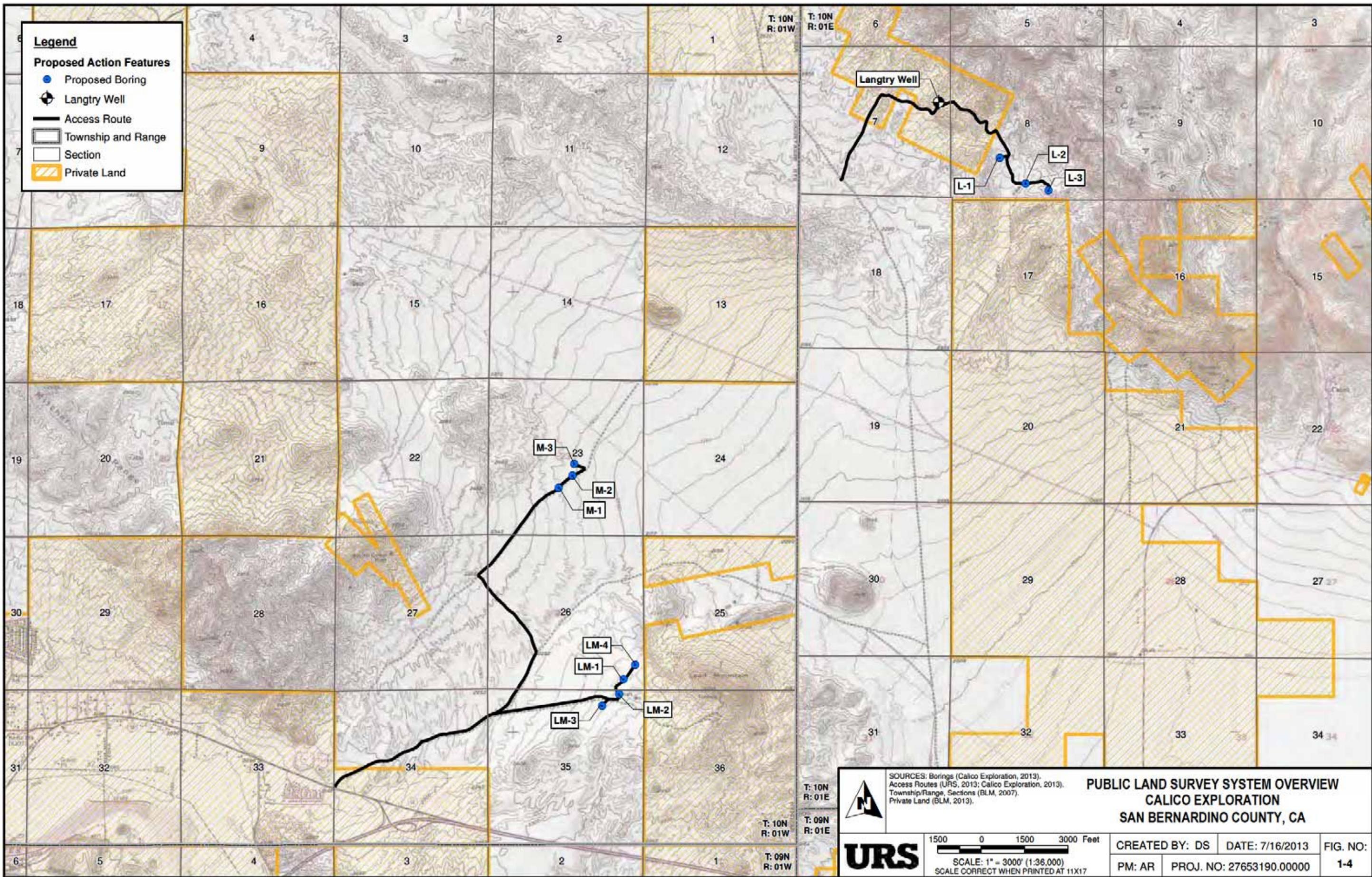
- Proposed Boring
- Access Route
- Proposed IP Geophysical Survey Line
- Area of Critical Environmental Concern
- MCLB Barstow
- Desert Tortoise Critical Habitat
- City/Town



	<p><b>SITE VICINITY MAP</b>  <b>MITCHELL/LEAD MOUNTAIN AREA AND LILLY CLAIMS AREA</b>  <b>CALICO EXPLORATION</b>  <b>SAN BERNARDINO COUNTY, CA</b></p>		
	<p>SOURCES: Baringo (Calico Exploration, 2010);          Access Routes (URS, 2013; Calico Exploration, 2010);          MCLB Barstow (BLM, 2012); ACECS (BLM, 2011);          Desert Tortoise Critical Habitat (USFWS, 1994).</p>	<p>0.75 0 0.75 1.5 Miles</p> <p>SCALE: 1" = .75 Miles (1:95,040)          SCALE CORRECT WHEN PRINTED AT 11X17</p>	<p>CREATED BY: DS    DATE: 7/16/2013    FIG. NO:          PM: AR    PROJ. NO: 27653190.01000    1-3</p>

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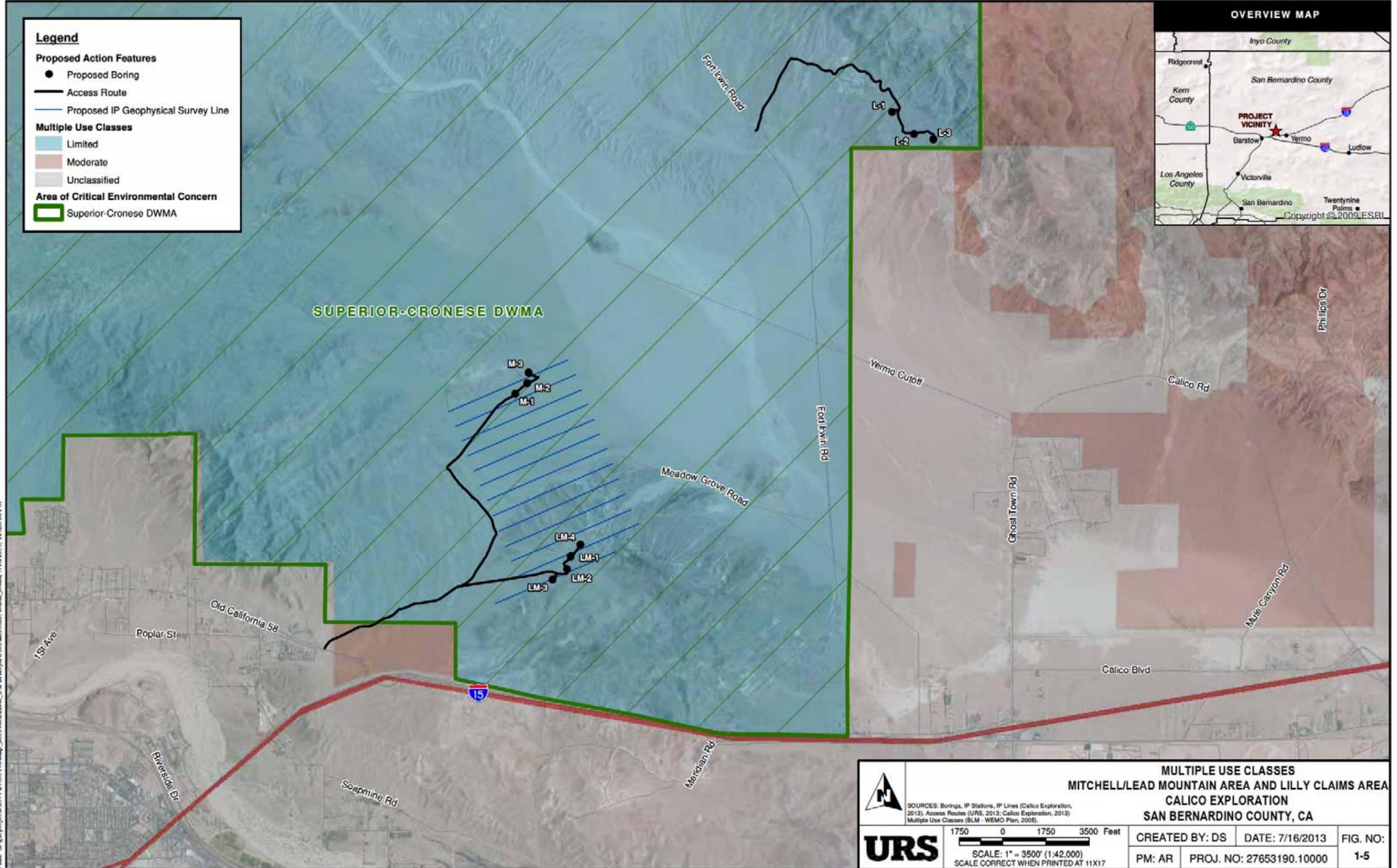


**Legend**

- Proposed Action Features**
- Proposed Boring
  - Access Route
  - Proposed IP Geophysical Survey Line
- Multiple Use Classes**
- Light Blue: Limited
  - Red: Moderate
  - Grey: Unclassified
- Area of Critical Environmental Concern**
- Green Outline: Superior-Cronese DWMA



**SUPERIOR-CRONESE DWMA**



	<p><b>MULTIPLE USE CLASSES</b>  <b>MITCHELL/LEAD MOUNTAIN AREA AND LILLY CLAIMS AREA</b>  <b>CALICO EXPLORATION</b>  <b>SAN BERNARDINO COUNTY, CA</b></p>		
	<p>SOURCES: Borings, IP Stations, IP Lines (Calico Exploration, 2013); Access Routes (URS, 2013); Calico Exploration, 2013); Multiple Use Classes (BLM - WEMO Plan, 2005).</p>	<p>CREATED BY: DS</p>	<p>DATE: 7/16/2013</p>
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Path: G:\ed\vermic\157702652\190\map\_documents\URS\201305\_BioSurvey\tracks.mxd, d:\msa\_mafk\_7/16/2013\_1:22:11 PM

**Legend**

- GPS Track Log
- Proposed Action Features**
  - Proposed Boring
  - Proposed IP Geophysical Survey Line
- Access Routes**
  - Existing Road
  - Proposed New Road



 	<p>SOURCES: Borings, IP Lines (Calico Exploration, 2013).          Access Routes (URS, 2013; Calico Exploration, 2013).          Tracklog (URS, 2013). Roads, Interstates,          Counties, Parks (ESRI, 2007). Aerial Imagery (Microsoft,          ESRI, I-cubed, USDA, USGS et al., 05/2010).</p>		
	<p><b>GPS TRACK LOGS</b>  <b>BIOLOGICAL RESOURCES SURVEY</b>  <b>CALICO EXPLORATION</b>  <b>SAN BERNARDINO COUNTY, CA</b></p>		
<p>0.25 0 0.25 0.5 Miles</p> <p>SCALE: 1" = 0.5 mi (1:31,680)          SCALE CORRECT WHEN PRINTED AT 11X17</p>	<p>CREATED BY: LR</p> <p>PM: AR</p>	<p>DATE: 7/16/2013</p> <p>PROJ. NO: 27653190.02000</p>	<p>FIG. NO:  <b>3.3-1</b></p>

**Legend**

**Desert Tortoise Burrow Class**

- 1: Currently active with tortoise or recent tortoise sign
- 2: Good condition, definitely tortoise, no recent sign
- 3: Deteriorated condition, definitely tortoise
- 4: Good condition, possibly tortoise
- 5: Deteriorated condition, possibly tortoise

Note: Numbers next to points correspond to data represented in tables.

**Proposed Action Features**

- Proposed Boring
- Proposed Geophysical IP Survey Line

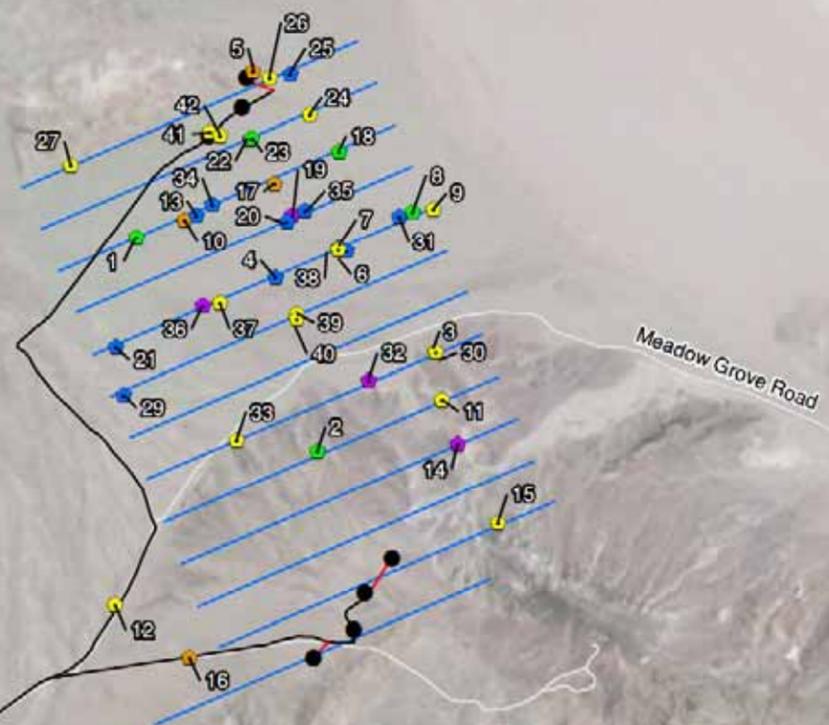
**Access Routes**

- Existing Road
- Proposed New Road

**OVERVIEW MAP**



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**DESERT TORTOISE BURROW MAP**  
**BIOLOGICAL RESOURCES SURVEY**  
**CALICO EXPLORATION**  
**SAN BERNARDINO COUNTY, CA**

SOURCES: Borings, IP Lines (Calico Exploration, 2013).  
Access Routes (URS, 2013; Calico Exploration, 2013).  
Desert Tortoise Burrows (URS, 2013). Roads, Interstates,  
Counties, Parks (ESRI, 2007). Aerial imagery (Microsoft,  
ESRI, i-cubed, USDA, USGS et al., 05/2010).

UR S

0.25 0 0.25 0.5 Miles  
SCALE: 1" = 0.5 mi (1:31,680)  
SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: LR	DATE: 7/16/2013	FIG. NO:
PM: AR	PROJ. NO: 27653190.02000	3.3-2

**Legend**

**Desert Tortoise Carcass Class**

-  2: Normal color, scutes adhere to bone
-  3: Scutes peeling off bone
-  4: Shell bone is falling apart; growth rings on scutes peeling
-  5: Disarticulated and scattered

*Note: Numbers next to points correspond to data represented in tables.*

**Proposed Action Features**

-  Proposed Boring
-  Proposed IP Geophysical Survey Line

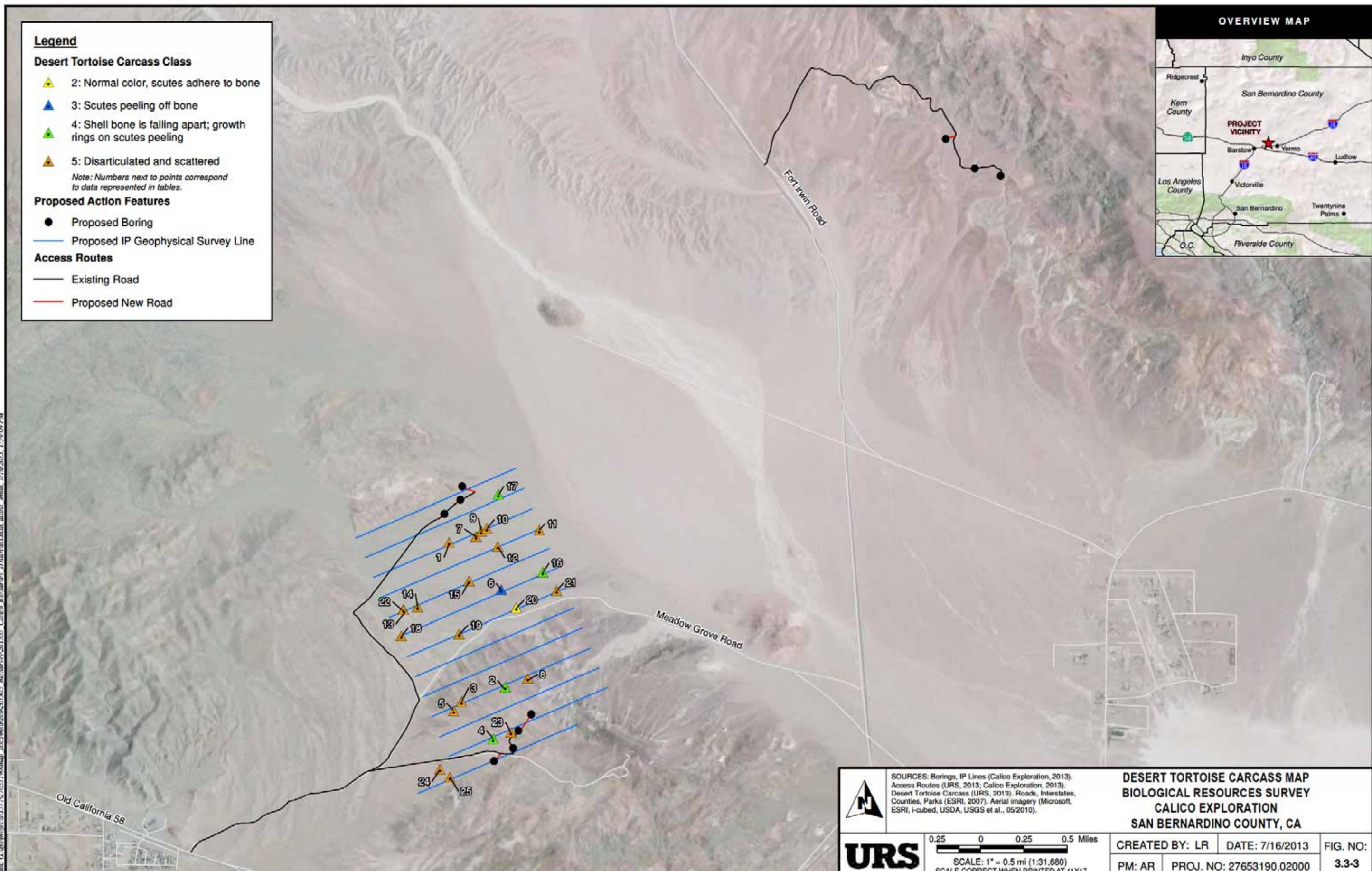
**Access Routes**

-  Existing Road
-  Proposed New Road

**OVERVIEW MAP**



Path: G:\ed\project\157702652\190\map\_documents\URS\01305\_01305\_BioSurvey\01305\_BioSurvey\_DTP\arcmap.dwg - mtd, 7/16/2013, 1:30:09 PM



	SOURCES: Borings, IP Lines (Calico Exploration, 2013). Access Routes (URS, 2013; Calico Exploration, 2013). Desert Tortoise Carcasses (URS, 2013). Roads, Interstates, Counties, Parks (ESRI, 2007). Aerial imagery (Microsoft, ESRI, I-cubed, USDA, USGS et al., 05/2010).			<b>DESERT TORTOISE CARCASS MAP</b> <b>BIOLOGICAL RESOURCES SURVEY</b> <b>CALICO EXPLORATION</b> <b>SAN BERNARDINO COUNTY, CA</b>		
		 SCALE: 1" = 0.5 mi (1:31,680) SCALE CORRECT WHEN PRINTED AT 11X17	CREATED BY: LR	DATE: 7/16/2013	FIG. NO:	
		PM: AR	PROJ. NO: 27653190.02000		3.3-3	

**Legend**

**Desert Tortoise Scat Class**

- 1: Wet (not from rain or dew) or freshly dried; obvious color
- 2: Dried with glaze; some odor; dark brown
- 3: Dried; no glaze or odor; bleaching (light brown) tightly packed
- 4: Dried; light brown to pale yellow, loose material
- 5: Bleached or consisting of only plant fiber

Note: Numbers next to points correspond to data represented in tables.

**Proposed Action Features**

- Proposed Boring
- Proposed IP Geophysical Survey Line

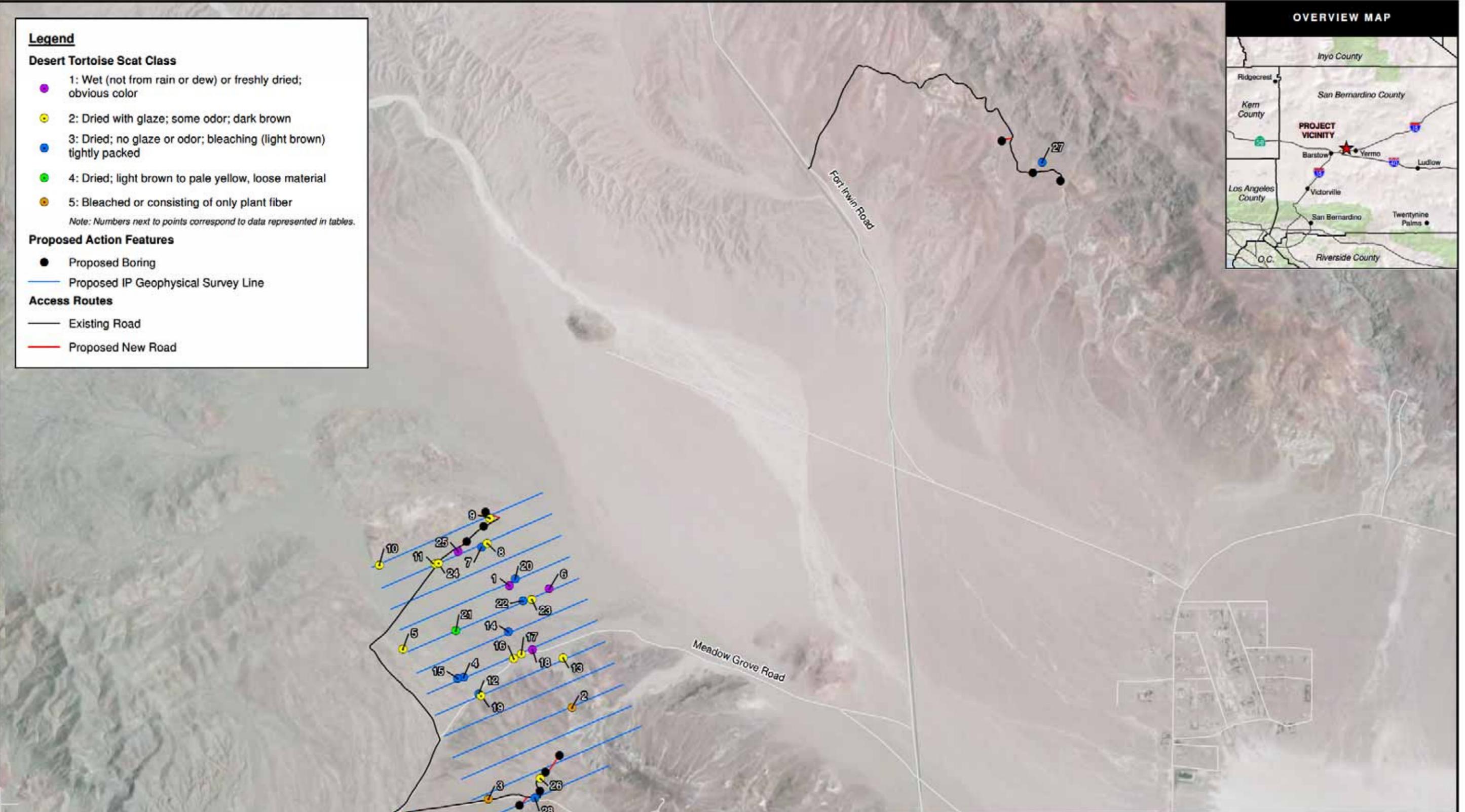
**Access Routes**

- Existing Road
- Proposed New Road

**OVERVIEW MAP**



Path: G:\ed\vermic\1577\2653\190\map\_documents\BIO\201305\_BioSurvey\201305\_Calico\_BioSurvey\_DTScatMap.dwg, smath, 7/16/2013, 1:41:50 PM



 	SOURCES: Borings, IP Lines (Calico Exploration, 2013). Access Routes (URS, 2013; Calico Exploration, 2013). Desert Tortoise Scat (URS, 2013). Roads, Interstates, Counties, Parks (ESRI, 2007). Aerial imagery (Microsoft, ESRI, I-cubed, USDA, USGS et al., 05/2010).		<b>DESERT TORTOISE SCAT MAP</b> <b>BIOLOGICAL RESOURCES SURVEY</b> <b>CALICO EXPLORATION</b> <b>SAN BERNARDINO COUNTY, CA</b>	
	0.25 0 0.25 0.5 Miles SCALE: 1" = 0.5 mi (1:31,680) SCALE CORRECT WHEN PRINTED AT 11X17	CREATED BY: LR PM: AR	DATE: 7/16/2013 PROJ. NO: 27653190.02000	FIG. NO: 3.3-4

**Legend**

 Desert Tortoise Live Encounter  
*Note: Numbers next to points correspond to data represented in tables.*

**Proposed Action Features**

 Proposed Boring  
 Proposed IP Geophysical Survey Line

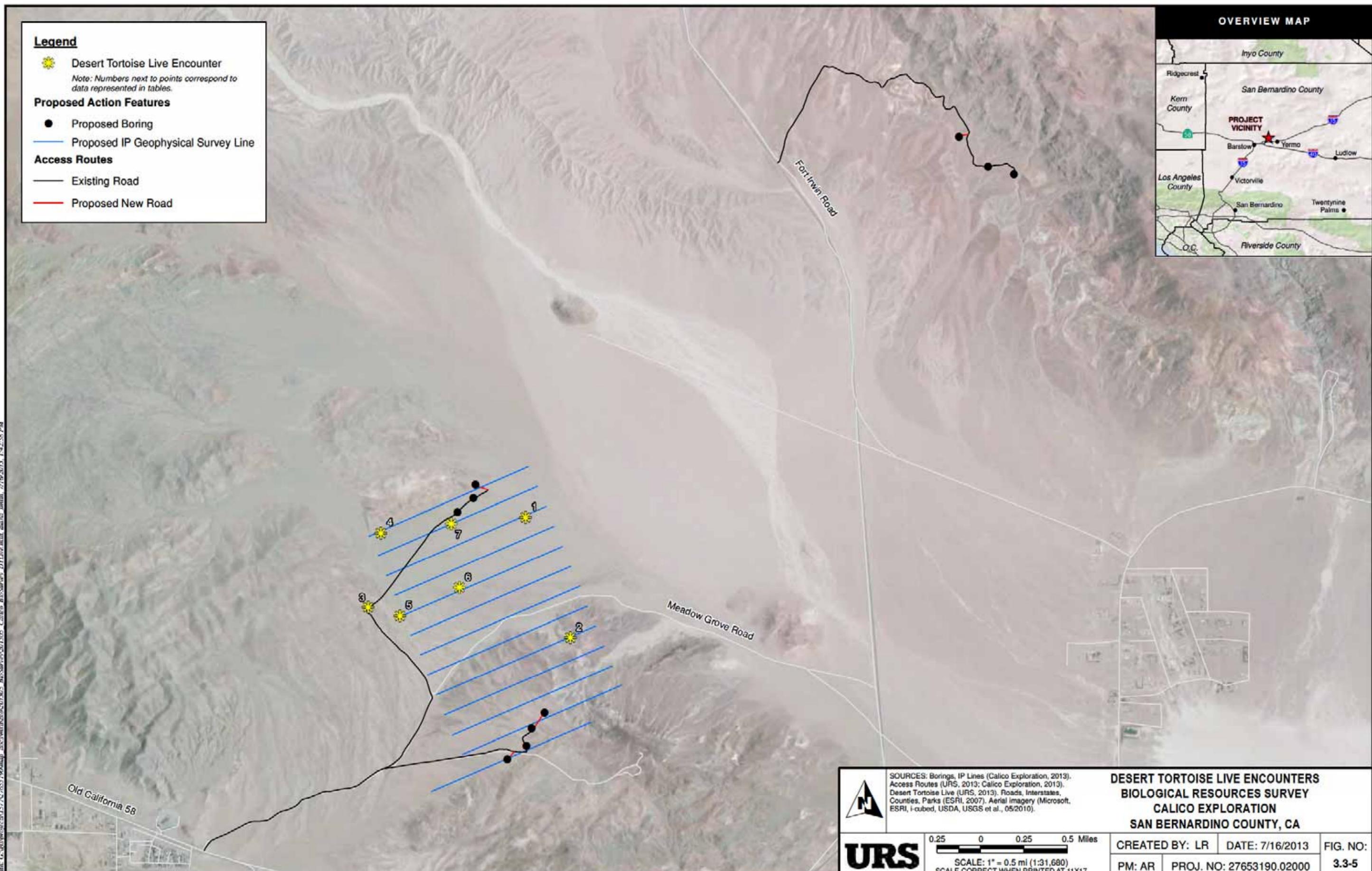
**Access Routes**

 Existing Road  
 Proposed New Road

**OVERVIEW MAP**

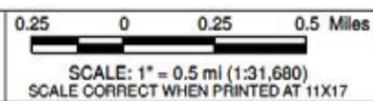


Path: G:\ed\verloc\1577\2653190\map\_documents\DTLive.mxd\_data\smth\_2/16/2013\_1:42:58\_PM



SOURCES: Borings, IP Lines (Calico Exploration, 2013).  
Access Routes (URS, 2013; Calico Exploration, 2013).  
Desert Tortoise Live (URS, 2013). Roads, Interstates,  
Counties, Parks (ESRI, 2007). Aerial Imagery (Microsoft,  
ESRI, i-cubed, USDA, USGS et al., 05/2010).

**DESERT TORTOISE LIVE ENCOUNTERS  
BIOLOGICAL RESOURCES SURVEY  
CALICO EXPLORATION  
SAN BERNARDINO COUNTY, CA**

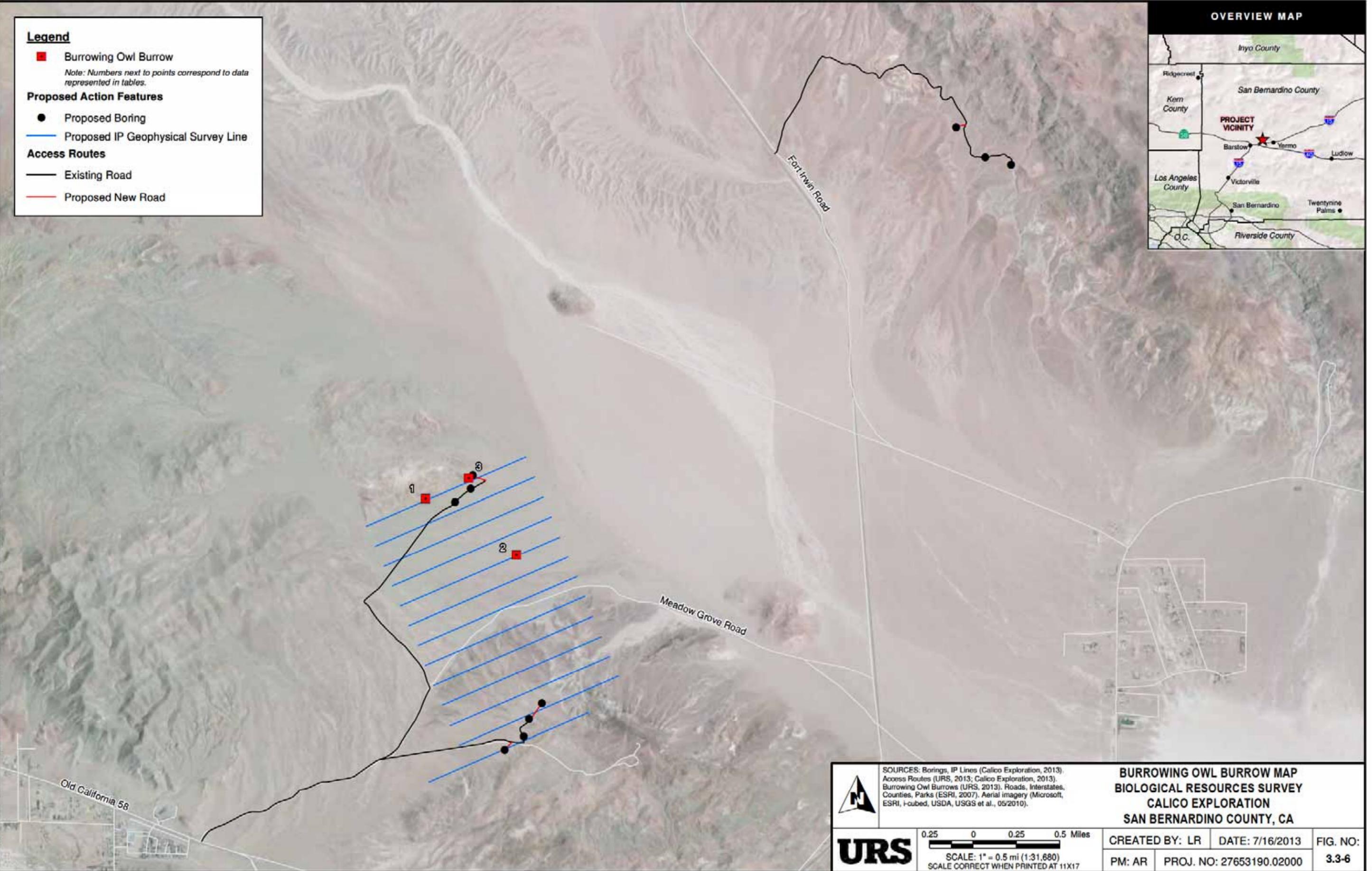


CREATED BY: LR	DATE: 7/16/2013	FIG. NO:
PM: AR	PROJ. NO: 27653190.02000	3.3-5

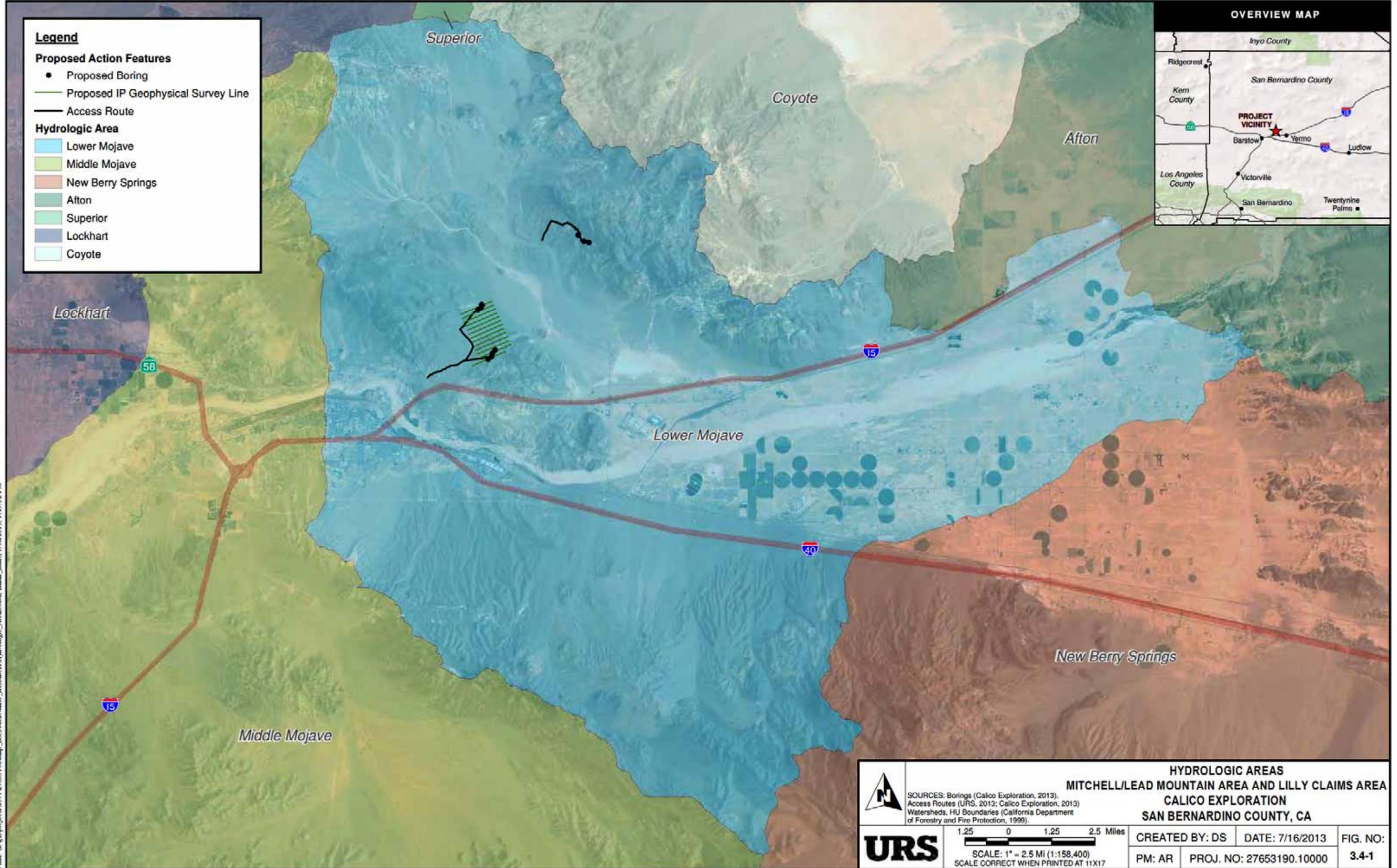
Path: G:\ed\verloc\157702653\190\map\_documents\BIR\201305\_BioSurvey\_BurrowingOwl\BIR\201305\_BioSurvey\_BurrowingOwl.dwg, 7/16/2013, 1:29:02 PM

**Legend**

- Burrowing Owl Burrow  
*Note: Numbers next to points correspond to data represented in tables.*
- Proposed Action Features**
- Proposed Boring
- Proposed IP Geophysical Survey Line
- Access Routes**
- Existing Road
- Proposed New Road



 	<p>SOURCES: Borings, IP Lines (Calico Exploration, 2013).          Access Routes (URS, 2013; Calico Exploration, 2013).          Burrowing Owl Burrows (URS, 2013). Roads, Interstates,          Counties, Parks (ESRI, 2007). Aerial imagery (Microsoft,          ESRI, I-cubed, USDA, USGS et al., 05/2010).</p>		<p><b>BURROWING OWL BURROW MAP</b>  <b>BIOLOGICAL RESOURCES SURVEY</b>  <b>CALICO EXPLORATION</b>  <b>SAN BERNARDINO COUNTY, CA</b></p>	
	<p>0.25 0 0.25 0.5 Miles</p> <p>SCALE: 1" = 0.5 mi (1:31,680)          SCALE CORRECT WHEN PRINTED AT 11X17</p>		<p>CREATED BY: LR</p> <p>PM: AR</p>	<p>DATE: 7/16/2013</p> <p>PROJ. NO: 27653190.02000</p>



**Legend**

**Proposed Action Features**

- Proposed Boring
- Proposed IP Geophysical Survey Line
- Access Route

**Hydrologic Area**

- Lower Mojave
- Middle Mojave
- New Berry Springs
- Afton
- Superior
- Lockhart
- Coyote



**HYDROLOGIC AREAS**  
**MITCHELL/LEAD MOUNTAIN AREA AND LILLY CLAIMS AREA**  
**CALICO EXPLORATION**  
**SAN BERNARDINO COUNTY, CA**

SOURCES: Borings (Calico Exploration, 2013).  
 Access Routes (URS, 2013; Calico Exploration, 2013)  
 Watersheds, HU Boundaries (California Department of Forestry and Fire Protection, 1999).

1.25 0 1.25 2.5 Miles  
 SCALE: 1" = 2.5 Mi (1:158,400)  
 SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: DS	DATE: 7/16/2013	FIG. NO:
PM: AR	PROJ. NO: 27653190.10000	3.4-1

Path: G:\gdp\proj\ca\1577\2053\190\map\_docs\mitchell\Water\_Resources\Hydrologic\_Areas.mxd, 7/16/2013, 1:13:12 PM

**Legend**

-  Flowline (NHD)
-  Contour

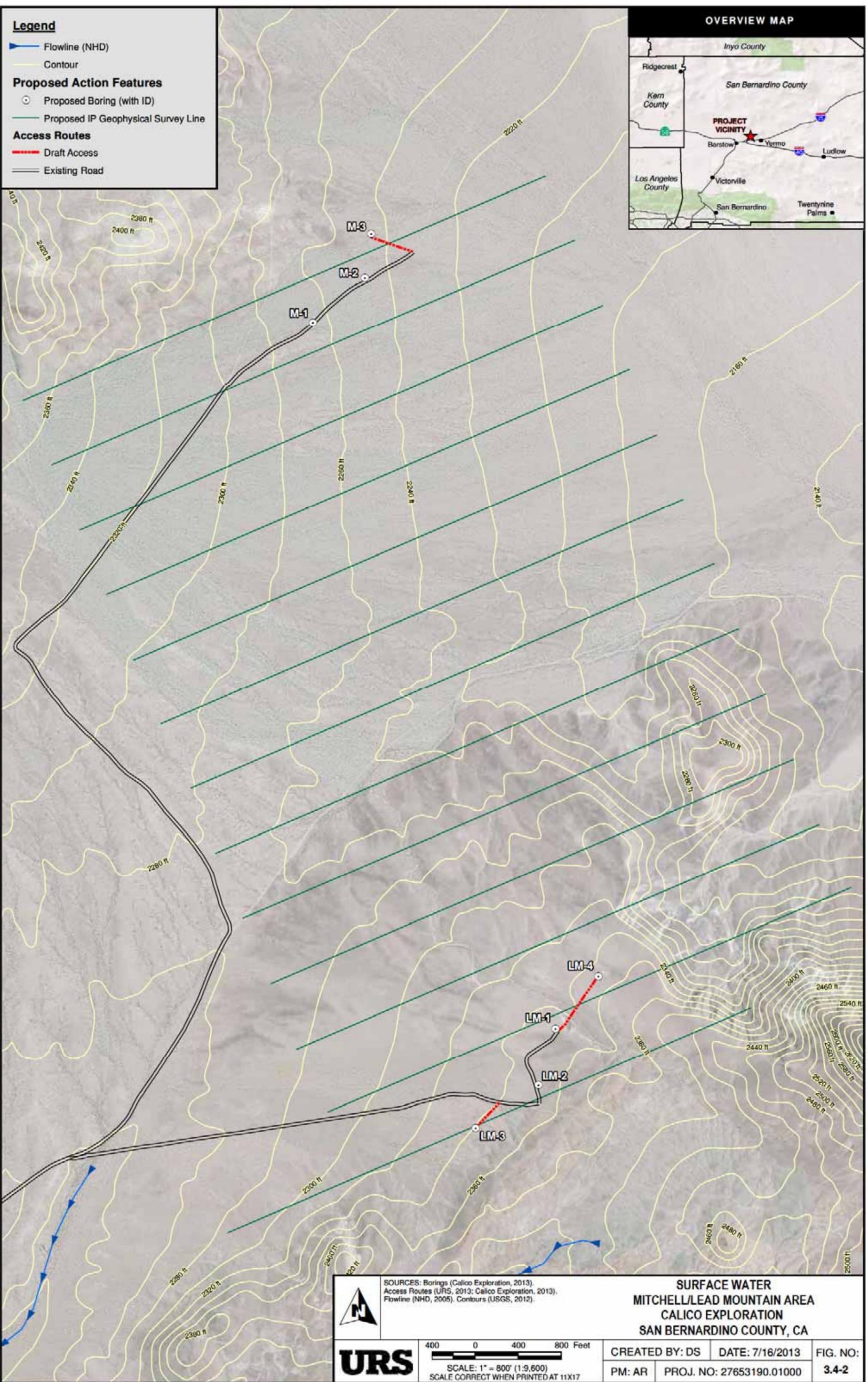
**Proposed Action Features**

-  Proposed Boring (with ID)
-  Proposed IP Geophysical Survey Line

**Access Routes**

-  Draft Access
-  Existing Road

**OVERVIEW MAP**



Path: G:\Ag\Projects\27653190\Map\_06\Map\_06.dwg (User: kumar, 7/16/2013, 12:34:40 PM)



SOURCES: Borings (Calico Exploration, 2013).  
 Access Routes (URS, 2013; Calico Exploration, 2013).  
 Flowline (NHD, 2005). Contours (USGS, 2012).

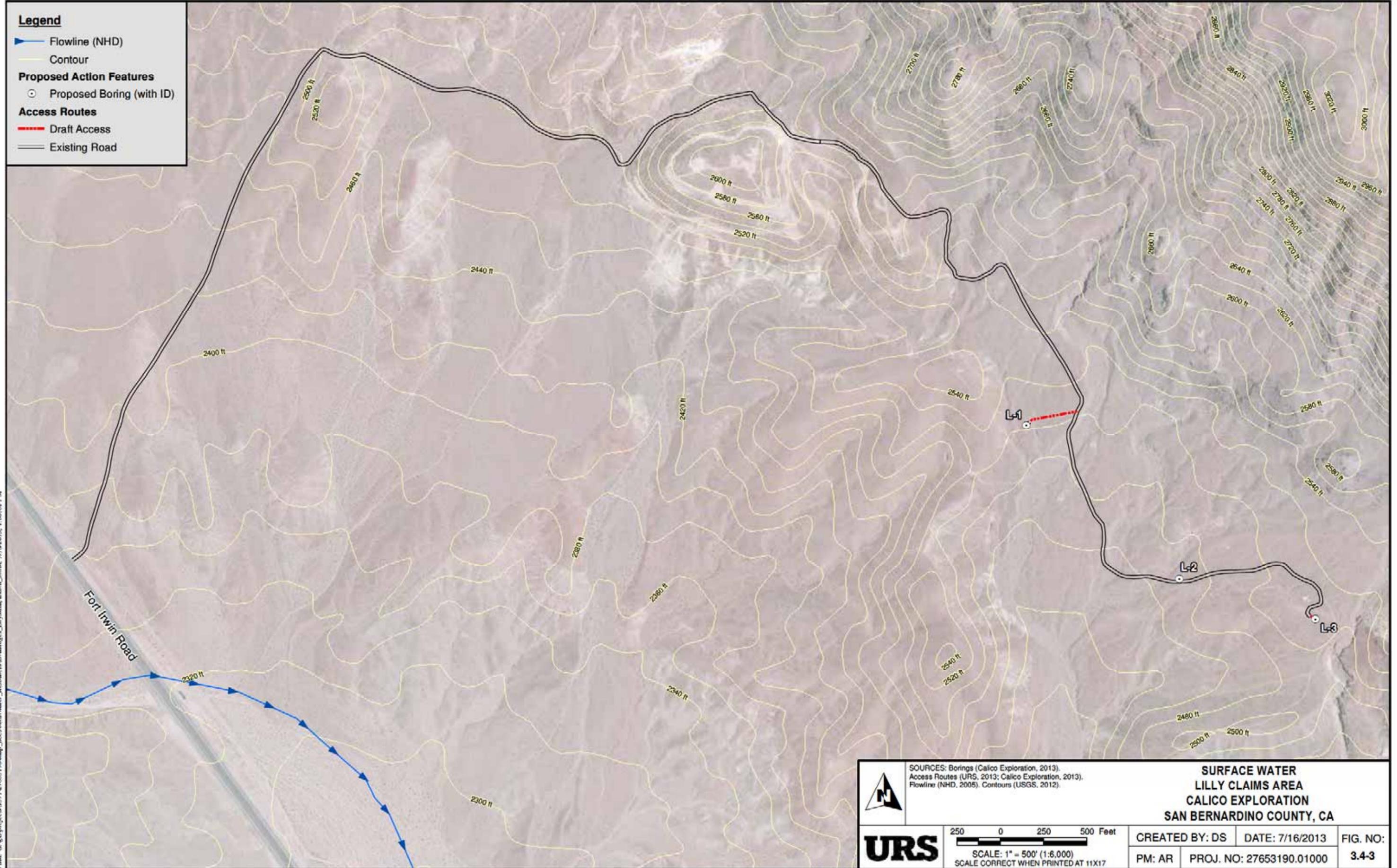
**SURFACE WATER  
 MITCHELL/LEAD MOUNTAIN AREA  
 CALICO EXPLORATION  
 SAN BERNARDINO COUNTY, CA**



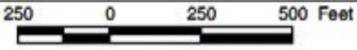
400 0 400 800 Feet  
 SCALE: 1" = 800' (1:9,600)  
 SCALE CORRECT WHEN PRINTED AT 11X17

CREATED BY: DS	DATE: 7/16/2013	FIG. NO:
PM: AR	PROJ. NO: 27653190.01000	3.4-2

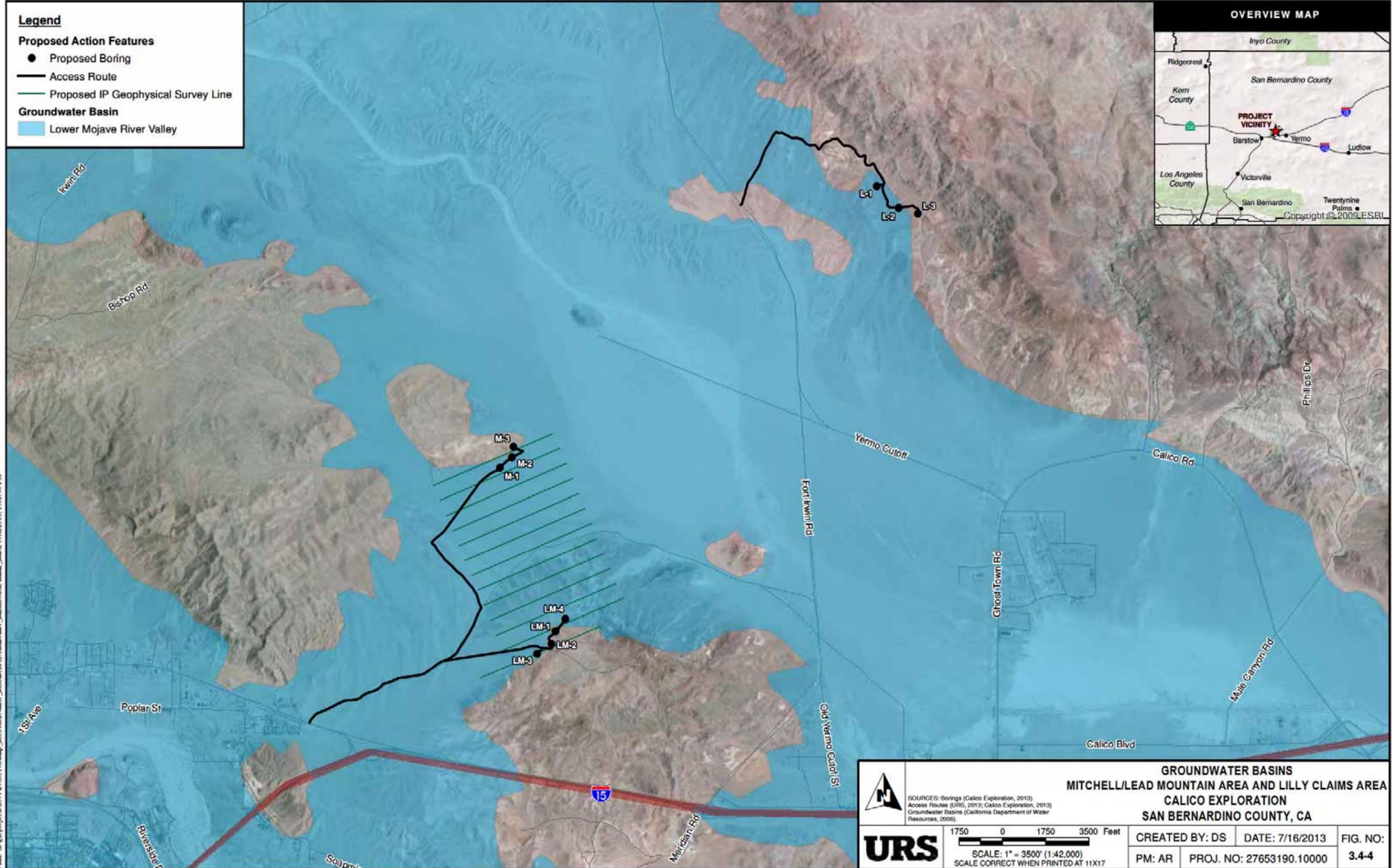
- Legend**
-  Flowline (NHD)
  -  Contour
  - Proposed Action Features**
  -  Proposed Boring (with ID)
  - Access Routes**
  -  Draft Access
  -  Existing Road



Path: G:\gdp\proj\cav157\2053\190\map\_documents\Water\_Resources\Drawings\Lilly\msd\_dlgm\_0113\_1100.02 PM

	SOURCES: Borings (Calico Exploration, 2013). Access Routes (URS, 2013; Calico Exploration, 2013). Flowline (NHD, 2005). Contours (USGS, 2012).		<b>SURFACE WATER</b> <b>LILLY CLAIMS AREA</b> <b>CALICO EXPLORATION</b> <b>SAN BERNARDINO COUNTY, CA</b>		
		 SCALE: 1" = 500' (1:5,000) SCALE CORRECT WHEN PRINTED AT 11X17	CREATED BY: DS	DATE: 7/16/2013	FIG. NO: <b>3.4-3</b>
	PM: AR	PROJ. NO: 27653190.01000			

- Legend**
- Proposed Action Features**
- Proposed Boring
  - Access Route
  - Proposed IP Geophysical Survey Line
- Groundwater Basin**
- Lower Mojave River Valley



	<p><b>GROUNDWATER BASINS</b>  <b>MITCHELL/LEAD MOUNTAIN AREA AND LILLY CLAIMS AREA</b>  <b>CALICO EXPLORATION</b>  <b>SAN BERNARDINO COUNTY, CA</b></p>		
	<p>SOURCES: Borings (Calico Exploration, 2013);          Access Routes (URS, 2013; Calico Exploration, 2013);          Groundwater Basins (California Department of Water Resources, 2006)</p>		
	<p>1750 0 1750 3500 Feet</p> <p>SCALE: 1" = 3500' (1:42,000)          SCALE CORRECT WHEN PRINTED AT 11X17</p>		<p>CREATED BY: DS    DATE: 7/16/2013    FIG. NO:          PM: AR    PROJ. NO: 27653190.10000    3.4-4</p>

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## **Spill Prevention Control Plan**

### ***Objectives***

The purpose of this Spill Prevention Control Plan (Plan) is as follows:

- To identify all pollutant sources that may exist within the Calico Exploration Project Area.
- To identify BMPs to prevent or reduce the quantity of potential pollutants discharged to the ground or surface water in order to minimize environmental impacts during and after the exploration project.

### ***Availability***

A copy of the Plan shall be attached to the Project's Exploration Operating Plan, along with the Material Safety Data Sheets (MSDS) for products used in vehicles, equipment, drilling and maintenance. All contractors are responsible for familiarizing their personnel with the information pertaining to spill prevention.

### ***Preventative Maintenance***

The following good housekeeping practices would be implemented onsite during the Proposed Action:

- Material storage will be restricted to the amount required to do the job.
- Materials will be stored in a neat, orderly manner in their appropriate containers.
- Materials will be kept in their original containers with the original manufacturer's label.
- Manufacturer's recommendations for proper use, storage, and disposal will be followed.
- The Project Coordinator will inspect the working areas daily to ensure proper use, storage, and disposal of materials onsite.

All contractors shall have a vehicle preventive maintenance program to ensure that all vehicles are operating under optimum conditions and all hoses and fittings are in good condition and leak-free. It is the responsibility of the operator, mechanic, tool pusher or other designee, to execute the repairs or preventive maintenance and complete any reporting required.

### ***Source Identification***

**Pollutants** - Potential sources of pollutants from drilling rigs, service vehicles, and other equipment include oil, fuel, lubrication grease, coolants and hydraulic fluids. Additional sources of pollutants may include drilling fluids, borehole plugging materials, solvents, trash and other debris. These pollutants are not expected to come into contact with onsite soils or surface waters; however, BMPs shall be employed to prevent potential release of contaminants.

**Debris** - To minimize impacts during precipitation events, trash bins shall be regularly inspected for leaks.

**Spill Contingency Plan** - Materials and equipment necessary for spill cleanup would be kept in the material storage area onsite. Equipment and materials would include, but not be limited to, brooms, dust

pans, mops, rags, gloves, goggles, sorbent materials, sand, sawdust, and plastic and metal trash containers specifically for this purpose. The recommendations in the respective MSDS would be strictly followed.

Well-maintained equipment would be used to perform the work. As much equipment maintenance would be performed offsite as possible. In the event of oil, fuel, and lubricating grease leaks, cleanup would be conducted as soon as possible. If the leak is on pavement or a compacted surface, an oil absorbing product such as Absorb® would be applied. Once the cleanup product has absorbed the leak, it would be swept up into watertight drums or bins, and disposed of according to federal, state or local regulations. If the leak occurs on soil, the contaminated soil would be removed and disposed of according to federal, state or local regulations. In the event of a major spill, the following actions should be taken, in addition to any federal, state or local health and safety regulations:

1. Contain the spread of the spill using onsite erosion control structures and/or by creating dirt berms as feasible and necessary, and utilize materials and equipment stored onsite to control the spill.
2. Notify the Environmental or Project Coordinator immediately.
3. Within 24 hours of an identified spill, the Project Coordinator or a designated representative will notify the following local and state agencies:
  - a. BLM Barstow Office – 760-252-6000
  - b. California EPA – 916-325-2514

In case of an emergency relevant phone numbers are provided below:

- a. Emergency calls – 760-256-4838 (San Bernardino County Sheriff, Barstow)
- b. Fire – 760-256-2554 (Barstow Fire Protection District)
- c. Hospital – 760-256-1761 (Barstow Community Hospital)

If there is a spill, this Plan would be adjusted to include measures to prevent that type of spill from recurring and how to clean up the spill should it occur again. A description of the spill, what caused it, and the cleanup measures would also be included.



## MATERIAL SAFETY DATA SHEET

Product Trade Name: **EZ-MUD® PLUS**

Revision Date: 30-Sep-2011

### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: EZ-MUD® PLUS  
Synonyms: None  
Chemical Family: Blend  
Application: Additive

Manufacturer/Supplier: Baroid Fluid Services  
Product Service Line of Halliburton  
P.O. Box 1675  
Houston, TX 77251  
Telephone: (281) 871-4000  
Emergency Telephone: (281) 575-5000

Prepared By: Chemical Compliance  
Telephone: 1-580-251-4335  
e-mail: fdunexchem@halliburton.com

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Hydrotreated light petroleum distillate	64742-47-8	10 - 30%	Not applicable	Not applicable

### 3. HAZARDS IDENTIFICATION

**Hazard Overview** May cause eye, skin, and respiratory irritation. May cause headache, dizziness, and other central nervous system effects. May be harmful if swallowed.

### 4. FIRST AID MEASURES

**Inhalation** If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

**Skin** Wash with soap and water. Get medical attention if irritation persists. Remove contaminated shoes and discard.

**Eyes** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

**Ingestion** Get medical attention! If vomiting occurs, keep head lower than hips to prevent aspiration.

**Notes to Physician** Not Applicable

## 5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Min: > 200
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Min: > 93
Autoignition Temperature (C):	PMCC
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

**Fire Extinguishing Media** Water fog, carbon dioxide, foam, dry chemical.

**Special Exposure Hazards** Decomposition in fire may produce toxic gases. Use water spray to cool fire exposed surfaces.

**Special Protective Equipment for Fire-Fighters** Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

**NFPA Ratings:** Health 2, Flammability 1, Reactivity 0  
**HMS Ratings:** Health 2, Flammability 1, Physical Hazard 0 , PPE: C

## 6. ACCIDENTAL RELEASE MEASURES

**Personal Precautionary Measures** Use appropriate protective equipment.

**Environmental Precautionary Measures** Prevent from entering sewers, waterways, or low areas.

**Procedure for Cleaning / Absorption** Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

## 7. HANDLING AND STORAGE

**Handling Precautions** Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse.

**Storage Information** Store away from oxidizers. Keep container closed when not in use. Product has a shelf life of 12 months.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Engineering Controls** A well ventilated area to control dust levels. Local exhaust ventilation should be used in areas without good cross ventilation.

**Personal Protective Equipment** If engineering controls and work practices cannot prevent excessive exposures, the selection and proper use of personal protective equipment should be determined by an industrial hygienist or other qualified professional based on the specific application of this product.

**Respiratory Protection** Not normally needed. But if significant exposures are possible then the following respirator is recommended:  
Organic vapor respirator with a dust/mist filter.

**Hand Protection** Impervious rubber gloves.

**Skin Protection** Rubber apron.

**Eye Protection** Chemical goggles; also wear a face shield if splashing hazard exists.

**Other Precautions** Eyewash fountains and safety showers must be easily accessible.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	White to gray
Odor:	Mild hydrocarbon
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.0
Density @ 20 C (lbs./gallon):	8.3
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	347
Boiling Point/Range (C):	175
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	70
Evaporation Rate (Butyl Acetate=1):	< 1
Solubility in Water (g/100ml):	Partially soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

## 10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Keep away from heat, sparks and flame.
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Ammonia. Oxides of nitrogen. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

## 11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal. May cause central nervous system depression including headache, dizziness, drowsiness, muscular weakness, incoordination, slowed reaction time, fatigue blurred vision, slurred speech, giddiness, tremors and convulsions.

<b>Aggravated Medical Conditions</b>	Lung disorders.
<b>Chronic Effects/Carcinogenicity</b>	No data available to indicate product or components present at greater than 1% are chronic health hazards.
<b>Other Information</b>	None known.
<b>Toxicity Tests</b>	
<b>Oral Toxicity:</b>	Not determined
<b>Dermal Toxicity:</b>	Not determined
<b>Inhalation Toxicity:</b>	Not determined
<b>Primary Irritation Effect:</b>	Not determined
<b>Carcinogenicity</b>	Not determined
<b>Genotoxicity:</b>	Not determined
<b>Reproductive / Developmental Toxicity:</b>	Not determined

## 12. ECOLOGICAL INFORMATION

<b>Mobility (Water/Soil/Air)</b>	Not determined
<b>Persistence/Degradability</b>	Not determined
<b>Bio-accumulation</b>	Not determined

### Ecotoxicological Information

<b>Acute Fish Toxicity:</b>	Not determined
<b>Acute Crustaceans Toxicity:</b>	TLM48: 98 mg/l (Acartia tonsa)
<b>Acute Algae Toxicity:</b>	EC50: 16.70 mg/l (Skeletonema costatum)

<b>Chemical Fate Information</b>	Not determined
<b>Other Information</b>	Not applicable

## 13. DISPOSAL CONSIDERATIONS

<b>Disposal Method</b>	Disposal should be made in accordance with federal, state, and local regulations.
<b>Contaminated Packaging</b>	Follow all applicable national or local regulations.

## 14. TRANSPORT INFORMATION

### Land Transportation

**DOT**  
Not restricted

**Canadian TDG**  
Not restricted

**ADR**  
Not restricted

## **Air Transportation**

**ICAO/IATA**  
Not restricted

## **Sea Transportation**

**IMDG**  
Not restricted

## **Other Transportation Information**

**Labels:** None

## **15. REGULATORY INFORMATION**

### **US Regulations**

<b>US TSCA Inventory</b>	All components listed on inventory or are exempt.
<b>EPA SARA Title III Extremely Hazardous Substances</b>	Not applicable
<b>EPA SARA (311,312) Hazard Class</b>	Acute Health Hazard
<b>EPA SARA (313) Chemicals</b>	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
<b>EPA CERCLA/Superfund Reportable Spill Quantity</b>	Not applicable.
<b>EPA RCRA Hazardous Waste Classification</b>	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
<b>California Proposition 65</b>	All components listed do not apply to the California Proposition 65 Regulation.
<b>MA Right-to-Know Law</b>	Does not apply.
<b>NJ Right-to-Know Law</b>	Does not apply.
<b>PA Right-to-Know Law</b>	Does not apply.

### **Canadian Regulations**

<b>Canadian DSL Inventory</b>	All components listed on inventory or are exempt.
<b>WHMIS Hazard Class</b>	D2B Toxic Materials

## **16. OTHER INFORMATION**

**The following sections have been revised since the last issue of this MSDS**  
Not applicable

**Additional Information**

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

**Disclaimer Statement**

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

**\*\*\*END OF MSDS\*\*\***

## MATERIAL SAFETY DATA SHEET

Product Trade Name: **QUIK-GEL®**

Revision Date: 19-Dec-2011

### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: QUIK-GEL®  
Synonyms: None  
Chemical Family: Mineral  
Application: Viscosifier  
Manufacturer/Supplier: Baroid Fluid Services  
Product Service Line of Halliburton  
P.O. Box 1675  
Houston, TX 77251  
Telephone: (281) 871-4000  
Emergency Telephone: (281) 575-5000

Prepared By: Chemical Compliance  
Telephone: 1-580-251-4335  
e-mail: fdunexchem@halliburton.com

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Bentonite	1302-78-9	60 - 100%	Not applicable	Not applicable
Crystalline silica, cristobalite	14464-46-1	0 - 1%	0.025 mg/m <sup>3</sup>	1/2 x 10 mg/m <sup>3</sup> %SiO <sub>2</sub> + 2
Crystalline silica, tridymite	15468-32-3	0 - 1%	0.05 mg/m <sup>3</sup>	1/2 x 10 mg/m <sup>3</sup> %SiO <sub>2</sub> + 2
Crystalline silica, quartz	14808-60-7	1 - 5%	0.025 mg/m <sup>3</sup>	10 mg/m <sup>3</sup> %SiO <sub>2</sub> + 2

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

### 3. HAZARDS IDENTIFICATION

#### Hazard Overview

**CAUTION! - ACUTE HEALTH HAZARD**

May cause eye and respiratory irritation.

**DANGER! - CHRONIC HEALTH HAZARD**

Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

### 4. FIRST AID MEASURES

#### Inhalation

If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

#### Skin

Wash with soap and water. Get medical attention if irritation persists.

#### Eyes

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

#### Ingestion

Under normal conditions, first aid procedures are not required.

#### Notes to Physician

Treat symptomatically.

### 5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

**Fire Extinguishing Media** All standard firefighting media.

**Special Exposure Hazards** Not applicable.

**Special Protective Equipment for Fire-Fighters** Not applicable.

**NFPA Ratings:** Health 0, Flammability 0, Reactivity 0

**HMIS Ratings:** Health 0\*, Flammability 0, Physical Hazard 0, PPE: E

### 6. ACCIDENTAL RELEASE MEASURES

**Personal Precautionary Measures** Use appropriate protective equipment. Avoid creating and breathing dust.

**Environmental Precautionary Measures** None known.

**Procedure for Cleaning / Absorption**

Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

**7. HANDLING AND STORAGE**

<b>Handling Precautions</b>	This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
<b>Storage Information</b>	Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Keep from excessive heat. Do not reuse empty container. Product has a shelf life of 36 months.

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

<b>Engineering Controls</b>	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
<b>Personal Protective Equipment</b>	If engineering controls and work practices cannot prevent excessive exposures, the selection and proper use of personal protective equipment should be determined by an industrial hygienist or other qualified professional based on the specific application of this product.
<b>Respiratory Protection</b>	Not normally needed. But if significant exposures are possible then the following respirator is recommended: Dust/mist respirator. (95%)
<b>Hand Protection</b>	Normal work gloves.
<b>Skin Protection</b>	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
<b>Eye Protection</b>	Wear safety glasses or goggles to protect against exposure.
<b>Other Precautions</b>	None known.

**9. PHYSICAL AND CHEMICAL PROPERTIES**

<b>Physical State:</b>	Powder
<b>Color:</b>	Various
<b>Odor:</b>	Mild earthy
<b>pH:</b>	8-10
<b>Specific Gravity @ 20 C (Water=1):</b>	2.6
<b>Density @ 20 C (lbs./gallon):</b>	Not Determined
<b>Bulk Density @ 20 C (lbs/ft3):</b>	47.6-72.1
<b>Boiling Point/Range (F):</b>	Not Determined
<b>Boiling Point/Range (C):</b>	Not Determined
<b>Freezing Point/Range (F):</b>	Not Determined
<b>Freezing Point/Range (C):</b>	Not Determined
<b>Vapor Pressure @ 20 C (mmHg):</b>	Not Determined
<b>Vapor Density (Air=1):</b>	Not Determined
<b>Percent Volatiles:</b>	Not Determined
<b>Evaporation Rate (Butyl Acetate=1):</b>	Not Determined
<b>Solubility in Water (g/100ml):</b>	Slightly soluble

## 9. PHYSICAL AND CHEMICAL PROPERTIES

Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

## 10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Hydrofluoric acid.
Hazardous Decomposition Products	Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

## 11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	<p>Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).</p> <p>Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).</p>
Skin Contact	May cause mechanical skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	None known
Aggravated Medical Conditions	Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

**Chronic Effects/Carcinogenicity** Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

**Other Information** For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

#### **Toxicity Tests**

<b>Oral Toxicity:</b>	Not determined
<b>Dermal Toxicity:</b>	Not determined
<b>Inhalation Toxicity:</b>	Not determined
<b>Primary Irritation Effect:</b>	Not determined
<b>Carcinogenicity</b>	Refer to <u>IARC Monograph 68, Silica, Some Silicates and Organic Fibres</u> (June 1997).
<b>Genotoxicity:</b>	Not determined
<b>Reproductive / Developmental Toxicity:</b>	Not determined

## **12. ECOLOGICAL INFORMATION**

**Mobility (Water/Soil/Air)** Not determined

**Persistence/Degradability** Not determined

**Bio-accumulation** Not determined

#### **Ecotoxicological Information**

**Acute Fish Toxicity:** TLM96: 10000 ppm (Oncorhynchus mykiss)

**Acute Crustaceans Toxicity:** Not determined

<b>Acute Algae Toxicity:</b>	Not determined
<b>Chemical Fate Information</b>	Not determined
<b>Other Information</b>	Not applicable

### 13. DISPOSAL CONSIDERATIONS

<b>Disposal Method</b>	If practical, recover and reclaim, recycle, or reuse by the guidelines of an approved local reuse program. Should contaminated product become a waste, dispose of in a licensed industrial landfill according to federal, state, and local regulations.
<b>Contaminated Packaging</b>	Follow all applicable national or local regulations.

### 14. TRANSPORT INFORMATION

#### Land Transportation

**DOT**  
Not restricted

**Canadian TDG**  
Not restricted

**ADR**  
Not restricted

#### Air Transportation

**ICAO/IATA**  
Not restricted

#### Sea Transportation

**IMDG**  
Not restricted

#### Other Transportation Information

**Labels:** None

### 15. REGULATORY INFORMATION

#### US Regulations

**US TSCA Inventory** All components listed on inventory or are exempt.

**EPA SARA Title III Extremely Hazardous Substances** Not applicable

**EPA SARA (311,312) Hazard Class** Acute Health Hazard  
Chronic Health Hazard

**EPA SARA (313) Chemicals** This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).

<b>EPA CERCLA/Superfund Reportable Spill Quantity</b>	Not applicable.
<b>EPA RCRA Hazardous Waste Classification</b>	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
<b>California Proposition 65</b>	The California Proposition 65 regulations apply to this product.
<b>MA Right-to-Know Law</b>	One or more components listed.
<b>NJ Right-to-Know Law</b>	One or more components listed.
<b>PA Right-to-Know Law</b>	One or more components listed.
<b>Canadian Regulations</b>	
<b>Canadian DSL Inventory</b>	All components listed on inventory or are exempt.
<b>WHMIS Hazard Class</b>	D2A Very Toxic Materials Crystalline silica

## 16. OTHER INFORMATION

### The following sections have been revised since the last issue of this MSDS

Section 7. Handling and Storage

#### Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

#### Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

**\*\*\*END OF MSDS\*\*\***

**SAFETY DATA SHEET**

**SODA ASH**

Revision Date: 30-Nov-2010

Revision Number: 12

**1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING**

**Product Identifier**

**Product Name** SODA ASH

**Relevant identified uses of the substance or mixture and uses advised against**

**Recommended Use** Buffer  
**Uses Advised Against** No information available

**Details of the supplier of the safety data sheet**

Halliburton Energy Services  
 Halliburton House, Howemoss Place  
 Kirkhill Industrial Estate  
 Dyce  
 Aberdeen, AB21 0GN  
 United Kingdom

Emergency Phone Number: +44 1224 795277 or +1 281 575 5000

www.halliburton.com

For further information, please contact

**E-Mail address:** fdunexchem@halliburton.com

**Emergency telephone number**

+44 1224 795277 or +1 281 575 5000

<b>Emergency telephone §45 - (EC)1272/2008</b>	
<b>Europe</b>	<b>112</b>
<b>Denmark</b>	Poison Control Hotline (DK): +45 82 12 12 12
<b>France</b>	ORFILA (FR): + 01 45 42 59 59
<b>Germany</b>	Poison Center Berlin (DE): +49 030 30686 790
<b>Italy</b>	Poison Center, Milan (IT): +39 02 6610 1029
<b>Netherlands</b>	National Poisons Information Center (NL): +31 30 274 88 88 (NB: this service is only available to health professionals)
<b>Norway</b>	Poisons Information (NO):+ 47 22 591300
<b>Poland</b>	Poison Control and Information Centre, Warsaw (PL): +48 22 619 66 54; +48 22 619 08 97
<b>Spain</b>	Poison Information Service (ES): +34 91 562 04 20
<b>United Kingdom</b>	NHS Direct (UK): +44 0845 46 47

**2. HAZARDS IDENTIFICATION**

**Classification of the substance or mixture**

**REGULATION (EC) No 1272/2008**

Serious Eye Damage / Eye Irritation - H319	Category 2
---	------------

**Classification according to EU Directives 67/548/EEC or 1999/45/EC**

For the full text of the R-phrases mentioned in this Section, see Section 16

## 2. HAZARDS IDENTIFICATION

**Classification** Xi - Irritant.

**Risk Phrases** R36 Irritating to eyes.

### Label Elements



**Signal Word**

**Warning**

### **Hazard Statements**

H319 - Causes serious eye irritation

### **Precautionary Statements - EU (§28, 1272/2008)**

P264 - Wash face, hands and any exposed skin thoroughly after handling

P280 - Wear protective gloves/eye protection/face protection

P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

P337 + P313 - If eye irritation persists: Get medical advice/attention

### **Other Hazards**

None known

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	EINECS	CAS Number	PERCENT	EEC Classification	EU - CLP Substance Classification	REACH No.
Sodium carbonate	207-838-8	497-19-8	60 - 100%	Xi; R36	Eye Irrit. 2 (H319)	No data available

For the full text of the R-phrases mentioned in this Section, see Section 16

## 4. FIRST AID MEASURES

### Description of first aid measures

#### **Inhalation**

If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

#### **Eyes**

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

#### **Skin**

Wash with soap and water. Get medical attention if irritation persists.

#### **Ingestion**

Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

### Most important symptoms and effects, both acute and delayed

May cause eye irritation.

### Indication of any immediate medical attention and special treatment needed

#### **Notes to Physician**

Treat symptomatically

## 5. FIREFIGHTING MEASURES

### **Extinguishing media**

#### **Suitable Extinguishing Media**

Water fog, carbon dioxide, foam, dry chemical.

#### **Extinguishing media which must not be used for safety reasons**

None known.

### **Special hazards arising from the substance of mixture**

#### **Special Exposure Hazards**

Decomposition in fire may produce toxic gases.

### **Advice for firefighters**

#### **Special Protective Equipment for Fire-Fighters**

Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

## 6. ACCIDENTAL RELEASE MEASURES

### **Personal precautions, protective equipment and emergency procedures**

Use appropriate protective equipment. Avoid creating and breathing dust.

See Section 12 for additional information

### **Environmental precautions**

Prevent from entering sewers, waterways, or low areas.

### **Methods and material for containment and cleaning up**

Scoop up and remove.

### **Reference to other sections**

See Section 12 for additional information.

## 7. HANDLING AND STORAGE

### **Precautions for Safe Handling**

Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust.

### **Hygiene Measures**

Handle in accordance with good industrial hygiene and safety practice

### **Conditions for safe storage, including any incompatibilities**

Store away from acids. Store in a cool, dry location. Product has a shelf life of 36 months.

### **Specific End Use(s)**

#### **Exposure Scenario**

No information available

#### **Other Guidelines**

No information available

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### **Control parameters**

Substances	EU	UK OEL	Netherlands	France OEL	Germany MAK/TRK
Sodium carbonate	Not applicable	10 mg/m <sup>3</sup>	Not applicable	Not applicable	Not applicable

### **Derived No Effect Level (DNEL)**

No information available.

### **Predicted No Effect Concentration (PNEC)**

No information available.

### **Exposure controls**

#### **Engineering Controls**

Use in a well ventilated area. Localized ventilation should be used to control dust levels.

#### **Personal protective equipment**

##### **Respiratory Protection**

Dust/mist respirator. (95%)

##### **Hand Protection**

Normal work gloves.

##### **Skin Protection**

Normal work coveralls.

##### **Eye Protection**

Dust proof goggles.

##### **Other Precautions**

Eyewash fountains and safety showers must be easily accessible.

#### **Environmental Exposure Controls**

No information available

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Information on basic physical and chemical properties

**Physical State:** Powder **Color:** White

**Odor:** Odorless

<u>Property</u> <u>Remarks/ Method</u>	<u>Values</u>
<b>pH:</b>	11.5
<b>Melting Point/Range</b>	No data available
<b>Freezing Point/Range (C):</b>	No data available
<b>Boiling Point/Range</b>	No data available
<b>Flash Point</b>	No data available
<b>Evaporation rate</b>	No data available
<b>Vapor Pressure</b>	No data available
<b>Vapor Density</b>	No data available
<b>Specific Gravity</b>	2.5
<b>Water Solubility</b>	Partly soluble
<b>Solubility in other solvents</b>	No data available
<b>Partition coefficient: n-octanol/water</b>	No data available
<b>Autoignition Temperature</b>	No data available
<b>Decomposition Temperature</b>	No data available
<b>Decomposition Temperature</b>	No data available
<b>Viscosity</b>	No data available
<b>Explosive Properties</b>	No information available
<b>Oxidizing Properties</b>	No information available

### Other information

**Molecular Weight** 105.99  
**VOC Content (%)** No data available

## 10. STABILITY AND REACTIVITY

### Reactivity

Not applicable

### Chemical Stability

Stable

### Possibility of Hazardous Reactions

Will Not Occur

### Conditions to Avoid

None anticipated

### Incompatible Materials

Strong acids.

### Hazardous Decomposition Products

Carbon monoxide and carbon dioxide.

## 11. TOXICOLOGICAL INFORMATION

### Information on Toxicological Effects

#### Acute Toxicity

<b>Inhalation</b>	May cause respiratory irritation.
<b>Eye Contact</b>	May cause eye irritation.
<b>Skin Contact</b>	Prolonged or repeated contact may cause skin irritation.
<b>Ingestion</b>	Irritation of the mouth, throat, and stomach.

**Chronic Effects/Carcinogenicity** No data available to indicate product or components present at greater than 1% are chronic health hazards.

## 11. TOXICOLOGICAL INFORMATION

Substances	LD50 Oral	LD50 Dermal	LC50 Inhalation
Sodium carbonate	4220 mg/kg	No data available	No data available

## 12. ECOLOGICAL INFORMATION

### Toxicity Ecotoxicity Effects

Substances	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Daphnia Magna (Water Flea)
Sodium carbonate	No information available	TLM24: 385 mg/l (Lepomis macrochirus)	No information available	No information available

### Persistence and degradability

No information available

### Bioaccumulative potential

No information available

### Mobility in soil

No information available

### Results of PBT and vPvB assessment

No information available.

### Other adverse effects

#### Endocrine Disruptor Information

This product does not contain any known or suspected endocrine disruptors

## 13. DISPOSAL CONSIDERATIONS

### Waste treatment methods

#### Disposal Method

Bury in a licensed landfill according to federal, state, and local regulations.

#### Contaminated Packaging

Follow all applicable national or local regulations.

## 14. TRANSPORT INFORMATION

### IMDG/IMO

**UN Number:** Not restricted.  
**UN Proper Shipping Name:** Not restricted  
**Transport Hazard Class(es):** Not applicable  
**Environmental Hazards:** Not applicable

### RID

**UN Number:** Not restricted.  
**UN Proper Shipping Name:** Not restricted  
**Transport Hazard Class(es):** Not applicable

### ADR

**UN Number:** Not restricted.  
**UN Proper Shipping Name:** Not restricted  
**Transport Hazard Class(es):** Not applicable

**14. TRANSPORT INFORMATION****IATA/ICAO**

**UN Number:** Not restricted.  
**UN Proper Shipping Name:** Not restricted  
**Transport Hazard Class(es):** Not applicable

**Special Precautions for User** None

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** Not applicable

**15. REGULATORY INFORMATION****Safety, health and environmental regulations/legislation specific for the substance or mixture****International Inventories**

**EINECS Inventory** This product, and all its components, complies with EINECS  
**US TSCA Inventory** All components listed on inventory or are exempt.  
**Canadian DSL Inventory** All components listed on inventory.

**Legend**

**TSCA** - United States Toxic Substances Control Act Section 8(b) Inventory

**EINECS/ELINCS** - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances

**DSL/NDL** - Canadian Domestic Substances List/Non-Domestic Substances List

**Germany, Water Endangering Classes (WGK)** WGK 1: Low hazard to waters.

**Chemical Safety Assessment**

No information available

**16. OTHER INFORMATION****Full text of R-phrases referred to under Sections 2 and 3**

R36 Irritating to eyes.

**Key literature references and sources for data**

[www.ChemADVISOR.com/](http://www.ChemADVISOR.com/)

**Revision Date:** 30-Nov-2010

**Revision Note** Not applicable

**This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006**

**Disclaimer Statement**

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

**End of Safety Data Sheet**



## WATER WELL ACCESS AGREEMENT

THIS WATER WELL ACCESS AGREEMENT ("Agreement") is entered into this 31st day of May, 2013, by and between The Bruce and Elizabeth Strachan Revocable Living Trust ("Grantor"), Athena Minerals, Inc., a Delaware corporation ("Lessee") and Calico Exploration, LLC, a California limited liability company ("Calico").

### WITNESSETH:

WHEREAS, Grantor is the owner of those certain patented mining claims known as the Langtry Claim Group (Mineral Survey No. 6777) located in Sections 6, 7, and 8, T10N, R1E, SBM ("Properties") and owns an un-permitted water well (the "Well") located in Section 6 at Latitude N 34° 58' 33.7" Longitude W 116° 54' 36.1; and

WHEREAS, Lessee currently holds a valid lease/option agreement from Grantor for the Properties and the rights to use the Well; and

WHEREAS, Calico owns and leases certain unpatented mining claims adjacent to the Properties and has submitted a plan of operations to BLM to conduct core drilling on its claims. Calico desires to enter upon the Properties to investigate and test the Well to determine its overall physical condition and conduct such tests to determine if it can produce a sustainable flow rate to support Calico's drilling program.

NOW THEREFORE, Grantor and Lessee hereby grants to Calico the rights of ingress and egress to and from the Properties, along with the right at any time and from time to time to enter upon said Properties in order to inspect, survey, sample and remediate the Well or other preliminary investigatory uses thereof as Calico deems necessary in its opinion to adequately determine the potential of the Well.

In the conduct of all such activities, Calico shall use due care and do no more damage to the

Properties than is reasonably incident to the exercise of the rights herein granted. Upon completion of its activities, Calico shall reclaim any disturbance it has made and shall provide to Grantor and Lessee a report of its activities in ascertaining the potential of the Well and any remedial work required to place the Well in operational status. Additionally, Calico shall provide to Grantor and Lessee any reports and/or recommendations from third party experts as to the condition and production status of the Well. Any remedial work or other improvements done by Calico shall inure to the benefit of Grantor and Lessee.

Calico further agrees to indemnify and hold harmless Grantor and Lessee from any and all claims, actions or causes of action which may be asserted against Grantor and Lessee for personal injury and/or property damage claimed or sustained by any person, firm or corporation whomsoever, and directly resulting from the activities performed on behalf of Calico during the course of its operations hereunder.

This Agreement shall be effective as of the date first above written and will expire on the 31st day of May, 2014. The terms of this Agreement shall be binding upon and inure to the benefit of the respective heirs, successors and assigns of the parties hereto.

IN WITNESS WHEREOF, the parties hereto executed this instrument, as of the day and year first above written.

GRANTOR

CALICO EXPLORATION, LLC

By: \_\_\_\_\_

By: \_\_\_\_\_

LESSEE

By: , PRESIDENT  
ATHENA MINERALS, INC.

## WATER WELL ACCESS AGREEMENT

THIS WATER WELL ACCESS AGREEMENT ("Agreement") is entered into this 31<sup>ST</sup> day of May, 2013, by and between The Bruce and Elizabeth Strachan Revocable Living Trust ("Grantor"), Athena Silver Corporation, a Delaware corporation ("Lessee") and Calico Exploration, LLC, a California limited liability company ("Calico").

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WHEREAS, Calico owns and leases certain unpatented mining claims adjacent to the Properties and has submitted a plan of operations to BLM to conduct core drilling on its claims. Calico desires to enter upon the Properties to investigate and test the Well to determine its overall physical condition and conduct such tests to determine if it can produce a sustainable flow rate to support Calico's drilling program.

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In the conduct of all such activities, Calico shall use due care and do no more damage to the

Properties than is reasonably incident to the exercise of the rights herein granted. Upon completion of its activities, Calico shall reclaim any disturbance it has made and shall provide to Grantor and Lessee a report of its activities in ascertaining the potential of the Well and any remedial work required to place the Well in operational status. Additionally, Calico shall provide to Grantor and Lessee any reports and/or recommendations from third party experts as to the condition and production status of the Well. Any remedial work or other improvements done by Calico shall inure to the benefit of Grantor and Lessee.

Calico further agrees to indemnify and hold harmless Grantor and Lessee from any and all claims, actions or causes of action which may be asserted against Grantor and Lessee for personal injury and/or property damage claimed or sustained by any person, firm or corporation whomsoever, and directly resulting from the activities performed on behalf of Calico during the course of its operations hereunder.

This Agreement shall be effective as of the date first above written and will expire on the 31<sup>ST</sup> day of May, 2014. The terms of this Agreement shall be binding upon and inure to the benefit of the respective heirs, successors and assigns of the parties hereto.

**IN WITNESS WHEREOF**, the parties hereto executed this instrument, as of the day and year first above written.

**GRANTOR**

By: Bruce D. Strachan

**CALICO EXPLORATION, LLC**

By: \_\_\_\_\_

**LESSEE**

By: \_\_\_\_\_



**B I O L O G I C A L   T E C H N I C A L   R E P O R T**

**F I N A L**

**CALICO MINERAL EXPLORATION  
PROJECT  
SAN BERNARDINO COUNTY,  
CALIFORNIA**

Prepared for

Bureau of Land Management  
Barstow Field Office  
2601 Barstow Road  
Barstow, CA 92311

URS Project No. 27653190.02000

December, 2013

Prepared by:

**URS**

4225 Executive Square, Suite 1600  
La Jolla, CA 92037  
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# TABLE OF CONTENTS

---

<b>Section 1</b>	<b>Introduction .....</b>	<b>1-1</b>
	1.1 Project Area .....	1-1
	1.2 Proposed action.....	1-1
<b>Section 2</b>	<b>Methods.....</b>	<b>2-1</b>
<b>Section 3</b>	<b>Results .....</b>	<b>3-1</b>
	3.1 Vegetation Communities .....	3-1
	3.2 Wildlife .....	3-2
	3.3 Jurisdictional Waters .....	3-4
	3.4 Impacts.....	3-5
	3.5 Recommendations.....	3-6
<b>Section 4</b>	<b>Conclusion .....</b>	<b>4-1</b>
<b>Section 5</b>	<b>References .....</b>	<b>5-1</b>

## List of Tables, Figures, and Appendices

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### Tables

Table 1	Proposed Action Temporary Disturbance
Table 2	Recorded and average weather temperatures for Barstow, CA
Table 3	Focused Desert Tortoise/Burrowing Owl Survey Results

### Figures

Figure 1	Overview Map
Figure 2	CNDDDB Sensitive Species Points
Figure 3	GPS Track Logs
Figure 4	Desert Tortoise Burrow Map
Figure 5	Desert Tortoise Carcass Map
Figure 6	Desert Tortoise Scat Map
Figure 7	Desert Tortoise Live Encounter Map
Figure 8	Burrowing Owl Burrow Map
Figure 9	Wash Avoidance Area Map

### Appendices

Appendix A	Special Status Plant and Wildlife Species Potentially Occurring In Project Area
Appendix B	Site Photographs
Appendix C	Incidental Flora and Fauna Species List

**SECTION 1 INTRODUCTION**

This Biological Technical Report has been prepared to support environmental compliance and permitting for the proposed development of a Mineral Exploration Project located in San Bernardino County, California. This report analyzes potential effects that the Calico Exploration LLC (Calico), Mineral Exploration Project (Proposed Action) may have on biological resources. The Proposed Action would investigate the subsurface geology and mineralogy and the mineral value of the mineralized zone(s) known to exist in San Bernardino County, California. The Proposed Action was selected by Calico based on the development and evaluation of exploration alternatives suitable for mineral exploration in terms of both yielding necessary subsurface geologic information and achieving compliance with BLM regulatory requirements.

**1.1 PROJECT AREA**

The Project Area occurs in an area consisting of public lands administered by the Bureau of Land Management (BLM) partially within the Superior-Cronese Desert Wildlife Management Area (DWMA) located from three to 12 miles northeast of the City of Barstow, California (Figure 1). Vegetation is composed primarily of Mojave Desert creosote bush scrub with smaller areas of Mojave wash scrub and un-vegetated desert pavement, rocky slopes and developed/disturbed, as defined by the Holland (1986) classification of plant communities, on generally located in gently rolling, open desert scrub habitat between 600 and 850 meters in elevation.

**1.2 PROPOSED ACTION**

The purpose of the Proposed Action would investigate the subsurface geology and mineralogy and the mineral value of the mineralized zone(s) known to exist in the region. Specifically, core samples would be evaluated to assist with determining efficacy of mining on the Mitchell/Lead Mountain Area and Lilly Claims Area. The Proposed Action would drill one or more core holes at 10 sites to obtain geologic and mineralogic data from potential ore bodies at two different locations (Mitchell/Lead Mountain Area and Lilly Claims Area), as well as perform an induced polarization (IP) geophysical survey (Figure 1). Core drilling would include a tracked diamond core rig with related support equipment at drilling locations within the Project Area and off of existing roads. The Proposed Action will consist of 10 drilling sites at Mitchell/Lead Mountain Area (LM-1, LM-2, LM-3, LM-4, M-1, M-2, and M-3) and Lilly Claims Area (L-1, L-2, and L-3). Access is via the Fort Irwin main access road (County right-of-way) and various two track existing roads. The total temporary surface disturbance of the Proposed Action is 0.919 acre during 3 months of work.

The core rig and support vehicles would be mobilized and demobilized to the drilling sites along existing routes and temporary access roads. Drilling supplies, water, and service materials would be delivered, and core and cuttings removed, from drill sites either by pick-up truck or all-terrain-vehicle (ATV) along existing routes. Table 1 shows the disturbance calculations for new roads and each of the drill sites with total Proposed Action disturbance.

## SECTION 2 METHODS

The biological resources assessment included a database review of the California Natural Diversity Database (CNDDDB) and CalFlora, Consortium of California Herberia (CCH) U.S. Fish and Wildlife Service (USFWS) record searches to identify previous biological resource locations in the Project Area (Figure 2 and Appendix A) and determine survey needs. Based on the results of this database review and site conditions, qualified URS biologists conducted focused field surveys for desert tortoise (*Gopherus agassizii*) and Burrowing Owl (*Athene cunicularia*) on May 6 through 9 and June 18th of 2013 (Figure 3). Surveyors slowly walked 10 meter meandering transects concurrently searching for desert tortoise and Burrowing Owl to a distance of 40 meters from proposed IP lines, drill sites, and new access roads. Existing access roads were surveyed to a distance of 10 meters. During these field surveys, biologists noted all desert tortoise and/or Burrowing Owl live encounters, potential burrows, and sign such as scat or carcasses. Biologists also noted general site conditions, vegetation, and suitability of habitat for various special-status species. Special attention was focused on special status plants and animals with the potential to occur onsite as identified through literature review and database queries conducted prior to the field surveys. During the field surveys, data pertaining to habitat type and quality, wildlife and plant species observed, potential for special-status biological resources to occur, and other pertinent features or conditions of the Project Area and adjacent lands were recorded.

Surveys for spring special status plants were not performed due to poor weather conditions in the months leading into the survey window for spring blooming plants. Special status plant surveys are conducted at the time of year when species are both evident and identifiable (i.e., flowering and/or fruiting). This can involve multiple visits to the same site (i.e. during fall, early spring and/or late spring survey for flowering plants) to capture the floristic diversity at a level necessary to determine if special status plants are present. The timing and number of visits are determined by geographic location, the natural communities present, and the weather patterns of the year in which the surveys are conducted. Nearby weather station precipitation records were monitored for rainfall activity in the months preceding potential spring special status plant surveys at the Daggett-Barstow weather station (Table 2). Precipitation records from this weather station show that the Project Area received too little rain in the months preceding potential surveys for special status plant species, which likely resulted in a lower incidence of plant growth and seed germination (Table 2).

Additionally, on April 10, 2013, URS botanists conducted a reference population check of known populations of special status plants (which are listed in Appendix A) within a 10 mile buffer of the Project Area. None of those species were found. Due to the lack of blooming reference populations and weather conditions described above, focused surveys for rare plant species were not conducted.

## SECTION 3 RESULTS

Calico Exploration LLC contracted URS to assess the current biological resources present on the site, and assess potential impacts that may result from the Proposed Action. URS biologists Phillip Howard, Alicia Omlid, Dennis Miller and Heather Rothbard conducted a biological survey of the site following the methodology described above on May 6 through 9 and June 18th of 2013.

### 3.1 VEGETATION COMMUNITIES

The Project Area primarily supports Mojave Desert creosote bush scrub with smaller areas of Mojave wash scrub and un-vegetated desert pavement, rocky slopes and developed/disturbed areas as defined by the Holland (1986) classification of plant communities.

Mojave creosote bush scrub (Holland Code 34100) is a community dominated by creosote bush (*Larrea tridentata*) and white bur-sage (*Ambrosia dumosa*). Shrubs are typically widely spaced with bare ground between them. A sparse annual herb layer may flower in late March and April with sufficient winter rains. Other common plant species in this habitat include smoke tree (*Senna armata*), Nevada ephedra (*Ephedra nevadensis*), white burrobush (*Hymenoclea salsola*), encelia (*Encelia spp.*), ratany (*Krameria spp.*), and various cactus species (e.g., *Opuntia spp.*). This plant community is usually found on well-drained secondary soils with very low water-holding capacity on slopes, fans, and valleys. This vegetation type makes up the majority of the acreage within the Project Area.

Mojave wash scrub (Holland Code 34250) consists of catclaw acacia (*Acacia greggii*) stands that occupy habitat similar to blue palo verde-ironwood-smoke tree series, but at lower elevations. This vegetation community occurs in sandy or gravelly washes and arroyos of the lower Mojave and Colorado Deserts, largely in frost-free areas. These washes typically have braided channels that are substantially rearranged following every surface flow event. This vegetation community can have many different component species. In the Project Area, the dominant shrub species include catclaw acacia, cheesbush (*Hymenoclea salsola*), brittlebush (*Encelia farinose*), sweetbush (*Bebbia juncea*) and small amounts of big galleta grass (*Hilaria rigida*) mixed in.

Developed lands (Holland Code 12000) include roads, built structures, and associated infrastructure. Within the Project Area, these included dirt roads and abandoned mine shafts.

Un-vegetated habitat (Holland Code 13000) occurs on rocky slopes with little vegetation.

#### *Special Status Plants*

As described in Section 2, special status plant surveys were not performed due to poor weather conditions in the months leading into the survey window for spring blooming plants. According to CNDDDB, CalFlora, and CCH record search results, there are five California Native Plant Society (CNPS) list 1 and 2 level plants that have a high to moderate potential to occur within a five mile radius of the Project Area. These are creamy blazing star (*Mentzelia tridentata*), spiny-hair blazing star (*Mentzelia tricuspis*), Mojave monkeyflower (*Mimulus mohavensis*), Indian breadroot (*Pediomelum castoreum*), and Barstow woolly sunflower (*Eriophyllum mohavense*). A complete list of all special status plants with potential to occur in the Project Area is located in Appendix A.

**Creamy blazing star**

Regulatory Status; State: G2/S2.3 1B.3, CNPS 1B.3

Creamy blazing star is an annual herb found mostly in rocky, gravelly, and sandy soils within creosote bush scrub. This plant prefers elevations of 700 to 900 meters and has a short bloom period from April to May.

**Spiny-hair blazing star**

Regulatory Status: State: G4/S2 2.1, CNPS 2.1

Spiny-hair blazing star is an annual herb found mostly in sandy and gravelly slopes and washes in creosote bush scrub. This plant prefers elevations of 150 to 1280 meters and blooms from March to May.

**Mojave monkeyflower**

Regulatory Status: State: G2/S2 1B.2 ; CNPS 1B.2, BLM Sensitive

Mojave monkeyflower is an annual herb found mostly on gravelly banks of desert washes in creosote bush scrub and Joshua tree woodland. This plant prefers elevations of 600-1000 meters and blooms from April to June.

**Indian breadroot**

Regulatory Status: State: G2/S2 1B.2; CNPS 1B.2, BLM Sensitive

Indian breadroot is a perennial herb that grows in sandy washes and road-cuts in open areas within creosote bush scrub or Joshua tree woodland. This plant prefers elevations that are less than 1750 meters and has a short bloom period from April to May.

**Barstow woolly sunflower**

Regulatory Status; State: G2/S2 1B.2; CNPS 1B.2, BLM Sensitive

Barstow woolly sunflower is an annual herb that grows in habitats of creosote bush scrub, shadscale scrub, alkali sinks, and playas. This plant prefers elevations from 500 to 800 meters and has a short bloom period from April to May.

None of these plants were observed during reference population checks or focused surveys for desert tortoise and burrowing owl.

**3.2 WILDLIFE**

The Project Area supports a diverse assemblage of desert wildlife species. For a complete list of these species see Appendix C. Reptiles detected include desert tortoise, desert horned lizard (*Phrynosoma platyrhinos*), common side-blotched lizard (*Uta stansburiana*), western whiptail lizard (*Cnemidophorus tigris*), zebra-tail lizard (*Callisaurus draconoides*), and sidewinder (*Crotalus cerastes*). Bird species detected include common raven (*Corvus corax*), California Horned Lark (*Eremophila alpestris*), Western Kingbird (*Tyrannus verticalis*), Black-throated Sparrow (*Amphispiza bilineata*), Say's Phoebe (*Sayornis saya*) and Red-tailed Hawk (*Buteo jamaicensis*). Mammals observed or indirectly detected from scat or tracks include black-tailed jackrabbit (*Lepus californicus*), kit fox (*Vulpes macrotis*), coyote (*Canis latrans*), and woodrat (*Neotoma* sp.).

### *Special Status Wildlife*

Two special status wildlife species have been documented to occur on the Project Area based on live encounters or sign (desert tortoise and Burrowing Owl). Focused surveys were conducted for these species and results are presented below and in Table 3. A listing of other special status wildlife species known from the Project Area is provided in Appendix A.

#### **Desert tortoise**

Regulatory Status: Federal: USFWS: Threatened; BLM Sensitive; State: CDFW: Threatened

Desert tortoise is a widely distributed species in the deserts of California, southern Nevada, extreme southwestern Utah, western and southern Arizona, and throughout most of Sonora, Mexico. Typical tortoise habitat consists of creosote bush scrub between 2,000 and 3,300 feet with firm but not hard ground, usually soft sandy loams and loamy sands that allow for burrow construction (Karl 1983). Lower densities occurring in Joshua tree woodland, saltbush scrub and occasionally in desert habitats above 4,100 feet (Karl 1983).

Desert tortoise populations are declining because of various factors, including the spread of a respiratory disease, increases in raven populations that prey on juvenile tortoises, and habitat loss and degradation because of various extensive and intensive land uses. Currently, only the Mojave population of desert tortoise is federal- and State-listed as threatened. Desert tortoise primarily occurs in four subpopulations in the California Mojave Desert (Ord-Rodman, Superior-Cronese, Fremont-Kramer, and Joshua Tree DWMA). Outside of these DWMA's, tortoises tend to occur at much lower densities.

The diet of desert tortoises consists mainly of annual plants and grasses, but also contains perennial plants such as cacti and native forbs. When available, certain non-native plant species are also eaten (West Mojave Planning Team 1999). Desert tortoises are most active when plants are available for forage or when pooled water is available for drinking, usually from March through early June and again between September and early November (Marlow 1979). They typically have overlapping home ranges averaging between 5 and 131 acres, which can fluctuate in size on a year-to-year basis based on several factors such as sex of the tortoise, rainfall, availability of resources, and other factors (Berry 1986). Individuals commonly traverse 1,500-2,600 feet per day within their home range, and males have been recorded traveling up to 3,200 feet within their home range. Mojave desert tortoises are also known to disperse over more extended distances (1.9 miles in 16 days and 4.5 miles in 15 months; Berry 1986).

The results of the focused survey included the observation of 42 burrows (5 confirmed active) (Figure 4), 25 carcasses (Figure 5), 29 instances of scat (Figure 6), and 7 live desert tortoise (Figure 7). Observations of desert tortoise and desert tortoise sign in the Project Area are shown in Figures 4 through 7 and in Table 3.

No active burrows are within 100 feet of drill sites or proposed access roads. Active burrows are located within 100 feet of the proposed IP lines. See Table 3 for an estimate of the distance in feet from these burrows to the nearest IP line. Impacts to these burrows will be minimized through mitigation measures discussed in section 3.5.

**Burrowing Owl**

Regulatory Status: Federal: BLM: Sensitive, USFWS: Birds of Conservation Concern; State: CDFW: Species of Special Concern

The Burrowing Owl is a small, ground-dwelling bird that inhabits open spaces such as grasslands, agricultural fields, and disturbed areas in the western half of the U.S. south into Baja California and central Mexico (Johnsgard 1988). Burrowing Owls use burrows throughout the year for shelter from weather and predators, and for nesting during the breeding season (February 1 to August 31). In southern California, the most commonly used rodent burrow is that of the California ground squirrel (*Spermophilus beecheyi*). Burrowing Owl nesting distribution is strongly correlated to local ground squirrel burrow distribution (Collins 1979). Burrowing Owls form short-term pair bonds. Not all individuals capable of breeding do so every year. Burrowing Owls have declined through much of their range because of habitat loss resulting from urbanization, agricultural conversion, and destruction of ground squirrel colonies (Remsen 1978, Shuford and Gardali 2008). The incidental poisoning of burrowing owls and the destruction of their burrows during eradication programs aimed at rodent colonies has also been a large factor in their population decrease (Collins 1979; Remsen 1978; and Zarn 1974).

There were no observations of Burrowing Owls in the Project Area during the focused surveys; however, three old vacant burrows suitable for Burrowing Owl were identified with historic signs of use. Both burrows had white wash and old pellets. Observations of Burrowing Owl burrows in the Project Area are shown in Figure 8 and in Table 3. No potential owl burrows are within 100 feet of proposed drill sites and access roads. Estimates of the distance these burrows are from the nearest IP lines are provided in Table 3. While these burrows are not currently active, potential impacts to these burrows if they become active will be minimized through BMP mitigation measures discussed in section 3.5.

### 3.3 JURISDICTIONAL WATERS

#### *Wetlands/Riparian Areas*

The Proposed Action sites are not located in wetland or riparian areas. Therefore, this element will not be considered further in this document. The Proposed Action would not impact wetland or riparian areas.

#### *Other Jurisdictional Waters of US/State*

To access LM-4, approximately 120 sq. feet of disturbed desert wash channel would be crossed by the truck-mounted drill rig and support vehicles (see Figure 9). The Proposed Action would not disturb the wash area, except to drive across it. Impacts to this channel are discussed in section 3.4.

#### *Floodplains*

According to the current Federal Emergency Management Agency (FEMA) 100-year floodplain boundary information, the Project Area is not in or near a floodplain. The ephemeral washes in the Project Area represent the greatest potential hazard areas for flooding. However, there are no proposed drilling locations in areas with the potential for concentrated stormwater flow. Therefore, this element is not considered further in this document. The Proposed Action would have no impact on floodplains.

### 3.4 IMPACTS

Due to the nature of the Proposed Action, long-term adverse impacts to vegetation and wildlife within the Project Area from the Proposed Action are expected to have negligible impacts. The Proposed Action may result in short-term temporary impacts to wildlife at the drill locations and IP locations. All of the drilling locations and IP test locations have been located to avoid and minimize environmental impact to wildlife and vegetation at these locations. The work areas associated with the Proposed Action (Figure 1) include space for the boring site, the drill rig, and sufficient room for equipment laydown within a 0.055 acre drill pad (Table 1).

#### *Special Status Plants*

##### *Creamy blazing star*

Regulatory Status; State: G2/S2.3 1B.3

There is moderate potential for impacts to this species. Suitable habitat is present onsite and CNDDDB and CCH records were found within 10 miles of the Project Area.

##### *Spiny-hair blazing star*

Regulatory Status; State: G4/S2 2.1

There is moderate potential for impacts to this species. Suitable habitat is present onsite and CNDDDB and CCH records were found within 10 miles of the Project Area.

##### *Mojave monkeyflower*

Regulatory Status; State: G2/S2 1B.2, BLM Sensitive

There is moderate potential for impacts to this species. Suitable habitat is present onsite and CNDDDB and CCH records were found within 10 miles of the Project Area.

##### *Indian breadroot*

Regulatory Status; State: G2/S2 1B.2, BLM Sensitive

There is moderate potential for impacts to this species. Suitable habitat is present onsite and CNDDDB and CCH records were found within 10 miles of the Project Area.

##### *Barstow woolly sunflower*

Regulatory Status; State: G2/S2 1B.2, BLM Sensitive

There is moderate potential for impacts to this species. Extant populations have been found within the vicinity of the Project Area. Habitat could be suitable for this species; however the Project Area does not include alkali sinks or playas.

#### *Special Status Wildlife*

##### *Desert tortoise*

Regulatory Status: Federal: USFWS: Threatened; State: BLM Sensitive, CDFW: Threatened

The Proposed Action could result in impacts to desert tortoise and their habitat. Live desert tortoises and active burrows have been detected at 11 locations within the Project Area, with a total of 7 live tortoises

and 5 active burrows (Figures 4 and 7) that could be directly impacted without proper mitigation and avoidance measures as described in section 3.5. Mortality from roadkill, site grading, enhanced predation by human-subsidized predators, and loss or degradation of suitable foraging habitat are the most likely impacts on any desert tortoise that may remain on-site during construction and operation.

#### *Burrowing Owl*

Regulatory Status: Federal: BLM: Sensitive, USFWS: Birds of Conservation Concern; State: CDFW: Species of Special Concern

There were no observations of Burrowing Owls or active burrows in the Project Area during the focused surveys; however, three old vacant burrows suitable for Burrowing Owl were identified with historic signs of use (Figure 8). The Project Area is within the historic breeding range for Burrowing Owl. If these burrows were to become active during construction, impacts could occur without proper mitigation and avoidance measures as described in section 3.5.

#### *Migratory Bird Treaty Act Species*

The following avian species were detected in the project area: Common Raven, California Horned Lark, Western Kingbird, Black-throated Sparrow, Say's Phoebe and Red-tailed Hawk. Impacts on these species are regulated by the Migratory Bird Treaty Act (MBTA). However, nests were not detected in the project area.

#### *Jurisdictional Waters*

To access LM-4, approximately 120 sq. feet of disturbed desert wash channel would be crossed. Access through the 12 foot width of wash channel would not require any blading of vegetation or grading for access. Pads and sumps would not be constructed within the wash (LM-1 is located approximately 159 feet from the wash and LM-4 is located approximately 349 feet from the wash ). The Proposed Action would not disturb the wash area, except to drive across it. Avoidance and minimization measures are in place (Section 2.1.1 of the *Proposed Calico Mineral Exploration Project Environmental Assessment Report*) that would lessen the effect of driving through the wash crossing to reach LM-4. No active (Class 1) Desert Tortoise or Burrowing Owl burrows were found in any of the areas of impact and in accordance with recommendations given below in section 3.5, field work and access would be monitored by a biologist to ensure that adjacent biological resources are avoided to the maximum extent practicable.

### **3.5 RECOMMENDATIONS**

In order to minimize impacts to biological resources on-site the following Best Management Practices (BMPs) are recommended measures during construction.

#### **Desert Tortoise**

The Proposed Action could result in impacts to desert tortoise and their habitat. This species has been detected in the Project Area and is known to use the areas proposed for geological testing. However, the

following measures incorporated into the project description would ensure that the Proposed Action would have a minimal effect on desert tortoise:

- Conduct pre-construction clearance surveys to detect tortoises in the construction area vicinity; a temporary exclusionary fence will be installed around the work site if an active desert tortoise or burrow is within 100 feet from work.
- All vehicles shall be checked underneath for the presence of desert tortoise prior to moving them.
- Assign a biological monitor to monitor the construction activities and adjacent habitat areas. Biological monitoring would also occur during any access road improvements in occupied desert tortoise habitat. Occupied tortoise burrows will be avoided by siting of drill sites 100 feet away from any active tortoise burrow or owl burrow.
- Worker Education Program: Personnel working onsite would attend special training for environmental awareness. The training shall cover the following: 1) the potential presence of sensitive species and their habitats; 2) the requirements and boundaries of the Proposed Action (e.g., areas delineated by flags or cones); 3) the importance of complying with avoidance measures; 4) environmentally responsible construction practices; and 5) identification of sensitive resources in the field, if present.
- Speed limits within the Project Area will be restricted to less than 15 MPH during construction and in areas surrounding the Project Area during operation of the Proposed Action.
- Restore all areas disturbed during the Proposed Action to their pre-project condition.

### **Burrowing Owl**

The Proposed Action could result in temporary impacts to Burrowing Owl and their habitat. Burrowing Owl sign has been detected within the Project Area and may use the areas proposed for geological testing. However, the following measures incorporated into the project description would ensure that the Proposed Action would have a minimal effect on Burrowing Owl:

- Pre-construction surveys for Burrowing Owl shall be conducted no more than 30 days prior to initiation of disturbance activities. Surveys shall be focused exclusively on detecting active Burrowing Owl burrows. Potentially active owl burrows shall be monitored for two hour periods in early morning (after sunrise) and late evening (before sunset). The survey area shall include potentially active owl burrows located within 250 feet of the boring locations.
- During the Burrowing Owl nesting season (February 1 to August 31), the qualified monitor shall establish and mark a 250 foot non-disturbance buffer circle around any active burrows detected by the survey above. The buffer shall be staked and roped-off prior to initiating any activity onsite including geotechnical boring
- If an active, non-breeding Burrowing Owl burrow is detected, the geotechnical boring should be located beyond a 160-foot distance, as determined by a qualified biologist. The non-disturbance buffer would be established with flagging by the biological monitor prior to any geotechnical activities.

**Other Special Status Species**

Impacts to special status bird species with potential to occur (found in Appendix A) are anticipated to be negligible. Vegetation removal will be avoided during the nesting or breeding season. This survey would be performed to determine the presence or absence of nesting birds in the work area. If an active nest is identified, a biological monitor will establish and mark a 50 foot setback buffer. The biological monitor will monitor the nest to ensure that the birds are not disturbed. Monitoring of the nest would continue until the birds have fledged. Nesting activity observed within the Project Area will be documented and reported to the BLM at the end of the project in the post-construction report.

Disturbance to vegetation will be limited to 0.919 acres of temporary disturbance. The following measures have been incorporated into the project description to ensure that impacts on biological resources will have reduced effects.

- Worker Education Program: Personnel working onsite would attend special training for environmental awareness. The training shall cover the following: 1) the potential presence of sensitive species and their habitats; 2) the requirements and boundaries of the Proposed Action (e.g., areas delineated by flags or cones); 3) the importance of complying with avoidance measures; 4) environmentally responsible construction practices; and 5) identification of sensitive resources in the field, if present.
- General entry and exit points for geotechnical activities and their work areas would be marked with traffic cones or flagging to avoid additional disturbance.
- All activities must comply with the MBTA. Active nests (i.e., nests with eggs or chicks) are protected by the MBTA. Proposed Action related vegetation disturbance will avoid active nests.

**SECTION 4 CONCLUSION**

The Proposed Action will not likely result in an impact on special status species. Impacts will be confined to previously graded and disturbed roadways and/or be temporary in nature. The scale and duration of the Proposed Action has been designed to limit impacts to biological resources. The Proposed Action would take approximately three months to complete. The Proposed Action was designed with minimal drilling locations. Additionally, measures have been incorporated into the design of the Proposed Action to ensure that impacts on biological resources would have negligible effects. Therefore, there would be no residual effects or adverse impacts that would remain after measures incorporated into the Proposed Action design are implemented.

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**Table 1: Proposed Action Temporary Disturbance**

Drill Site	New Access Road Length <sup>1</sup> (feet)	New Access Road Disturbance Area <sup>2</sup> (square feet)	New Access Road Disturbance Area (acres)	Drill Pad Disturbance Area (acres)	Total Drill Site Disturbance Area <sup>3</sup> (acres)
L-1	314 (30)	2785.3	0.064	0.055	0.119
L-2	0	0.0	0.000	0.055	0.055
L-3	0	0.0	0.000	0.055	0.055
<b>Lilly Claims Total</b>	<b>314</b>	<b>2785.3</b>	<b>0.064</b>	<b>0.165</b>	<b>0.229</b>
M-1	0	0.0	0.000	0.055	0.055
M-2	34 (22)	70.1	0.002	0.055	0.057
M-3	444 (21)	4165.6	0.096	0.055	0.151
LM-1	0	0.0	0.000	0.055	0.055
LM-2	0	0.0	0.000	0.055	0.055
LM-3	331 (28)	2968.3	0.068	0.055	0.123
LM-4	631 (25)	6003.7	0.138	0.055	0.193
<b>Mitchel/Lead Total</b>	<b>1,440</b>	<b>13207.7</b>	<b>0.304</b>	<b>0.386</b>	<b>0.690</b>
<b>Proposed Action Total</b>	<b>1,754</b>	<b>15993</b>	<b>0.368</b>	<b>0.551</b>	<b>0.919</b>

1 Road length portions shown in parenthesis are included within "Pad Disturbance Area" towards the total disturbance estimate.

2 New access road width is assumed to be 10 feet (width of a scraper blade).

3 Disturbance area is conservatively estimated assuming that all new access roads and drill pads will require grading. However, it is anticipated that several access roads/pads will not require any grading for project vehicles to travel across.

**Table 2**  
**Monthly Weather Conditions for Daggett-Barstow California, 2013 ([www.wunderground.com](http://www.wunderground.com)).**

Month	Avg. Temp (°F)	Avg. High (°F)	Avg. Low (°F)	Total Rainfall (inches)
January	45	57	29	0.28
February	51	60	44	0.02
March	63	76	44	0.11
April	69	84	56	0.00
May	75	85	62	0.01
June	86	94	73	0.00

**Table 3 Focused Desert Tortoise/Burrowing Owl Survey Results**  
 \*yellow highlighting indicates active burrow

Label	Lat	Long	Class	Notes	Closest Feature	Distance (Feet)
<b>Desert Tortoise Burrows</b>						
DT_Burrow1	34.93564099	116.957335	4	19x10 cm. No scat or tracks nearby	IP Line	1.311
DT_Burrow2	34.92718499	116.948626	4	includes 3 possible resting spots	IP Line	58.670
DT_Burrow3	34.93112398	116.942949	2	25x10 cm. 2 class 4 scat. Rocks at entrance	IP Line	45.500
DT_Burrow4	34.93407601	116.950634	3	30x15 cm	IP Line	12.148
DT_Burrow5	34.942199	116.95174	5	10x5 cm	IP Line	26.142
DT_Burrow6	34.93519398	116.947614	3	30x13 cm. Also has owl pellets nearby.	IP Line	3.594
DT_Burrow7	34.93513498	116.947227	3	30x13 cm. Appears to have old eggs shells inside	IP Line	61.979
DT_Burrow8	34.93664204	116.944044	4	point includes 2 class 4 burrows, each 25x11 cm.	IP Line	64.510
DT_Burrow9	34.93677397	116.943036	2	33x32 cm	IP Line	59.849
DT_Burrow10	34.93633099	116.955012	5	31x12 cm. Has cobwebs in entrance	IP Line	43.426
DT_Burrow11	34.92923303	116.94262	2	2 class 3 scat nearby	IP Line	31.392
DT_Burrow12	34.92110903	116.958382	2	21x10cm. Has cobwebs	Access Route	47.171
DT_Burrow13	34.936535	116.954465	3	31x14 cm. Has cobwebs	IP Line	40.076
DT_Burrow14	34.927503	-116.941877	1	20+ class 2 and 3 scat nearby. Tracks in burrow.	IP Line	26.310
DT_Burrow15	34.92436599	116.939931	2	not very deep.	IP Line	53.948
DT_Burrow16	34.91902898	116.954798	5	25x9 cm. Has cobwebs.	Access Route	14.253
DT_Burrow17	34.93778299	116.950717	5	Also has badger sign/scat nearby	IP Line	67.178
DT_Burrow18	34.93905201	116.947604	4	No full burrow, about 1.5 feet deep. Possible resting area	IP Line	11.960
DT_Burrow19	34.93652503	-116.949854	1	recent tracks inside burrow, scat nearby. 29x15 cm	IP Line	56.770
DT_Burrow20	34.93626301	116.950099	3	31x12 cm	IP Line	1.756
DT_Burrow21	34.93127796	116.958344	3	28x12 cm	IP Line	33.423
DT_Burrow22	34.93953899	-116.951889	1	2 class 2 scat. 33x13 cm.	IP Line	2.585
DT_Burrow23	34.939568	116.951805	4	25x11 cm. cobwebs, partial collapse	IP Line	2.855
DT_Burrow24	34.94047802	116.94899	2	37x15 cm	IP Line	32.300
DT_Burrow25	34.94210402	116.949938	3	30x17 cm	IP Line	32.034
DT_Burrow26	34.94195801	116.950943	2	37x15 cm	IP Line	38.251
DT_Burrow27	34.93850098	116.960517	2	36x16 cm. Class 3 scat nearby	IP Line	17.614
DT_Burrow28	34.97601201	116.907995	4	28x11 cm	Access Route	42.074
DT_Burrow29	34.92943	116.95796	3	20x12 cm	IP Line	49.621
DT_Burrow30	34.931096	116.942932	2	33x12 cm	IP Line	34.137
DT_Burrow31	34.936467	116.94469	3	has scat	IP Line	82.553
DT_Burrow32	34.930026	-116.94615	1	28x9 cm. Foot prints in and out of burrow. Fresh scat nearby	IP Line	57.860
DT_Burrow33	34.927626	116.952541	2	28x13 cm. Scat found nearby, cobwebs in burrow.	IP Line	13.207
DT_Burrow34	34.936958	116.953703	3	25x10 cm	IP Line	10.977

**Table 3 Focused Desert Tortoise/Burrowing Owl Survey Results**  
 \*yellow highlighting indicates active burrow

Label	Lat	Long	Class	Notes	Closest Feature	Distance (Feet)
DT_Burrow35	34.936713	116.949246	3	33x13 cm.	IP Line	47.542
DT_Burrow36	34.932963	-116.954132	1	28x11 cm. Tracks and class 2 scat inside.	IP Line	30.452
DT_Burrow37	34.933017	116.953311	2	30x10 cm.	IP Line	48.799
DT_Burrow38	34.935161	116.947637	2	28x11 cm.	IP Line	4.704
DT_Burrow39	34.93261	116.949632	2	30x14 cm	IP Line	26.048
DT_Burrow40	34.932393	116.949632	2	32x13 cm. Class 4 scat inside	IP Line	46.466
DT_Burrow41	34.939819	116.953833	2	12x10 cm. No scat. No cobwebs	Boring Pad	46.772
DT_Burrow42	34.939648	116.953322	2	20x10 cm	Access Route	105.325
<b>Desert Tortoise Carcasses</b>						
DT_Shell1	34.93724504	116.953361	5	26 cm long, 15 cm wide	IP Line	66.363
DT_Shell2	34.92515397	116.947666	4	190 mcl	IP Line	72.720
DT_Shell3	34.92398998	116.952109	5		IP Line	64.851
DT_Shell4	34.92089303	116.948891	4	200 mcl	IP Line	44.885
DT_Shell5	34.92320401	116.952883	5		IP Line	106.059
DT_Shell6	34.93329699	116.948106	3	very small, 110 mcl	IP Line	74.798
DT_Shell7	34.93774904	116.950632	5	27 cm long	IP Line	88.593
DT_Shell8	34.92590499	116.945398	5		IP Line	90.505
DT_Shell9	34.93818196	116.950089	5	0	IP Line	8.263
DT_Shell10	34.93840601	116.949532	5	0	IP Line	0.610
DT_Shell11	34.938275	116.944229	5		IP Line	24.911
DT_Shell12	34.93692703	116.948406	5	0	IP Line	19.533
DT_Shell13	34.93165003	116.957999	5	0	IP Line	50.016
DT_Shell14	34.93185396	116.956545	5	0	IP Line	54.168
DT_Shell15	34.93403099	116.951316	5	0	IP Line	53.621
DT_Shell16	34.934751	116.943863	4	0	IP Line	57.953
DT_Shell17	34.94120498	116.948371	4	220 mcl	IP Line	137.286
DT_Shell18	34.92947702	116.958191	5	50 mcl	IP Line	6.532
DT_Shell19	34.92961097	116.952338	5		IP Line	4.253
DT_Shell20	34.93176796	116.946543	2	20.5 mcl	IP Line	38.345
DT_Shell21	34.93318702	116.942462	5		IP Line	29.027
DT_Shell22	34.93163796	116.957986	5	190 mcl	IP Line	44.443
DT_Shell23	34.92139704	116.947111	5		IP Line	87.407
DT_Shell24	34.91835902	116.954319	5		Access Route	276.966
DT_Shell25	34.91769399	116.953283	5		IP Line	66.612

**Table 3 Focused Desert Tortoise/Burrowing Owl Survey Results**  
 \*yellow highlighting indicates active burrow

Label	Lat	Long	Class	Notes	Closest Feature	Distance (Feet)
<b>Desert Tortoise Scat</b>						
DT_Scat1	34.93618799	116.949804	1	2 class 1's	IP Line	61.775
DT_Scat2	34.92667504	116.943854	5	partial burrow nearby	IP Line	16.133
DT_Scat3	34.91949501	116.95182	5		Access Route	14.899
DT_Scat4	34.92905198	116.95414	3		IP Line	31.023
DT_Scat5	34.931184	116.959936	2		IP Line	173.431
DT_Scat6	34.93592304	116.946004	1	2 class 1's	IP Line	56.463
DT_Scat7	34.939194	116.952448	3		IP Line	51.633
DT_Scat8	34.93947202	116.951922	2		IP Line	21.061
DT_Scat9	34.94141101	116.95166	2		IP Line	59.573
DT_Scat10	34.93777201	116.962162	2		IP Line	31.010
DT_Scat11	34.93786002	116.956846	2		IP Line	23.778
DT_Scat12	34.92772001	116.952705	3		IP Line	64.058
DT_Scat13	34.93049501	116.944692	2		IP Line	41.831
DT_Scat14	34.93256198	116.949878	3		IP Line	39.148
DT_Scat15	34.92895802	116.95473	3		IP Line	69.549
DT_Scat16	34.93045502	116.949401	2		IP Line	61.733
DT_Scat17	34.93082098	116.948656	2		IP Line	27.732
DT_Scat18	34.93111602	116.947604	1		IP Line	53.787
DT_Scat19	34.92758799	116.952518	2	9 class 2's	IP Line	2.218
DT_Scat20	34.936722	116.949234	3		IP Line	49.127
DT_Scat21	34.93263901	116.954883	4		IP Line	11.185
DT_Scat22	34.93496801	116.948521	3		IP Line	35.551
DT_Scat23	34.93507496	116.947649	2		IP Line	32.038
DT_Scat24	34.93789698	116.956534	2		IP Line	0.842
DT_Scat25	34.93883701	116.95469	1		Access Route	93.647
DT_Scat26	34.92107903	116.94686	2		Access Route	0.513
DT_Scat27	34.96917598	116.899083	3		Access Route	249.236
DT_Scat28	34.91959099	116.947374	3		IP Line	0.191
DT_Scat29	34.91791897	116.959701	3		Access Route	196.394
<b>Desert Tortoise Live Encounters</b>						
Live_DT1	34.93917103	116.946941		270 mcl male	IP Line	50.741
Live_DT2	34.92918801	116.942429		250 mcl male	IP Line	6.282
Live_DT3	34.93166202	116.962933		210 mcl female	Access Route	34.946
Live_DT4	34.93788499	116.961627		200 mcl male	IP Line	56.668
Live_DT5	34.930963	116.959706		250 mcl sex unknown	IP Line	92.738
Live_DT6	34.933315	116.953683		220 mcl male	IP Line	94.866

**Table 3 Focused Desert Tortoise/Burrowing Owl Survey Results**  
 \*yellow highlighting indicates active burrow

Label	Lat	Long	Class	Notes	Closest Feature	Distance (Feet)
Live_DT7	34.938617	116.954479		190 mcl male	IP Line	3.774
<b>Burrowing Owl Burrows</b>						
BUOW_Burrow1	34.93994996	116.956851		has white wash, old pellets. Possible winter use	IP Line	67.328
BUOW_Burrow2	34.93526003	116.947618		White wash and pellets nearby. Cobwebs in entrance. Possible winter use	IP Line	26.142
BUOW_Burrow3	34.941621	116.952473		White wash and pellets nearby. No cobwebs in entrance, possible winter use	IP Line	103.819
<b>Legend</b>						
<b>Desert Tortoise Burrows</b>						
Class 1: Currently active with tortoise or recent tortoise sign						
Class 2: Good condition, definitely tortoise, no recent sign						
Class 3: Deteriorated condition, definitely tortoise						
Class 4: Good condition, possibly tortoise						
Class 5: Deteriorated condition, possibly tortoise.						
<b>Desert Tortoise Carcasses</b>						
Class 1: Fresh or putrid						
Class 2: Normal color, scutes adhere to bone						
Class 3: Scutes peeling off bone						
Class 4: Shell bone is falling apart; growth rings on scutes peeling						
Class 5: Disarticulated and scattered						
<b>Desert Tortoise Scat</b>						
Class 1: Wet (not from rain or dew) or freshly dried; obvious color						
Class 2: Dried with glaze; some odor; dark brown						
Class 3: Dried; no glaze or odor; bleaching (light brown) tightly packed						
Class 4: Dried; light brown to pale yellow, loose material						
Class 5: Bleached or consisting of only plant fiber						



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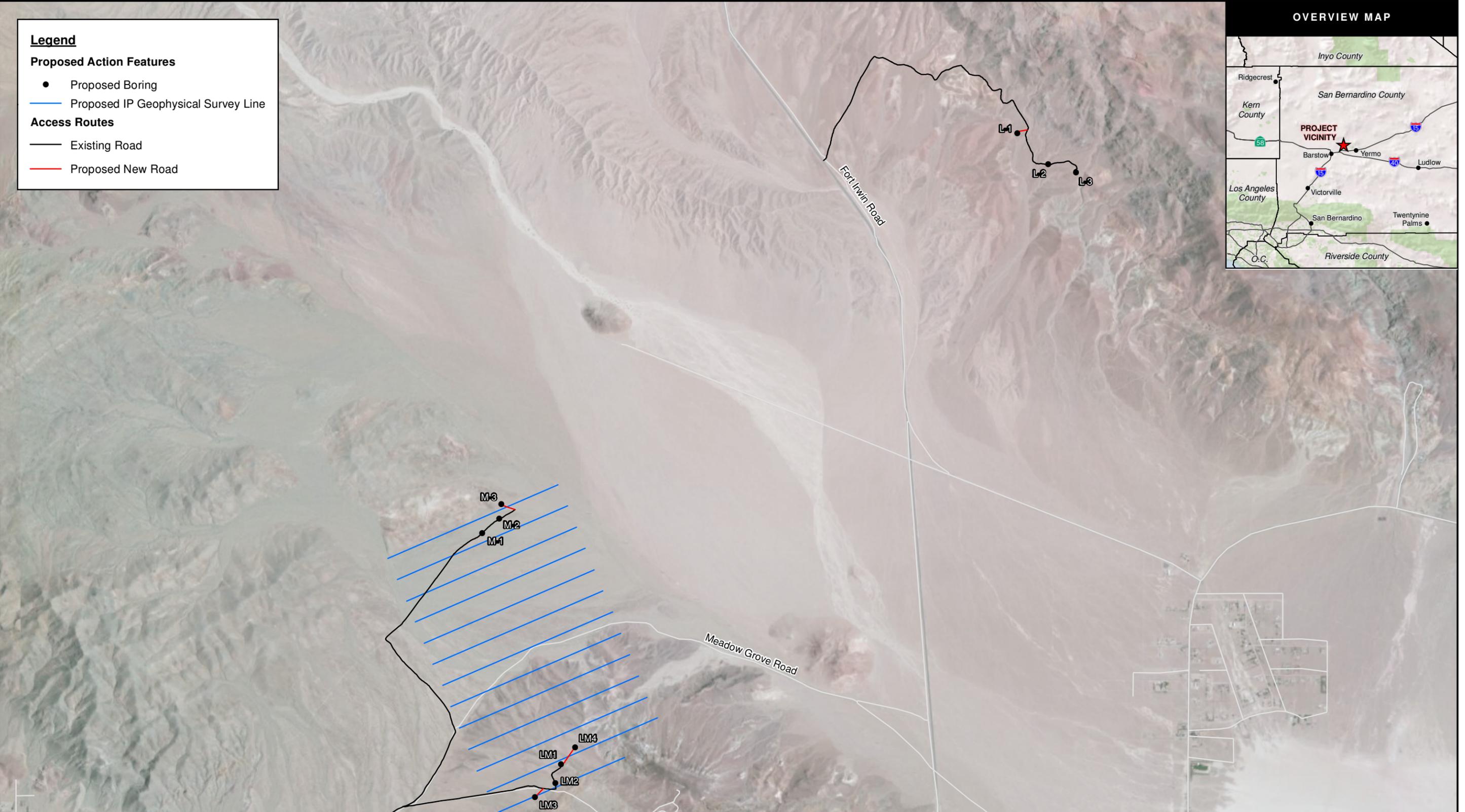
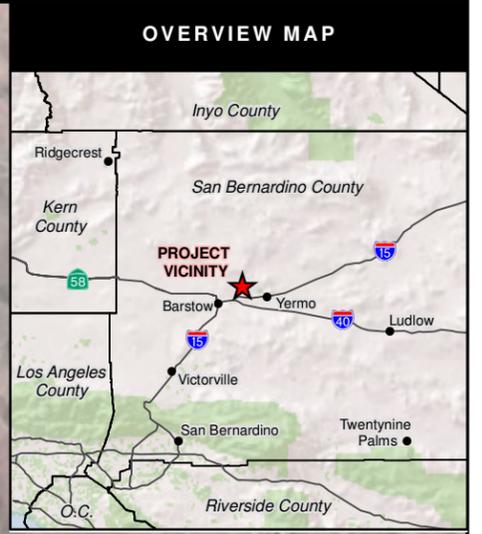
**Legend**

**Proposed Action Features**

- Proposed Boring
- Proposed IP Geophysical Survey Line

**Access Routes**

- Existing Road
- Proposed New Road



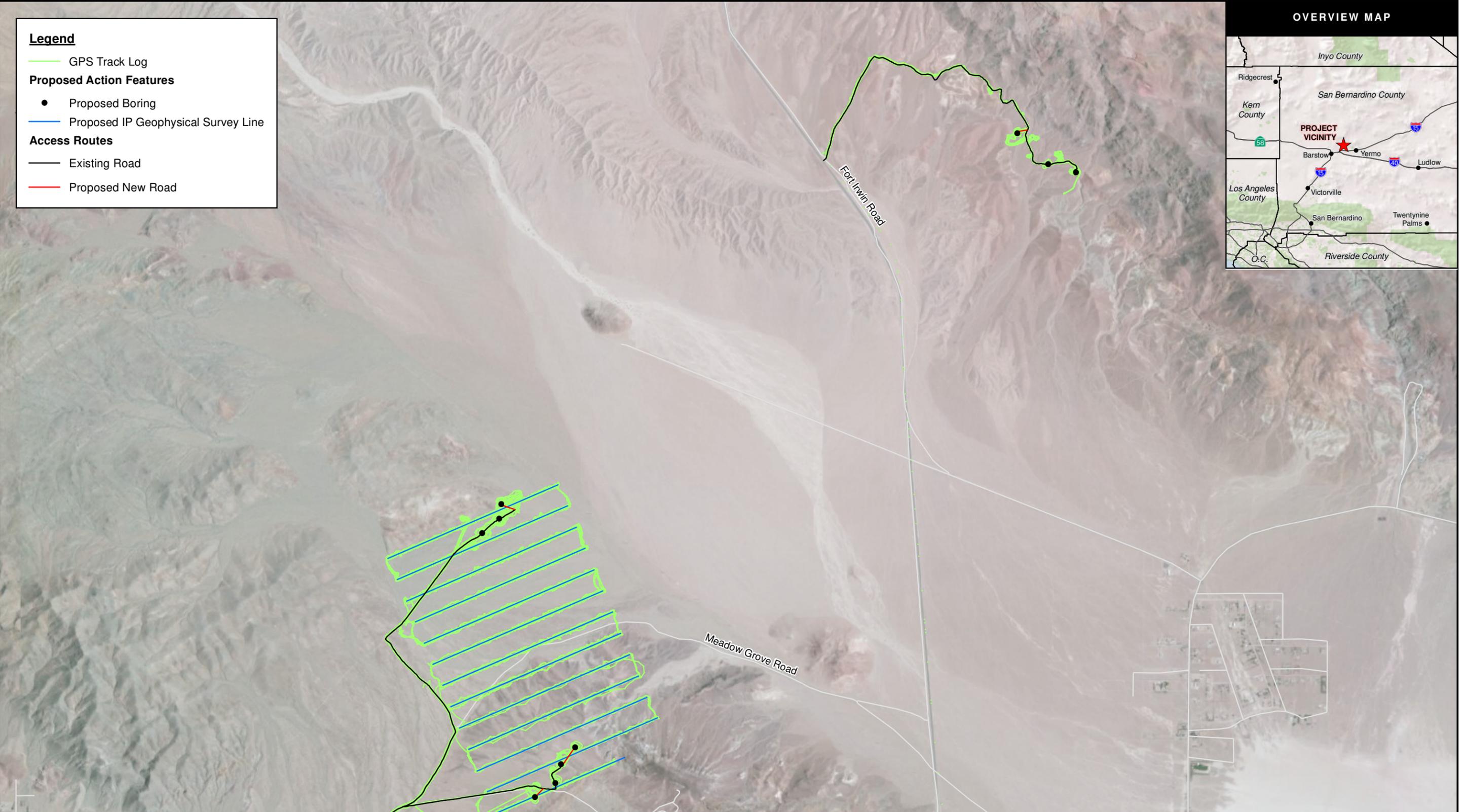
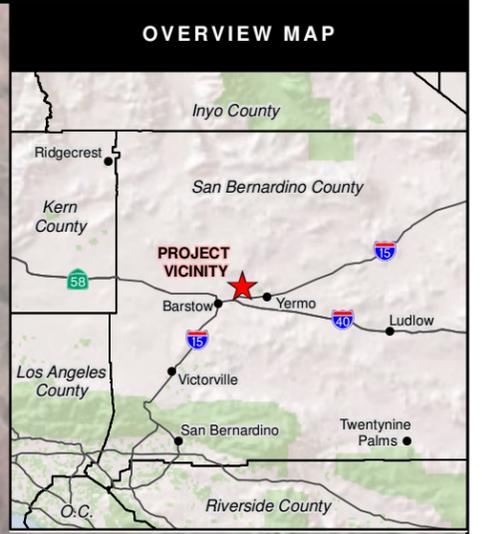
 	<p>SOURCES: Borings, IP Lines (Calico Exploration, 2013).          Access Routes (URS, 2013; Calico Exploration, 2013).          Roads, Interstates, Counties, Parks (ESRI, 2007).          Aerial imagery (Microsoft, ESRI, i-cubed, USDA, USGS et al., 05/2010).</p>		<p><b>OVERVIEW MAP</b>  <b>BIOLOGICAL RESOURCES SURVEY</b>  <b>CALICO EXPLORATION</b>  <b>SAN BERNARDINO COUNTY, CA</b></p>	
	<p>0.25 0 0.25 0.5 Miles</p> <p>SCALE: 1" = 0.5 mi (1:31,680)          SCALE CORRECT WHEN PRINTED AT 11X17</p>		<p>CREATED BY: LR</p> <p>PM: AR</p>	<p>DATE: 7/18/2013</p> <p>PROJ. NO: 27653190.02000</p>



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**Legend**

- GPS Track Log
- Proposed Action Features**
  - Proposed Boring
  - Proposed IP Geophysical Survey Line
- Access Routes**
  - Existing Road
  - Proposed New Road



 	<p>SOURCES: Borings, IP Lines (Calico Exploration, 2013).          Access Routes (URS, 2013; Calico Exploration, 2013).          Tracklog (URS, 2013). Roads, Interstates,          Counties, Parks (ESRI, 2007). Aerial imagery (Microsoft,          ESRI, i-cubed, USDA, USGS et al., 05/2010).</p>		<p><b>GPS TRACK LOGS</b>  <b>BIOLOGICAL RESOURCES SURVEY</b>  <b>CALICO EXPLORATION</b>  <b>SAN BERNARDINO COUNTY, CA</b></p>		
	<p>0.25 0 0.25 0.5 Miles          SCALE: 1" = 0.5 mi (1:31,680)          SCALE CORRECT WHEN PRINTED AT 11X17</p>		<p>CREATED BY: LR</p>	<p>DATE: 7/18/2013</p>	<p>FIG. NO: 3</p>
		<p>PM: AR</p>	<p>PROJ. NO: 27653190.02000</p>		

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**Legend**

**Desert Tortoise Burrow Class**

- 1: Currently active with tortoise or recent tortoise sign
- 2: Good condition, definitely tortoise, no recent sign
- 3: Deteriorated condition, definitely tortoise
- 4: Good condition, possibly tortoise
- 5: Deteriorated condition, possibly tortoise

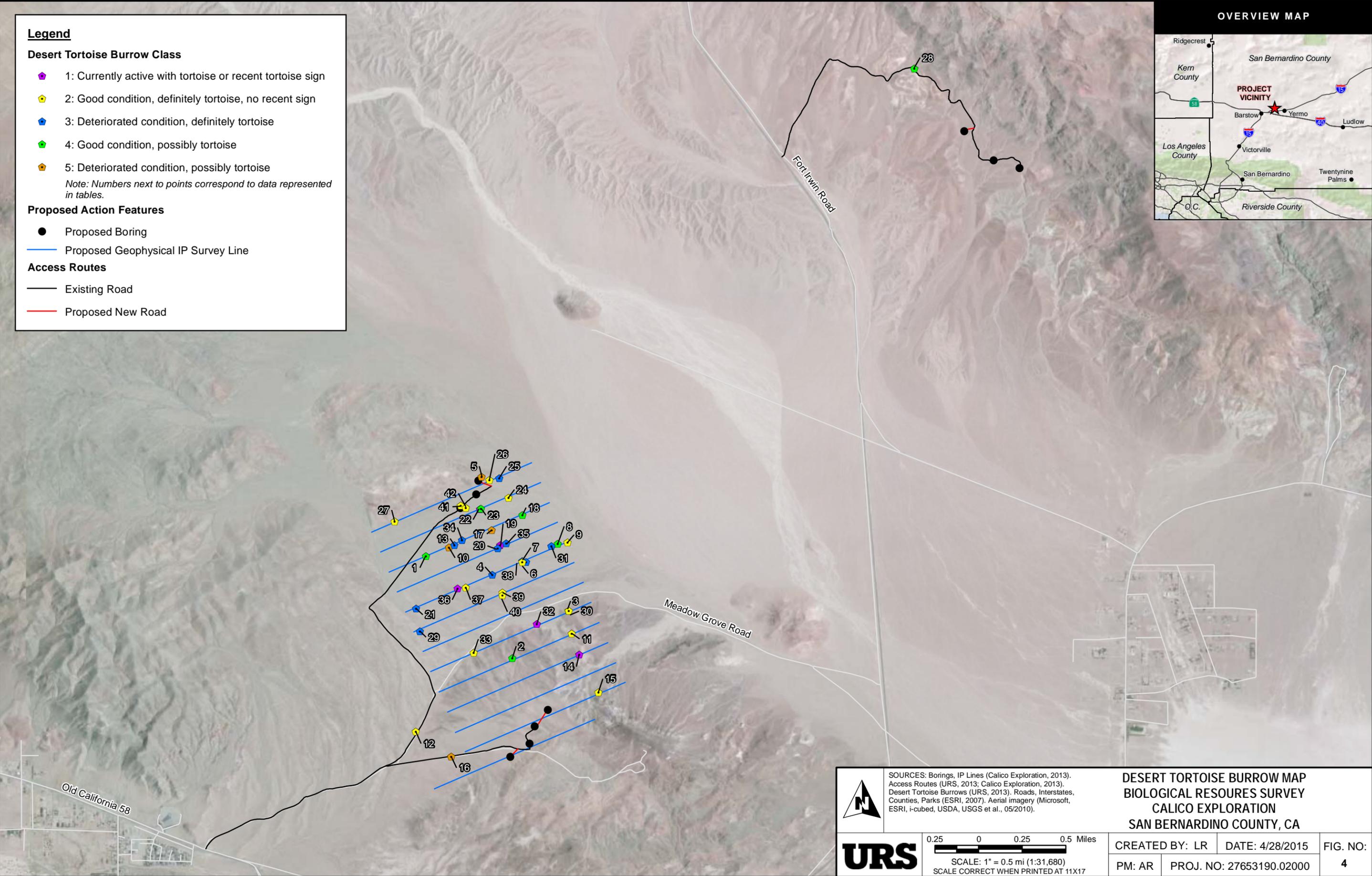
*Note: Numbers next to points correspond to data represented in tables.*

**Proposed Action Features**

- Proposed Boring
- Proposed Geophysical IP Survey Line

**Access Routes**

- Existing Road
- Proposed New Road



 	SOURCES: Borings, IP Lines (Calico Exploration, 2013). Access Routes (URS, 2013; Calico Exploration, 2013). Desert Tortoise Burrows (URS, 2013). Roads, Interstates, Counties, Parks (ESRI, 2007). Aerial imagery (Microsoft, ESRI, i-cubed, USDA, USGS et al., 05/2010).		<b>DESERT TORTOISE BURROW MAP</b> <b>BIOLOGICAL RESOURCES SURVEY</b> <b>CALICO EXPLORATION</b> <b>SAN BERNARDINO COUNTY, CA</b>	
	0.25 0 0.25 0.5 Miles SCALE: 1" = 0.5 mi (1:31,680) SCALE CORRECT WHEN PRINTED AT 11X17		CREATED BY: LR	DATE: 4/28/2015
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**Legend**

**Desert Tortoise Carcass Class**

-  2: Normal color, scutes adhere to bone
-  3: Scutes peeling off bone
-  4: Shell bone is falling apart; growth rings on scutes peeling
-  5: Disarticulated and scattered

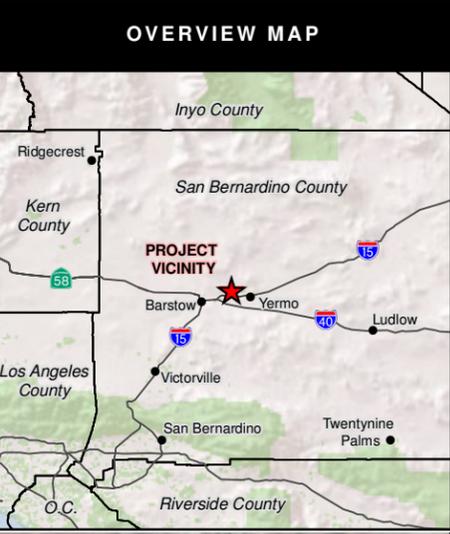
*Note: Numbers next to points correspond to data represented in tables.*

**Proposed Action Features**

-  Proposed Boring
-  Proposed IP Geophysical Survey Line

**Access Routes**

-  Existing Road
-  Proposed New Road



 	SOURCES: Borings, IP Lines (Calico Exploration, 2013). Access Routes (URS, 2013; Calico Exploration, 2013). Desert Tortoise Carcass (URS, 2013). Roads, Interstates, Counties, Parks (ESRI, 2007). Aerial imagery (Microsoft, ESRI, i-cubed, USDA, USGS et al., 05/2010).		<b>DESERT TORTOISE CARCASS MAP</b> <b>BIOLOGICAL RESOURCES SURVEY</b> <b>CALICO EXPLORATION</b> <b>SAN BERNARDINO COUNTY, CA</b>		
	0.25 0 0.25 0.5 Miles SCALE: 1" = 0.5 mi (1:31,680) SCALE CORRECT WHEN PRINTED AT 11X17		CREATED BY: LR	DATE: 7/18/2013	FIG. NO: 5
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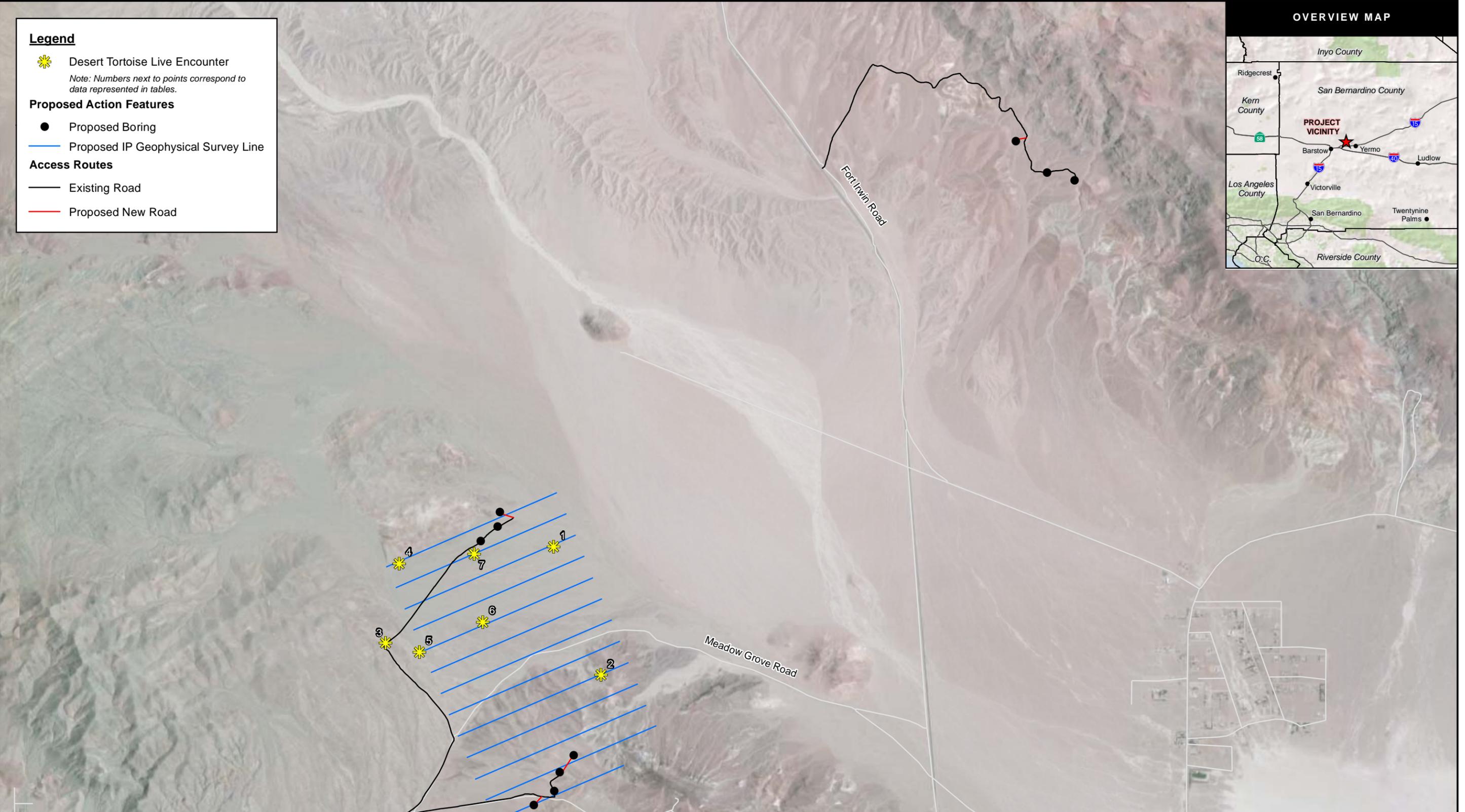


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**Legend**

-  Desert Tortoise Live Encounter  
*Note: Numbers next to points correspond to data represented in tables.*
- Proposed Action Features**
-  Proposed Boring
-  Proposed IP Geophysical Survey Line
- Access Routes**
-  Existing Road
-  Proposed New Road

**OVERVIEW MAP**

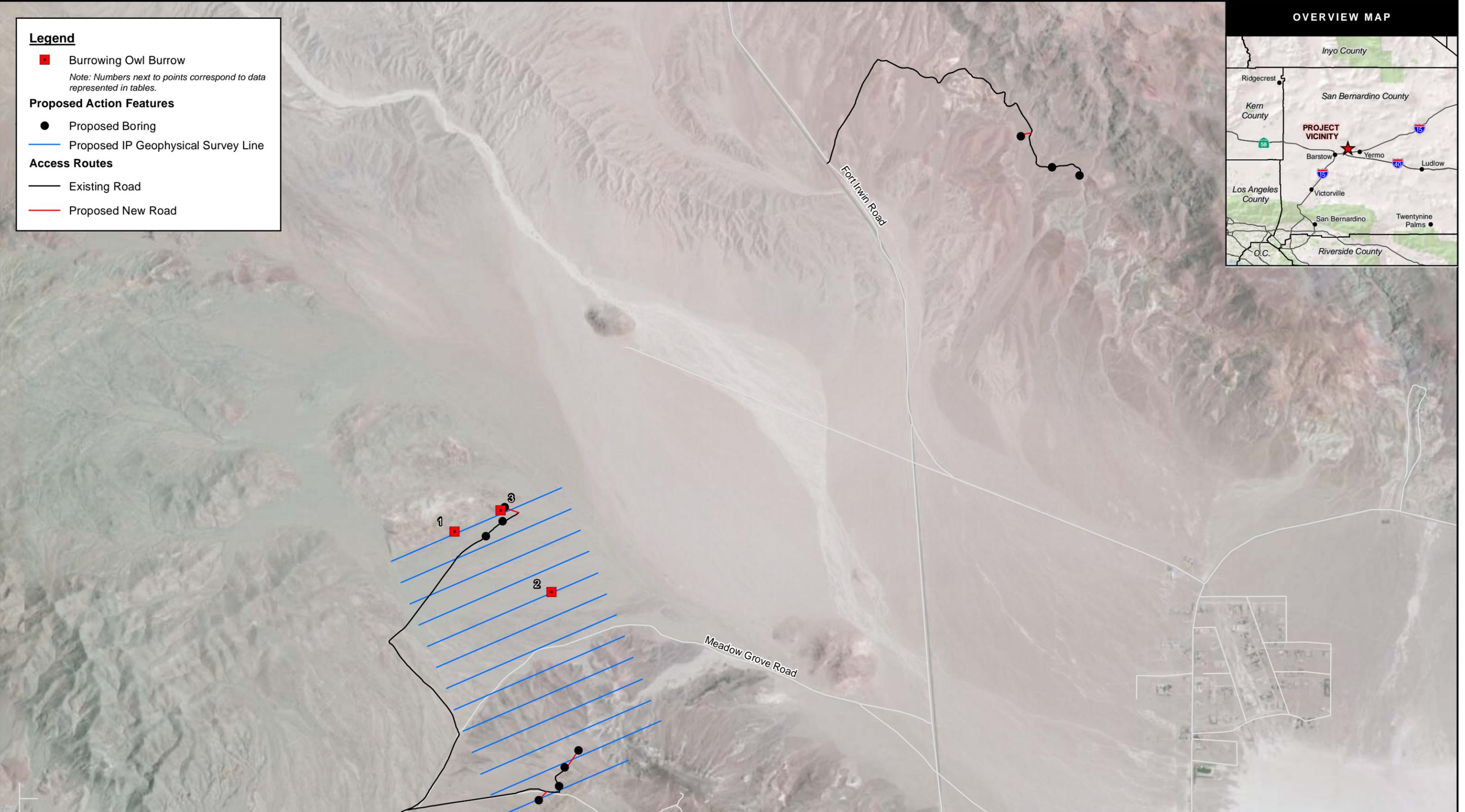



 	<p>SOURCES: Borings, IP Lines (Calico Exploration, 2013).          Access Routes (URS, 2013; Calico Exploration, 2013).          Desert Tortoise Live (URS, 2013). Roads, Interstates,          Counties, Parks (ESRI, 2007). Aerial imagery (Microsoft,          ESRI, i-cubed, USDA, USGS et al., 05/2010).</p>		<p><b>DESERT TORTOISE LIVE ENCOUNTERS          BIOLOGICAL RESOURCES SURVEY          CALICO EXPLORATION          SAN BERNARDINO COUNTY, CA</b></p>	
	<p>0.25 0 0.25 0.5 Miles</p> <p>SCALE: 1" = 0.5 mi (1:31,680)          SCALE CORRECT WHEN PRINTED AT 11X17</p>	<p>CREATED BY: LR</p> <p>PM: AR</p>	<p>DATE: 4/28/2015</p> <p>PROJ. NO: 27653190.02000</p>	<p>FIG. NO: 7</p>

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**Legend**

- Burrowing Owl Burrow  
*Note: Numbers next to points correspond to data represented in tables.*
- Proposed Action Features**
- Proposed Boring
- Proposed IP Geophysical Survey Line
- Access Routes**
- Existing Road
- Proposed New Road



 	<p>SOURCES: Borings, IP Lines (Calico Exploration, 2013).          Access Routes (URS, 2013; Calico Exploration, 2013).          Burrowing Owl Burrows (URS, 2013). Roads, Interstates,          Counties, Parks (ESRI, 2007). Aerial Imagery (Microsoft,          ESRI, i-cubed, USDA, USGS et al., 05/2010).</p>		<p><b>BURROWING OWL BURROW MAP</b>  <b>BIOLOGICAL RESOURCES SURVEY</b>  <b>CALICO EXPLORATION</b>  <b>SAN BERNARDINO COUNTY, CA</b></p>	
	<p>0.25 0 0.25 0.5 Miles</p> <p>SCALE: 1" = 0.5 mi (1:31,680)          SCALE CORRECT WHEN PRINTED AT 11X17</p>	<p>CREATED BY: LR</p> <p>PM: AR</p>	<p>DATE: 4/28/2015</p> <p>PROJ. NO: 27653190.02000</p>	<p>FIG. NO: <b>8</b></p>

**Legend**

 Wash Avoidance Area

**Proposed Action Features**

 Proposed Boring (with ID)

 Boring Pad

 Proposed IP Geophysical Survey Line

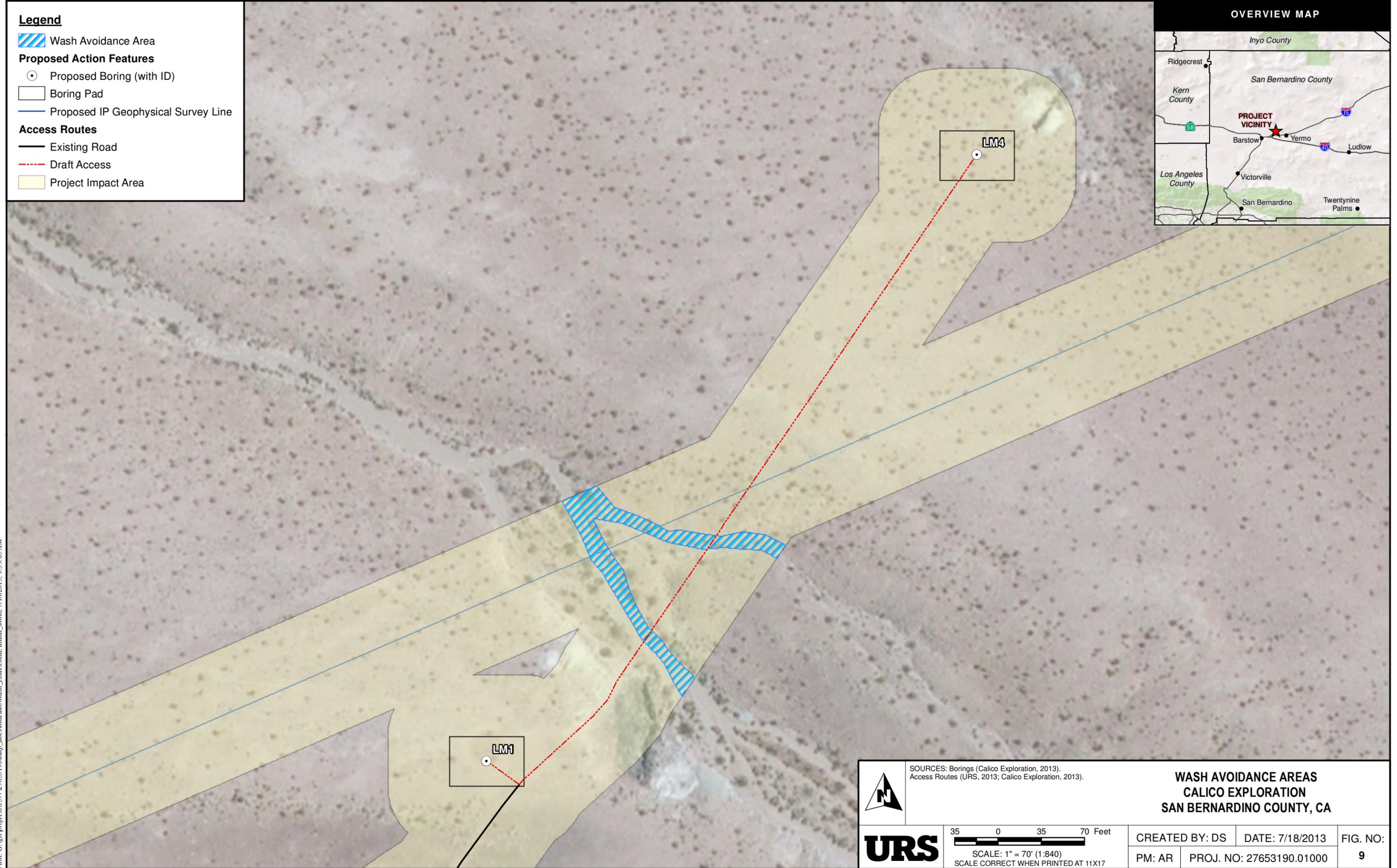
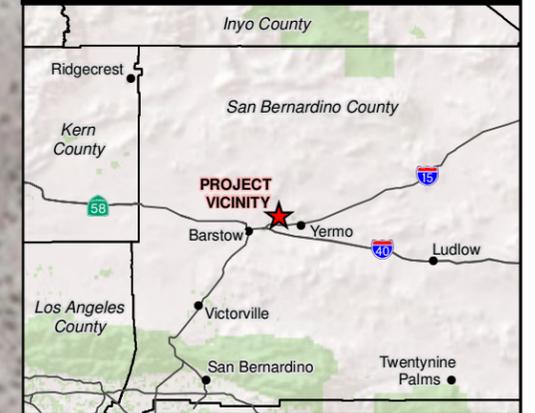
**Access Routes**

 Existing Road

 Draft Access

 Project Impact Area

**OVERVIEW MAP**



	SOURCES: Borings (Calico Exploration, 2013). Access Routes (URS, 2013; Calico Exploration, 2013).		<b>WASH AVOIDANCE AREAS CALICO EXPLORATION SAN BERNARDINO COUNTY, CA</b>	
		CREATED BY: DS	DATE: 7/18/2013	FIG. NO:
<b>URS</b>	SCALE: 1" = 70' (1:840) SCALE CORRECT WHEN PRINTED AT 11X17	PM: AR	PROJ. NO: 27653190.01000	<b>9</b>

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**Appendix A: Special Status Plant and Wildlife Species Potentially Occurring On-site**  
 Assessment included a database review of the California Natural Diversity Database (CNDDB) and CalFlora, Consortium of California Herberia (CCH) U.S. Fish and Wildlife Service (USFWS ) record searches

PLANTS						
SPECIES		SENSITIVITY STATUS			HABITAT ASSOCIATIONS	POTENTIAL TO OCCUR
Common Name	Scientific Name	Federal	State	CNPS		
Small-flowered androstaphyllum	<i>Androslephium breviflorum</i>	None	None	2.2	None	Perennial herb (bulb), desert dunes; bajadas; Creosote bush scrub; sandy to rocky soil; 100-1600 m; March-April. Low. CNPS inventory records show populations over 50 miles east of the project site and up into the Clark Mtns on the Nevada-California border. Habitat not suitable, as loose desert sands and stabilized dunes are not present on site.
White bearpoppy	<i>Arctomecon merriamii</i>	None	None	2.2	None	Perennial herb; rocky slopes; Creosote bush scrub; Shadscale scrub; rocky slopes; 800-1600 m; April-May. Low. Known only from Death Valley NP to the Clark Mtns along the Nevada-California border.
Alkalai mariposa lily	<i>Calochortus striatus</i>	None	None	1B.2	BLM Sensitive	Perennial herb (bulb); alkaline, mesic; Alkaline meadows; moist creosote-bush scrub; 800-1400 m; April-June. Low. Suitable habitat not present on site.
Booth's evening primrose	<i>Camissonia boothii</i> ssp. boothii	None	None	2.3	None	Annual herb; Joshua tree woodland; pinyon-juniper woodland; blooms April-September. Low. Suitable habitat not present on site.
Emory's crucifixion thorn	<i>Castaia emoryi</i>	SC	None	2.2	None	Perennial shrub; Creosote bush scrub; dry, rocky desert washes; slopes and plains; 90-600 m; June-July. Low. No individuals were found during protocol level surveys for Mojave desert tortoise and burrowing owl.
White-bracted spineflower	<i>Chorizanthe xanti</i> var. leucotheca	None	None	1B.2	None	Annual herb; Sand or gravel; Coastal scrub (alluvial fans); Creosote bush scrub; pinyon and juniper woodland; 400-1300 m; blooms April-June. Low. CNPS inventory records show extant populations in the San Bernardino Mtns down thru the San Jacinto Mtns, more than 100 miles south of the Project area. No suitable habitat present on site.
Utah vine milkweed	<i>Funastrum utahense</i>	None	None	4.2	None	Perennial herb; Creosote bush scrub; Shadscale scrub; Alkali sink; gravelly areas; < 1000 m; blooms April-Sept. High. Suitable habitat onsite; CNDDB and CCH records found in vicinity of the Project area. Very common in Mojave desert.
Barstow woolly sunflower	<i>Eriophyllum mohavense</i>	None	None	1B.2	BLM Sensitive	Annual herb; Creosote bush scrub; Shadscale scrub; Alkali sink; playas; 500-800 m; April-May. Moderate. Extant populations have been found within the vicinity of the Project area. Habitat could be suitable for this species; however the Project area does not include alkali sinks or playas.
Viviparous foxtail cactus	<i>Coryphantha vivipara</i> var. rosea	None	None	2.2	None	Perennial herb (stem succulent); Limestone slopes, hills; 1500-2700 m; Mojave desert scrub; May-June. Low. Suitable habitat not present on the Project area. Known populations are found at a much higher elevation than what exists on the Project site (600-850m).
Sagebrush loeflingia	<i>Loeflingia squarrosa</i> var. artemisium	None	None	2.2	None	Annual herb; sandy soils; Desert dunes; Sagebrush scrub; Creosote bush scrub; 700-1650 m; April-May. Low. Suitable habitat not present in the Project area. Known extant populations are found closer to the Nevada-California border.
Spiny-hair blazing star	<i>Mentzelia tricuspis</i>	None	None	2.1	None	Annual herb; sandy, gravelly slopes or washes; Creosote bush scrub; 150-1280 m; March thru May Moderate. Suitable habitat onsite; CNDDB and CCH records found in vicinity of Project area.
Creamy blazing star	<i>Mentzelia tridentata</i>	None	None	1B.3	None	Annual herb; rocky, gravelly, sandy soil; Creosote bush scrub; 700-1300m; April-May. Moderate. Suitable habitat present onsite; CNDDB and CCH records found within 10 miles of the Project area.
Mojave monkeyflower	<i>Mimulus mohavensis</i>	None	None	1B.2	BLM Sensitive	Annual herb; gravelly banks of desert washes; 600-1000 m; Creosote bush scrub; Joshua tree woodland; blooms April-June. Moderate. Suitable habitat present onsite; CNDDB and CCH records found within 10 miles of the Project area.
Mojave menodora	<i>Menodora spinescens</i> var. mohavensis	None	None	1B.2	BLM Sensitive	Perennial deciduous shrub; Andesite gravel; rocky desert hillsides; canyons; 690-2000 m; April-May Low. No individuals were found during protocol level surveys for Mojave desert tortoise or burrowing owl.
Short-joint beavertail cactus	<i>Opuntia basilaris</i> var. brachyclada	None	None	1B.2	BLM Sensitive	Perennial herb (stem succulent); Creosote bush scrub; Joshua tree woodland; 425-1800 m; April to Aug. Low. Is not known in the area. Records found are located in the western mojave, on the northern edges of the San Bernardino Mtns. No individuals were found during Mojave desert tortoise and burrowing owl surveys.
Indian breadroot	<i>Pediomeelum castoreum</i>	None	None	1B.2	BLM Sensitive	Perennial herb; sandy washes; open areas; roadcuts; Creosote bush scrub; Joshua tree woodland; < 1750 m; April-May Moderate. CNPS inventory show CNDDB and CCH records within the vicinity of the Project area. Suitable habitat is present on site.
White-margined beardtongue	<i>Penstemon albomarginatus</i>	None	None	1B.1	BLM Sensitive	Perennial herb; loose, desert sand, generally on stabilized dunes; Creosote bush scrub; Mojave desert; 700-900 m; March-May. Low. CNPS inventory records show populations over 50 miles east of the project site. Habitat not suitable, as loose desert sands and stabilized dunes are not present on site..
Sky-blue phacelia	<i>Phacelia coerulea</i>	None	None	2.3	None	Annual herb; open, sandy to rocky areas; Creosote bush scrub; pinyon and juniper woodland; 1400-2000 m; Mojave desert scrub; pinyon and juniper woodland, blooms April-May. Low. CNPS inventory records show extant populations near the Nevada-California border. over 50 miles east of the project site. Habitat could be suitable.
Parish's phacelia	<i>Phacelia parishii</i>	None	None	1B.1	BLM Sensitive	Annual herb; clay or alkaline soils; dry lake margins; Alkali Sink playas; 540-1200 m; April-July. Low. CNPS inventory records show extant populations near the Nevada-California border and within the vicinity of the project site. However, the habitat on the site is not suitable.
Thorny milkwort	<i>Polygala acanthoclada</i>	None	None	2.3	BLM Sensitive	Shrub; loose, sandy or gravelly soil; Chenopod shrub; Mojave scrub; Joshua tree woodland; pinyon and juniper woodland; 940-1830 m; May-August. Low. CNPS inventory records show extant populations near the Nevada-California border and the southern portion of Joshua Tree National Park.
Rusby's desert mallow	<i>Sphaeralcea rusbyi</i> var. eremiticola	None	None	1B.2	BLM Sensitive	Perennial herb; Creosote bush scrub; Joshua tree woodland; Mojave desert scrub; 1000-1500 m; March-June. Low. Known only from Death Valley NP and near the Clark Mtns along the Nevada-California border.
WILDLIFE						
SPECIES		SENSITIVITY STATUS			HABITAT ASSOCIATIONS	POTENTIAL TO OCCUR
Common Name	Scientific Name	Federal	State	State		
Le Conte's Thrasher	<i>Toxostoma lecontei</i>	BCC	SSC	SSC	SSC	Desert washes where large shrubs occur for nesting. moderate. Suitable habitat
Mohave ground squirrel	<i>Xeroperomphilus mohavensis</i>	none	ST	ST	ST	Mojave desert scrub west of Barstow. low
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	none	SSC	SSC	SSC	Desert scrub and coniferous forests, roosts in caves, abandoned mines, and buildings. moderate
Burrowing Owl	<i>Athene cucularia</i>	BCC	SSC	SSC	SSC	Found in open grasslands and agricultural areas with suitable fossorial mammal burrows for nesting. present (sign and burrows)
Desert Tortoise	<i>Gopherus agassizii</i>	FT	ST	ST	ST	River washes, rocky hillsides, and flat desert having sandy or gravelly soil with creosote bush, burro bush, saltbush, Joshua tree, Mojave yucca, cacti, other shrubs, grasses, and wildflowers. present (sign, burrow and live encounters)
<p><b>State Status</b>                  SE: Listed as endangered under the California Endangered Species Act                  ST: Listed as threatened under the California Endangered Species Act                  SSC - Species of Special Concern (California Department of Fish and Wildlife)</p> <p><b>BLM Sensitive</b>                  Plants with federal, state, or CNPS rankings, that are known to occur on BLM lands.</p> <p><b>Federal Status</b>                  FD: Delisted. Status to be monitored for 5 years                  FE: Listed as endangered under the federal Endangered Species Act                  FT: Listed as threatened under the federal Endangered Species Act                  SC - Species of Concern (United States Fish and Wildlife Service)                  BCC - Birds of Conservation Concern (United States Fish and Wildlife Service)</p>						
<p><b>California Native Plant Society (CNPS)</b>                  1B: Rare, threatened, or endangered in California and elsewhere                  2: Rare, threatened, or endangered in California, but more common elsewhere                  3: More information is needed                  4: Limited distribution or infrequent throughout California                  0.1: Seriously endangered in California                  0.2: Fairly endangered in California                  0.3: Not very endangered in California</p>						



## Appendix B: Site photographs



Photograph 1

Date: May 6, 2013

An overview shot of the project site showing the dominant Mojave creosote bush scrub.



Photograph 2

Date: May 6, 2013

Photograph of a desert tortoise. Presence of dirt on the shell could be indicative of fresh excavation activity.



Photograph 3

Date: May 7, 2013

Photograph of a desert tortoise found using the shelving of a rocky bank for shade.



Photograph 4

Date: May 6, 2013

Photograph of a typical burrow used by desert tortoise.



## Appendix C: Incidental flora and fauna species list

### Plants

Cat-claw acacia (*Acacia greggii*)  
White bur-sage (*Ambrosia dumosa*)  
Sweetbush (*Bebbia juncea*)  
Wiggins' cholla (*Cylindropuntia echinocarpa*)  
Branched pencil cholla (*Cylindropuntia ramosissima*)  
Brittlebush (*Encelia farinosa*)  
Nevada ephedra (*Ephedra nevadensis*)  
California buckwheat (*Eriogonum fasciculatum*)  
Desert trumpet (*Eriogonum inflatum*)  
Barrel cactus (*Ferocactus cylindraceus*)  
Big galleta grass (*Hilaria ridgida*)  
Cheesbush (*Hymenoclea salsola*)  
Desert ratany (*Krameria grayi*)  
Creosote bush (*Larrea tridentata*)  
Anderson's boxthorn (*Lycium andersonii*)  
Beavertail cactus (*Opuntia basilaris*)

### Reptiles

Mojave desert tortoise (*Gopherus agassizii*)  
Desert horned lizard (*Phrynosoma platyrhinos*)  
Common side-blotched lizard (*Uta stansburiana*)  
Western whiptail lizard (*Cnemidophorus tigris*)  
Zebra-tail lizard (*Callisaurus draconoides*)  
Sidewinder (*Crotalus cerastes*)

### Birds

Common Raven (*Corvus corax*),  
California Horned Lark (*Eremophila alpestris*)  
Western Kingbird (*Tyrannus verticalis*)  
Black-throated Sparrow (*Amphispiza bilineata*)  
Say's Phoebe (*Sayornis saya*)  
Red-tailed Hawk (*Buteo jamaicensis*)

### Mammals observed or indirectly detected from scat or tracks

Black-tailed jackrabbit (*Lepus californicus*)  
Desert Kit fox (*Vulpes macrotis*)  
Coyote (*Canis latrans*)  
Woodrat (*Neotoma* sp.)



**Calico Exploration**

**Equipment and Vehicle Projection for Emission Calculation**

Equipment/Vehicles	Gasoline/ Diesel (G/D/ Both)	Horse- power (hp)	Weight (ton)	Origin	Round Trip/ Day/ Unit	Traveling distance off- site (mile/trip/da y/unit)	Total off- site traveling distance (mile/day/u nit)	Traveling distance on- site (mile/trip/da y/unit)	Total on- site traveling distance (mile/day/u nit)	Op. Hrs/ Day Per Unit	Month of Project (# of units per day)				
											1 - Days 1- 15	1 - Days 16-30	2	3	
<b>Off-road Equipment</b>															
Cat D6 Dozer	D	250	20	Barstow	0	5	5	1	1	6	1	1	-	-	
LF 90 Truck Mounted drill rig	D	500	50	Barstow	-	-	-	1.0	1	24	1	1	1	1	
RT HOE 710 (backhoe)	D	118	7	Barstow	-	-	-	1.0	1	2	1	1	1	1	
HD truck to haul equipment (dozer, backhoe, drill rig)	D	500	20	Barstow	1	-	15	10.0	10	6	3.0	-	-	3	
<b>Portable Equipment</b>															
Air compressor	Gasoline/ Diesel (G/D/ Both)									1	1.0	1.0	1	1	
Welder	electrical									1	1.0	1.0	1	1	
<b>On-road Vehicles</b>															
Pick up trucks	Both	202	5	Barstow	4	5	20	3.0	12	4	1	1	1	1	
WATER TRUCK 4000 GAL	D	300	20	Barstow	2	15.0	30	1.0	2	4	1	1	1	1	
Service Truck	D	250	20	Barstow	2	5	20	1.0	4	4	1	1	1	1	
IP survey 2 pickup trucks	Gasoline/ Diesel (G/D/ Both)	202	3	Barstow	2	5	10	20.0	13	12	1.0	-	-	-	
Worker vehicles	Both				1	15	15	-	-	-	13.0	8.0	8	8	
Soil haul truck	D	300	20		1	300	300	1.0	1		-	-	-	1	

**Note:**

- Equipment schedule is provided by the applicant.
  - Total month construction (maximum) 3 months
  - Days per week 7 days
  - Days per month 30 days
  - Hours per day 24 hours
- Project phases are provided by the applicant and listed as follows:
  - Road construction month 1 only
  - Exploratory drilling month 1 -3 also IP survey to last 15 days in first month only, 2 trucks per day, 4 man crew total, 1 12-hr shift/day
- Heavy equipment for road repair will be delivered by a heavy duty (HD) truck at project start and removed by a HD truck after road repair is complete. To be conservative, one HD truck round trip is expected in start of Month 1 to drop off dozer, then again at end of Month 1 to pick it up.
- The drill rig and water truck will stay onsite overnight, the water truck will make two daily trips for water refill at Barstow or Yermo.
- Pick up trucks will serve as worker commuter vehicles.
- It is expected that no more than 2 pick up trucks will access the site on a daily basis once exploratory drilling and road repair has commenced.
- We have assumed one haul truck trip to remove boring soil at the end of the 3 month period; assumed average distance from site to Barstow.
- The above vehicle counts used for estimation purposes are extremely conservative; per the operational elements, not more than 6 vehicles are anticipated to be onsite during drilling activities.



**ONSITE EXHAUST**

Equipment/Vehicles	Emissions (lb/day/unit)								
	TOG	CO	NOx	CO2	SO2	PM10	PM2.5	N2O	CH4
<b>Off-road Equipment</b>									
Cat D6 Dozer	1.06	3.00	9.56	995.89	0.01	0.37	0.34	0.00	0.10
LF 90 Truck Mounted drill rig	3.10	13.23	28.10	7464.70	0.07	0.87	0.80	0.00	0.28
RT HOE 710 (backhoe)	0.14	0.71	0.91	103.36	0.00	0.08	0.07	0.00	0.01
HD truck to haul equipment	1.30	3.81	10.71	1632.54	0.02	0.38	0.35	0.00	0.12
<b>Portable Equipment</b>									
Air compressor	0.10	0.30	1.14	131.10	0.00	0.03	0.03	0.00	0.01
Welder	0.09	0.26	1.01	118.96	0.00	0.03	0.03	0.00	0.01
<b>On-road Vehicles</b>									
Pick up trucks	0.01	0.13	0.01	18.25	0.00	0.00	0.00	0.0027	0.0022
WATER TRUCK 4000 GAL	0.01	0.03	0.07	11.45	0.00	0.00	0.00	0.0000	0.0000
Service Truck	0.00	0.03	0.06	13.27	0.00	0.00	0.00	0.0009	0.0007
IP survey 2 pickup trucks	0.01	0.15	0.01	20.28	0.00	0.00	0.00	0.0030	0.0024
Worker vehicles	-	-	-	-	-	-	-	-	-
Soil haul truck	0.01	0.01	0.03	5.72	0.00	0.00	0.00	0.0000	0.0000

Off-road and portable equipment calculated based on operating hours/day (OFFROAD emission factors are in lb/hr)  
 On-road vehicles calculated based on onsite traveling distance (EMFAC emission factors are in lb/mile); N2O and CH4 calculated using CCAR emission factors  
 Per the client, no worker vehicles will be operated onsite.

**OFFSITE EXHAUST**

Equipment/Vehicles	Emissions (lb/day/unit)								
	TOG	CO	NOx	CO2	SO2	PM10	PM2.5	N2O	CH4
<b>Off-road Equipment</b>									
Cat D6 Dozer	0.02	0.05	0.14	15.09	0.00	0.01	0.01	0.00	0.00
LF 90 Truck Mounted drill rig	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RT HOE 710 (backhoe)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HD truck to haul equipment	0.06	0.17	0.49	74.21	0.00	0.02	0.02	0.00	0.01
<b>Portable Equipment</b>									
Air compressor	-	-	-	-	-	-	-	-	-
Welder	-	-	-	-	-	-	-	-	-
<b>On-road Vehicles</b>									
Pick up trucks	0.01	0.13	0.02	16.85	0.00	0.00	0.00	0.00456	0.00358
WATER TRUCK 4000 GAL	0.04	0.17	0.73	109.95	0.00	0.03	0.03	0.00032	0.00034
Service Truck	0.01	0.05	0.30	66.36	0.00	0.01	0.01	0.00456	0.00358
IP survey 2 pickup trucks	0.00	0.07	0.01	8.42	0.00	0.00	0.00	0.00228	0.00179
Worker vehicles	0.00	0.05	0.01	10.12	0.00	0.00	0.00	0.00342	0.00269
Soil haul truck	0.42	1.65	7.32	1099.46	0.01	0.32	0.27	0.00317	0.00337

Off-road and portable equipment calculated based on off-site traveling distance, assuming speed of 55mph for converting EFs from lb/hr to lb/mile  
 On-road vehicles calculated based on off-site traveling distance (EMFAC EFs are in lb/mile); N2O and CH4 calculated using CCAR emission factors  
 Portable equipment will not travel offsite and thus does not have any emissions.

OFFSITE FUGITIVE DUST - PAVED ROADS

Equipment/Vehicles	Weight, W (ton)	Emission Factor (lb/VMT)		Emissions (lb/day/vehicle)	
		PM10	PM2.5	PM10	PM2.5
<b>Off-road Equipment</b>					
Cat D6 Dozer	20	0.029	0.007	0.145	0.036
LF 90 Truck Mounted drill rig	50	0.074	0.018	0.000	0.000
RT HOE 710 (backhoe)	7	0.010	0.002	0.000	0.000
HD truck to haul equipment	20	0.029	0.007	0.434	0.107
<b>On-road Vehicles</b>					
Pick up trucks	5	0.007	0.002	0.141	0.035
WATER TRUCK 4000 GAL	20	0.029	0.007	0.868	0.213
Service Truck	20	0.029	0.007	0.579	0.142
IP survey 2 pickup trucks	3	0.004	0.001	0.042	0.010
Worker vehicles	1.6	0.002	0.001	0.033	0.008
Soil haul trucks	20	0.029	0.007	8.682	2.131

AP 42 13.2.1 Paved Roads, updated January 2011

For a daily basis,

$$E = [k (sL)^{0.91} \times (W)^{1.02}] (1-P/4N) \quad \text{equation (2)}$$

	k
	lb/VMT
PM2.5	0.00054
PM10	0.0022

sL = 0.6 g/m2  
 P = 5 days  
 N = 90 days

AP-42 Table 13.2.1-2, Ubiquitous Baseline, ADT < 500  
 Daggett FAA Airport (east of Barstow), 1948-2012; average for July-September (station ID 042257)  
 assume three months

ONSITE FUGITIVE DUST

**Emission Factor Equation:  
 (1) Travel on unpaved surfaces**

$$E = k * (s/12)^a * (W/3)^b$$

Source: EPA AP-42 Section 13.2.2 Unpaved Roads Equation 1a

E = size-specific emission factor (lb/VMT)

k, a, b = empirical constants

8.5 s = surface material silt content (%)      Construction sites - Scraper routes  
 W = mean vehicle weight (tons)

constants	PM <sub>2.5</sub>	PM <sub>10</sub>	Industrial Roads
k	0.15	1.5	
a	0.9	0.9	
b	0.45	0.45	





Equipment/Vehicles	Actual Op Hrs./Day/Unit	Total off-site traveling distance (mile/day/unit)	Total on-site traveling distance (mile/day/unit)	EF Source	Category	Offsite Emission Factors <sup>3</sup> - 55 mph (lb/mile)											
						TOG	CO	NOx	CO2	SO2	PM10 (total)	PM2.5	N2O	CH4			
<b>Off-road Equipment</b>																	
Cat D6 Dozer	6	5	0.5	OFFROAD	Crawler Tractors	0.003204	0.009085	0.028957	3.017862	3.39561E-05	0.001142	0.00103	0	0.000289			
LF 90 Truck Mounted drill rig	24	0	1.0	OFFROAD	Bore/Drill Rigs	0.002352	0.010022	0.021288	5.655074	5.55064E-05	0.0006565	0.00060	0	0.000212			
RT HOE 710 (backhoe)	2	0	1.0	OFFROAD	Tractors/Loaders/Backhoes	0.00126	0.006409	0.008289	0.939665	1.10228E-05	0.0006951	0.00064	0	0.000114			
HD truck to haul equipment	6	15	10.0	OFFROAD	Off-Highway Trucks	0.003941	0.011558	0.032445	4.947079	4.85572E-05	0.0011507	0.00106	0	0.000356			
<b>Portable Equipment</b>																	
Air compressor	1			OFFROAD	Air Compressors	-	-	-	-	-	-	-	-	-	-	-	-
Welder	1			OFFROAD	Welders	-	-	-	-	-	-	-	-	-	-	-	-
<b>On-road Vehicles</b>																	
Pick up trucks	4	20	12	EMFAC	LDT1	0.000265	0.006691	0.000807	0.842413	8.818E-06	7.055E-05	0.00004	0.000228175	0.000179			
WATER TRUCK 4000 GAL	4	30	2	EMFAC	HHH	0.001396	0.005501	0.024396	3.664859	3.527E-05	0.0010648	0.00090	1.0582E-05	1.12E-05			
Service Truck	4	20	4	EMFAC	MHD	0.000276	0.002821	0.014936	3.317957	3.086E-05	0.0003505	0.00029	0.000228175	0.000179			
IP survey 2 pickup trucks	12	10	13	EMFAC	LDT1	0.000265	0.006691	0.000807	0.842413	8.818E-06	7.055E-05	0.00004	0.000228175	0.000179			
Worker vehicles	-	15	-	EMFAC	LDA	0.000123	0.003571	0.000399	0.674537	6.614E-06	6.614E-05	0.00003	0.000228175	0.000179			
Soil haul truck	0	300	1	EMFAC	HHH	0.001396	0.005501	0.024396	3.664859	3.5274E-05	0.0010648	0.00090	1.0582E-05	1.12E-05			

55 mph

Notes:

- EMFAC converted from lb/mile to lb/hr based on 15 mph
  - OFFROAD converted from lb/hr to lb/mile based on 15 mph
  - OFFROAD converted from lb/hr to lb/mile based on 15 mph
  - PM<sub>2.5</sub> emission factors determined using guidance from SCAQMD Final - Methodology to Calculate PM<sub>2.5</sub> and PM<sub>2.5</sub> Significance Thresholds 10/1/2006.
- Appendix A - Updated CEIDARS Table with PM<sub>2.5</sub> Fractions
- PM<sub>2.5</sub> Fraction of PM<sub>10</sub>, Brake wear = 0.429
  - PM<sub>2.5</sub> Fraction of PM<sub>10</sub>, Diesel = 0.920
  - PM<sub>2.5</sub> Fraction of PM<sub>10</sub>, Tire wear = 0.250
  - PM<sub>2.5</sub> Fraction of PM<sub>10</sub>, Diesel off-road equipment = 0.920
- Operating hours per day of watering truck was not provided by client, and a value of 4 hours/day was assumed.
  - N20 and CH4 emission factors for on-road vehicles obtained from the California Climate Action Registry (CCAR), General Reporting Protocol Version 3.1, January 2009

**Table C.4 Methane and Nitrous Oxide Emission Factors for Highway Vehicles by Model Year**

Vehicle Types/Model Years	N <sub>2</sub> O (g/mile)	CH <sub>4</sub> (g/mile)
<b>Gasoline Passenger Cars</b>		
Model Years 1984-1993	0.0647	0.0704
Model Year 1994	0.0560	0.0531
Model Year 1995	0.0473	0.0358
Model Year 1996	0.0426	0.0272
Model Year 1997	0.0422	0.0268
Model Year 1998	0.0393	0.0249
Model Year 1999	0.0337	0.0216
Model Year 2000	0.0273	0.0178
Model Year 2001	0.0158	0.0110
Model Year 2002	0.0153	0.0107
Model Year 2003	0.0135	0.0114
Model Year 2004	0.0083	0.0145
Model Year 2005 - Present	0.0079	0.0147
<b>Gasoline Light Trucks (Vans, Pickup Trucks, SUVs)</b>		
Model Years 1987-1993	0.1035	0.0813
Model Year 1994	0.0982	0.0646
Model Year 1995	0.0908	0.0517
Model Year 1996	0.0871	0.0452
Model Year 1997	0.0871	0.0452
Model Year 1998	0.0728	0.0391
Model Year 1999	0.0564	0.0321
Model Year 2000	0.0621	0.0346
Model Year 2001	0.0164	0.0151
Model Year 2002	0.0228	0.0178
Model Year 2003	0.0114	0.0155
Model Year 2004	0.0132	0.0152
Model Year 2005 - Present	0.0101	0.0157

**Table C.4 Methane and Nitrous Oxide Emission Factors for Highway Vehicles by Model Year (continued)**

Vehicle Types/Model Years	N <sub>2</sub> O (g/mile)	CH <sub>4</sub> (g/mile)
<b>Gasoline Heavy-Duty Vehicles</b>		
Model Years 1985-1986	0.0515	0.4090
Model Year 1987	0.0849	0.3675
Model Years 1988-1989	0.0933	0.3492
Model Years 1990-1995	0.1142	0.3246
Model Year 1996	0.1680	0.1278
Model Year 1997	0.1726	0.0924
Model Year 1998	0.1693	0.0641
Model Year 1999	0.1435	0.0578
Model Year 2000	0.1092	0.0493
Model Year 2001	0.1235	0.0528
Model Year 2002	0.1307	0.0546
Model Year 2003	0.1240	0.0533
Model Year 2004	0.0285	0.0341
Model Year 2005 - Present	0.0177	0.0326
<b>Diesel Passenger Cars</b>		
Model Years 1960-1982	0.0012	0.0006
Model Years 1983 - Present	0.0010	0.0005
<b>Diesel Light Trucks</b>		
Model Years 1960-1982	0.0017	0.0011
Model Years 1983-1995	0.0014	0.0009
Model Years 1996 - Present	0.0015	0.0010
<b>Diesel Heavy-Duty Vehicles</b>		
All Model Years	0.0048	0.0051

Source: Gasoline vehicle factors from EPA Climate Leaders, Mobile Combustion Guidance, (2006) based on U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005 (2007). Diesel vehicle factors based on U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005 (2007), Annex 3.2, Table A-98.

**Table C.6 Methane and Nitrous Oxide Emission Factors for Non-Highway Vehicles**

Vehicle Type/Fuel Type	N <sub>2</sub> O (g/gallon)	CH <sub>4</sub> (g/gallon)
<b>Ships &amp; Boats</b>		
Residual Fuel Oil	0.30	0.86
Diesel Fuel	0.26	0.74
Gasoline	0.22	0.64
<b>Locomotives</b>		
Diesel Fuel	0.26	0.80
<b>Agricultural Equipment</b>		
Gasoline	0.22	1.26
Diesel Fuel	0.26	1.44
<b>Construction</b>		
Gasoline	0.22	0.50
Diesel Fuel	0.26	0.58
<b>Other Non-Highway</b>		
Snowmobiles (Gasoline)	0.22	0.50
Other Recreational (Gasoline)	0.22	0.50
Other Small Utility (Gasoline)	0.22	0.50
Other Large Utility (Gasoline)	0.22	0.50
Other Large Utility (Diesel)	0.26	0.58
<b>Aircraft</b>		
Jet Fuel	0.31	0.27
Aviation Gasoline	0.11	7.04
<b>All Non-Highway/Construction Vehicles</b>		
Butane*	0.41	0.09
Propane*	0.41	0.09

Source: U.S. EPA, Climate Leaders, Mobile Combustion Guidance (2008) based on U.S. EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005 (2007), Annex 3.2, Table A-101, except butane and propane.  
 \* Butane and propane emission factors based on stationary combustion emission factors for these fuels from U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2000 (2002).