SECOND ADDENDUM TO THE BIOLOGICAL AND SOIL RESOURCE EVALUATION FOR SOLEDAD MOUNTAIN PROJECT

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SUMMARY

Golden Queen Mining Company, LLC (GQM) currently operates the Soledad Mountain Project, a gold/silver and aggregates surface mining operation (the Project), located approximately 5 miles south of the town of Mojave, California (**Figure 1**). Construction of the Project began in 2014 and mining commenced in March 2015 following two major environmental review processes for the Project. First, a joint National Environmental Policy Act (NEPA) and a California Environmental Quality Act (CEQA) analysis (Kern County and BLM 1997) resulted in a joint Environmental Impact Report/Environmental Impact Statement (1997 EIR/EIS) that became certified and final in 1997. Second, a supplemental Environmental Impact Report (SEIR) analyzing a smaller project than was analyzed in the 1997 EIR/EIS was certified in 2010 (Kern County 2010), with final County approval in 2012. GQM is proposing to modify the existing mine plan and entitlements to re-authorize mining and related activities in substantially the same configuration as originally approved and permitted by the Bureau of Land Management (BLM) and Kern County (County) in 1997.

The principal proposed modifications of the Project include modification of the outline of the proposed excavation area and changes in the locations of the surge piles used for aggregate storage. The operation will disturb approximately 1,188 acres. The original and modified permit areas encompass approximately 2,009 acres (Modified Project Area), as shown in **Figures 1 and 2**.

This Second Addendum to the Biological and Soil Resource Evaluation reviews the results of soils and biological inventories conducted in 1989/90, 1995 and 2006, as further supported by surveys conducted in 2018, to provide baseline studies in support of Project permitting requirements. In this report, we summarize the soils and biological resources reported within the Modified Project Area that includes the existing permit area and the additional areas that are subject to the proposed mine plan modification (Permit Modification Area, **Figure 2**). This information is presented to support the reclamation planning and for use in determining impacts and mitigations measures as part of the County's review. The principal findings of these studies were the following:

- Soils are skeletal with little profile, generally rocky or pebbly loams on the slopes, and sandy loams on alluvial fans and flats (Bamberg and Bamberg 1997),
- The general lack of soil development, suitable surface horizons, and coarse texture are major limitations for soil salvage and potential for use in reclamation (Bamberg and Bamberg 1997),
- Vegetation is a creosote bush shrub-scrub on the lower alluvial fans, and on the mountain slopes is a mixed shrub/grass type; vegetation is fairly diverse and productive, however the repeated disturbances and burns have reduced plant cover, species diversity, and increased introduced annual grasses and weeds over the entire Modified Project Area (Bamberg and Bamberg 1997),
- Wildlife populations are low due to the desert climate, burns, and alterations of habitats, and high winds; wildlife species present are typical for desert habitats with small mammals, reptiles, birds, and their predators as dominant components (Bamberg and Bamberg 1997),

- Four special status plant species and 13 special status wildlife species were identified as known to occur or having low to moderate potential to occur in the vicinity of the Project (Bamberg and Bamberg 2006, Carroll 2018):
    - Alkali mariposa lily (*Calochortus striatus*), CNPS Rank 1B.2. Moderate.
    - Mojave spineflower (*Chorizanthe spinosa*), CNPS Rank 4.2. Moderate.
    - Recurved larkspur (*Delphinium recurvatum*), CNPS Rank 1B.2. Moderate.
    - Sagebrush Loeflingia (*Loeflingia squarrosa* var. *artemisiarum*), CNPS Rank 2B.2. Moderate
    - Townsend's big-eared bat, (*Corynorhinus townsendii townsendii*), CDFW Species of Special Concern, Western Bat Working Group (WBWG) High Priority. Present.
    - Ringtail, (*Bassariscus astutus*), CDFW Fully Protected Species. Present.
    - Swainson's hawk (*Buteo swainsoni*). State Threatened, U.S. Fish and Wildlife Service (USFWS) Bird of Conservation Concern. Present.
    - Northern harrier (*Circus hudsonius [cyaneus]*). CDFW Species of Special Concern. Present.
    - Prairie falcon (*Falco mexicanus*), USFWS Bird of Conservation Concern. Present.
    - Burrowing owl (*Athene cunicularia*). CDFW Species of Special Concern; USFWS Bird of Conservation Concern. Present.
    - Le Conte's thrasher (*Toxostoma lecontei*). CDFW Species of Special Concern. USFWS Bird of Conservation Concern. Present.
    - Loggerhead shrike (*Lanius ludovicianus*), CDFW Species of Special Concern, USFWS Bird of Conservation Concern. Present.
    - American peregrine falcon (*Falco peregrinus anatum*); Federal Delisted, State Delisted, CDFW Fully Protected, USFWS Bird of Conservation Concern. Present.
    - Mohave shoulderband (*Helminthoglypta greggi*). Present.
    - Desert tortoise (Gopherus agassizii). Federally Threatened. State Threatened. Moderate potential.
    - Golden eagle (*Aquila chrysaetos*), Federal Bald and Golden Eagle Protection Act, CDFW Fully Protected Species, USFWS Bird of Conservation Concern. Moderate potential.
    - Mojave Ground Squirrel (*Xerospermophilus mohavensis*). State Threatened. Low potential.
- The Project is not expected to result in population-level negative effects to any special status species (Bamberg and Bamberg 1997, 2006, Carroll 2018, Dupler 2019, GQMC 2017) and, where appropriate, mitigation measures have been and would continue to be implemented to further minimize and mitigate impacts to these species.
- Modified Project impacts within the Permit Modification Area would not have a substantial adverse effect, either directly or through habitat modifications, on any special status species.

1. INTRODUCTION AND BACKGROUND

WestLand Resources, Inc. (WestLand), was retained by Golden Queen Mining Company, LLC (GQMC) to update the biological and soils resource evaluation for the Soledad Mountain Project (the Project). The Soledad Mountain Project a gold/silver and aggregates surface mining operation (the Project), located approximately 5 miles south of the town of Mojave, California (**Figure 1**). Construction of the Project began in 2014 and mining commenced in March 2015 following two major environmental review processes for the Project. First, a joint National Environmental Policy Act (NEPA) and CEQA analysis (Kern County and BLM 1997) resulted in a joint Environmental Impact Report/Environmental Impact Statement (1997 EIR/EIS) that became certified and final in 1997. Second, a supplemental Environmental Impact Report (SEIR) analyzing a smaller project than was analyzed in the 1997 EIR/EIS was certified in 2010 (Kern County 2010), with final County approval in 2012. GQM is proposing to modify the existing mine plan and entitlements to re-authorize mining and related activities in substantially the same configuration as originally approved and permitted by the Bureau of Land Management (BLM) and Kern County (County) in 1997.

GQMC is proposing modifications of the Project including modification of the outline of the proposed excavation area and changes in the locations of the surge piles used for aggregate storage. The operation will disturb approximately 1,188 acres. The modified project areas encompass approximately 2,009 acres (Modified Project Area), as shown in **Figures 1 and 2**. The Modified Project Area includes the existing permit area and the additional areas that are subject to the proposed mine plan modification (Permit Modification Area, **Figure 2**). The Permit Modification Area is a conservative definition of the Modified Project Area because, under CEQA's subsequent review standards, this report is required only to analyze Project impacts to areas not analyzed in the prior CEQA document (the 1997 EIR/EIS). Instead, this report analyzes some areas that were addressed in the 1997 EIR/EIS and the 2010 SEIR, as well as areas that were not in order to provide a more complete assessment of biological resources.

The original biological and soils resource evaluation was completed and accepted in 1997 by Kern County and the Bureau of Land Management (BLM) as supporting documentation for the Environmental Impact Statement/ Environmental Impact Report (EIS/EIR) prepared for the Project (Bamberg and Bamberg 1997). An addendum to the revised biological and soils resource evaluation was prepared in 2006 to support the Reclamation Plan and Supplemental EIR (SEIR) for an expansion of the Project. This report is an update of the original and revised biological and soils evaluations to include the most recent biological surveys to support the permitting process for the Modified Project Area (**Figure 2**).

The purpose of this report is to:

- Review and compile the biological and soil resources descriptions from earlier reports and document any changes in the current biological conditions within the Modified Project Area,

- Document additional biological and soil surveys and qualitative assessments conducted within the Permit Modification Area,
- Describe the special status species impact analyses documented in the 1997 EIS/EIR and the 2010 SEIR, and
- Assess the special status species impacts associated with the Modified Project.

2. PROJECT SUMMARY

The Modified Project is substantially the same as the 1997 Project, with certain minor modifications (See **Figure 3**; **Table 1**). **Table 1** presents a summary of the Project between 1997, 2010, and what is currently proposed, and **Figure 3** provides a visual comparison of the 1997 and 2010 permit areas and Project footprints and the 2019 Modified Project boundary and footprint.

Table 1. Comparison Between 1997, 2010, and Modified Projects

1997 Project	2010 Project (with updates from 2011 and 2012)	Modified Project
Project Acreage		
Project Site: 1,690 acres Total Disturbance Area: 930 acres Total Reclaimed Area: 419 ac. of 930 ac. (45%)	Project Site: 1,440 acres Total Disturbance Area: 905 acres Total Reclaimed Area: 839 ac. of 905 ac. (93%)	Project Site: ~2,009 acres Total Disturbance Post-Excavation, Pre-Reclamation (before sale of 20 MT of aggregate): ~1,156 acres Total Disturbance Area upon Reclamation (2:1 slopes): ~1,188 acres 100% of the disturbed areas are included in the reclamation plan
Mine Life		
Mining operations will be expected to continue for up to 15 years (10 years operations, 5 years reclamation)	12 years of mining 14 years of leaching 2 years of rinsing and draindown 2 years of reclamation 3 years of post-closure monitoring Production and sale of aggregate and construction materials for up to 30 years	15 years of mining – started mining in March 2015; plan to mine through 1st Q 2029 4 years of rinsing and drain down 3 years of reclamation 3 years of post-closure monitoring Production and sale of aggregate until 2061
Effects of Project Footprint		
As analyzed in the 1997 FEIR/EIS	Revised Project reduces surface disturbance; however, it also includes modifications to the leaching process. Changes in the location and extent of the Phase 1 heap leach pad result in placement over a recorded access easement, siting within a floodplain, and reduced distance to a County-maintained roadway.	No major changes from the 1997 and 2010 plans Some increase in surface disturbance (~259 acres more than 1997 plan)

Table 1. Comparison Between 1997, 2010, and Modified Projects

1997 Project	2010 Project (with updates from 2011 and 2012)	Modified Project
Project Tonnage		
Overburden: 225 million tons Ore: 60 million tons	Overburden: 108.4 million tons (19.0 million tons sold as aggregate and construction materials and 89.4 million tons managed on-site) Ore: 51.2 million tons	Overburden: 264 million tons (20 million tons sold as aggregate) Ore: 59 million tons
Mining rate up to 6 million tons ore per year	Mining rate up to 4.55 million tons ore per year	Mining rate up to 4.7 million tons of ore per year
Up to 30 million tons combined ore and overburden per year	Up to 14 million tons combined ore and overburden per year	Up to 24 million tons ore and overburden per year
Materials Mined		
Gold, silver, aggregate, and construction by-products	No change	No change
Mine Phasing		
None Proposed (i.e., no reclamation will take place until mining operations are completed in a given area)	Five phases of mining with concurrent reclamation	Concurrent Reclamation
Mining Process		
Surface mining operation (gold and silver) with heap leach processing methods	No change	No change
Mining process is conventional open pit with hard rock mining methods that include: • Drilling of blast holes • Blasting • Loading haul trucks with shovels or front-end loaders • Hauling ore to the processing area • Hauling overburden to the overburden piles	No change	No change

Table 1. Comparison Between 1997, 2010, and Modified Projects

1997 Project	2010 Project (with updates from 2011 and 2012)	Modified Project
No material replacement into mined-out phases of the excavation area	Sequential material replacement into mined-out phases of the excavation area	Sequential material replacement into mined-out phases of the excavation area
Construction Activities		
Time = 1 Year	Time = 1 Year	No additional construction activities
Activities would include: • Improving site access and creation of a construction staging area • Building access and haulage roads to the open pit mining areas and other site facilities • Preparation of the initial open pit mine production areas • Site preparation of and construction of crushing, conveying, and agglomeration facilities • Site preparation of and construction of the heap leach solution processing and precious metals recovery plant • Site preparation and installation of the first stage of the heap leach pad liner and leak detection system • Site preparation and construction of parking, office, maintenance, and other ancillary facilities	No Change, but Phase 2 of the mining process will include construction of a coarse ore pipe conveyor to haul ore to the primary crusher.	No coarse ore pipe conveyor will be built. No other planned construction other than the additional stages of the Leach Pad, which are already conceptually approved.
Reclamation Plan		
The project area will be returned to open space for wildlife habitat as the primary land use objective.	No change	No change

Table 1. Comparison Between 1997, 2010, and Modified Projects

1997 Project	2010 Project (with updates from 2011 and 2012)	Modified Project
Reclamation will include: • Salvage and storage of top soils for use as growth media • Slope reduction of the overburden piles • Contouring and surface preparation of top horizontal surfaces of the overburden piles • Contouring and surface preparation of top and sides of the heap leach piles • Contouring and surface preparation of exploration disturbances and production support facilities sites • Revegetation of prepared surfaces of the overburden piles, heap leach pads and support facilities • Revegetation with seeds collected from the site vicinity • Neutralization of the process components • Dismantling and removal of structures • Preserving evidence of the mineralization and the mineral resources • Reducing risk to public health and safety	No change, except sequential replacement of material into mined-out phases of the excavation area will occur.	No change
Process Plant Equipment List	Process Plant Equipment List	No change
Hazardous Materials List	Hazardous Materials List	No change
Operations		
Project will operate 24 hours per day, 7 days per week, 52 weeks per year	24 hours per day, 7 days per week, 52 weeks per year	No change
Approximately 230 long-term employees	Approximately 156 long-term employees	Approximately 240 long-term employees
Blasting one time per day, approximately 5 days per week	One time per day; during daylight	No change

Table 1. Comparison Between 1997, 2010, and Modified Projects

1997 Project	2010 Project (with updates from 2011 and 2012)	Modified Project
Miners transported via passenger bus	Vehicle trip generation average load per day: 64.09 heavy trucks and 119.35 light vehicles (including 98 trips for GQM employees)	No change
Long Term personnel – 230; 35-40 average number of employees per shift; 80% local residents	Construction Manpower Peak = 200; Full time production workforce = 150 (could be as high as 165) Aggregate Manpower = 15 Maximum Employees onsite at any one time = 64 during day shift and 30 during second shift	No change
Water requirement average = 750 gallons per minute	Water requirement average = 653.7 gallons per minute	No change
Aggregate Transport = ~140 ADTs for truck traffic to SR 14 and Silver Queen Total at Operation = 515 ADTs	Aggregate Transport = 60.14 heavy trucks and 16 light vehicles Average Loads per day or ~ 120 ADTs for truck traffic Total at Operation = ~ 183 average loads/day or ~ 366 ADTs	No change

Source: Table 3-1 and Table 3-3 2010 SEIR, 2012 Correspondence for Compliance with Condition 107 of the Surface Mining and Reclamation Plan

3. SOILS

The on-site soil types and characteristics, as well as the suitability and amounts for use as substrate material during reclamation, were initially mapped by the U.S. Soil Conservation Service (1981), and were field-verified during the 1990 surveys (**Figure 4**). The field surveys collected data on soil types, verified profile descriptions, collected soil samples, and determined present soil conditions and resources. The soils were again reviewed during the April 1995 field visit for additional information on several soil profiles for depth and suitability for reclamation (Bamberg and Bamberg 1997). This information provides a baseline of the general location of the soil types, as well as the physical and chemical characteristics for reclamation and revegetation.

Soils and topographic surfaces in this area are relatively stable and do not change significantly over short time periods. Therefore, outside of a database query to determine the soil composition within the expansion areas (Dupler 2019), no further soil analysis was conducted in the 2006 inventory.

3.1. GENERAL DESCRIPTION OF SOIL RESOURCES

Soledad Mountain formed as a result of volcanic activity and the parent material and soils are, therefore, of volcanic origin (Bamberg and Bamberg 1997). The principal rock substrates consist of three types: 1) two kinds of ryolites (flow and intruded), 2) pyroclastic debris, tufts and breccias, and 3) quartz alunites and latites (Bamberg and Bamberg 1997). These are acidic volcanic rocks having zones altered by hydrothermal activity. The altered zones may contain clays, quartz, and secondary mineralization. The soils formed from these substrates vary from weathered rock outcrop to deeper draughty soil with a clay loam to sandy loam texture. Soils are skeletal, and soil development has been slow and profile development is incomplete or lacking. The soil surfaces are fairly stable and, in some places are old and weathered (Bamberg and Bamberg 1997). Soil formation is lacking due to the arid climate. The residual soils on the mountain proper differ from the alluvial soils on the lower fans and flats in that soil textures become increasingly finer out onto the adjacent alluvial flats.

Although the slopes on the mountain are steep, very little evidence exists of slope or soil instability in the form of slides, soil creep, or solifluction lobes (Bamberg and Bamberg 1997). The reasons for this are not completely understood at present, but are most likely related to the weathering of the soils producing a clay content that binds soil and rock particles into a stable mass (Bamberg and Bamberg 1997). In this dry climate, the soil does not become saturated enough to move on the bedrock which is rough and without bedding planes.

3.2. SOIL TYPES

The soil types are related to rock types and substrates influenced by the topography on and around Soledad Mountain. The taxonomic classification and description of the soils on the Modified Project

Area are provided in **Table 2**. The classifications and soil series descriptions are based on the soil survey of southeastern Kern County and the general descriptions provided of the U.S. Soil Conservation Service (1981), as well as observations during field survey. All soils information provided in this section is from the 1997 report (Bamberg and Bamberg 1997).

Table 2. Taxonomic Classification of Soil Series, Soledad Mountain Project

Series Name	Classification	Description
Arizo	Sandy-skeletal, mixed, thermic Typic Torriorthents	Deep, sandy loam soils on alluvial toe slopes and fans around the base of the mountain, 2- to 10-% slopes.
Cajon	Mixed, thermic Typic Torriorthents	Deep, sandy to loamy sand, 0- to 5-% slope, on alluvial fans and plains out from the base of the mountain.
Garlock	Fine-loamy, mixed, thermic Typic Haplargids	Very deep, loamy sand to sandy loam, well drained, gently sloping and gently rolling soil on alluvial fans and terraces, 2- to 9-% slopes.
Rosamond	Fine-loamy, mixed, (calcareous), thermic Typic Torrifluvents	Very deep, sandy loam to clay loam, well drained, nearly level on alluvial plains, 0- to 2-% slopes.
Torriorthents	Undifferentiated	Weathered rock outcrop and shallow to deep residual soils from host rocks on the mountain; mostly skeletal soils with light brown clay to sandy loam texture, 60- to 70-% rock and cobbles, irregular boundary to C horizon (bedrock or residual weathered rock)
Rock Outcrop	Unclassified	Occurs on all aspects on the mountain as crags, cliffs and along ridges and peaks
Other		
Mined rock	Variable texture, size and weathering	Piles of various sizes and materials from mining
Mill tailings	Fine textured, uniform	Rhyolite tailings and mined rock; some has been sold as construction material

Descriptions of profiles and soil development for typical soils in place are provided below. The local soil types generally match the descriptions of the SCS soil classification series soil types. The information includes physical factors such as structure, consistency, depths, percentage rock, erosion potential, and permeability.

3.2.1. Arizo

The Arizo soils are generally located on the alluvial toe slopes and fans around the base of the mountain at 2- to 10-percent slopes (**Figure 4**). The soil is a sandy loam with 40-percent gravel and small stones to 50-percent stones and cobbles with depth. It has no structure and is loose and friable with good permeability and high wind erosion potential. Portions of the leach heap are planned on these soils. A soil pit dug to 36 inches showed the following: alluvial sloping (4-50) to the north, no profile development (not even A horizon); sandy clay loam to sandy loam; cobbles increase with depth,

40-precent cobbles at 30 inches of depth, and 65-percent coarse materials at greater than 30 inches. Coarse fragments limit soil salvage, and soil suitability is low due to poor nutrient status and texture.

3.2.2. Cajon

Cajon soils are located on alluvial fans and plains out from the base of the mountain. Slopes are from 2 to 15 percent. The soil consists of a loose friable, gravelly loam to loamy sand, with numerous surface fine roots. The soil color is light brown to brown. Gravel content is 15 percent and reduces with depth. Permeability is rapid and wind erosion potential is very high. Portions of the heap leach site located on the western side of the Modified Project Area may be developed on these soils (**Figure 4**). A soil pit showed the following: alluvial fan with slopes to 15 percent; no profile development; gravelly loamy sand to loamy sand, friable; coarse fragments, cobbles to 15 inches at 60 percent, no structure, no development, erodible by wind; severe limitations for salvage due to coarse fragments on portions of the alluvial fan.

3.2.3. Garlock

Garlock soils are very deep, loamy sand located on the alluvial flat lands surrounding Soledad Mountain (**Figure 4**). A lag gravel surface may exist on these loose, friable, brown soils. The 0 to 1-percent sloped soils have a 5-percent gravel content near surface, and a dense, slightly blocky structure and increased clay content with depth. Permeability is moderately slow. Water erosion hazard is slight or moderate. Wind erosion potential is high. The present mining will not disturb soils in this unit. Limitations for reclamation use are an increased clay and mineral content out onto the flats and the low nutrient status.

3.2.4. Rosamond

Rosamond soils are located on the flats to the west of the mountain (**Figure 4**). The sandy loam to gravelly sandy loam soil has 10-percent gravel and stones, is slightly blocky, reddish to light brown, and contains very low to no organics. These alluvial soils are on 0- to 2-percent slopes, permeability is moderately slow, and erosion potential is high.

3.2.5. Torriorthents

Although not of any single soil classification series, torriorthents consist of weathered rock out crop and shallow to deep, residual soils from host rocks on the mountain (**Figure 4**). The soils range from a clay loam to a cobbly, loamy sand with up to 60- to 70-percent rock and cobbles on slopes of 50 to 75 percent. Permeability ranges from moderately slow to moderately rapid with a moderate erosion potential. A 1995 soil pit on slopes at 8 to 10 percent showed the following: alluvial soil washed in from upslope; no profile development; gravelly sandy loam; cobbly, coarse fragments 40 to 50 percent; bedrock at a depth of 12 inches. These soils cannot be stripped for reclamation from the potential

mine pits. Salvage is severely limited due to lack of equipment access on steep slopes, and there are inherent limitations of these soils for reclamation.

4. VEGETATION

4.1. PLANT SPECIES OBSERVATIONS

The Modified Project Area contains plant species (floristics) typical for the western Mojave Desert in Antelope Valley (Bamberg and Bamberg 2006). The plant species are hardy desert shrubs and sub-shrubs, which grow year-round when moisture is available. Fall-germinating, annual species that grow throughout the mild winter and spring seasons are present (Bamberg and Bamberg 2006, Hidalgo 2018). Some shrubs (such as joint-fir, spiny hop-sage, and shadscale) grow only at higher altitudes this far south (Bamberg and Bamberg 2006). They are more widely distributed in the Great Basin area to the northeast. This is likely a result of the cooler temperatures, higher altitude, and the steep slopes at Soledad Mountain compared to the lower regions of the Mojave Desert region (Bamberg and Bamberg 2006). Cactus, trees, and tall shrubs are not present on-site with the exception of the Joshua tree and beaver-tail, pencil and golden cholla cactus (Bamberg and Bamberg 2006, Hidalgo 2018, Hughes 2018). There is a lack of well-defined drainages or washes, and the type of vegetation characteristic of these washes. A juniper zone is not present due to the volcanic substrate and the unfavorable dry, warm climate (Bamberg and Bamberg 2006).

4.2. VEGETATION TYPES AND DISTRIBUTION

The two dominant types of vegetation mapped were shrub scrub and mixed shrub/grass (Bamberg and Bamberg 2006, Hughes 2018). Zones of vegetation on and below the mountain are naturally divided by topography (**Figure 5**). The lower slopes on alluvial fans and flats contain a desert shrub/scrub dominated by the creosote bush (*Larrea tridentate*) and a secondary cover of burrobush (*Ambrosia dumosa*), Mojave aster *(Xylorhiza tortifolia*), goldenhead (*Acamptopappus sphaerocephalus*), and Morman tea (*Ephedra nevadensis*). Plant zonation at the base of the mountain is dominated by burrobush and taller growths of creosote bush (Bamberg and Bamberg 2006). There is less plant variety at the base of the mountain, most likely due to a less diverse topography and the greater disturbance.

The vegetation on the mid- and upper-slopes of the mountain consists of a mixed shrub/grass community including spiny hopsage (*Grayia spinosa*), winterfat (*Krascheninnikovia janata*), buckwheat (*Erlogonum* sp.), and cattle spinach (*Atriplex polycarpa*) common in the Great Basin (Bamberg and Bamberg 2006). Much of the land surface is covered by rock outcrops and rock slides. Some plant species are found more commonly among the rocks than in the soils. Overall, the vegetation is fairly diverse and productive, however the repeated disturbances and burns have reduced the plant cover and species diversity.

4.3. VEGETATION COVER, DENSITY, AND DIVERSITY

Vegetative cover was sparse with small shrubs, a few clumps of grasses and scatterings of forbs during the winter season in 1990. Cover in 1995 was greater due to increased moisture and improved growing conditions (Bamberg and Bamberg 1997). In 1990, the total canopy cover of the shrub-scrub on the alluvial fans and flats ranged from 20 to 26 percent and averaged 23 percent for the four linear transects (Bamberg and Bamberg 1997). Individual plots within the surveyed plots varied from 9 to 35 percent. The vegetation is fairly uniform with a dominant cover of creosote bush, and a secondary cover of burrobush and goldenhead. Few other species have more than 1- to 3-percent cover except for Mojave aster in a few plots (Bamberg and Bamberg 1997).

The results of the two transects surveyed in 1995 showed a large increase in plant cover from averaging 23 percent in 1990 to approximately 80 percent in 1995. The annual grasses and forbs had the greatest increase in percent ground cover and the shrubs were also larger due to the recent rains. In 1990, the mixed shrub community on the mountain slopes consisted mainly of annual grasses with a cover value of 10 percent due to fire (Bamberg and Bamberg 1997). In protected areas, the shrubs cattle spinach and *Tetradymia axillaris* (horsebrush) dominated with a cover value of 49 percent (Bamberg and Bamberg 1997).

In 1995 in the same area, the total cover values were estimated at approximately 80 percent (Bamberg and Bamberg 1997). The vegetation is extremely variable. Additional dominant species include spiny hopsage, Morman tea, several species of perennial buckwheats, and grasses such as needlegrass (*Achnatherum* sp.), bluegrass (*Poa secunda*), and squirreltail (*Elymus elymoides*). The extreme differences in cover between 1990 and 1995 demonstrates the highly variable nature of the vegetation depending on exposure, weather, and soil moisture conditions (Bamberg and Bamberg 1997).

In 1995, plant surveys were conducted using linear transects on the potential heap leach areas (Bamberg and Bamberg 1997). These areas are located on the northern and western alluvial lower slopes of the mountain. Results of these surveys indicate that this was an excellent year for plant growth (averaging about 80-% cover) (Bamberg and Bamberg 1997). Shrub densities in 1995 averaged 3700 and 4300 plants per hectare (1480 to 1720 per acre.) Perennial densities were not determined in 1990, however the densities were likely lower due to the prolonged drought. Perennial densities of vegetation change slowly. Plant species diversity (average number of species per plot) in 1995 were fairly uniform at 13.6 and 14.0 plant species recorded per 20 square meter plot with a range from 11 to 17. These values for density and diversity are average for desert vegetation and do not indicate unusual conditions (Bamberg and Bamberg 1997).

Data on vegetation cover was not recorded site-wide during the 2018 surveys. However, Hughes (Kent Hughes, Kent Hughes Consulting, pers. comm. to Amanda Best, WestLand, 2018) noted vegetation densities within the expansion parcels were relatively low, ranging between no vegetation cover in the

northwest corner of the Permit Modification Area to less than 20-percent cover within the alluvial plain below the western slope of Soledad Mountain. Dupler (2019) noted vegetation throughout the Permit Modification Area is often low-density and in most cases characterized as scrub, with the dominant species being white bursage (*Ambrosia dumosa*) and creosote bush (*Larrea tridentata*). Within the Joshua tree woodland, Joshua tree cover was recorded as open and comprising at least 1 percent, with individuals evenly distributed (Dupler 2019).

5. WILDLIFE RESOURCES

Wildlife species present on the Soledad Modified Project Area are typical of desert habitats, with small mammals, reptiles, and birds being the dominant components (Bamberg and Bamberg 1997, 2006, Hughes 2018). General populations of wildlife appear to be low due to the dry, hot desert climate, fires, and historic and recent disturbances to native habitats by mining, recreational activities, and urbanization (Bamberg and Bamberg 1997). This area of the western Mojave Desert in Antelope Valley is being developed by mining, farming, housing and wind energy generation. The effect on animal populations has been reduced habitat availability, including the total displacement of large herbivores. There were no deer or bighorn sheep observed on Soledad Mountain (Bamberg and Bamberg 1997, 2006, Hughes 2018). The region has also been subject to drought from December 2011 to March 2019, with severe to exceptional drought conditions from 2014 to 2018 (Dong et al. 2019, National Drought Monitor Center 2019).

5.1. WILDLIFE SPECIES OBSERVATIONS

Desert reptiles, rodents, and lagomorphs occur on the Modified Project Area as well as coyote (*Canis latrans*) and other small predators and raptors that prey on these species. Several game birds, including chukar (*Alectoris graeca*), quail (*Lophortyx californicus*), and mourning dove (*Zenaida macroura*) are also present. Predators observed inhabiting the Modified Project Area are wide ranging, common mammals that prey on reptiles, birds, and other small mammals (Bamberg and Bamberg 1997). These include coyote, bobcat *(Lynx rufus*), ringtail *(Bassariscus astutus),* gray fox *(Urocyon cinereoargenteus),* desert kit fox *(Vulpes macrotis;* not the San Joaquin kit fox *[Vulpes macrotis mutica],* a federal endangered subspecies), and possibly badger *(Taxidea taxus*). The Modified Project Area occupies a portion of the predators' large home range and hunting territory.

Small mammals observed within the Modified Project Area are typical of those with affinities to desert scrub and rock-slopes, the two dominant habitats on the mountain (Bamberg and Bamberg 1997). Common mammals include antelope ground squirrel *(Ammospermophilus leucurus),* black-tailed jackrabbit *(Lepus californicus),* cottontail *(Sylvilagus audubonil),* kangaroo rat *(Dipodomys merriamt),* desert woodrat *(Neotoma lepida),* and several species of small rodents (See Table A-2 in the 1997 report Bamberg and Bamberg 1997). Antelope ground squirrels were abundant and were captured on both grids during the two trapping periods.

There were no large grazing mammals, such as deer, mountain sheep, or feral burros, observed, nor any sign of recent activity (Bamberg and Bamberg 1997, Hughes 2018).

Birds observed and common to the Modified Project Area include the raven (*Corvus corax*), rock dove (*Columba livia*), violet-green swallow (*Tachycineta thalassina*), and Brewer's sparrow (*Spizella brewer*). Raptors observed included the peregrine falcon (*Falco peregrinus*), golden eagle (noted in 1990), turkey vulture (*Catharles aura*), and red-tailed hawk (*Buteo jamaicensis*) (Bamberg and Bamberg 1997, Hughes 2018). Raptor perches were observed on high points on the Modified Project Area (Bamberg and Bamberg 1997). No waterfowl were observed on the Modified Project Area in this dry portion of the desert that lacks any surface or flowing water.

Little evidence of bats was found in the openings or mine workings within the original permitted area (Bamberg and Bamberg 1997). One western pipistrelle (*Pipistrellus hesperus*) was trapped in a mist net over a nearby water tank, and other pipistrelles and pallid bats were observed flying in the evening (Bamberg and Bamberg 1997). High winds and low numbers of flying insects may have accounted for the low numbers of bats, and possible low populations.

During the winter survey, no bats were observed hibernating in the mine workings, and only a few pieces of fresh guano were detected in one mine adit (Bamberg and Bamberg 1997).

During the 2018 bat habitat survey, surveyors located 68 features in the vicinity of the Permit Modification Area that included enough underground workings to potentially support use by bats (Sherwin 2019). Surveyors found direct evidence (ex., bats, guano) of bat activity in 8 of the 68 features surveyed in the Permit Modification Area, while 44 additional workings included potential roosting habitat for bats (Sherwin 2019) (**Figure 6**). The majority of these 68 features were small prospects with relatively simple underground workings, compared to the features surveyed in previous years, which were typically large, interconnected, and complex (Sherwin 2019). Observed bat species included Townsend's big-eared bat (*Corynorhinus townsendii*) and a single big-brown bat (*Eptesicus fuscus*) (Sherwin 2019).

Bat use of the mine workings may be characterized as seasonal use by a low number of individuals representing moderate species diversity (Bamberg and Bamberg 1997, Sherwin 2019).

5.2. HABITATS PRESENT

The Modified Project Area supports three natural wildlife habitats and one resulting from human disturbance. All these habitat types are shrub/grass communities with a ground layer of annual forbs and grasses in the spring. Habitat diversity is low on the Modified Project Area and resource productivity is unpredictable because of harsh desert conditions (Bamberg and Bamberg 2006). Shrubs and other plants in these habitat types are widely spaced with low and variable productivity (Bamberg

and Bamberg 1997, 2006). Animals using these habitats for shelter, food, and reproduction are generally highly adapted to the xeric desert environment.

These habitats, and their common wildlife associates, are as follows.

5.2.1. Mountain Rock Outcrops, Rock Slides

These habitats occur on peaks and ridges on the mountain proper throughout the Modified Project Area (Bamberg and Bamberg 1997). These rocky areas have scattered shrubs and grass species, which grow in crevices and intermingled soil pockets. Plants at times in the absence of fires have luxuriant growth due to water collection. These areas are used for denning and foraging of small mammals and as perches for birds including raptors. Common wildlife species are:

Predators: coyotes, bobcats, ringtails
Reptiles: lizards, snakes
Small mammals: jackrabbit, woodrat and other rodents
Birds: game birds, passerine, ravens, raptors, raptor's nests and perches

5.2.2. Scrub/Grass on Steep Mountain Slopes

These steep slopes have shallow soils over rocky substrates (Bamberg and Bamberg 1997). The vegetation is a shrub/grass with dominant species of creosote bush, saltbush, joint-fir, and spiny hopsage. Grasses grow as single clumps or under and through the shrubs. These habitats have been highly modified by previous fires and past grazing, and on large areas are mainly annual grasses dominated by brome grasses and forbs. Vegetative cover varies from 20 to 80 percent depending on seasonal rains and amount of time since the last fire (Bamberg and Bamberg 1997). Wildlife species are the same as above, except raptors nests and perches are not present. These slopes are used for foraging and denning of small mammals, are hunted by raptors.

5.2.3. Creosote Bush Scrub on Fans and Alluvial Flats

This is the common habitat on the lower slopes and fans (bajadas) around the base of the mountain (Bamberg and Bamberg 1997). This is a creosote bush shrub vegetation with widely spaced Joshua trees on the upper bajadas. Perennial grasses grow between and underneath the shrubs, and annual grasses from a ground cover. Wildlife species are:

Predators: raptors, coyotes, foxes, reptiles: lizards, snakes
Small mammals: jackrabbit, ground squirrels, rodents
Birds: wrens and other passerine, ravens, overflights of raptors

5.2.4. Human Altered Areas and Habitats

The human disturbance on the mountain has resulted from historic mining activities and mineral exploration (Bamberg and Bamberg 2006), as well as current large-scale mining operations. In addition, the area is used for recreational vehicle activities and firearm target practice. Southern California has been under drought conditions from December 2011 to March 2019, and experienced severe to exceptional drought conditions from 2012 to 2016 (National Drought Monitor Center 2019). These drought conditions have negatively affected vegetation health at a landscape scale as well as contributed to increases in wildfire risks in Southern California (Crockett and Westerling 2018, Dong et al. 2019). There has also been a severe drought within this region for four of the five years between 2014 and 2018 (National Drought Monitor Center 2019).

The mining and other human activities have increased habitat diversity by creating underground openings and abandoned buildings (Bamberg and Bamberg 1997). Surface mining facilities, roads, and grading have reduced vegetation productivity, but increased use by different wildlife species (Bamberg and Bamberg 2006). Evidence of animal use in underground workings included desert woodrat, deer mouse, ringtail, and bobcat. Domestic pigeons and barn owls were observed roosting in mine workings with vertical cuts to the surface. A dead golden eagle and mummified desert tortoise were observed at the bottom of a shaft in the Eagle Adit (Bamberg and Bamberg 1997, 2006). Underground workings provide structural habitat for bats such as roosts and hibernacula.

6. SPECIAL STATUS SPECIES

6.1. SPECIAL STATUS PLANT SPECIES IMPACT ANALYSIS

There were no threatened or endangered plant species expected or observed in the Modified Project Area (Bamberg and Bamberg 2006, Hughes 2018). Four species listed on the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants of California were determined to have some potential to occur (Dupler 2019). These species include:

- Alkali mariposa lily (*Calochortus striatus*), CNPS Rank 1B.2.
- Mojave spineflower (*Chorizanthe spinosa*), CNPS Rank 4.2
- Recurved larkspur (*Delphinium recurvatum*), CNPS 1B.2
- Sagebrush Loeflingia (*Loeflingia squarrosa* var. *artemisiarum*), CNPS Rank 2B.2

Dupler (2019) also notes the presence of a designated sensitive natural community, the Joshua tree woodland (ranked S3 by CDFW), on the alluvial fan at the base of the western slope of Soledad Mountain.

6.1.1. 1997 EIR/EIS and 2010 SEIR Conclusions

As described in Section 4.1, the 1997 FEIR/EIS concluded the following:

> *There are no endangered, threatened, rare, or sensitive plant species observed or present, therefore, no impacts are anticipated.* (1997 FEIR/EIS, p. 223)

> *Permanent or temporary loss…of natural vegetation is a residual impact. Revegetation during reclamation will offset the loss of natural vegetation types. The loss would be Less Than Significant because no rare or unique habitats are affected and there are large amounts of similar undisturbed habitats in the regional area.* (1997 FEIR/EIS, p. 225)

As part of the 2010 analysis, technical studies were submitted to provide updated assessments of the Project's potential effects on biological resources or to satisfy standard regulatory requirements of the 1997 Project's approval. Similar to the findings of the 1997 FEIR/FEIS, the reports concluded that no endangered, threatened, rare, or sensitive plant species were observed or present on-site. Sunrise Consulting (2009) noted that although the alkali mariposa lily was not observed on-site, it has a moderate potential for occurrence on-site in the lower areas of the site. However, the lower areas of the site were found to be unlikely to be disturbed by the Modified Project; therefore, no impact was anticipated and no further surveys or mitigation were required for this species. The white pygmy poppy was not observed on-site and suitable habitat does not exist on-site; therefore, no impacts were found to occur, and no further surveys or mitigation were required for this species (Sunrise Consulting 2009).

6.1.2. Modified Project Impacts

The Modified Project is substantially the same as the 1997 Project, with certain minor modifications. In comparison to the 1997 Project, an additional approximately 258 acres would be impacted by the Modified Project. The Modified Project footprint configuration includes 155 acres that were not previously included in the 1997 and 2010 Project footprints and excludes approximately 214 acres that were proposed to be impacted in the 1997 and 2010 Project footprints (**Figure 3**). The additional impacts when compared to the 1997 Project may impact individual special status plant species, but would not result in range-wide negative effects. Regulatory requirements and existing mitigation measures that would be implemented as part of the Modified Project would further minimize and mitigate impacts (See **Section 6.1.3**). Modified Project impacts within the Permit Modification Area would not have a substantial adverse effect, either directly or through habitat modifications, on any special status plant species, as described below.

Alkali mariposa lily (Calochortus striatus), CNPS Rank 1B.2

Within the Permit Modification Area, this species has moderate potential to occur in the allscale scrub habitat in the parcel south of the intersection of Mountain View and Mojave Tropico Road (Dupler 2019). It is unlikely to occur in the remainder of the Permit Modification Area because of the absence

of halophytic scrub (e.g., saltbush species [Atriplex spp.]) habitats. This species was not observed during the site assessment on May 30-31, 2018 (by WRA) or during surveys conducted November 15-17, 2018 (by Kent Hughes Consulting) (Dupler 2019). Due to the limited availability of suitable habitat within the Permit Modification Area and the Modified Project's minimal additional impacts, the Modified Project would not result in a range-wide negative effect to this species. Regulatory requirements and existing mitigation measures that would be implemented as part of the Modified Project would further minimize and mitigate negative effects (See **Section 6.1.3**).

Mojave spineflower (Chorizanthe spinosa), CNPS Rank 4.2

The Permit Modification Area contains suitable sandy to gravelly soils and known associated desert scrub and woodland species (Dupler 2019). This species has moderate potential to occur throughout the Permit Modification Area where such substrate is present. This species was not observed during the site assessment on May 30-31, 2018 (by WRA) or during surveys conducted November 15-17, 2018 (by Kent Hughes Consulting) (Dupler 2019). Due to the limited availability of suitable habitat within the Permit Modification Area and the Modified Project's minimal additional impacts, the Modified Project would not result in a range-wide negative effect to this species. Regulatory requirements and existing mitigation measures that would be implemented as part of the Modified Project would further minimize and mitigate negative effects (See **Section 6.1.3**).

Recurved larkspur (Delphinium recurvatum), CNPS Rank 1B.2

This species has moderate potential to occur in allscale scrub habitat in the parcel south of the intersection of Mountain View and Mojave Tropico Road in the Permit Modification Area (Dupler 2019). It is unlikely to occur in the remainder of the Permit Modification Area because of the absence of halophytic scrub (e.g., saltbush species [Atriplex spp.]) habitats) (Dupler 2019). This species was not observed during the site assessment on May 30-31, 2018 (by WRA) or during surveys conducted November 15-17, 2018 (by Kent Hughes Consulting). Due to the limited availability of suitable habitat within the Permit Modification Area and the Modified Project's minimal additional impacts, the Modified Project would not result in a range-wide negative effect to this species. Regulatory requirements and existing mitigation measures that would be implemented as part of the Modified Project would further minimize and mitigate negative effects (See **Section 6.1.3**).

Sagebrush Loeflingia (Loeflingia squarrosa var. artemisiarum), CNPS Rank 2B.2

The Permit Modification Area contains suitable sandy to gravelly soils and known associated desert scrub and woodland species (Dupler 2019). This species has moderate potential to occur throughout the Permit Modification Area where such substrate is present (Dupler 2019). This species was not observed during the site assessment on May 30-31, 2018 (by WRA) or during surveys conducted November 15-17, 2018 (by Kent Hughes Consulting) (Dupler 2019). Due to the limited availability of suitable habitat within the Permit Modification Area and the Modified Project's minimal additional impacts, the Modified Project would not result in a range-wide negative effect to this species.

Regulatory requirements and existing mitigation measures that would be implemented as part of the Modified Project would further minimize and mitigate negative effects (See **Section 6.1.3**).

6.1.3. Regulatory Requirements and Existing Required Mitigation Measures

Regulatory Requirements

- A Reclamation Plan has been filed with the County in accordance with Surface Mining and Reclamation Act requirements.
- The Reclamation Plan requires revegetation of disturbed areas which will include the heap leach pads, facilities area, unnecessary roads, the tops of the overburden piles and areas of the pit.
- The seed mix will utilize only plant species native to the site area.
- Financial assurance is required to assure appropriate revegetation efforts are completed.
- Reclamation according to the Surface Mining and Reclamation Act of 1975, will return the project site to open habitat including native vegetation after mining is completed.

Existing Mitigation Measures/Conditions of Approval

Existing mitigation measures that apply to the salvage of growth media and revegetation would continue to be implemented under the Modified Project as described in **Table 3**.

Table 3. Project Mitigation Measures Specific to Salvage of Growth Media and Revegetation

Mitigation Measures	Comments/Progress
Condition No. 11 1997 FEIR/EIS MM #7 Growth media stockpiles will be stabilized by allowing germination of seeds naturally contained in the soil.	GQMC has complied and will continue to comply with this requirement. No change in measure is required.
Condition No. 12 1997 FEIR/EIS MM #8 The feasibility of inoculation of soil with biological components will be investigated in test plots.	This measure has been implemented and monitoring is ongoing
Condition No. 14. 1997 FEIR/EIS MM #10 Additional erosion prevention techniques include: (a) Site drainage will be retained onsite; (b) Site roads and drainages will be inspected by project proponent personnel after rainfall events which result in surface flow to ensure erosion prevention is maintained and upgraded as needed; (c) Drainage from the tops of overburden piles will be directed away from the slopes toward the pit; (d) Salvaged growth media will be stockpiled away from areas of concentrated drainage; (e) Reclamation of disturbed areas will occur as soon as possible.	Sespe Consulting prepared a Site Drainage Plan for the Soledad Mountain Project dated September, 2019 (Swerdfeger 2019). This is the fifth update of the site drainage plan for the Project. The underlying engineering assumptions meet the requirements of the California State Water Resources Control Board and the Kern County Engineering, Surveying & Permit Services Department. A Stage I, Surface Water, Sediment and Erosion Control Plan for the construction and early mining phases of the Project is included in the Site Drainage Plan. No change in measure is required.
Condition No. 28 1997 FEIR/EIS MM #24 Mature Joshua trees which may be disturbed will be salvaged and replanted in undisturbed areas within the property boundary.	GQMC has transplanted a number of young Joshua trees and is ongoing as required by this measure. No change in measure is required.
Condition No. 29 1997 FEIR/EIS MM #25 The use of seedlings for revegetation will be investigated in test plots.	Test plots have been prepared to investigate the use of seedlings for revegetation. No change in measure is required.
Condition No. 30. *1997 FEIR/EIS MM #26 Fencing around the heap leach pads will remain in place until vegetation is established or as otherwise specified in the Reclamation Plan.	No change in measure is required.
Condition No. 70. Where surface mining operations result in the compaction of the soil, ripping, disking, or other means shall be used prior to revegetation in accordance with the approved reclamation plan.	Alternative methods were investigated when the reclamation test plots were constructed. No change in measure is required.
Condition No. 71. Topsoil shall be separated and immediately reapplied or stockpiled as necessary for use in reclamation of the site. Reclamation shall require the reapplication of a minimum of four inches of topsoil prior to reseeding. In the event that stockpiled topsoil is insufficient to provide this uniform depth, imported topsoil or soil amendments shall be utilized. Depth of topsoil may be decreased or eliminated altogether if test plots demonstrate to the satisfaction of the Kem County Planning Department that revegetation will occur in accordance with the performance standards identified in the approved reclamation plan.	No change in measure is required.

Table 3. Project Mitigation Measures Specific to Salvage of Growth Media and Revegetation

Mitigation Measures	Comments/Progress
Condition No. 74. Site reclamation shall include the shaping of waste materials followed by an application of topsoil to heap and waste rock stockpiles where necessary to achieve final overall slopes in conformance with the approved reclamation plan.	No change in measure is required.
Condition No. 77. Final reclamation shall not be considered complete until all excavated areas have been graded and/or fenced in accordance with the approved reclamation plan, and accompanying cross sections and all disturbed areas will be replanted or reseeded using plantings or a seed mixture and rate of application as specified in the approved reclamation plan. Pursuant to SMARA 1975, Section 3705, success of revegetation shall be judged based upon the effectiveness of the vegetation for the approved end use, and by comparing the quantified measures of vegetative cover, density, and species richness of the reclaimed mined lands to similar parameters of naturally occurring vegetation in the area. Quantitative standards for success shall be set forth in the approved reclamation plan. Monitoring shall continue until performance standards are met provided that, during the last two years, there has been no human intervention. Standards for success shall be based on expected local recovery rates and presented in the approved reclamation plan.	No change in measure is required.

6.2. SPECIAL STATUS WILDLIFE SPECIES IMPACT ANALYSIS

Thirteen special status wildlife species were identified as present or having low to moderate potential to occur in the vicinity of the Modified Project Area (Dupler 2019):

- Townsend's big-eared bat, (*Corynorhinus townsendii townsendii*), CDFW Species of Special Concern, WBWG High Priority. Present.
- Ringtail, (*Bassariscus astutus*), CDFW Fully Protected Species. Present.
- Swainson's hawk (*Buteo swainsoni*). State Threatened, USFWS Bird of Conservation Concern. Present.
- Northern harrier (*Circus hudsonius [cyaneus]*). CDFW Species of Special Concern. Present.
- Prairie falcon (*Falco mexicanus*), USFWS Bird of Conservation Concern. Present.
- Burrowing owl (*Athene cunicularia*). CDFW Species of Special Concern; USFWS Bird of Conservation Concern. Present.
- Le Conte's thrasher (*Toxostoma lecontei*). CDFW Species of Special Concern. USFWS Bird of Conservation Concern. Present.
- Loggerhead shrike (*Lanius ludovicianus*), CDFW Species of Special Concern, USFWS Bird of Conservation Concern. Present.

- American peregrine falcon (*Falco peregrinus anatum*); Federal Delisted, State Delisted, CDFW Fully Protected, USFWS Bird of Conservation Concern. Present.
- Mohave shoulderband (*Helminthoglypta greggi*). Present.
- Desert tortoise (*Gopherus agassizii*). Federally Threatened. State Threatened. Moderate potential.
- Golden eagle (*Aquila chrysaetos*), Federal Bald and Golden Eagle Protection Act, CDFW Fully Protected Species, USFWS Bird of Conservation Concern. Moderate potential.
- Mojave Ground Squirrel (*Xerospermophilus mohavensis*). State Threatened. Low potential.

6.2.1. 1997 EIR/EIS and 2010 SEIR Conclusions

The 1997 FEIR/EIS identified three threatened or endangered wildlife species that were potentially present on or near the site, including the federal and state listed endangered peregrine falcon (no longer federally listed), the federal and state listed threatened desert tortoise, and the Mohave ground squirrel, a California listed threatened species. Surveys conducted on-site did not identify the presence of these animals or their habitat on the site (Bamberg and Bamberg 1997, Sunrise Consulting 2009). The 1997 Bamberg report (Bamberg and Bamberg 1997) further concluded that impacts to special status species would be insignificant if the project complied with standard regulatory requirements, including desert tortoise survey and consultation with the California Department of Fish and Game (CDFG) and the USFWS. As described further below, preconstruction surveys for desert tortoises were conducted in April 1997 and February 2009. No tortoises were observed within the 1997 or 2010 Project Areas.

The 1997 FEIR/EIS noted that a peregrine falcon had been observed crossing a road to the north of the project site. However, peregrine falcons were not observed on the project site during extensive wildlife surveys, and there are no peregrine eyrie within the 1997 Project Area or in the surrounding area (Kern County and BLM 1997). Preferred habitat for peregrine falcon nesting and foraging is cliff faces, usually near streams or bodies of water. The 1997 Project site is not considered good foraging habitat due to distances to suitable habitat types for nesting and wetland habitats (Kern County and BLM 1997).

Surveys conducted for the desert tortoise and the Mohave ground squirrel did not identify the presence of these animals on the site (Bamberg and Bamberg 1997). Sunrise Consulting (2009) also identified six additional special status wildlife species that had been recorded in the vicinity of the 2010 Project Area:

- Townsend's big-eared bat, (*Corynorhinus townsendii townsendii*), High Potential.
- Prairie falcon (*Falco mexicanus*), High Potential.

- Burrowing owl (*Athene cunicularia*), Present.
- Le Conte's thrasher (*Toxostoma lecontei*), High Potential.
- Loggerhead shrike (*Lanius ludovicianus*), Present.
- American badger (Taxidea taxus), Low Potential
- Desert tortoise (Gopherus agassizii). Federally Threatened. State Threatened. Absent.
- Mojave Ground Squirrel (*Xerospermophilus mohavensis*). State Threatened. Low potential.

Of the eight species that have been recorded in the vicinity of the site, only the birds have been observed on or near the site, or have a high potential of appearing on-site (Sunrise Consulting 2009). Suitable nesting habitat for various birds, including raptors and migratory bird species, such as loggerhead shrike, prairie falcon and Le Conte's thrasher, was identified in the Project Area; however, because no project activities were to take place in areas of potential nesting, and loggerhead shrikes and LeConte's thrashers are both very mobile and unlikely to be adversely affected by Project activities (Sunrise Consulting 2009), it was determined there would be no impact and no further surveys or avoidance/mitigation will be required for prairie falcons, loggerhead shrikes, and LeConte's thrashers.

Evidence of the burrowing owl was found onsite during the surveys conducted by Sunrise Consulting (2009), and mitigation measures were identified, incorporated as conditions of approval, and have been implemented for burrowing owls.

Historically, desert tortoises have been found near the site, but Kern County (2010) noted that none had been found in the past 20 years west of State Highway 14 (to date that is approximately 29 years). The focused surveys conducted for the Project evaluated by the 2010 SEIR to comply with regulatory requirements imposed by CDFG and USFWS found no evidence of current or historical presence of this desert tortoise on-site; therefore, the desert tortoise was considered to be absent from the project site. Further, Sunrise Consulting (2009) found that historical soil disturbance has left soils on the site only marginally suitable for this species and as a result it is not likely that the species will be re-established onsite.

The Mohave ground squirrel and American badger were not found onsite and the only record of their occurrence was 10 and 5 miles from the project site respectively. The Mohave ground squirrel has also not been found west of State Highway 14 (Sunrise Consulting 2009).

Surveys for sensitive bat species were conducted by Dr. Patricia Brown in the underground stopes and glory holes in Soledad Mountain (Bamberg and Bamberg 1997). Based on distribution and habitat preference this area could potentially support this species. A tentative identification of Townsend's big-eared bats was made by Dr. Brown during out-flight surveys of underground mine workings in the summer/fall of 1996 (Bamberg and Bamberg 1997). Dr. Brown concluded that if this species is present, seasonal use is limited to low numbers of individuals (Bamberg and Bamberg 1997).

The Project evaluated in the 2010 SEIR was required to comply with the 1997 requirements, features and measures/conditions of approval as provided in **Table 4**, with the exception of the requirement to conduct additional desert tortoise surveys, which were not required or recommended for desert tortoise if vegetation removal activities were conducted within one year of the surveys (February 12, 2010). After that time, no further surveys were found to be needed (Kern County 2010).

6.2.2. Modified Project Impacts

The Modified Project is substantially the same as the 1997 Project, with certain minor modifications. In comparison to the 1997 Project, an additional approximately 258 acres would be impacted by the Modified Project. The Modified Project footprint configuration includes 155 acres that were not previously included in the 1997 and 2010 Project footprints and excludes approximately 214 acres that were proposed to be impacted in the 1997 and 2010 Project footprints (**Figure 3**). The additional acreage of impact when compared to the 1997 Project may impact individual special status wildlife species, but it would not result in population level negative effects. Regulatory requirements and existing mitigation measures that would be implemented as part of the Modified Project would further minimize and mitigate these effects (See **Section 6.2.4**). Modified Project impacts within the Permit Modification Area would not have a substantial adverse effect, either directly or through habitat modifications, on any special status wildlife species, as described below.

Townsend's big-eared bat, (Corynorhinus townsendii townsendii), CDFW Species of Special Concern, WBWG High Priority

The 2018 bat survey identified the presence of Townsend's big-eared bat guano in several abandoned mines within the vicinity of the Permit Modification Area (Sherwin 2019). Sherwin (2019) stated the concentrations of Townsend's big-eared bat guano in these features suggests use is limited to the summer months, with higher concentrations of guano at one mine feature, GQ3-24 (location depicted in **Figure 6**) potentially indicating early season ephemeral use by this species. The determination as "*early season*" indicates that this species likely utilizes the site as a staging roost.

The GQ3-24 mine consists of a 300-foot-long blind adit with a partial collapse at 150 feet. The highest concentration of guano categorized as Townsend's big-eared bat, was located past the collapse. It was noted by Sherwin (2019) that the air beyond the collapse was qualitatively different than in the first 150 feet of the mine, indicating that that the habitat suitability of this roost for Townsend's big-eared bats varies temporally. The lack of roosting bats beyond the partial collapse indicates that the microclimate it this section of the mine was not suitable for this species in late summer (August survey period).

While no single mine is likely to produce the same two microclimates found in the GQ3-24 mine, five other mines surveyed in the immediate vicinity and during the same temporal window had similar internal structures and likely microclimates to the GQ3-24 mine. Along with the similar mine

structures Townsend's big-eared bat use was detected in two of these mines (GQ3-27 and GQ3-62) and the nature of the substrate in the remaining two mines (GQ3-59 and GQ3-61) likely prevented guano detection (Sherwin 2019). Other bat use was detected in the fifth mine (GQ3-18). The high roost fidelity of Townsend's big-eared bats will likely result in the use by Townsend's big-eared bats of these five roosts in the absence of the GQ3-24 mine.

More than 30 abandoned mine features surveyed by Sherwin (2019) have confirmed or potential bat habitat present and are located outside the Modified Project footprint (**Figure 6**). These features would not be impacted by the Modified Project. Pursuant to Condition 37 (1997 FEIR/EIS MM #33), some of the mine adits on the landscape will be retained and gated. The Modified Project also includes a design component that entails wildlife exclusion and closure of GQ3-24 prior to the disturbance of the feature. Based on limited impacts and the proposed mitigation measures that would be implemented to offset those impacts the Modified Project may impact individual Townsend's big-eared bats and one potential roosting site for the species, but it is not expected to result in population-level negative effects to Townsend's big-eared bat.

Ringtail, (Bassariscus astutus), CDFW Fully Protected Species

Ringtail tracks were observed in a mine adit in 2006 (Brown and Berry 2007). However, there are no California Natural Diversity Database records from Soledad Mountain or adjacent quads (CDFW 2019).

Ringtails occur from southern Oregon and California, through the south-western states to Texas and south through Mexico to Oaxaca (Reid, Schipper, and Timm 2016). They inhabit a variety of habitats from deserts to montane conifer forests (Reid, Schipper, and Timm 2016). Ringtails tolerate some level of disturbance and are frequently found in rural or urban areas (Reid, Schipper, and Timm 2016). Home range size is variable, but historical estimates from California range from 109 to 1280 acres (Ahlborn 2005). These estimates, however, pre-date modern tracking techniques and may not accurately reflect home range size. Modern home range estimates (outside of California) range from approximately 12 to 576 acres (Reid, Schipper, and Timm 2016). The Modified Project would locally reduce available habitat for wildlife and potentially disrupt the home ranges of one or more ringtails. However, no population-level negative effects on ringtails are expected to result from the Modified Project due to the small extent of surface disturbance relative to their total range. Regulatory requirements and existing mitigation measures that would be implemented as part of the Modified Project would further minimize and mitigate negative effects (See **Section 6.2.3**).

Swainson's hawk (Buteo swainsoni). State Threatened, USFWS Bird of Conservation Concern

A Swainson's hawk was observed in flight south of the Modified Project Area during biological surveys in November 2018 (Kent Hughes, Kent Hughes Consulting, pers. comm. to Amanda Best, WestLand, 2018). This species has been recorded from the following adjacent quads: Willow Springs, Little Butte,

and Rosamond (CDFW 2019). No Swainson's hawk were observed during golden eagle survey conducted in May 2018 (Carroll 2018).

Swainson's hawks are long distance neotropical migrants that breed throughout much of western North America including disjunct breeding populations in some Californian valleys (Bechard et al. 2010). This species breeds and forages in grasslands, sparse shrublands, open woodlands and agricultural areas with crops similar in height to grasslands (Bechard et al. 2010). The Modified Project would reduce the prey base of all large raptors in the area, but it is not expected to result in population-level negative effects to Swainson's hawk or other large raptors in the area. Regulatory requirements and existing mitigation measures that would be implemented as part of the Modified Project would further minimize and mitigate negative effects to this species (See **Section 6.2.3**).

Northern harrier (Circus hudsonius [cyaneus]). CDFW Species of Special Concern

A Northern harrier was observed during biological surveys in November 2018 (Kent Hughes, Kent Hughes Consulting, pers. comm. to Amanda Best, WestLand, 2018). Additionally, there are California Natural Diversity Database records from the Soledad Mountain quad and the following adjacent quads: Willow Springs, Little Butte, and Rosamond Lake (CDFW 2019). No northern harriers observed during golden eagle survey conducted in May 2018 (Carroll 2018).

Northern harriers are partial migrants that breed throughout much of North America and Eurasia (Smith et al. 2011). Smith et al. (2011) consider Northern harrier to be a "[r]are and erratic breeder or summer resident" in California. However, the Proposed Project occurs with an area where this species is expected to occur year-round (Shuford and Garadali 2008, Smith et al. 2011).Northern harriers nest on the ground in wetlands, wet pastures, tundra, prairies, grasslands, cold desert shrub-steppe and riparian woodland (Smith et al. 2011). Breeding habitat is "extremely limited" in the southern deserts of California (Shuford and Garadali 2008). This species is not expected to breed within the Modified Project Area due to a lack of suitable habitat. However, the area may be used for foraging. The Modified Project would reduce the prey base of all large raptors in the area, but it is not expected to result in population-level negative effects to Northern harrier or other large raptors in the area due to the relatively small extent of surface disturbance.

Prairie falcon (Falco mexicanus), USFWS Bird of Conservation Concern

Three prairie falcons were observed in March 2018 near a presumably active nest, located approximately 0.1 miles from the Modified Permit Area (Carroll 2018). No falcons were observed during biological surveys in November 2018 (Kent Hughes, Kent Hughes Consulting, pers. comm. to Amanda Best, WestLand, 2018). Additionally, there are California Natural Diversity Database records from Soledad Mountain and the following adjacent quads: Mojave, Monolith, Willow Springs, Little Butte, Rosamond and Bissell (CDFW 2019).

Prairie falcons primarily occur in the western U.S., with the range extending southward to Zacaetecas and possibly Oaxaca, Mexico (Steenhof 2013). Prairie falcons are uncommon year-round residents in California, which primarily nest on cliff ledges (Polite and Pratt 2005, Steenhof 2013). The Modified Project is expected to reduce the prey base and potential nest sites for prairie falcons. Prairie falcons forage up to 15 miles from the nest site (Tesky 1994). Consequently, local reductions in the prey base could potentially be offset by increased foraging distances. The known prairie falcon nest site is outside of the Modified Project Area and was seemingly active in 2018, despite ongoing operations in the vicinity. Individuals may be affected, but no population-level negative effects on prairie falcon are expected to result from the proposed project due to the small amount of surface disturbance relative to the species' range. Regulatory requirements and existing mitigation measures that would be implemented as part of the Modified Project would further minimize and mitigate negative effects (See **Section 6.2.3**).

Burrowing owl (Athene cunicularia). CDFW Species of Special Concern; USFWS Bird of Conservation Concern

The nearest recorded presence of burrowing owls as inhabitants is 4 miles northeast. Burrowing owls have been found to be present on mine property over the last fifteen years of surveys on the mine property and surrounding areas (buffer zones). However, no burrowing owls have been found to be *inhabiting* this property itself and no signs of burrowing owls (feathers, whitewash, or pellets) was encountered during the 2018 survey. These birds are common in the agricultural areas of Antelope Valley, and utilize abandoned animal or self-constructed burrows. Pre-disturbance surveys for this species are required by Condition 90, and Conditions 92 through 94 specify actions to be taken in the event burrowing owls or burrows are found (**Table 3**). Regulatory requirements and existing mitigation measures that would be implemented as part of the Modified Project would further minimize and mitigate negative effects (See **Section 6.2.3**).

The Modified Project is not expected to impact the species.

Le Conte's thrasher (Toxostoma lecontei). CDFW Species of Special Concern. USFWS Bird of Conservation Concern

Le Conte's thrashers have been observed in the vicinity of the Modified Project Area (Dupler 2019). Additionally, there are California Natural Diversity Database records from Soledad Mountain and the following adjacent quads: Mojave, Monolith, Willow Springs, Little Buttes and Sanborn (CDFW 2019).

Most Le Conte's thrashers occur in the hottest and driest portions of the Mojave and Sonoran desert in Arizona, California, Nevada and Utah, USA and Baja California, Mexico. Additionally, two disjunct populations occur, one in the San Joaquin Valley of California and a second in the west-central portion of the Baja California peninsula (Fitton 2008, Sheppard 2019). Only the San Joaquin population is designated as a Species of Special Concern (CDFW 2019). Le Conte's thrasher is xerophilic and resides year-round in in sparsely vegetated desert areas including flats, alluvial fans, gently rolling hills, broad

canyons or small arroyos (Sheppard 2019). Le Conte's thrashers within the Modified Permit Area are not part of the San Joaquin population as described by Fitton (2008) but rather occur in the western-most extent of the core population. The Modified Project would result in a local reduction in breeding and foraging habitat, but it is not expected to result in population-level negative effects to Le Conte's thrashers due to the small amount of surface disturbance relative to their total range. Regulatory requirements and existing mitigation measures that would be implemented as part of the Modified Project would further minimize and mitigate negative effects (See **Section 6.2.3**).

Loggerhead shrike (Lanius ludovicianus), CDFW Species of Special Concern, USFWS Bird of Conservation Concern

A loggerhead shrike was observed during biological surveys in November 2018 (Kent Hughes, Kent Hughes Consulting, pers. comm. to Amanda Best, WestLand, 2018). Additionally, there are California Natural Diversity Database records from Soledad Mountain and all adjacent quads (CDFW 2019).

Loggerhead shrikes are partial migrants that primarily breed from southern Alberta and Saskatchewan, Canada, southward through the western, central and southern US and through Mexico to Oaxaca (Yosef 1996). Loggerhead shrikes are year-round residents in the southern deserts of California (Humple 2008, Yosef 1996). Breeding habitat for this species includes desertscrub (Humple 2008) and the Modified Project Area contains potentially suitable breeding habitat. Loggerhead shrikes prey on arthropods, amphibians, reptiles, small mammals and birds (Yosef 1996). The Modified Project would result in a local reduction in breeding and foraging habitat, but it is not expected to result in population-level negative effects to loggerhead shrikes due to the small amount of surface disturbance relative to the species' total range. Regulatory requirements and existing mitigation measures that would be implemented as part of the Modified Project would further minimize and mitigate negative effects (See **Section 6.2.3**).

American peregrine falcon (Falco peregrinus anatum); Federal Delisted, State Delisted, CDFW Fully Protected, USFWS Bird of Conservation Concern

A single peregrine falcon was observed in flight in the spring of 1990 (Bamberg and Bamberg 1997). This species was not observed during surveys in 2006 or 2018 (Bamberg and Bamberg 2006, Carroll 2018) (Kent Hughes, Kent Hughes Consulting, pers. comm. to Amanda Best, WestLand, 2018). Between 1953 and 2017, there were no known peregrine falcon nesting territories within Kern County (CDFW 2017) and there are no California Natural Diversity Database records from Soledad Mountain or adjacent quads (CDFW 2019).

F. peregrinus occurs on every continent expect Antarctica (White et al. 2002). The *anatum* subspecies is a partial migrant and breeds throughout North America south of the tundra, excluding coastal Pacific Northwest, to northern Mexico (White et al. 2002). Peregrine falcons breed in a wide variety of open habitats, including urban areas (White et al. 2002). However, given the paucity of reports and absence of known breeding within Kern County (Bamberg and Bamberg 2006, Carroll 2018) (Kent Hughes,

Kent Hughes Consulting, pers. comm. to Amanda Best, WestLand, 2018) we do not expect this species to breed in the vicinity of the proposed project. However, peregrine falcons may occur in the area during non-breeding periods. The Modified Project is expected to reduce the prey base but the proposed project is not expected to result in population-level negative effects to peregrine falcons due to the small amount of surface disturbance relative to its total range. Regulatory requirements and existing mitigation measures that would be implemented as part of the Modified Project would further minimize and mitigate negative effects (See **Section 6.2.3**).

Mohave shoulderband (Helminthoglypta greggi)

Subsequent to the completion of the SEIR in 2010, the Mohave shoulderband snail was petitioned for listing under the Endangered Species Act (Center for Biological Diversity 2014). This snail was not evaluated in prior permitting efforts for the project. The snail inhabits rock features that provide interstitial spaces for shelter and foraging opportunities (USFWS 2017a). Similar to other desert snails, the Mohave shoulderband is active for a brief period following winter rains and aestivates during dry periods of the year (USFWS 2017a).

Surveys conducted in support of the petition and efforts funded by the USFWS (WestLand 2017) documented snail and snail shell locations and delineated potential habitat for the Mohave shoulderband on the three topographic features thought to be inhabited by the snail: Middle Butte, Standard Hill, and Soledad Mountain. Based largely on this information and habitat delineated by the USFWS, the USFWS' determined that the Mohave shoulderband did not require the protections of the Endangered Species Act (USFWS 2017b)(**Appendix A**).

USFWS (2017a) analyzed the following potential threats to the snail:

1) Hard rock mining
2) Wildland fire,
3) Vegetation type conversion, and
4) Climate change

The USFWS determined that the amount of habitat for the snail on Soledad Mountain that is expected to be lost as a result of the mining and aggregate activities associated with GQMC existing operations would not result in a high risk of extinction of the snail. USFWS (2017a) concluded that impacts from existing mining and aggregate activities are expected to result in approximately 19.4 percent loss of the snail's modeled habitat and approximately 16.7 percent (15 of 90) of the known locations of the snail, but that there is no evidence to indicate that snail populations would become unviable in the next 40 to 50 years. This is largely due to the fact that occupied habitat across three topographic features would remain and provide the necessary habitat features to support the snail, and that the snail has presented in an area with historical mining activities.

Subsequent to USFWS (2017a) and the Special Status Species Assessment (USFWS 2017a, USFWS 2017b), additional surveys for the Mohave shoulderband snail were conducted on Soledad Mountain, Middle Butte, and Standard Hill (Ramey 2019a, b). These surveys resulted in additional known locations of the snail, including conclusive evidence of current occupancy of Middle Butte and Standard Hill. As such, currently there are approximately 218 known locations of evidence of Mohave shoulderband snail (**Figure 7**). The disturbance footprint of the proposed project will result in increases in the effects to habitat of snail such that approximately 25 percent of the of the known locations of the snail (**Figure 8**) and 25 percent of the snail's modeled habitat (**Figure 9**) will be affected by mining and aggregate activities. However, snail habitat and known locations would remain across three topographic features and habitat within these features would continue to provide the necessary features to support the snail through the implementation of Project design features that provide proposed conservation areas, as shown in **Figures 8 and 9**, and thereby promote the long-term persistence of Mohave shoulderband snail (GQMC 2017).

USFWS (2017a) determined that the other potential threats, wildland fire, vegetation conversion, and climate change, would not result in population-level negative effects in the foreseeable future because the snail has "demonstrated its ability to withstand a broad range of environmental conditions, including drought, and existing vegetation within the snail's range is sparse, thus resulting in "only a small likelihood of negative effects to Mohave shoulderband snail and its habitat." The proposed project has little influence on these potential threats and thus is not expected to result in population-level negative effects in the foreseeable future.

Desert tortoise (Gopherus agassizii), Federally Threatened, State Threatened

No live tortoises or recent active sign of any type were observed in any of the surveys (Bamberg and Bamberg 1997, Hughes 2018). Desert tortoise surveys were conducted in areas with suitable habitat during both survey periods conducted for the 1997 report (Bamberg and Bamberg 1997). In a total of seven triangular surveys conducted in 1990, there were five possible tortoise signs as inactive burrows underneath creosote bush. The burrows were old, collapsed, and could have been made by other burrowing animals. No other types of tortoise sign were observed. Three similar surveys for tortoises in May 1995 did not reveal any tortoise sign either as burrows, scat, or other signs of activity. If tortoises had been present during this year of high plant growth, then their presence would have been detected. One mummified tortoise was found at the bottom of a mineshaft by Dr. Pat Brown in 1990 during her bat surveys, indicating an earlier presence of tortoises in this area (Bamberg and Bamberg 1997).

This area in Antelope Valley may have supported tortoise in the past, however recent surveys have not detected tortoises west of Highway 14, according to the USFWS (Kent Hughes, Kent Hughes Consulting, pers. comm. to Amanda Best, WestLand, 2018). The area around Soledad Mountain is not designated desert tortoise habitat, and the nearest designated preserve, the Desert Tortoise Natural Area, is north of California City approximately 20 miles to the northeast of the Modified Project Area

(Bamberg and Bamberg 1997). The nearest recorded Mojave desert tortoise is 9.5 miles away (Kent Hughes, Kent Hughes Consulting, pers. comm. to Amanda Best, WestLand, 2018).

Golden eagle (Aquila chrysaetos), Federal Bald and Golden Eagle Protection Act, CDFW Fully Protected Species, USFWS Bird of Conservation Concern

A pair of golden eagles nested and fledged two birds in spring of 1990 in a nest approximately one mile south of the proposed open pit (Bamberg and Bamberg 1997). This nesting site was not used in spring 1995. Golden eagles were observed soaring and hunting on Soledad Mountain and the adjacent Tehachapi Range to the northwest during surveys in 1989/90. No individuals were observed during the 2006 survey (Bamberg and Bamberg 2006) or 2018 surveys (Carroll 2018) (Kent Hughes, Kent Hughes Consulting, pers. comm. to Amanda Best, WestLand, 2018). Golden eagle, and their nests, are protected by the Bald and Golden Eagle Protection Act, but are not a threatened or endangered species. The Modified Project would result in a small reduction in the prey base of all large raptors in the area, but it is not expected to result in population-level negative effects to large raptors in the area. Regulatory requirements and existing mitigation measures that would be implemented as part of the Modified Project would further minimize and mitigate negative effects (See **Section 6.2.3**).

Mojave Ground Squirrel (Xerospermophilus mohavensis), State Threatened, Low potential

No Mojave ground squirrels were captured or observed during surveys (Bamberg and Bamberg 1997, Hughes 2018). The Permit Modification Area is on the edge of the Mojave ground squirrel's known historical range. Additional visual surveys have not detected this species near the Permit Modification Area (Bamberg and Bamberg 1997, 2006) (Kent Hughes, Kent Hughes Consulting, pers. comm. to Amanda Best, WestLand, 2018). The nearest recorded Mojave ground squirrel presence is eight miles northeast of the mine site and the accepted associated habitat was not observed within the Permit Modification Area (Kent Hughes, Kent Hughes Consulting, pers. comm. to Amanda Best, WestLand, 2018).

6.2.3. Regulatory Requirements and Existing Required Mitigation Measures

Regulatory Requirements

- A Reclamation Plan has been filed with Kern County in accordance with Surface Mining and Reclamation Act requirements.
- The Reclamation Plan requires revegetation of disturbed areas which will include the heap leach pads, facilities area, unnecessary roads, the tops of the overburden piles and areas of the pit.
- The seed mix will utilize only plant species native to the site area.
- Financial assurance is required to assure appropriate revegetation efforts are completed.
- Reclamation according to the Surface Mining and Reclamation Act of 1975, will return the project site to open habitat including native vegetation after mining is completed.

Existing Mitigation Measures/Conditions of Approval

GQMC has complied with and will continue to comply with mitigation measures that will mitigate Project impacts to biological and soil resources and further ensure that the Project would not result in population-level negative effects to wildlife or plants, including special status species. **Table 4** summarizes the specific measures that are implemented to mitigate impacts to wildlife, including special status species.

Table 4. Project Mitigation Measures for Special Status Species

Mitigation Measures that are Conditions of Project Approval	Comments/Progress
Condition No. 28 1997 FEIR/EIS MM #24 Mature Joshua trees which may be disturbed will be salvaged and replanted in undisturbed areas within the property boundary.	GQMC has transplanted a number of young Joshua trees and this is ongoing as required by this measure. No change in measure is required.
Condition No. 29 1997 FEIR/EIS MM #25 The use of seedlings for revegetation will be investigated in test plots	Test plots have been prepared to investigate the use of seedlings for revegetation. No change in measure is required.
Condition of Approval No. 31 Grading for the project will be minimized to the extent consistent with safe and efficient operations to limit the total area of surface disturbance.	GQMC has complied and will continue to comply with this requirement. No change in measure is required.
Condition of Approval No. 32 Routine distribution of cyanide solution on the top of the heap leach pad will occur via a drip irrigation system and the heap leach pads will be contoured to prevent surface ponding which could attract birds and small animals.	GQMC has complied and will continue to comply with this requirement. No change in measure is required.
Condition of Approval No. 33 Containers of reagents will be stored within controlled reagent storage areas and kept closed, stored in enclosed areas, or otherwise managed to prevent access by wildlife.	GQMC has complied and will continue to comply with this requirement. No change in measure is required.
Condition of Approval No. 34 Project waste will be properly managed at the site to control garbage that could attract wildlife.	GQMC has complied and will continue to comply with this requirement. No change in measure is required.
Condition of Approval No. 35 The maximum vehicle speed will be 25 mph.	GQMC has complied and will continue to comply with this requirement. No change in measure is required.

Table 4. Project Mitigation Measures for Special Status Species

Mitigation Measures that are Conditions of Project Approval	Comments/Progress
Condition No. 36 1997 FEIR/EIS MM #32 Wildlife habitat awareness will be included in the workers education program.	GQMC has prepared a power point presentation of wildlife and wildlife habitat on site. The power point presentation continues to be used for contractor and employee training purposes. No change in measure is required.
Condition No. 37 1997 FEIR/EIS MM #33 Some of the mine adits will be retained and gated and some of the mine shafts will be covered by grates to allow access by bats, while excluding people.	The first bat gate was installed in an adit located on property controlled by the company south of Soledad Mountain in 2007. GQMC is evaluating sites that will be suitable for constructing bat gates and that will not be disturbed by future mining. No change in measure is required.
Condition No. 90 MM 4.3-1 A pre-construction survey shall be conducted by a qualified biologist for burrowing owl activities to assess owl presence and need for implementation of Mitigation Measures 4.3-2 through 4.3-4 within thirty (30) days prior to ground disturbing activities using California Department of Fish and Game and California Burrowing Owl Consortium guidelines (CBOC 1993). The breeding period for burrowing owls is February 1 - August 31 with the peak being April 15 - July 15, the recommended survey window. Winter surveys may be conducted between December 1 and January 31. If construction of each phase of the project is delayed or suspended for more than 30 days after the survey, the area shall be resurveyed. Surveys shall be completed for occupied burrows within all construction areas and within 150 meters (500 feet) from the project work areas (where possible and appropriate based on habitat). All occupied burrows will be mapped on an aerial photo for submittal to California Department of Fish and Game and the Kem County Planning Department. At least 15 days prior to the expected start of any project-related ground disturbance activities, or restart of activities, the project proponent shall provide the burrowing owl survey results and mapping to California Department of Fish and Game and the Kem County Planning Department.	GQMC has complied and will continue to comply with this requirement. No change in measure is required.

Table 4. Project Mitigation Measures for Special Status Species

Mitigation Measures that are Conditions of Project Approval	Comments/Progress
Condition No. 92 MM4.3-2 If burrowing owl presence is indicated or assumed in required surveys, the following actions shall be taken by the project proponent to offset impacts during construction: a) If paired owls are present in areas scheduled for disturbance or degradation (e.g. grading) or within 50 meters (160 feet) of a permanent project feature, and nesting is not occurring, owls shall be relocated to a California Department of Fish and Game-approved location. b) If paired owls are present within 50 meters (160 feet) of a temporary project disturbance (e.g., parking areas) then active burrows shall be protected with fencing/cones/flagging and monitored by a qualified biologist throughout construction to identify losses from nest abandonment and/or loss of reproductive effort (e.g., killing of young). c) If paired owls are nesting in areas scheduled for disturbance or degradation, nest(s) shall be avoided from February 1 through August 31 by a minimum of a 75-meter (250-foot) buffer or until fledging has occurred. Following fledging, owls may be passively relocated according to California Department of Fish and Game guidelines.	GQMC has complied and will continue to comply with this requirement. No change in measure is required.
Condition No. 93 MM 4.3-3 If any protected burrows are discovered during surveys, the project proponent shall implement all avoidance and mitigation currently stipulated by California Department of Fish and Game. No work would be completed within 500 feet of the nest without approval from California Department of Fish and Game and an authorized raptor biologist monitoring the nesting birds. These measures shall be initiated prior to the initiation of ground disturbance activities in the vicinity of the nest.	GQMC has complied and will continue to comply with this requirement. No change in measure is required.
Condition No. 94 MM 4.3-4 If burrows cannot be avoided, the project proponent shall implement mitigation measures from the California Burrowing Owl Consortium' s Burrowing Owl Survey Protocol and Mitigation Guidelines (CBOC 1993), including, but not limited to, "passively relocating" owls during pre- construction surveys. The timing of the burrowing owl relocation is critical and shall not occur during this species' breeding season (February 1 through August 31).	GQMC has complied and will continue to comply with this requirement. No change in measure is required.

Table 4. Project Mitigation Measures for Special Status Species

Mitigation Measures that are Conditions of Project Approval	Comments/Progress
Condition No. 102 The project proponent shall install netting or other protective measures approved by the Kem County Planning Department, around the heap leach facility pump box in a manner that prevents wildlife access. Said protective measures shall be continuously maintained in good condition.	GQMC has complied and will continue to comply with this requirement. No change in measure is required.

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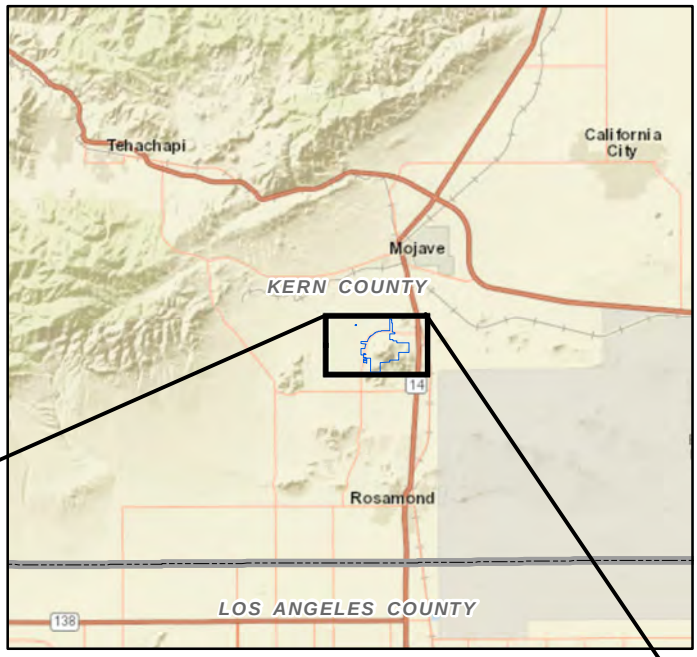
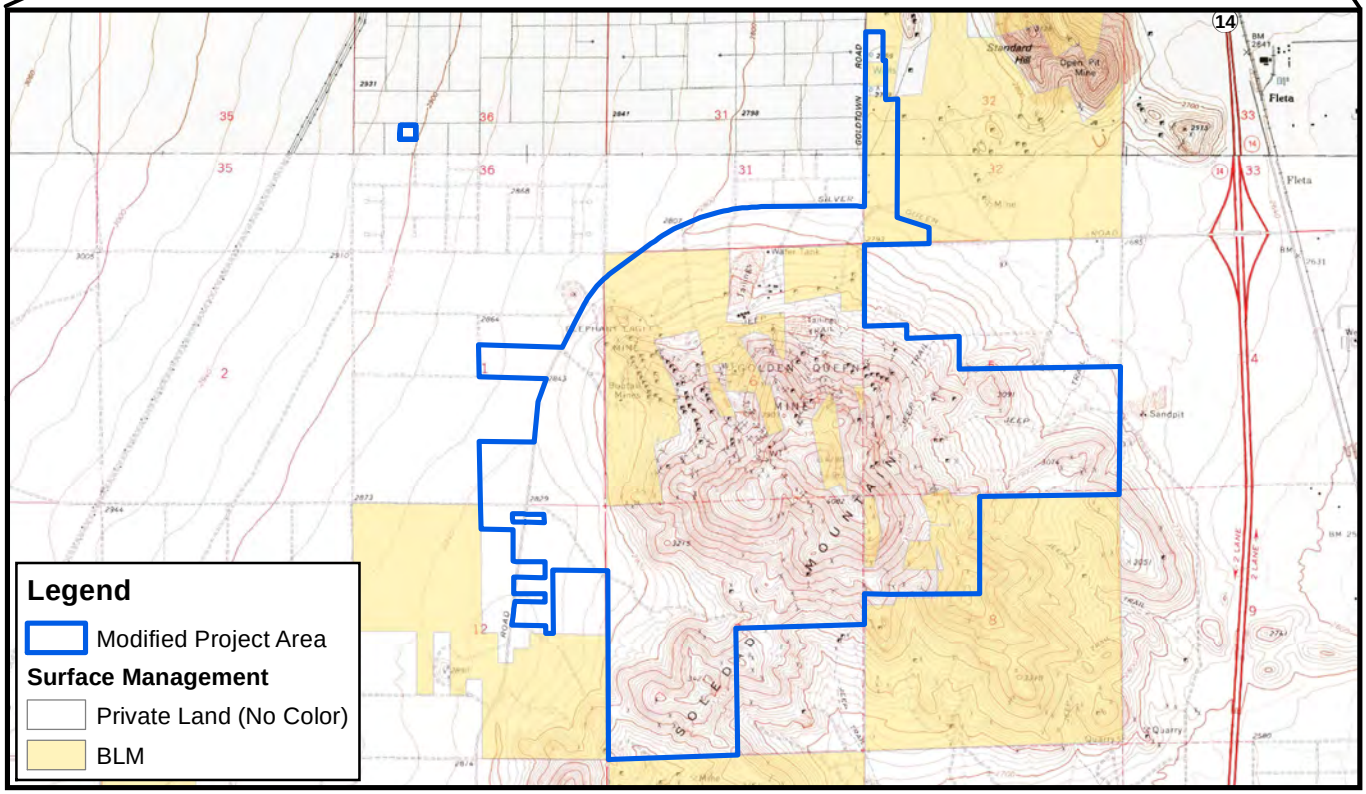
FIGURES

CALIFORNIA

PROJECT VICINITY



Approximate Scale 1 Inch = 10 Miles



T10N, R12W, Portions of Sections 5-8,
T10N, R13W, Portions of Sections 1 and 12,
T11N, R12W, Portions of Sections 31 and 32,
T11N, R13W, a Portion of Section 36,
Kern County, California
Mojave and Soledad Mountain USGS 7.5' Quadrangles
Surface Management: BLM 2017, WRI modified 2018
Image Source: ArcGIS Online, World Street Map

WestLand Resources

N

0 2,000 4,000 Feet

0 750 1,500 Meters

GOLDEN QUEEN MINING COMPANY, LLC

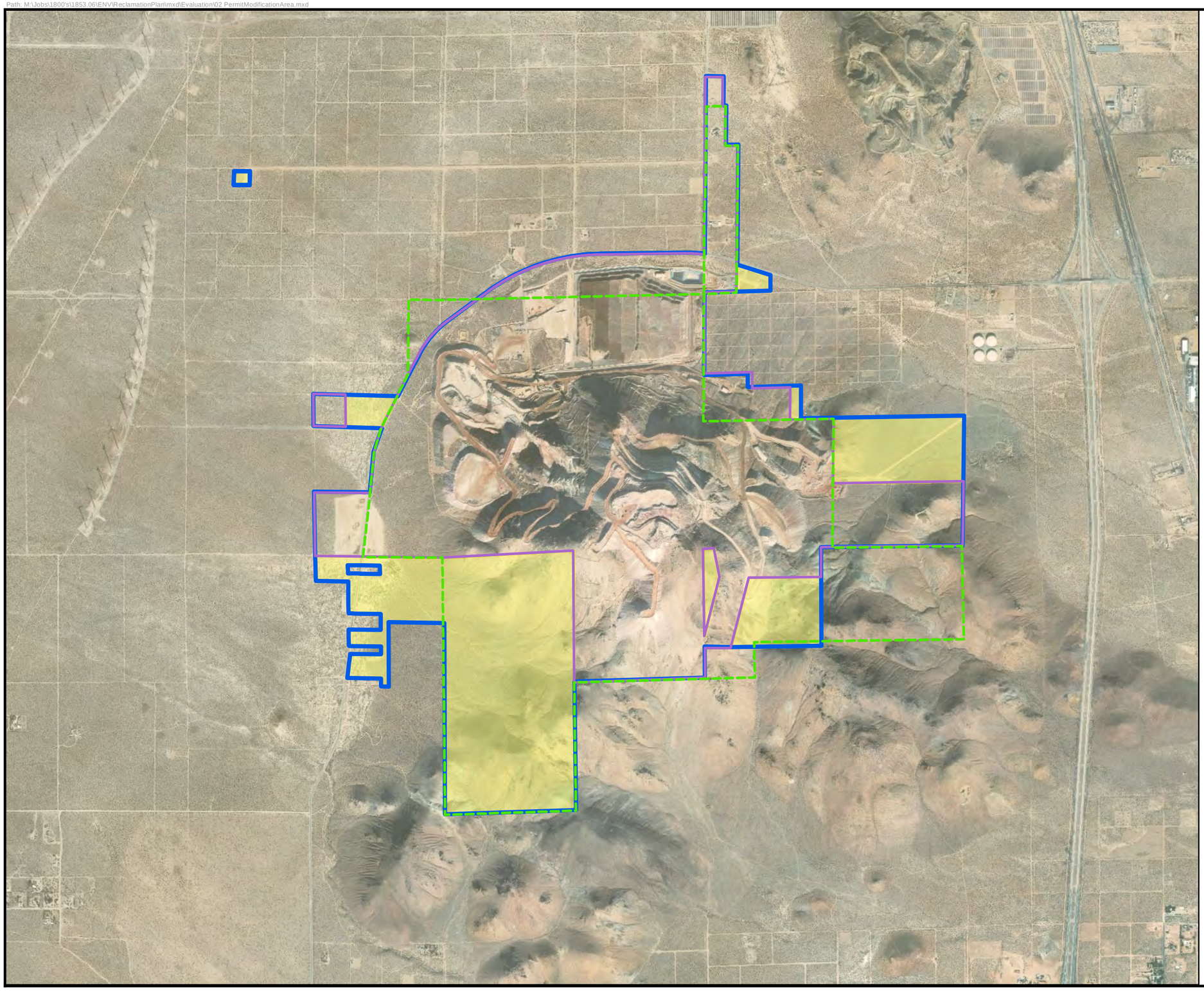
Biological and Soil Resource Evaluation
Soledad Mountain Project

VICINITY MAP

Figure 1

Path: M:\Jobs\1800's\1853.06\ENV\ReclamationPlan\mxd\Evaluation\02 PermitModificationArea.mxd

Date: 11/19/2019 User: evinson



T10N, R12W, Portions of Sections 5, 6, 7, and 8,
T10N, R13W, Portions of Sections 1 and 12,
T11N, R12W, Portions of Sections 31 and 32,
T11N, R13W, a Portion of Section 36,
Kern County, California
Projection: California State Plane Zone V, NAD83
2019 Digital Globe imagery provided by ArcGIS Online

Legend

- Modified Project Area
- County Recorded Permit Boundary (2010 Project Boundary)
- FEIS/EIR Permit Area (1997 Project Boundary)
- Permit Modification Area (conservatively based on 2010 Project Boundary)

N

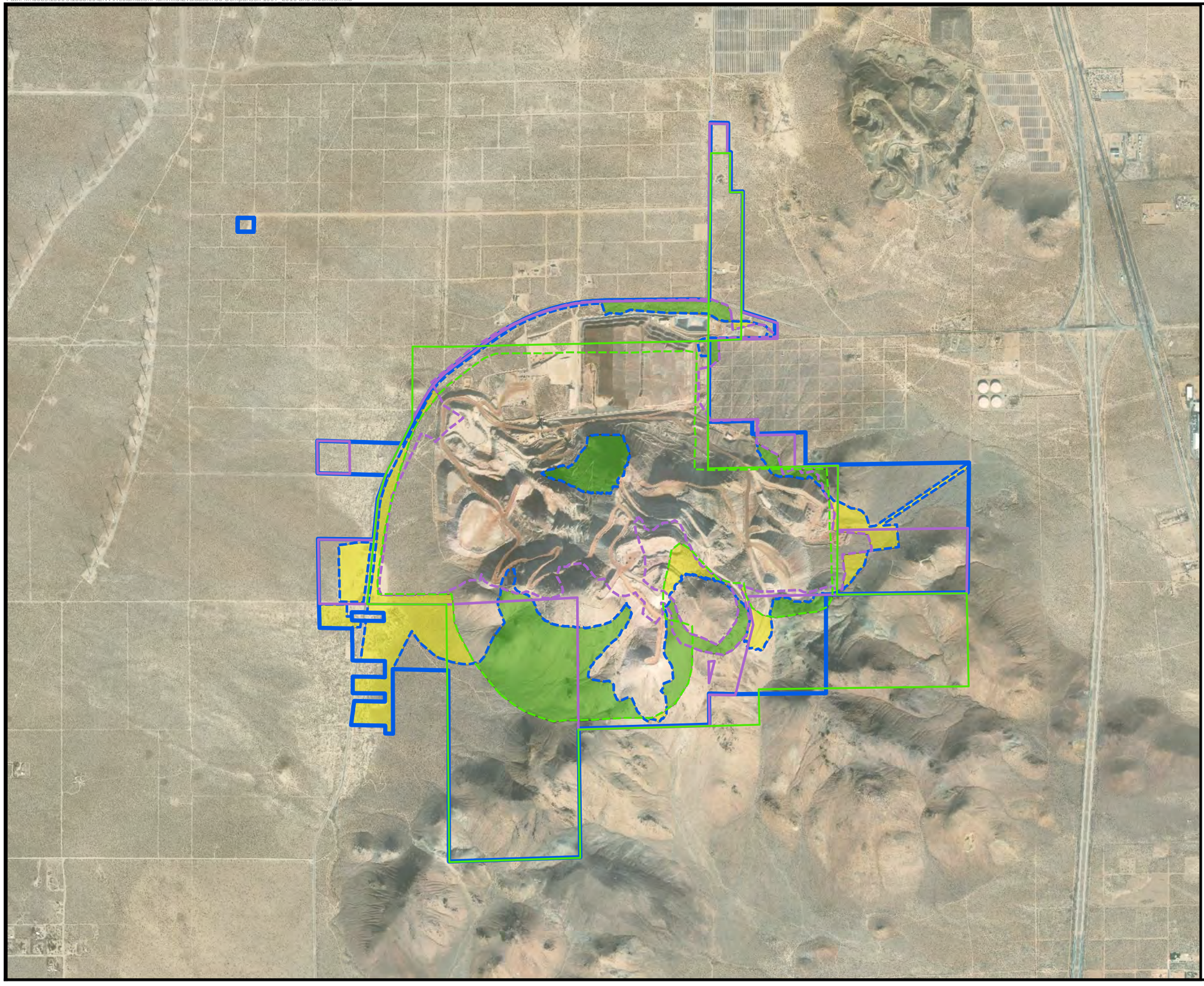
0 1,000 2,000 Feet

0 300 600 Meters

WestLand Resources

GOLDEN QUEEN MINING COMPANY, LLC
Biological and Soil Resource Evaluation
Soledad Mountain Project

PERMIT MODIFICATION AREA
Figure 2



T10N, R12W, Portions of Sections 5-8,
T10N, R13W, Portions of Sections 1 and 12,
T11N, R12W, Portions of Sections 31 and 32,
T11N, R13W, a Portion of Section 36,
Kern County, California
Data Source: Soledad Mtn. Golden Queen Mines LTD, and SESPE
Image Source: ArcGIS Online, World Imagery,
07/31/2016 & 03/07/2017

Note: 1997 Permit Area and Project Footprint were digitized from Exhibit 1.0-2 (Property Boundaries and Federal Lands) of the 1997 EIS/EIR. The 1997 acreages provided in the legend were taken from Table 3-3 of the 2010 SEIR. The 2019 Permit Area and acreage provided in the legend is from Kenton R. Maevers (PLS 7850); the 2019 Project Footprint is from Golden Queen Mining Company, LLC, and the 2019 Project Footprint acreage provided in the legend was calculated in GIS by WestLand Resources Inc.

Legend

- New Impact Areas (155 AC.)
- No Longer Impacted (214 AC.)
- 2019 Soledad Mountain Modified Permit Area (2009.5 AC.)
- 2019 Project Footprint (1188 AC.)
- 2010 SEIR Permit Area (1440 AC.)
- 2010 Project Footprint (950 AC.)
- 1997 FEIS/EIR Permit Area (1690 AC.)
- 1997 Project Footprint (930 AC.)

N

0 1,000 2,000 Feet

0 300 600 Meters

WestLand Resources

GOLDEN QUEEN MINING COMPANY, LLC

Biological and Soil Resource Evaluation
Soledad Mountain Project

COMPARISON OF THE 1997, 2010
AND MODIFIED PROJECTS
Figure 3

Path: M:\Jobs\1800's\1853.06\ENV\ReclamationPlan\mxd\Evaluation\04 Soils.mxd

Date: 11/25/2019 User: evinson

T10N, R12W, Portions of Sections 5-8,
T10N, R13W, Portions of Sections 1 and 12,
T11N, R12W, Portions of Sections 31 and 32,
T11N, R13W, a Portion of Section 36,
Kern County, California
Soil Survey Areas: Edwards Air Force Base, CA (CA669), and Kern County, CA (CA670)
Image Source: ArcGIS Online, World Imagery, 07/31/2016 & 03/07/2017

Legend

Modified Project Area

NRCS Soils Data

- 104; Arizo gravelly loamy sand, 2 to 9 percent slopes
- 113; DeStazo complex, 0 to 5 percent slopes
- 114; Cajon loamy sand, 0 to 5 percent slopes
- 116; Cajon gravelly loamy sand, 0 to 9 percent slopes
- 117; Helendale-Cajon complex, 2 to 5 percent slopes
- 125; DeStazo sandy loam, 0 to 2 percent slopes
- 128; Dumps, mine
- 137; Garlock loamy sand, 2 to 9 percent slopes
- 157; Pits
- 158; Playas
- 164; Porterville cobbly clay, 5 to 9 percent slopes
- 171; Rosamond clay loam
- 172; Rosamond clay loam, saline-alkali
- 185; Torriorthents-Rock outcrop complex, very steep

N

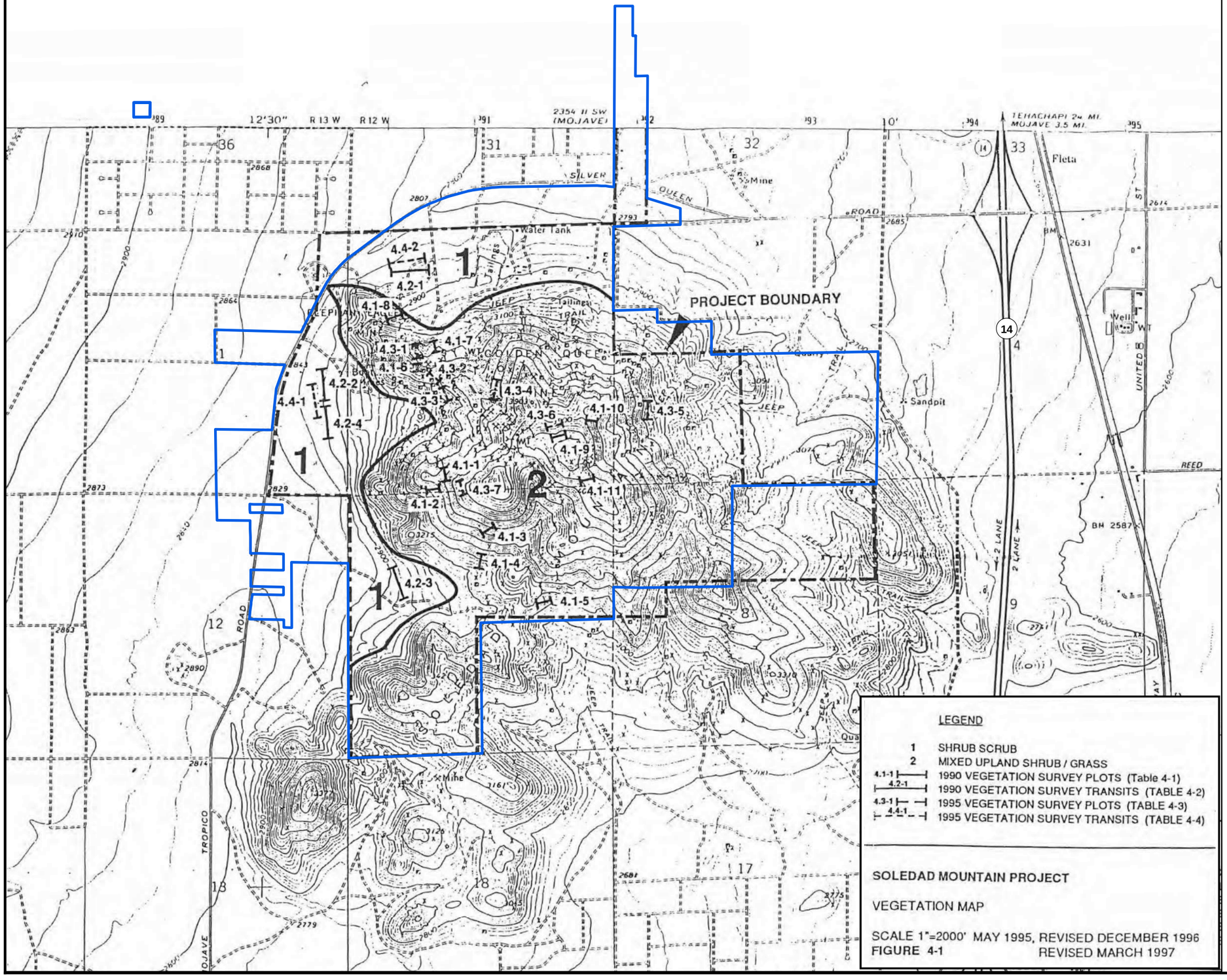
0 1,000 2,000 Feet

0 300 600 Meters

WestLand Resources

GOLDEN QUEEN MINING COMPANY, LLC
Biological and Soil Resource Evaluation
Soledad Mountain Project

SOILS MAP
Figure 4



LEGEND

1	SHRUB SCRUB
2	MIXED UPLAND SHRUB / GRASS
4.1-1	1990 VEGETATION SURVEY PLOTS (Table 4-1)
4.2-1	1990 VEGETATION SURVEY TRANSITS (TABLE 4-2)
4.3-1	1995 VEGETATION SURVEY PLOTS (TABLE 4-3)
4.4-1	1995 VEGETATION SURVEY TRANSITS (TABLE 4-4)

SOLEDAD MOUNTAIN PROJECT

VEGETATION MAP

SCALE 1"=2000' MAY 1995, REVISED DECEMBER 1996
FIGURE 4-1 REVISED MARCH 1997

T10N, R12W, Portions of Sections 5-8,
T10N, R13W, Portions of Sections 1 and 12,
T11N, R12W, Portions of Sections 31 and 32,
T11N, R13W, a Portion of Section 36,
Kern County, California
Image Source: Bamberg, Samuel A., and S. Lynn Bamberg. 1997. Biological and Soil Resource Evaluation for Soledad Mountain Project. *Prepared for Golden Queen Mining Co. Inc.* Littleton, Colorado. April 1997. 68 pp.

Legend

Modified Project Area

N

0 1,000 2,000 Feet

0 300 600 Meters

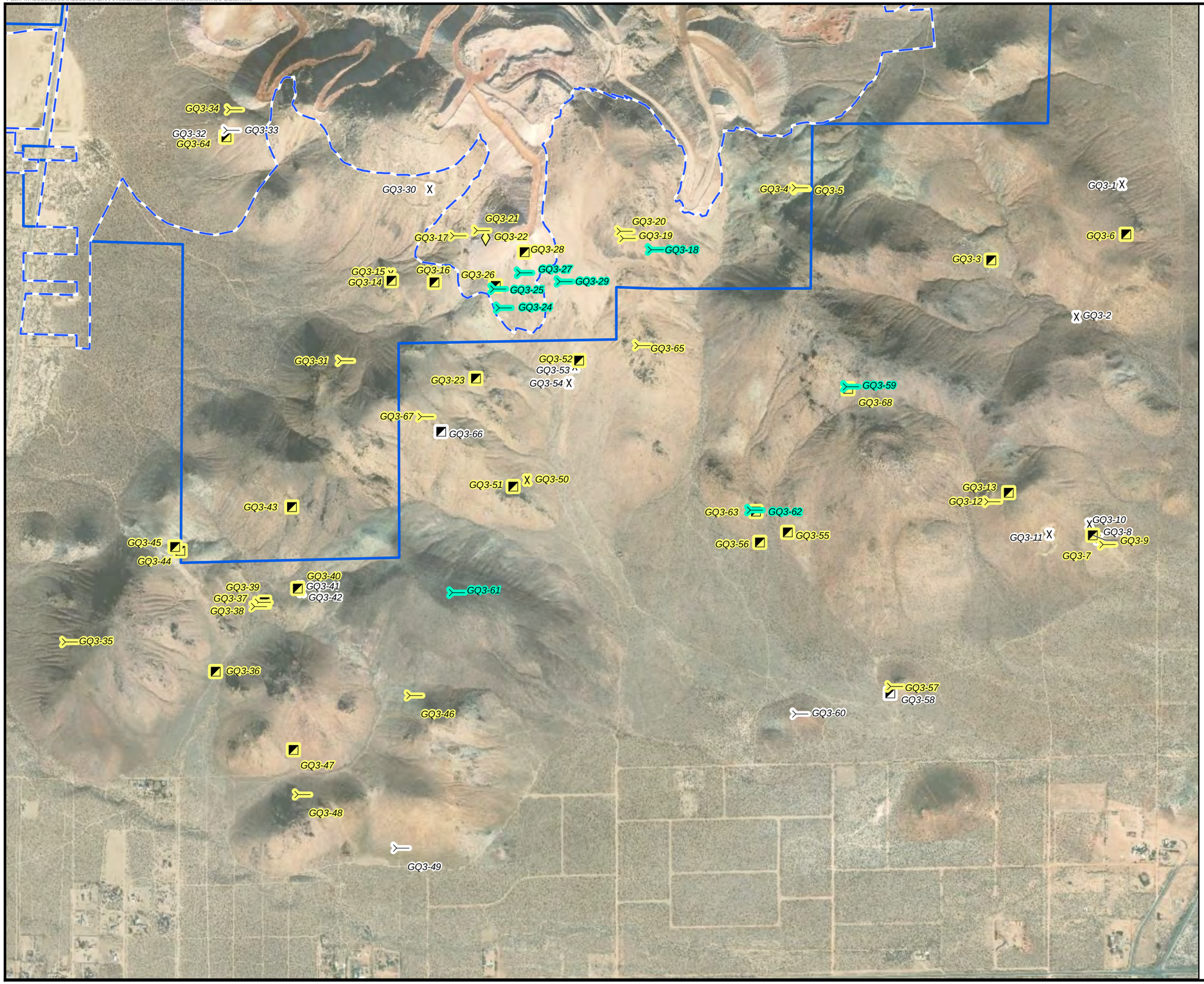
WestLand Resources

GOLDEN QUEEN MINING COMPANY, LLC
Biological and Soil Resource Evaluation
Soledad Mountain Project

VEGETATION
Figure 5

Path: M:\Jobs\1800's\1853.06\ENV\ReclamationPlan\mxd\Evaluation\06 Bats.mxd

Date: 11/25/2019 User: evinson



T10N, R12W, Portions of Sections 5-8,
T10N, R13W, Portions of Sections 1 and 12,
T11N, R12W, Portions of Sections 31 and 32,
T11N, R13W, a Portion of Section 36,
Kern County, California
Data Source: Soledad Mtn. Golden Queen Mines LTD, SESPE and Sherwin 2019 Evaluation and Treatment of Mines Surveyed in the Southern Expansion Area of the Golden Queen Mine.
Image Source: ArcGIS Online, World Imagery, 07/31/2016 & 03/07/2017

Legend

- Modified Project Area
- Modified Project Footprint

Shaft
- Potential bat habitat present
- No bat habitat present

Prospect
- Potential bat habitat present
- No bat habitat present

Natural Cave
- Potential bat habitat present

Adit
- Confirmed bat habitat present
- Potential bat habitat present
- No bat habitat present

N

0 600 1,200 Feet

0 200 400 Meters

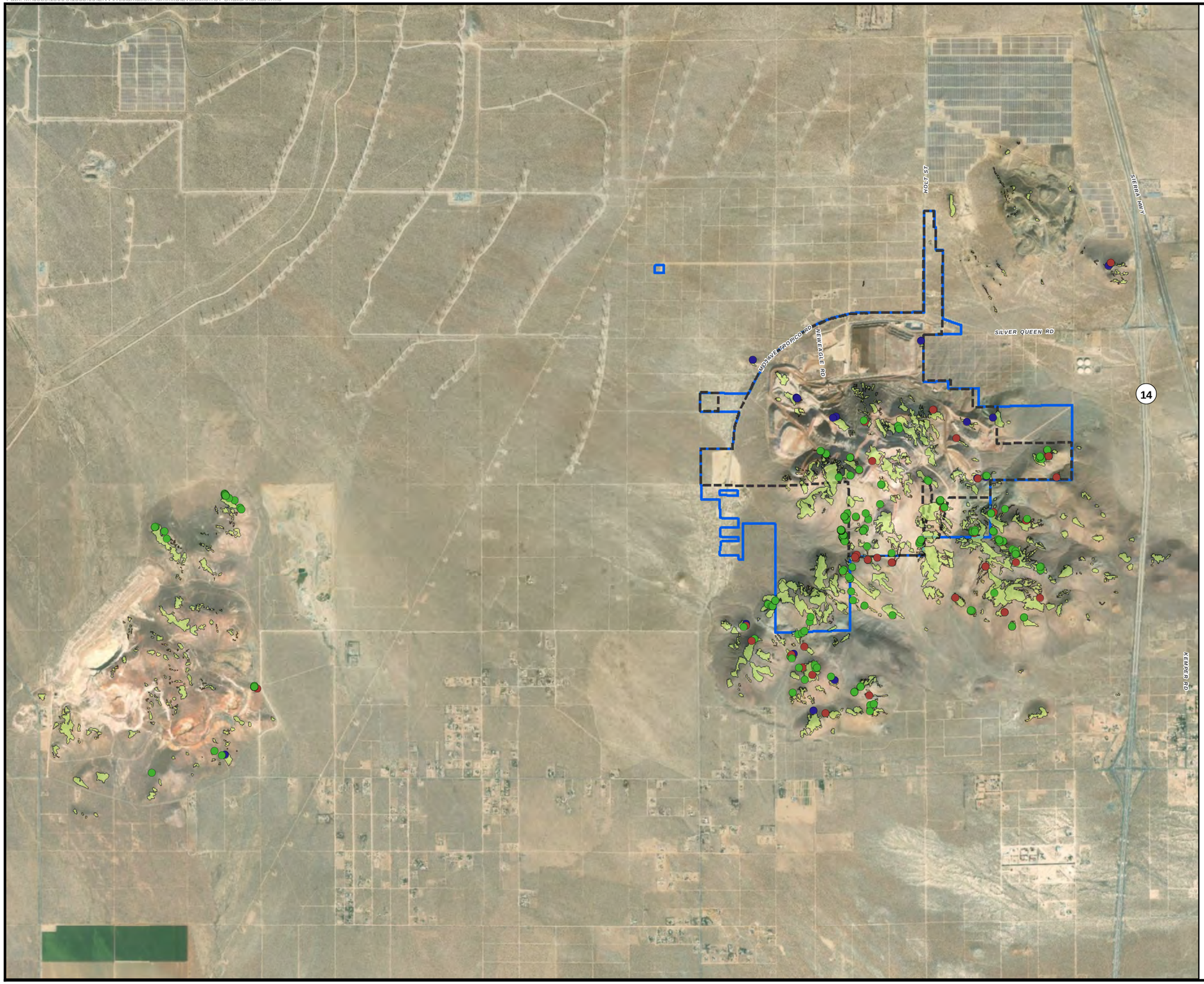
WestLand Resources

GOLDEN QUEEN MINING COMPANY, LLC
Biological and Soil Resource Evaluation
Soledad Mountain Project

BAT SURVEY RESULTS
Figure 6

Path: M:\Jobs\1800's\1853.06\ENV\ReclamationPlan\mxd\Evaluation\07 SnailsAndHab.mxd

Date: 11/25/2019 User: evinson



T10N, R12W, Portions of Sections 5-8,
T10N, R13W, Portions of Sections 1 and 12,
T11N, R12W, Portions of Sections 31 and 32,
T11N, R13W, a Portion of Section 36,
Kern County, California
Data Source: Soledad Mtn. Golden Queen Mines LTD, and SESPE
Image Source: ArcGIS Online, World Imagery, 07/31/2016 & 03/07/2017

Legend

Snail Survey Results

- Live Snail
- Shell Only
- Snail Evidence/Type Unknown
- Mohave Shoulderband Habitat
- Modified Project Area
- County Recorded Permit Boundary

N

0 1,750 3,500 Feet

0 500 1,000 Meters

WestLand Resources

GOLDEN QUEEN MINING COMPANY, LLC

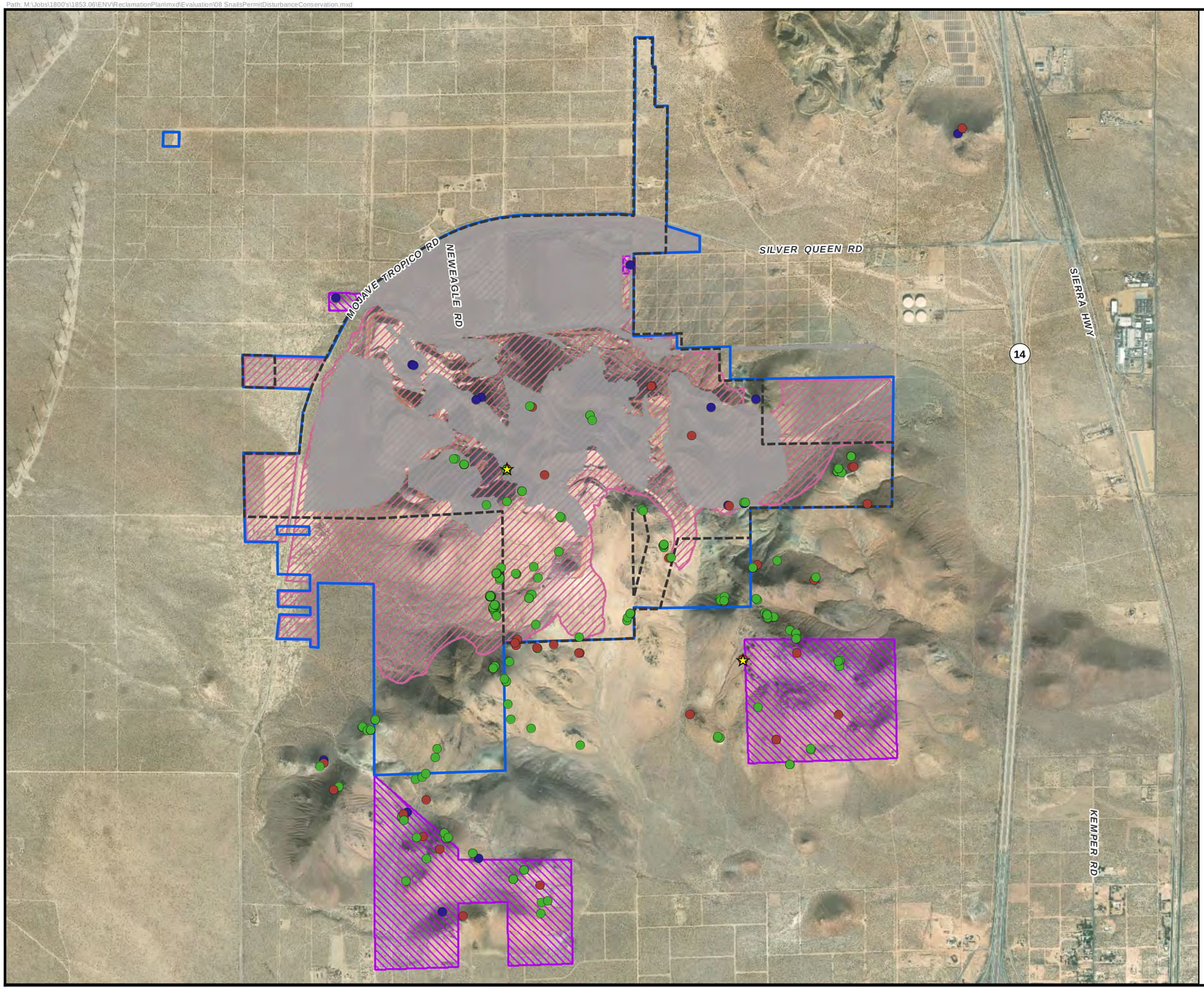
Biological and Soil Resource Evaluation
Soledad Mountain Project

KNOWN LOCATIONS OF MOHAVE SHOULDERBAND SNAILS AND SHELLS

Figure 7

Path: M:\Jobs\1800's\1853.06\ENV\ReclamationPlan\mxd\Evaluation\08 SnailsPermitDisturbanceConservation.mxd

Date: 11/26/2019 User: evinson



T10N, R12W, Portions of Sections 5-8,
T10N, R13W, Portions of Sections 1 and 12,
T11N, R12W, Portions of Sections 31 and 32,
T11N, R13W, a Portion of Section 36,
Kern County, California
Data Source: Soledad Mtn. Golden Queen Mines LTD, and SESPE
Image Source: ArcGIS Online, World Imagery, 07/31/2016 & 03/07/2017

Legend

- Breeding Snails

Snail Survey Results

- Live Snail
- Shell Only
- Snail Evidence/Type Unknown
- Modified Project Area
- County Recorded Permit Boundary
- Disturbance Footprint of Project 2014
- 20 MT Disturbance Boundary
- Proposed Conservation Area

N

0 1,000 2,000 Feet

0 300 600 Meters

WestLand Resources

GOLDEN QUEEN MINING COMPANY, LLC

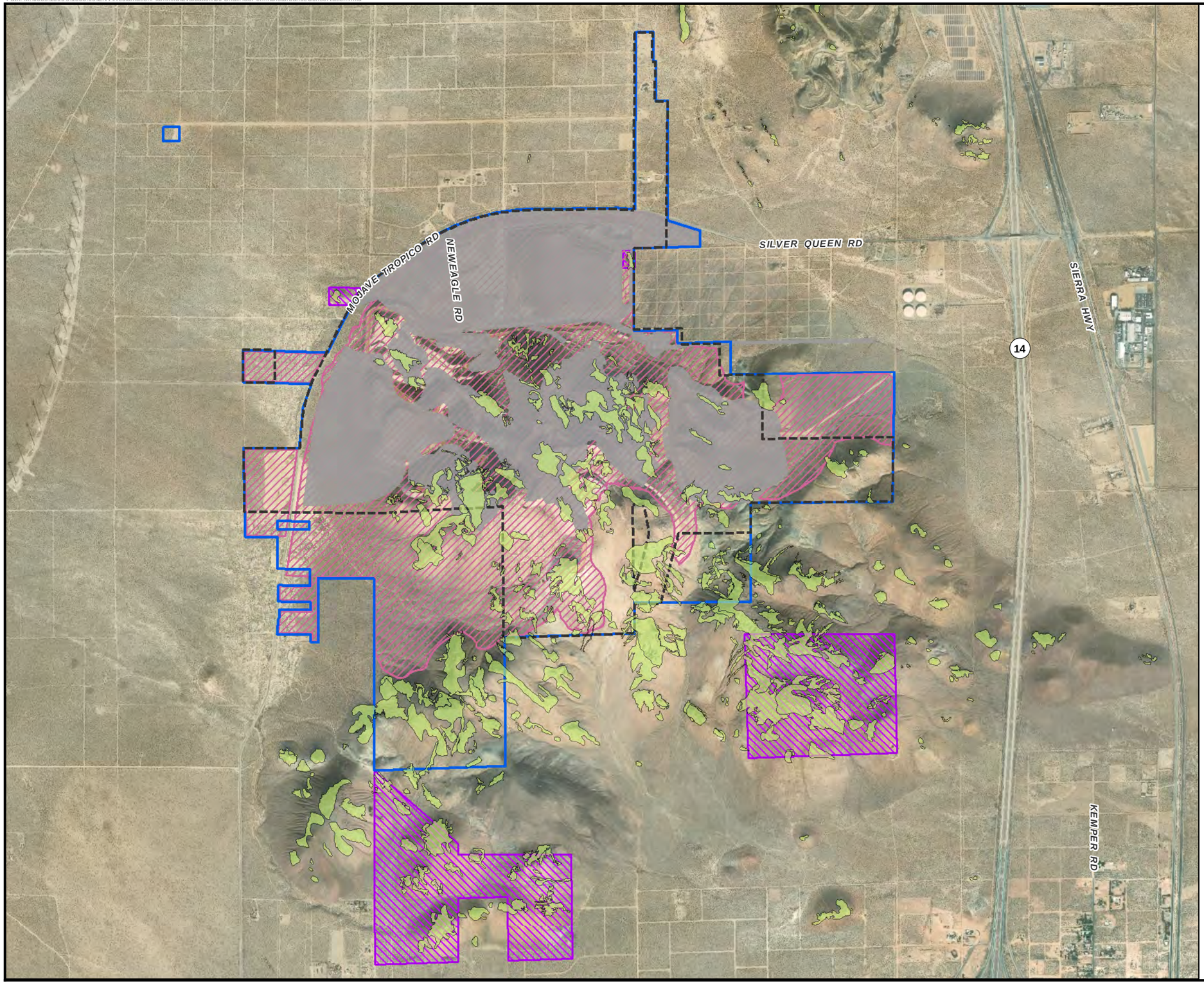
Biological and Soil Resource Evaluation
Soledad Mountain Project

MOHAVE SHOULDERBAND LOCATIONS AND PROJECT FOOTPRNT OF DISTURBANCE

Figure 8

Path: M:\Jobs\1800's\1853.06\ENV\ReclamationPlan\mxd\Evaluation\09 SnailHabPermitDisturbanceConservation.mxd

Date: 11/26/2019 User: evinson



T10N, R12W, Portions of Sections 5-8,
T10N, R13W, Portions of Sections 1 and 12,
T11N, R12W, Portions of Sections 31 and 32,
T11N, R13W, a Portion of Section 36,
Kern County, California
Data Source: Soledad Mtn. Golden Queen Mines LTD, and SESPE
Image Source: ArcGIS Online, World Imagery, 07/31/2016 & 03/07/2017

Legend

- Mohave Shoulderband Habitat
- Modified Project Area
- County Recorded Permit Boundary
- Disturbance Footprint of Project 2014
- 20 MT Disturbance Boundary
- Proposed Conservation Area

N

0 1,000 2,000 Feet

0 300 600 Meters

WestLand Resources

GOLDEN QUEEN MINING COMPANY, LLC

Biological and Soil Resource Evaluation
Soledad Mountain Project

MOHAVE SHOULDERBAND HABITAT AND PROJECT FOOTPRINT OF DISTURBANCE

Figure 9

APPENDIX A

USFWS 12-Month Finding on the Petition to List the Mohave Shoulderband Snail

(82 FR 57562 57565)

U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Helminthoglypta greggi*

COMMON NAME: Mohave shoulderband snail

LEAD REGION: R8, Pacific Southwest Region

DATE INFORMATION CURRENT AS OF: September 21, 2017

STATUS/ACTION

_X_ Species assessment - determined either we do not have sufficient information on threats or **the information on the threats does not support a proposal to list the species** and, therefore, it was not elevated to Candidate status

___ Listed species petitioned for uplisting for which we have made a warranted-but-precluded finding for uplisting (this is part of the annual resubmitted petition finding)

___ Candidate that received funding for a proposed listing determination; assessment not updated

___ New candidate

___ Continuing candidate

___ Listing priority number change
Former LPN: ___
New LPN: ___

___ Candidate removal: Former LPN: ___
___ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.
___U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.
___ F – Range is no longer a U.S. territory.
___ I – Insufficient information exists on biological vulnerability and threats to support listing.

___ M – Taxon mistakenly included in past notice of review.
___ N – Taxon does not meet the Act's definition of "species."
___ X – Taxon believed to be extinct.

Date when the species first became a Candidate (as currently defined): N/A

PETITION INFORMATION

___ Non-petitioned
_X_ Petitioned; Date petition received: January 31, 2014
90-day substantial finding FR publication date: April 10, 2015
12-month warranted but precluded finding FR publication date: N/A

FOR PETITIONED SPECIES:

a. **Is listing warranted?** NO

b. To date, has publication of a finding been precluded by other higher priority listing actions? Yes. We notified the petitioner in a letter dated April 4, 2014, that work on this species was delayed due to court orders, judicially approved settlement agreements, other statutory deadlines, and funding for the remainder of fiscal year 2014. Once funding was available in fiscal year 2015, we proceeded with work on a 90-day finding. Subsequently, the finding was delayed twice as a result of the Center for Biological Diversity (CBD; plaintiffs) electing to modify (with court approval) the terms and conditions of a settlement agreement (CBD vs. S.M.R. Jewell, *et al.*, Case 1:15-cv-00229-EGS) to future dates. The current settlement date established by court order is November 30, 2017.

c. Why is listing precluded? N/A

ANIMAL/PLANT GROUP AND FAMILY:

Gastropods (snails, slugs, escargots, etc.) within the family Helminthoglyptidae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE:

Kern County, California

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE:

Kern County, California

LAND OWNERSHIP:

Private, Bureau of Land Management, and Department of Defense

LEAD REGION CONTACT:

Dan Russell, Species Assessment Team (SAT) Regional Liaison, 916–978–6191

LEAD FIELD OFFICE CONTACT:

Betty Grizzle, Fish and Wildlife Biologist, 760–431–9440 x215

BIOLOGICAL INFORMATION:

The Species Status Assessment Report (SSA Report) for the Mohave shoulderband snail is a summary of the information assembled and reviewed by us and incorporates the best scientific and commercial information available for this species. For further information, please refer to the SSA Report (Service 2017, entire).

Species Description

The Mohave shoulderband snail, *Helminthoglypta greggi*, is a small (diameter ranging from 0.48 to 0.58 inches (in) (12.3 to 14.6 millimeters (mm)), brown desert snail. The type description was based on morphometric shell characteristics (see Willett 1931, p. 124 for details). In general, there is lack of comprehensive biological, ecological, and natural history information beyond basic species descriptions for desert helminthoglyptids, including the Mohave shoulderband snail.

Photo Credit: *E. Fiesler, BioVeyda Biological Inventories and Consulting*

Taxonomy

We have carefully reviewed the available taxonomic information and conclude that the Mohave shoulderband snail (*Helminthoglypta greggi*) is a valid taxon (see Service 2017, p. 9).

The Mohave shoulderband snail type (#1031, Los Angeles County Museum) and 24 additional specimens collected in 1931 were described from "rock slides on the side of a hill" 3.5 mi (5.63 km) south of Mojave (Willett 1931, p. 125), in Kern County, California. Roth and Sadeghian (2006, pp. 3–7, 25–26) present a supraspecific taxonomic classification summary and checklist of land snails and slugs of California, placing the Mohave shoulderband snail in the subgenus *Coyote*, genus *Helminthoglypta*, family Helminthoglyptidae. The reproductive and molecular anatomy of *Helminthoglypta greggi* is described in Goodward *et al.* (2017, pp. 12–14), noting differences from a similar snail in reproductive organs and mucous gland bulbs, as well as unique ornamentation of the whorl patterns of its shell.

Habitat/Life History

The Mohave shoulderband snail occurs in rock outcrops and talus slopes found on volcanic formations (plugs) composed primarily of rhyolite material, in the western Mojave Desert. Very little is known about the species' life history and ecological needs. Because of the hot, arid conditions in the Mojave Desert, desert snails, including the Mohave shoulderband snail, are active primarily during the brief winter season and enter a state of dormancy during the remainder of the year, sealing themselves to rocks to prevent desiccation. They emerge during and following periods of rainfall in search of food resources or for mating and egg-laying activities. The Mohave shoulderband snail's life history is therefore dependent on local precipitation and subsequent increases in humidity within rock outcrop habitats. Although water represents the primary limiting resource in desert environments, other climatic and physical factors such as temperature and topography, as well as food availability, can influence the ecology of desert snails, and a combination of these factors can be important.

Based on studies of other desert snails, lichens that are found on rocks represent a likely food source for the Mohave shoulderband snail. These communities are known to occupy rock environments of the Mojave Desert and are found primarily on north-facing rather than south-facing slopes, due to availability of moisture and protection from intense radiation. Desert microbiotic soil crusts, which consist of

cyanobacteria, algae, microfungi, lichens, or mosses, may also be (although not confirmed) a potential food source for the Mohave shoulderband snail.

Overall, the best available information indicates that the Mohave shoulderband snail's physical and ecological needs include:
(1) Volcanic rock outcrops (primarily rhyolite) or talus slopes in the western Mojave Desert, including, *but not limited to*, north-facing slopes, which provide areas of moisture and protection from intense radiation;
(2) Adequate food source, including mosses, lichens, fungi, algae or other plant materials growing on rock surfaces or within microbiotic crusts; and
(3) Adequate water availability, which provides opportunities for dispersal, particularly after precipitation events, to locate food and for locating potential mates for reproductive activities.

Historical Range/Distribution

The Mohave shoulderband snail is found within the western region of the Mojave Desert and has been reported at Middle Butte, Standard Hill, and Soledad Mountain. Its distribution and habitat conditions have been shaped by significant geological and landscape-changing changes that occurred over millions of years. It is also likely a relict species from a time in the past when this region was much wetter (e.g., Pliocene and Pleistocene pluvial episodes).

Movement of land snails is primarily dependent on conditions of adequate moisture and humidity (Naranjo-Garcia 1988, p. 76). With increasingly drier conditions by the end of the Pleistocene Epoch (17,100 to 17,850 years ago) in many of today's southwestern desert regions, land snails had to adapt "in place" in order to survive these environments.

Current Range/Distribution

The Mohave shoulderband snail's current range/distribution is likely the same as the historical range/distribution, i.e., the western region of the Mojave Desert at Middle Butte, Standard Hill, and Soledad Mountain. Suitable/modeled habitat extends beyond these three locations onto some adjacent lands, although there have been limited systematic surveys beyond the three locations.

Current Conditions—Abundance and Suitable Habitat

No population estimates exist for Mohave shoulderband snail. Other than the minimal description provided in the original discovery of the species in 1931, with 25 snails collected (Willett 1931, entire), we are unaware of any other information prior to 2013 describing the abundance and distribution of the Mohave shoulderband snail. In 2013, opportunistic surveys reported 15 observations on Soledad Mountain. Subsequently, during winter 2015/2016 9 observations (live snails or shells) were reported for Soledad Mountain. For Middle Butte and Standard Hill locations, the earliest documented record includes one observation for each location during spring 2013.

Additional surveys were conducted in 2017 on Soledad Mountain and the surrounding areas that may provide suitable habitat. A total of 76 rock features were surveyed on Soledad Mountain in January/February and live snails and shells were reported at 66 of the locations (87 percent) (WestLand Resources Inc. 2017, p. 14). Surveys were also conducted on the northeast side of the mountain near Middle Butte (including Cactus Gold Mine) and snail shells were reported from several locations within two of the three survey areas (WestLand Resources Inc. 2017, p. 14, Figure 6). No evidence of the Mohave shoulderband snail (live snails or shells) were found within surveyed areas at Edwards Air Force Base, Tropico Hill (south of Rosemond Hills, see Figure 6 in the SSA Report), and directly north of Soledad

Mountain near Standard Hill (Westland Resources Inc. 2017, pp. 4, 13, 14). However, with regard to the 2017 surveys conducted at Standard Hill, it is important to note that the geographic area surveyed on Standard Hill was limited to the western side due to land ownership restrictions (WestLand Resources Inc. 2017, p. 21). Therefore, based on the 2013 observation (from southeast location of Standard Hill), we presume that Standard Hill is likely still occupied.

As part of our status assessment, we modeled potentially suitable habitat for Mohave shoulderband snail. Using rock outcrops, "northness", and geology (rhyolite formation), we estimated 210 acres (ac) (85 hectares (ha)) of potentially suitable habitat, rangewide, with approximately 51 ac (20.6 ha) managed by BLM, 1.2 ac (0.5 ha) within Edwards Air Force Base, and 157.8 ac (63.8 ha), or 75 percent, as private lands. A more detailed habitat modeling effort specific to Soledad Mountain was also performed, which estimated 187 ac (76 ha) of potentially suitable habitat at Soledad Mountain only. This modeling was based on a general understanding that the Mohave shoulderband snail prefers north-facing slopes. However, during the January/February 2017 surveys, snails were found on both north- and south-facing slopes. Therefore, the modeling may have resulted in an underestimate of potentially suitable habitat.

Current Conditions—Threats

The primary current impact to the Mohave shoulderband snail is hard rock mining (i.e., gold and silver mining by the Golden Queen Mine (GQM)), which affects a portion of its habitat within one of the three locations where the species has been observed. Based on our rangewide geospatial analysis, we determined that habitat loss or habitat modification from gold and silver mining activities (GQM Project) is expected to result in the loss of 40.8 ac (16.5 ha) or 19.4 percent of the rangewide 210 ac (85 ha) estimated Mohave shoulderband snail potentially suitable habitat. [NOTE: Using a refined model specifically for Soledad Mountain that incorporates talus features, the expected loss is 48 ac (19.5 ha).] The specific 40.8-ac (16.5-ha) GQM Project footprint overlaps 15 of 90 (17 percent) Mohave shoulderband snail observations.

Other potential impacts that may result in modification, degradation, or loss of habitat or loss of individuals include off-highway vehicle (OHV) activity, wildland fire, and vegetation type conversion. OHV activity and other access are restricted at the Soledad Mountain location. We determined that in all locations where the species has been observed, OHV activity is not likely to impact rock outcrops that support the Mohave shoulderband snail. Due to the Mohave shoulderband snail's life history characteristics and its rocky habitat and the wildland fire suppression and nonnative plant control measures being implemented on private lands under the control of GQM, and on lands managed by the BLM in the Mojave Desert, wildland fire and vegetation type conversion are not likely to substantially impact the Mohave shoulderband snail. Additionally, this species has been observed in areas on Soledad Mountain previously burned by wildland fires. The best available information indicates that disease, predation, and overutilization for commercial, recreational, scientific, or educational purposes are not considered stressors to the species. Of all the stressors evaluated, mining activity is likely to have the greatest impact on the Mohave shoulderband snail and its habitat, resulting in loss or modification of up to 19.4 percent (40.8 ac (16.5 ha)) of the species' rangewide, potentially suitable (modeled) habitat. The remaining 169.2 ac (68.5 ha) of the 210 ac (85 ha) of potentially suitable habitat identified for the Mohave shoulderband snail is not likely to be disturbed by mining activities.

Future Conditions—Threats

The future timeframe evaluated in our analysis is approximately 40 to 50 years, which captures the range of time periods for proposed projects within the species' range, as well as our best professional judgment of the projected future conditions related to climate change, wildland fire conditions, or other potential cumulative impacts.

After considering the current conditions for Mohave shoulderband snail and its habitat, we describe here three circumstances that could potentially result in the most likely future conditions scenario:

- Mining impacts for the GQM Project will continue for about 12 years on a portion (40.8 ac (16.5 ha) or 19.4 percent) of the rangewide modeled suitable habitat on Soledad Mountain.
- Climate change effects, such as elevated temperatures, a change in annual precipitation patterns, or extended drought conditions beyond the historical norm, may modify suitable habitat, which could also change the scope of the wildfire and vegetation type conversion stressors. Climate change model projections indicate an increase in temperature for the western Mojave Desert region ranging from 2.5 °C (4.5 °F) to 3.0 °C (5.4 °F) by the 2060s as compared to 1985-1994. Although droughts in this region are not unusual, drought periods have the potential to be exacerbated by projected temperature increases. Precipitation patterns into the future are less clear as the climate models show significant disagreement in their projections. For example, some model simulations predict an increase in summer rainfall within the Mojave Desert region (Pierce *et al.* 2013, pp. 851, 855), while another modeling effort results in a decrease of water in southern California during spring months but an increase or no change for winter and summer months (Gao *et al.*, pp. 1,746–1,747).
- Wildfire and vegetation type conversion may continue to modify suitable habitat. We considered temperature and precipitation projections from climate change models in conjunction with wildland fire risk and, relatedly, vegetation type conversion. If a change in climate in the future results in increased precipitation, this could also result in increased nonnative vegetation fuel loads and thus potential for a higher prevalence of fires in the Mojave Desert. Biological soil crust communities may be affected by increased levels of carbon dioxide, interacting with increased temperature and changes in precipitation patterns.

Threats can also work in concert with one another to cumulatively create conditions that may impact the Mohave shoulderband snail or its habitat beyond the scope of each individual threat. Given an expected increase in temperature in the region, it is possible for vegetation changes to occur in concert with changes in land use and other environmental factors into the future. At this time, the best available information indicates that, if there are any cumulative impacts in the future, the most likely could be vegetation changes from the combination of wildland fire and increased drought conditions.

- Bachelet *et al.*'s (2016, pp. 21–25) climate model for portions of the Mojave and Sonoran deserts predict large increases in herbaceous vegetation (i.e., grasses, sedges, forbs) in the Mojave Desert for two future time periods (2036–2065 and 2071–2100) using three future climate projections and IPCC's Representative Concentration Pathway (RCP) 8.5 scenario representing changes in atmospheric carbon dioxide, and incorporating the downscaling method from Abatzoglou (2013). Bachelet *et al.* (2016, p. 25) also note that other model simulations indicated increased annual precipitation in California's desert regions, which could exacerbate the invasion and establishment of nonnative grasses.

- Keeley and Syphard (2016, entire) analyzed fire-climate relationships to predict future fire regimes in California. Their review concluded that: (1) Climate is not a major determinant of fire activity across

all landscapes; (2) hotter and drier conditions for areas at lower elevations and lower latitude were found to have little or no increase in fire activity as vegetation types in these regions are ignition limited; (3) increasing annual temperatures by themselves are not good predictors of increased fire activity; seasonality, especially spring and summer temperatures, are more important; and (4) fire-climate models need to be scaled to vegetation types; broad-scale models may produce over-predictions of the total increase in future fire regimes (Keeley and Syphard 2016, p. 1, 10). Additionally, drought is a key factor in defining fire regimes and annual precipitation is the primary driver of drought variability (Williams *et al.* 2015, p. 6,819), but, at the present time, it is difficult to separate current droughts in California from natural cycles of drought (Keeley and Syphard 2016, p. 6). This study also suggests that any projected increases in precipitation could result in a higher prevalence of fires in the Mojave Desert; however, the authors note that projected increases in temperature may mitigate the increase in fire due to a reduction in available moisture (Tagestad *et al.* 2016, p. 394).

- Increases in atmospheric carbon dioxide may also affect desert microbiotic soil crusts, a potential food source for the Mohave shoulderband snail. Lane *et al.* (2013, entire) found that biological soil crusts were able to sequester carbon under different moisture regimes. Also, Stark *et al.* (2011, pp. 459–461) determined that patches of a biological crust moss exposed to moderate and severe drought-type conditions had reduced underground biomass, indicating excess carbon consumption during recovery. These studies highlight the potential interacting effects of projected (future) climate change on desert biological soil crust communities; however, there is no information as to how these interactions may affect potential food availability for the Mohave shoulderband snail. Additionally, we note that it is unlikely that microbiotic soil crusts comprise a significant portion of the Mohave shoulderband snail's diet.

Given their evolutionary history in the southwestern United States, desert snails, such as the Mohave shoulderband snail, have demonstrated behavioral and physiological abilities to withstand warm, dry conditions. Therefore, it is reasonable to predict that effects associated with projected environmental conditions due to the effects of climate change will not significantly affect the Mohave shoulderband snail or its habitat.

CONSERVATION MEASURES IMPLEMENTED

Management actions, including control of invasive plants, reclamation of mining areas, fire suppression, and restricted access to Mohave shoulderband snail habitat, currently and in the future, alleviate effects associated with impacts related to wildland fire, vegetation type conversion, and off-highway vehicle activity, but will not remove all the potential effects of habitat-related impacts. GQM has also developed a conservation plan, which primarily targets anticipated impacts from hard rock mining activities at Soledad Mountain. Though we did not rely on its potential beneficial effects in our analysis of the status of the species, the conservation plan benefits the Mohave shoulderband snail by providing some protections (e.g., eliminating a source of potential habitat pollution, establishing conservation areas and security measures) at locations where it currently occurs. Existing regulatory mechanisms and planned (future) conservation measures are outlined in detail in the SSA Report, Appendix F (Service 2017, pp. 73–78).

RISK ASSESSMENT

In order to characterize a species' viability and demographic risks, we consider the concepts of resilience, representation, and redundancy. We also consider known and potential stressors that may negatively impact the physical and biological features that the species needs for survival and reproduction. Stressors are expressed as risks to its demographic features such as abundance (redundancy), population or spatial structure (resiliency), and genetic or ecological diversity (representation). We consider the level of impact a stressor may have on a species along with the consideration of demographic factors (e.g., whether a species has stable, increasing, or decreasing trends in abundance, population growth rates, diversity of populations, and loss or degradation of habitat). The following discussion provides a representation of the demographic risks for the Mohave shoulderband snail.

Redundancy

Accurate historical and current estimates of population abundance are not available for the Mohave shoulderband snail at the present time. As noted above, 94 observations (live animal or shell) over three distinct geographical locations have been recorded from 2013–2017. This information is based on limited survey efforts. At this time, the best available information does not indicate that the species' abundance is significantly impacted by factors that are human-caused. The best available information also does not indicate either increasing or declining numbers of snails for this species.

For small populations, demographic stochasticity (the variability of annual population change that results from random birth and death events at the individual level) can impact the population. Based on our evaluation of the best available information, there is little information on population sizes for the Mohave shoulderband snail across its range. Regardless, surveys conducted in 2015–2017 (though incomplete) continue to document its presence at the Soledad location. In total, 76 features were surveyed in 2017 (January and February) and live snails or shells were detected at 66 of the rock outcrops or talus rockpiles (87 percent) (WestLand Resources Inc., 2017, p. 14). In addition, the February surveys were conducted to look at locations where only snail shells were previously recorded. Live snails were reported at 50 percent of the locations re-surveyed (WestLand Resources Inc., 2017, p. 21), supporting that presence of snail shells provides good evidence for occupancy by the Mohave shoulderband snail. During February 2017 surveys, snail shells were also found on the northeast side of the mountain near Middle Butte (including Cactus Gold Mine). Based on the secondary efforts conducted on Soledad Mountain, evidence of snail shells suggests that Middle Butte likely remains occupied.

The Mohave shoulderband snail occurs at three locations (Middle Butte, Standard Hill, and Soledad Mountain) within the western region of the Mojave Desert (its likely historical range). Further, the likelihood for this species to continue to occur with an appropriate population size and growth rate at these locations is supported by our current finding of the potential for only low-level to negligible impacts from the stressors described in detail in the SSA Report (Service 2017, entire). Therefore, the total abundance across the Mohave shoulderband snail's range is not likely to decrease to a level that would result in a negative effect to the population.

Resiliency

As indicated above, population size, growth rate, and current population trends are unknown for the Mohave shoulderband snail due to the lack of abundance information. The range of the Mohave shoulderband snail occurs within an approximate 10-mi (16.09-km) radius from the center of Soledad Mountain (i.e., the estimated location of its type locality (Willett 1931, p. 125)) based on geological features that support its known habitat (i.e., rock outcrops and talus slopes). Within this range, we identified

approximately 210 ac (85 ha) of potentially suitable habitat for the species. Mining activities at Soledad Mountain over the next 12 years will likely result in the rangewide loss of approximately 19.4 percent (40.8 ac (16.5 ha)) of potentially suitable habitat identified for the Mohave shoulderband snail. This area is the largest of the three locations from which individuals have been observed. Additionally, the specific 40.8-ac (16.5-ha) GQM Project footprint overlaps 15 of 90 (17 percent) Mohave shoulderband snail observations. Based on this assessment, it is unlikely that this loss would result in a significant loss of resiliency to the species.

Representation

As discussed above, climate change effects (e.g., higher temperatures) and wildland fire may affect the resilience of the Mohave shoulderband snail by creating an environment that is less favorable to its physiological and ecological needs. However, this desert land snail has adapted to successfully occupy habitats with arid conditions from at least the Miocene age.

Currently, we are unaware of any documented specific risks for the Mohave shoulderband snail related to a substantial change or loss of diversity in life history traits, population demographics, morphology, behavior, or genetic characteristics. Rates of dispersal or gene flow are not known to have changed. Additionally, there is no currently available information to indicate that the current abundance of the Mohave shoulderband snail is at level that is causing inbreeding depression or loss of genetic variation. Finally, the best available information also indicates that the species has historically demonstrated its ability to withstand a broad range of environmental conditions, indicating that it will likely be able to withstand predicted conditions in the future.

FINDING

Standard for Review

Section 4 of the Act (16 U.S.C. 1533), and its implementing regulations at 50 CFR part 424, set forth the procedures for determining whether a species is an endangered species or threatened species and should be included on the Federal Lists of Endangered and Threatened Wildlife and Plants (listed). The Act defines an endangered species as any species that is "in danger of extinction throughout all or a significant portion of its range" and a threatened species as any species "that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future." The phrase "significant portion of its range" (SPR) is not defined by the Act, and, since the Service's policy interpreting the phrase was vacated by the court in *Center for Biological Diversity* v. *Jewel*, No. 14-cv-02506-RM (D. Ariz. Mar. 29, 2017), we currently do not have a binding interpretation that addresses: (1) The outcome of a determination that a species is either in danger of extinction or likely to become so in the foreseeable future throughout a significant portion of its range; or (2) what qualifies a portion of a range as "significant." We have examined the plain language of the Act and court decisions addressing the Service's application of the SPR phrase in various listing decisions, and for purposes of this rulemaking we are applying the following interpretation for the phrase "significant portion of its range" and its context in determining whether or not a species is an endangered species or a threatened species.

Two district court decisions have evaluated whether the outcomes of the Service's determinations that a species is in danger of extinction or likely to become so in the foreseeable future in a significant portion of

its range were reasonable. *Defenders of Wildlife* v. *Salazar*, 729 F. Supp. 2d 1207 (D. Mont. 2010) (appeal dismissed as moot because of public law vacating the listing, 2012 U.S. App. LEXIS 26769 (9th Cir. Nov. 7, 2012)); *WildEarth Guardians* v. *Salazar*, No. 09-00574-PHX-FJM, 2010 U.S. Dist. LEXIS 105253 (D. Ariz. Sept. 30, 2010). Both courts found that, once the Service determines that a "species"—which can include a species, subspecies, or distinct population segment (DPS) under ESA Section 3(16)—meets the definition of an "endangered species" or a "threatened species," the species must be listed in its entirety and the Act's protections applied consistently to all members of that species (subject to modification of protections through rules under sections 4(d) and 10(j) of the Act). See *Defenders*, 729 F. Supp. 2d at 1222 (delisting the Northern Rocky Mountain DPS of gray wolf except in the Wyoming portion of its range (74 FR 15123 (Apr. 2, 2009)) was unreasonable because the ESA unambiguously prohibits listing or protecting part of a DPS); *WildEarth Guardians*, 2010 U.S. Dist. LEXIS 105253, at 15-16 (the Service's finding that listing the Gunnison's prairie dog in the "montane portion" of its range was warranted (73 FR 6660 (Feb. 5, 2008)) was unreasonable because the Service "cannot determine that anything other than a species, as defined by the ESA, is an endangered or threatened species"). The issue has not been addressed by a Federal Court of Appeals.

For the purposes of this finding, we interpret the phrase "significant portion of its range" (SPR) in the Act's definitions of "endangered species" and "threatened species" to provide an independent basis for listing a species in its entirety; thus two situations (or factual bases) would qualify a species for listing: A species may be in danger of extinction or likely to become so in the foreseeable future throughout all of its range; or a species may be in danger of extinction or likely to become so throughout a significant portion of its range. If a species is in danger of extinction throughout an SPR, it, the species, is an "endangered species." The same analysis applies to "threatened species." Therefore, the consequence of finding that a species is in danger of extinction or likely to become so throughout a significant portion of its range is that the entire species will be listed as an endangered species or threatened species, respectively, and the Act's protections will be applied to all individuals of the species wherever found.

Although there are potentially many ways to determine whether a portion of a species' range is "significant," we conclude, for the purposes of this finding, that the significance of the portion of the range should be determined based on its biological contribution to the conservation of the species. For this reason, we describe the threshold for "significant" in terms of an increase in the risk of extinction for the species. We conclude that such a biologically based definition of "significant" best conforms to the purposes of the Act, is consistent with judicial interpretations, and best ensures species' conservation.

For the purposes of this finding, we determine if a portion's biological contribution is so important that the portion qualifies as "significant" by asking whether, *without that portion*, the species in the remainder of its range warrants listing. Conversely, we would not consider the portion of the range at issue to be "significant" if the species would not warrant listing even if the population in that portion of the range in question became extirpated (extinct locally).

We interpret the term "range" to be the general geographical area within which the species is currently found, including those areas used throughout all or part of the species' life cycle, even if not used on a regular basis. We consider the "current" range of the species to be the range occupied by the species at the time the Service makes a determination under section 4 of the Act. The phrase "is in danger" in the definition of "endangered species" denotes a present-tense condition of being at risk of a current or future undesired event. Hence, to say a species "is in danger" in an area where it no longer exists—*i.e.*, in its

historical range where it has been extirpated—is inconsistent with common usage. Thus, "range" must mean "current range," not "historical range." A corollary of this logic is that lost historical range cannot constitute a significant portion of a species' range where a species is in danger of extinction or likely to become so within the foreseeable (i.e., it cannot be currently in danger of extinction in a portion of its range where it is already extirpated). While we conclude that a species cannot be in danger of extinction in its lost historical range, taking into account the effects of loss of historical range on a species is an important component of determining a species' current and future status.

In implementing these independent bases for listing a species, as discussed above, we list any species in its entirety either because it is in danger of extinction now or likely to become so in the foreseeable future throughout all of its range or because it is in danger of extinction or likely to become so in the foreseeable future throughout a significant portion of its range. With regard to the text of the Act, we note that Congress placed the "all" language before the SPR phrase in the definitions of "endangered species" and "threatened species." This suggests that Congress intended that an analysis based on consideration of the entire range should receive primary focus. Thus, the first step in our assessment of the status of a species is to determine its status throughout all of its range. Depending on the status throughout all of its range, we will subsequently examine whether it is necessary to determine its status throughout a significant portion of its range.

Under section 4(a)(1) of the Act, we determine whether a species is an endangered species or threatened species because of any of the following: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence. These five factors apply whether we are analyzing the species' status throughout all of its range or throughout a significant portion of its range.

Determination of Status Throughout All of Its Range

The biological information for the Mohave shoulderband snail that we reviewed and analyzed as the basis for our finding is documented in the SSA Report (Service 2017, entire), a summary of which is provided in the BIOLOGICAL INFORMATION section of this Species Assessment Form. The projection for future conditions is based on our expectations of the potential risk factors (in other words, the stressors' potential effects on the species or its habitat) that may result in population- or rangewide-level effects currently or in the future. The stressors we evaluated in detail in our SSA Report (Service 2017, entire) that fall under Factors A and E of ESA section 4(a)(1) are hard rock mining (Factors A and E), wildland fire (Factor A), vegetation type conversion (Factor A), and climate change (Factor A). An examination of existing regulatory mechanisms (Factor D) for both the Mohave shoulderband snail and its habitat in general reveals that some mechanisms exist that either provide or have the potential to provide a conservation benefit to the species (as outlined in detail in Appendix F of the SSA Report (Service 2017, pp. 73–78)).

There is no evidence to suggest that OHV activity (Factors A and E), disease (Factor C), predation (Factor C), overutilization of the Mohave shoulderband snail for commercial, recreational, scientific, or educational purposes (Factor B), or small population size (Factor E) are stressors to the species.

To make the determination whether the Mohave shoulderband snail warrants protection as an endangered species or a threatened species under the Act, we evaluated the current conditions and the species' potential future viability given projections of future conditions (taking into account the risk factors and

their effects on those populations). As described below, we first evaluate whether the Mohave shoulderband snail is in danger of extinction throughout its range now (an endangered species). Second, we evaluate whether the species is likely to become in danger of extinction throughout its range in the foreseeable future (a threatened species). Finally, following introductory discussion about examining a species' status throughout a significant portion of its range, we consider whether the Mohave shoulderband snail is an endangered species or a threatened species in a significant portion of its range.

(1) Is the Mohave Shoulderband Snail an Endangered Species Throughout its Range?

We used the best available scientific and commercial data to evaluate the current viability (and thus risk of extinction) of the Mohave shoulderband snail to determine if it meets the definition of an endangered species. Our review of this information indicates that the Mohave shoulderband snail continues to occupy the entirety of its likely historical range, currently found at three geologic formations (Soledad Mountain, Middle Butte, and Standard Hill) surveyed since 2013 (although it was first discovered in 1931). The most recent presence/absence survey effort on Soledad Mountain in January/February 2017 found snails present at 87 percent of the surveyed sites.

The amount and distribution of potentially suitable habitat totals 210 ac (85 ha) rangewide and encompasses all known observations of the species. We estimate that 40.8 ac (16.5 ha) of occupied habitat on Soledad Mountain is expected to be lost in the near term as a result of mining operations (GQM Project), which encompasses 15 of the 90 Mohave shoulderband snail observations at this location. The loss of this habitat totals 19.4 percent of the modeled suitable habitat rangewide, the remainder of which is likely to support sufficient resiliency to sustain the Mohave shoulderband snail beyond the near term. Although mining impacts are expected to result in the loss of 19.4 percent of its modeled habitat, there is no evidence to suggest that the species would not remain viable in the near term; in other words, maintaining stable Mohave shoulderband snail populations is likely given that it has persisted despite historical mining impacts throughout its range. Furthermore, neither the GQM Project nor any other stressors are likely to cause population- or rangewide-level impacts in the near term, such that the Mohave shoulderband snail would meet the definition of an endangered species. The persistence of occupied habitat (as well as potentially occupied modeled suitable habitat) across the species' range provides resiliency, redundancy, and representation to sustain the species beyond the near term. Thus, we conclude that the current risk of extinction of the Mohave shoulderband snail is low.

(2) Is the Mohave Shoulderband Snail a Threatened Species Throughout its Range?

Under the Act, a threatened species is any species that is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." The foreseeable future refers to the extent to which the Secretary can reasonably rely on predictions about the future in making determinations about the future conservation status of the species (U.S. Department of the Interior, Solicitor's Memorandum, M–37021, January 16, 2009). A key statutory difference between a threatened species and an endangered species is the timing of when the relevant threats would begin acting upon a species such that it may be in danger of extinction, either now (endangered species) or in the foreseeable future (threatened species).

As described in **Future Conditions—Threats**, above, in considering the foreseeable future as it relates to the status of the Mohave shoulderband snail, we considered the relevant risk factors acting on the species, existing regulatory measures, and whether we could draw reliable predictions about the status of the species in response to these factors. We considered whether we could reliably predict any future actions

that might affect the status of the species, recognizing that our ability to make reliable predictions into the future is limited by the variable quantity and quality of available data about effects to the Mohave shoulderband snail and the species' response to those effects. ***The future timeframe for this analysis is 40 to 50 years***, which is a reasonably long time to consider as the foreseeable future. This timeframe also captures the range of time periods for proposed projects within the species' range, as well as our best professional judgment of the projected future conditions related to climate change, wildland fire conditions, or other potential effects, including cumulative effects. Since the analysis of potential effects from climate change was an important consideration in our status assessment, it was necessary to consider a long enough timeframe to adequately evaluate those potential effects. However, we did not extend our forecasting out quite as far as all existing climate change models (e.g., models that extend approximately 100 years) due to increased uncertainty in the model results that far into the future.

As stated previously, the potential risk factors that may be affecting the Mohave shoulderband snail or its habitat are: (1) hard rock mining, (2) wildland fire, (3) vegetation type conversion, and (4) climate change. While only one of these stressors (i.e., hard rock mining from the GQM Project on Soledad Mountain) can be assessed on a site-specific basis, none of these stressors have shown or are expected to cause population- or species-level effects due to their limited scope, exposure, and magnitude (see Service 2017, pp. 28–47). The level of potential effects from mining activities, wildland fire, and vegetation type conversion are also reduced both currently and in the future due to ongoing existing regulatory mechanisms (e.g., BLM's reclamation and revegetation plans for mining activities and wildland fire, and the Desert Renewable Energy Conservation Plan Land Use Plan Amendment's objective to maintain or reestablish a fire regime in this region that supports native vegetation types (see Appendix F in the SSA Report)). Given the risk factors affecting the species currently or potentially in the future we determined the following:

- The best available information indicates that mining activities have occurred across the species' range since as early as 123 years ago (1894), during the 1930s and early 1940s, more recently in the mid-1980s and early 1990s, and currently (and in the foreseeable future) only at Soledad Mountain. Given the type of disturbances caused by mining activities and the presence of residual facilities or disturbance (e.g., tailings, abandoned mine shafts, accumulated waste rock) on the landscape, as well as the continued presence of the Mohave shoulderband snail throughout its estimated historical range, this species appears resilient over the long-term in the face of mining activities. Within the foreseeable future, only one mining activity, the GQM Project, is expected to result in impacts to the species and its habitat at one of the three locations (Soledad Mountain) within the species' range. Although individual snails and habitat are expected to be lost, the amount of area lost is restricted to 40.8 ac (16.5 ha) at this one location. This loss totals 19.4 percent of all modeled suitable habitat across the species' range where it has historically and currently occurs. The number of individuals that may be lost from the GQM Project is unknown, although the project footprint overlaps with only 15 of 90 observations on Soledad Mountain, thus not affecting the remaining snails nor the remaining suitable and occupied habitat on Soledad Mountain, nor any other snails or habitat throughout the remainder of the species' range. Thus, the proposed mining activities on Soledad Mountain are not projected to result in population- or rangewide-level impacts to the species or its needs into the foreseeable future.

- The best available information does not indicate that changes in climatological conditions (including those conditions (i.e., drought) that could elevate the frequency or intensity of wildfires and thus potentially increase nonnative vegetation) will result in population- or rangewide-level negative effects in the foreseeable future. This conclusion is supported by the fact that the species

has historically demonstrated its ability to withstand a broad range of environmental conditions, including drought.

- Although there is potential for an increase in these other stressors (i.e., wildfire or increased vegetation type conversion), the habitat occupied by the species is such that those stressors would not likely have a significant effect. In other words, there is very low fuel load (vegetation) present or potentially present at this species' preferred physical features/needs (i.e., rock outcrops or talus slopes, cavities in rock crevices the support cool, moist microenvironments). Therefore, there is only a small likelihood of negative effects to Mohave shoulderband snail and its habitat.

Taking into account the effects of the most likely stressors and the potential for cumulative effects to the species' needs, our projections for future conditions are that the Mohave shoulderband snail's viability will continue to be characterized by three locations. The three locations provide redundancy; the species would exist at these locations across its historical range, which would help the species withstand catastrophic events, even though the species' range is inherently small. The species would continue to exhibit resiliency; each of the locations would continue to harbor snails whose populations appear to be sufficiently robust to help withstand stochastic events. Finally, the species would exhibit representation; multiple locations would continue to occur across the range of the species to maintain ecological and genetic diversity. Additionally, there is no evidence of any significant loss of the species' physical and ecological needs across the species' range, nor is there any evidence of declining numbers of snails at any of the locations. Rather, recent (2017) presence/absence surveys have resulted in additional observations of the species throughout its range as compared to the limited, opportunistic survey attempts conducted prior to 2017. Thus, our analysis of the future reveals a low risk of extirpation in the foreseeable future.

Based on the current conditions, number and distribution of locations, the continued presence of adequate resources to meet the species' needs, and our consideration of the species' continued redundancy, resiliency, and representation, we conclude the Mohave shoulderband snail is currently and likely to remain at a sufficiently low risk of extinction that it is not in danger of extinction throughout all of its range, nor is it likely to becomes so in the foreseeable future.

Determination of Status Throughout A Significant Portion of Its Range

Consistent with our interpretation that there are two independent bases for listing species as described above, after examining the Mohave shoulderband snail's status throughout all of its range, we now examine whether it is necessary to determine its status throughout a significant portion of its range. We must give operational effect to both the "throughout all" of its range language and the SPR phrase in the definitions of "endangered species" and "threatened species." The Act, however, does not specify the relationship between the two bases for listing. As discussed above under "Standard for Review," to give operational effect to the "throughout all" language and that it is referenced first in the definition, consideration of the species' status throughout the entire range should receive primary focus and we should undertake that analysis first. In order to give operational effect to the SPR language, the Service should undertake an SPR analysis if the species is neither in danger of extinction nor likely to become so in the foreseeable future throughout all of its range, to determine if the species should nonetheless be listed because of its status in an SPR. Thus, we conclude that to give operational effect to both the "throughout all" language and the SPR phrase, the

Service should conduct an SPR analysis if (and only if) a species does not warrant listing according to the "throughout all" language.

Because we determined that the Mohave shoulderband snail is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range, we will consider whether there are any significant portions of its range in which the [species] is in danger of extinction or likely to become so.

Although there are potentially many ways to determine whether a portion of a species' range is "significant," we conclude, as noted above, for the purposes of this rule, that the significance of the portion of the range should be determined based on its biological contribution to the conservation of the species. For this reason, we describe the threshold for "significant" in terms of an increase in the risk of extinction for the species. We conclude that such a biologically based definition of "significant" best conforms to the purposes of the Act, is consistent with judicial interpretations, and best ensures species' conservation.

We evaluate biological significance based on the principles of conservation biology using the concepts of redundancy, resiliency, and representation because decreases in the redundancy, resiliency, and representation of a species lead to increases in the risk of extinction for the species. *Redundancy* (having multiple resilient populations considering genetic and environmental diversity) may be needed to provide a margin of safety for the species to withstand catastrophic events. *Resiliency* describes the characteristics of a species that allow it to recover from stochastic events or periodic disturbance. *Representation* (the range of variation found in a species) ensures that the species' ability to adapt to changing environments is conserved. Redundancy, resiliency, and representation are not independent of each other, and some characteristics of a species or area may contribute to all three. For example, distribution across a wide variety of habitats is an indicator of representation, but it may also indicate a broad geographic distribution contributing to redundancy (decreasing the chance that any one event affects the entire species), and the likelihood that some habitat types are less susceptible to certain threats, contributing to resiliency (the ability of the species to recover from disturbance). None of these concepts is intended to be mutually exclusive, and a portion of a species' range may be determined to be "significant" due to its contributions under any one of these concepts.

For the purposes of this finding, we determine if a portion's biological contribution qualifies as "significant" by asking whether, *without that portion*, the representation, redundancy, or resiliency of the species would be so impaired that the species would be in danger of extinction or likely to become so in the foreseeable future (*i.e.*, would be an "endangered species" or a "threatened species"). Conversely, we would not consider a portion to be "significant" if there is sufficient resiliency, redundancy, and representation elsewhere in the species' range that the species would not be in danger of extinction or likely to become so throughout its range even if the population in that portion of the range in question became extirpated.

We recognize that this definition of "significant" establishes a threshold that is relatively high. Given that the outcome of finding a species to be in danger of extinction or likely to become so in an SPR would be to list the species and apply protections of the Act to all individuals of the species wherever found, we concluded it is important to use a threshold for "significant" that is robust. It would not be meaningful or appropriate to establish a low threshold whereby a portion of the range can be considered "significant" even if only a negligible increase in extinction risk would result from its loss. Because nearly any portion of a species' range can be said to contribute some increment to a species' viability, use of such a low threshold would require us to impose restrictions and expend conservation resources disproportionately to conservation benefit: Listing would be rangewide, even if only a portion of the range with minor conservation importance to the species is imperiled. On the other hand, it would be inappropriate to

establish a threshold for "significant" that is too high. This would be the case if the standard were, for example, that a portion of the range can be considered "significant" only if threats in that portion result in the entire species' being currently in danger of extinction or likely to become so. Such a high bar would not give the SPR phrase independent meaning, as the Ninth Circuit held in *Defenders of Wildlife* v. *Norton*, 258 F.3d 1136 (9th Cir. 2001).

The definition of "significant" used in this rule carefully balances these concerns. By setting a relatively high threshold, we minimize the degree to which restrictions would be imposed or resources expended that do not contribute substantially to species conservation. But we have not set the threshold so high that the phrase "throughout a significant portion of its range" loses independent meaning. Specifically, we have not set the threshold as high as it was under the interpretation presented by the Service in the *Defenders* litigation. Under that interpretation, the portion of the range would have to be so important that the species' current level of imperilment in the portion results in the species currently being in danger of extinction or likely to becomes throughout all of its range. Under the definition of "significant" used in this rule, the portion of the range need not rise to such an exceptionally high level of biological significance.

We are aware that the court in *Center for Biological Diversity* v. *Jewel* found that this definition of "significant" does not give sufficient independent meaning to the SPR phrase. However, that decision was based on two misunderstandings about the interpretation of "significant." First, the court's decision was based on its finding that, as with the interpretation that the court rejected in *Defenders*, the definition of "significant" does not allow for an independent basis for listing. However, this definition of "significant" is not the same as the definition applied in *Defenders*, which looked at the current status within the portion and asked what the current effect on the entire range of the species is. By contrast, this definition of "significant" looks at a future hypothetical loss of all members within the portion and evaluates the effect on the remainder of the species. The current status of the species in that portion is relevant *only* for determining the listing status if the portion has been determined to be significant. This definition of "significant" establishes a lower threshold than requiring that the species' current status in that portion of its range is already causing the species to be in danger of extinction throughout all of its range or likely to become so in the foreseeable future. In other words, this definition of "significant" captures circumstances that would not be captured by the definition used in *Defenders*, or by analyzing whether a species is in danger of extinction or likely to become so throughout all of its range: a species that is *not* currently even likely to become an endangered species in the foreseeable future, but would be if a particular important portion of its range is completely lost, can nonetheless be listed now if the species in that portion is threatened or endangered (as opposed to only after the portion is in fact lost, as would be the case if the SPR language did not exist).

The second misunderstanding was the court's characterization of the listing determination for the African coelacanth as an indication of our difficulty applying this definition of "significant." However, in that listing determination, the conclusion was that the species was not in danger of extinction throughout all of its range or likely to become so in the foreseeable future but it did warrant listing because of its status in a significant portion of its range. The only reason for not listing the entire species was that the population in that portion of the range met the definition of a DPS. Therefore, the agency listed the DPS instead of the entire species. The population in an SPR is not automatically a DPS so, contrary to the court's reasoning, the definition of "significant" can be applied and result in listing a species that would not otherwise be listed. We also note another instance in which this definition has resulted in a finding that an entity was not in danger of extinction in the foreseeable future through all of its range, but was in a significant portion. In a proposed rule (82 FR 3694; January 12, 2017), NMFS found that the giant manta ray was not currently in danger of extinction or likely to become so in the foreseeable future throughout all of its range because the

Atlantic populations were not experiencing the same risks as the Pacific populations. However, they did find that the Pacific populations constituted an SPR, because without that portion, the smaller and more sparsely distributed populations in the Atlantic would become vulnerable to demographic risks and would be likely to become in danger of extinction in the foreseeable future. Accordingly, the giant manta ray is proposed to be listed as a threatened species. In light of these two misunderstandings, we are currently seeking reconsideration of the district court's decision.

To undertake this analysis, we first identify any portions of the species' range that warrant further consideration. The range of a species can theoretically be divided into portions in an infinite number of ways. To identify only those portions that warrant further consideration, we determine whether there is substantial information indicating that there are any portions of the species' range: (1) that may be "significant," and (2) where the species may be in danger of extinction or likely to become so in the foreseeable future. We emphasize that answering these questions in the affirmative is not equivalent to a determination that the species should be listed—rather, it is a step in determining whether a more-detailed analysis of the issue is required.

A key part of identifying portions appropriate for further analysis is whether the threats are geographically concentrated. If a species is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range and the threats to the species are essentially uniform throughout its range, then the species is not likely to be in danger of extinction or likely to become so in the foreseeable future in any portion of its range. Moreover, if any concentration of threats applies only to portions of the species' range that are not "significant," such portions will not warrant further consideration.

If we identify any portions (1) that may be significant and (2) where the species may be in danger of extinction or likely to become so in the foreseeable future, we conduct a more thorough analysis to determine whether both of these standards are indeed met. The identification of a geographic area that meets our definition of significant does not create a presumption, prejudgment, or other determination as to whether the species is in danger of extinction or likely to become so in the foreseeable future in that identified SPR. We must then analyze whether the species is in danger of extinction or likely to become so in the SPR. To make that determination, we use the same standards and methodology that we use to determine if a species is in danger of extinction or likely to become so in the foreseeable future throughout all of its range.

Depending on the biology of the species, its range, and the threats it faces, it might be more efficient for us to address the significance question first or the status question first. If we address significance first and determine that a portion of the range is not "significant," we do not need to determine whether the species is in danger of extinction or likely to become so in the foreseeable future there; if we address the status of the species in portions of its range first and determine that the species is not in danger of extinction or likely to become so in a portion of its range, we do not need to determine if that portion is "significant."

For the Mohave shoulderband snail, we evaluated its current range to determine if there are any apparent geographic concentrations of potential threats to the species. The risk factors that occur throughout the Mohave shoulderband snail's range include wildland fire, vegetation type conversion, and climate change. Hard rock mining, however, is occurring both currently and in the foreseeable future solely at the Soledad Mountain location. Thus, this one location is subject to mining impacts that are *not* affecting the species uniformly throughout its range.

To determine if further consideration of the Soledad Mountain portion of the range is warranted, we next consider whether the species at the Soledad Mountain location may be in danger of extinction or likely to become so within the foreseeable future. Using our refined habitat model specific to Soledad Mountain (which incorporates talus features), the expected loss of habitat from hard rock mining (i.e., the GQM Project footprint) is 48 ac (19.5 ha), which is approximately 25.7 percent of the modeled suitable habitat at Soledad Mountain. This area also encompasses 15 of 90 of the observations as of January/February 2017 on Soledad Mountain. If we hypothetically assume that all snails and occupied habitat are lost within this footprint, approximately 74 percent of the modeled suitable habitat at Soledad Mountain would remain for the species. Within this 74 percent of modeled suitable habitat, the best available information indicates that there are no stressors that would likely cause significant impacts at the population or rangewide levels in the near term or in the foreseeable future. Additionally, there is no information to suggest that the remaining suitable habitat at Soledad Mountain would not continue to support the species at this location. Thus, we conclude that the Mohave shoulderband snail in the Soledad Mountain portion of the range is not in danger of extinction or likely to become so within the foreseeable future. Therefore, ***we find no portion of the species' range meets the criteria of an SPR and therefore the Mohave shoulderband snail is not in danger of extinction currently nor is it likely to become so in the foreseeable future in a significant portion of its range.***

CONCLUSION:

Our review of the best available scientific and commercial information indicates that the Mohave shoulderband snail is not in danger of extinction (endangered) nor likely to become endangered within the foreseeable future (threatened), throughout all or a significant portion of its range. Therefore, we find that listing the Mohave shoulderband snail as an endangered species or a threatened species under the Act is not warranted at this time.

RECOMMENDED CONSERVATION MEASURES:

- Implementation of the *Golden Queen Mining Company LLC Conservation Plan for the Mohave Shoulderband Snail* at Soledad Mountain prepared by representatives from the GQM (GQM 2017). The conservation plan identifies five major objectives:

  (1) Eliminating a source of arsenic pollution to the Mohave shoulderband snail and its habitat by remediation of existing tailings on Soledad Mountain that contain arsenic.
  (2) Identifying areas targeted for conservation on Soledad Mountain.
  (3) Acquiring private land and mineral rights on public lands within these targeted conservation areas.
  (4) Dedicating negative easements or other protective measures assuring that habitat on private land will be protected.
  (5) Executing a binding agreement between GQM and BLM to preclude surface disturbance in snail habitat occurring on BLM-administered land for which GQM maintains mineral rights.

- As described by GQM in its conservation plan, survey for snail presence in protected areas and undertake adaptive management should data indicate a decreasing trend in occupancy within the conservation areas (GQM 2017).

- Continued implementation of beneficial conservation measures outlined in BLM's Desert Renewable Energy Conservation Plan Land Use Plan Amendment (see Appendix F in the SSA Report).

We commend and support these efforts to date, and will continue a cooperative working relationship with GQM to help ensure the long-term conservation of the Mohave shoulderband snail and its habitat at Soledad Mountain.

We request that you submit any new information concerning the status of, or threats to, the Mohave shoulderband snail to our Carlsbad Fish and Wildlife Office (see **ADDRESSES** section of the Federal Register Notice for the 12-month finding) whenever it becomes available. New information will help us monitor this species and encourage its conservation. If an emergency situation develops for the species, we will act to provide immediate protection.

DESCRIPTION OF MONITORING:

To date, there have been limited systematic surveys of the Mohave shoulderband snail. The *Golden Queen Mining Company LLC Conservation Plan for the Mohave Shoulderband Snail* (GQM 2017) indicates that monitoring will take place in the conservation areas every 3 to 7 years, as appropriate with precipitation events. GQM will also provide annual reports to the Service updating their progress on implementation of conservation efforts indicated in the plan (GQM 2017).

COORDINATION WITH STATES:

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: **California – California Department of Fish and Wildlife**

Indicate which State(s) did not provide any information or comments: N/A

REFERENCES CITED:

A complete list of references cited in this Species Assessment Form and in our full Species Status Assessment is provided in the SSA Report for Mohave shoulderband snail (Service 2017, pp. 52–66).

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: _____ 9-28-17
Regional Director, Fish and Wildlife Service — Date

Concur: James W. Kurth 30 OCT 2017
Director, Fish and Wildlife Service — Date
Acting

Do not concur: _____ _____
Director, Fish and Wildlife Service — Date

Director's Remarks: _____

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