9.2 IRON MOUNTAIN

9.2.1 Background and Summary of Impacts

9.2.1.1 General Information

The proposed Iron Mountain SEZ has a total area of 106,522 acres (431 km^2) and is located in San Bernardino County in southeastern California, about 20 mi (32 km) west of the Arizona border (Figure 9.2.1.1-1). In 2008, the county population was 2,086,465, while the two-county region surrounding the SEZ—San Bernardino and Riverside Counties—had a total population of 4,189,515. Several mid-sized cities lie near the SEZ, including San Bernardino, Fontana, Ontario, Rancho Cucamonga, and Victorville in San Bernardino County, and Riverside and Moreno Valley in Riverside County. U.S. 95 runs north–south about 15 mi (24 km) to the east of the proposed SEZ, while State Route 62, a two-lane highway, passes through its southern edge. Los Angeles to the west and Phoenix to the southeast are each about 220 mi (355 km) away via I-10, which runs east–west approximately 31 mi (50 km) south of the Iron Mountain SEZ. The Arizona and California (ARZC) Railroad serves the area and traverses the SEZ from the northwest to the southeast, roughly bisecting the SEZ. The Cadiz Road is an unpaved road adjacent to and paralleling the railroad. Three small public airports are within approximately 85 mi (137 km) of the SEZ.

A 230-kV transmission line runs north–south through the western portion of the SEZ. It is assumed that this existing 230-kV transmission line could potentially provide access from the SEZ to the transmission grid (see Section 9.2.1.2). As of February 2010, five solar project applications were pending in the SEZ. Active pending renewable energy applications within the SEZ are described in Section 9.2.22 and are shown in Figure 9.2.22.2-1. Figure 9.2.22.2-1 also shows several large areas of active pending solar ROW applications on BLM-administered lands to the west-northwest of the proposed SEZ.

The proposed Iron Mountain SEZ lies in Ward Valley, a broad valley within the California Desert Conservation Area within the Mojave Desert. Ward Valley lies in the Basin and Range physiographic province and is bounded by the Turtle Mountains to the east and the Iron Mountains to the west; surface elevations range from 600 to 1650 ft (183 to 503 m) and lower elevations occur near the center of the valley. The Old Woman Mountains and the Palen-McCoy WAs, with some peaks higher than 5,000 ft (1,524 m), also lie nearby. The region is characterized by wide daily temperature extremes and low precipitation and humidity. Annual precipitation amounts increase with elevation, from 3.6 in. (9 cm) in the valleys up to 12 in. (30.5 cm) in the mountains. Danby Lake (also known as Danby Dry Lake), which covers approximately 31.5 mi^2 (81.5 km^2) of the northwestern portion of the proposed SEZ (Figure 9.2.1.1-1), is an internal drainage area for the Ward Valley and a region of active soda mining that can be inundated intermittently throughout the year because of natural drainage. The valley floor slopes gently toward Danby Lake in all directions. The Ward Valley groundwater basin underlies the area. The abandoned town of Milligan is located in the northwest corner of

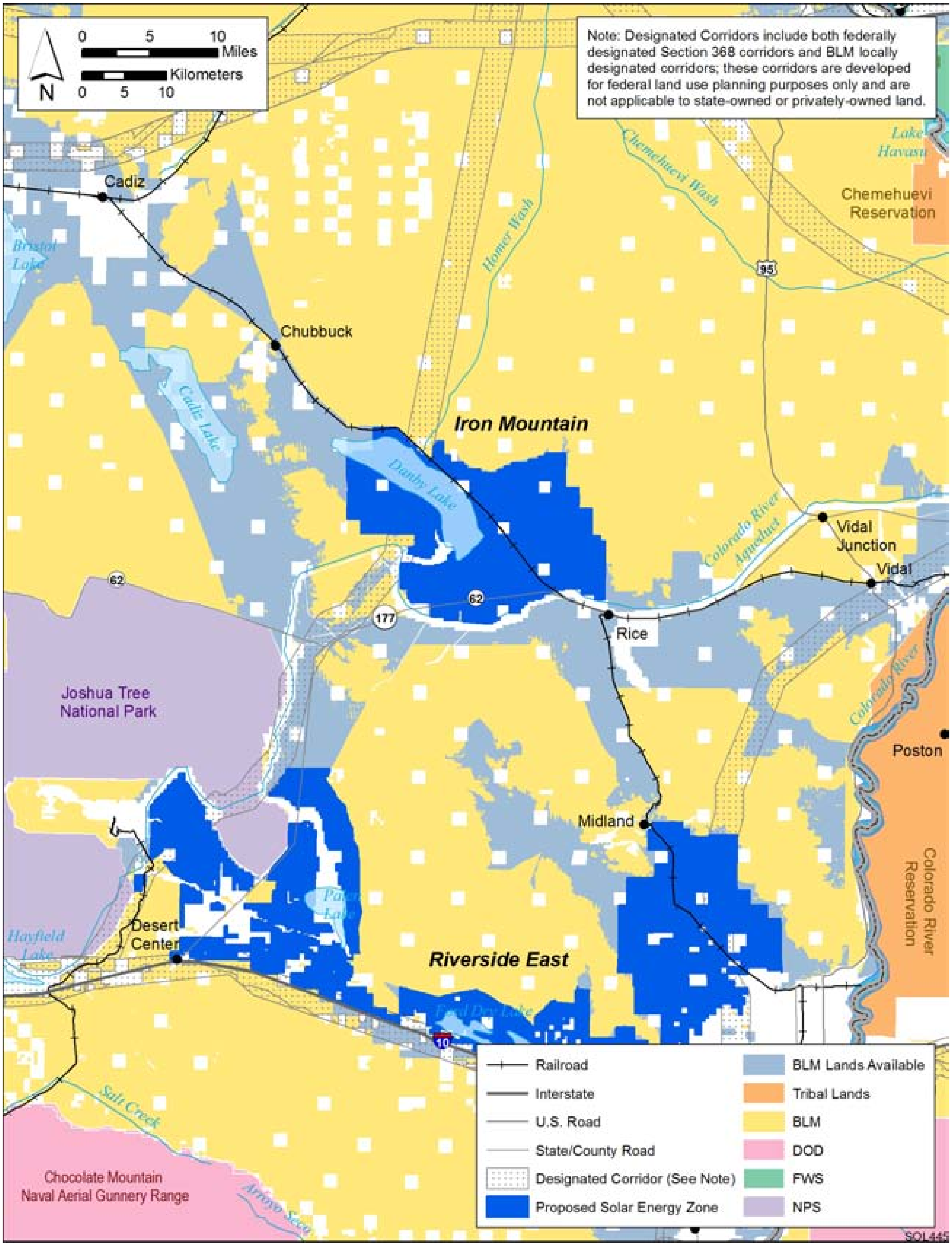

FIGURE 9.2.1.1-1 Proposed Iron Mountain SEZ

the SEZ, and trailers used by sodium lease operators working an active sodium lease are located approximately 1.3 mi (2.2 km) east of Milligan on Cadiz Road. The Metropolitan Water District Aqueduct is located on the south and west sides of the SEZ. Three WWII Military Divisional Camps started by General Patton border the Iron Mountain SEZ. The Iron Mountain Divisional Camp is an ACEC eligible for listing on the NRHP and is the best preserved camp in California. Scrubland vegetation throughout the area reflects the arid climate.

The proposed Iron Mountain SEZ and other relevant information are shown in Figure 9.2.1.1-1. The criteria used to identify the SEZ as an appropriate location for solar development included proximity to existing transmission lines or designated corridors, proximity to existing roads, a slope of generally less than 2%, and an area of more than 2,500 acres (10 km^2). In addition, the area was identified as being relatively free of other types of conflicts, such as USFWS-designated critical habitat for threatened and endangered species, ACECs, SRMAs, and NLCS lands (see Section 2.2.2.2 for the complete list of exclusions). Although these classes of restricted lands were excluded from the proposed Iron Mountain SEZ, other restrictions might be appropriate. The analyses in the following sections address the affected environment and potential impacts associated with utility-scale solar energy development in the proposed SEZ for important environmental, cultural, and socioeconomic resources.

As initially announced in the *Federal Register* on June 30, 2009, the proposed Iron Mountain SEZ encompassed 109,642 acres (444 km^2). Subsequent to the study area scoping period, the Iron Mountain SEZ boundaries were altered somewhat to facilitate BLM's administration of the SEZ area. Borders with irregularly shaped boundaries were adjusted to match the section boundaries of the Public Lands Survey System (PLSS) (BLM and USFS 2010a). Some small higher slope areas internal to and at the borders of the site were also added to the SEZ; although included in the SEZ, these higher slope areas would not likely be utilized for solar facilities. The revised SEZ is approximately 3,100 acres (15 km^2) smaller than the original SEZ as published in June 2009.

9.2.1.2 Development Assumptions for the Impact Analysis

Maximum development of the proposed Iron Mountain SEZ was assumed to be 80% of the total SEZ area over a period of 20 years, a maximum of 85,217 acres (345 km^2). These values are shown in Table 9.2.1.2-1, along with other development assumptions. Full development of the Iron Mountain SEZ would allow development of facilities with an estimated total of 9,469 MW of electrical power capacity if power tower, dish engine, or PV technologies were used, assuming 9 acres/MW (0.04 km^2/MW) of land required, and an estimated 17,043 MW of power if solar trough technologies were used, assuming 5 acres/MW (0.02 km^2/MW) of land required.

Availability of transmission from SEZs to load centers will be an important consideration for future development in SEZs. The nearest existing transmission line is a 230-kV line that runs through the SEZ. It is possible that this existing line could be used to provide access from the SEZ to the transmission grid, but the 230-kV capacity of that line would be inadequate for 9,469 to 17,043 MW of new capacity (note that a 500-kV line can accommodate approximately

TABLE 9.2.1.2-1 Proposed Iron Mountain SEZ—Assumed Development Acreages, Maximum Solar MW Output, Access Roads, and Transmission Line ROWs

Total Acreage and 80% of Acreage	Maximum Output for Various Solar Technologies	Distance to Nearest State, U.S., or Interstate Highway	Distance and Capacity of Nearest Existing Transmission Line	Assumed Area of Transmission Line ROW and Road ROW	Distance to Nearest Designated Transmission Corridor[d]
106,522 acres and 85,217 acres[a]	9,469 MW[b] 17,043 MW[c]	Adjacent (State Route 62)	Adjacent and 230 kV	0 acres and 0 acres	Adjacent to SEZ[e]

[a] To convert acres to km^2, multiply by 0.004047.

[b] Maximum power output if the SEZ were fully developed using power tower, dish engine, or PV technologies, assuming 9 acres/MW (0.04 km^2/MW) of land required.

[c] Maximum power output if the SEZ were fully developed using solar trough technologies, assuming 5 acres/MW (0.02 km^2/MW) of land required.

[d] BLM-designated corridors are developed for federal land use planning purposes only and are not applicable to state-owned or privately owned land.

[e] A Section 368 federally designated 2-mi (3-km) wide energy corridor runs through the western portion of the SEZ.

the load of one 700-MW facility). At full build-out capacity of the proposed Iron Mountain SEZ, it is clear that substantial new transmission and/or upgrades of existing transmission lines would be required to bring electricity from the SEZ to load centers; however, at this time the location and size of such new transmission facilities are unknown. Generic impacts of transmission and associated infrastructure construction and of line upgrades for various resources are discussed in Chapter 5. Project-specific analyses would need to identify the specific impacts of new transmission construction and line upgrades for any projects proposed within the SEZ.

For the analysis in this PEIS, it was assumed that the existing 230-kV transmission line that runs north–south through the western portion of the SEZ could provide access to the transmission grid, and thus no additional acreage disturbance for transmission line access was assessed. Access to the transmission line was assumed, without additional information on whether this line would be available for connection of future solar facilities. If a connecting transmission line were constructed in the future to connect facilities within the SEZ to a different off-site grid location from the one assumed here, site developers would need to determine the impacts from construction and operation of that line. In addition, developers would need to determine the impacts of line upgrades if they were needed.

Existing road access to the proposed Iron Mountain SEZ should be adequate to support construction and operation of solar facilities, because State Route 62, a two-lane highway, passes through the southern edge the SEZ. Thus, no additional road construction outside of the SEZ is assumed to be required to support solar development.

9.2.1.3 Summary of Major Impacts and SEZ-Specific Design Features

In this section, the impacts and SEZ-specific design features assessed in Sections 9.2.2 through 9.2.21 for the proposed Iron Mountain SEZ are summarized in tabular form. Table 9.2.1.3-1 is a comprehensive list of the impacts discussed in these sections; the reader may reference the applicable sections for detailed support of the impact assessment. Section 9.2.22 discusses potential cumulative impacts from solar energy development in the proposed SEZ.

Only those design features specific to the Iron Mountain SEZ are included in Sections 9.2.2 through 9.2.21 and in the summary table. The detailed programmatic design features for each resource area to be required under BLM's Solar Energy Program are presented in Appendix A, Section A.2.2. These programmatic design features would also be required for development in this and other SEZs.

TABLE 9.2.1.3-1 Summary of Impacts of Solar Energy Development within the Proposed Iron Mountain SEZ and SEZ-Specific Design Features[a]

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Lands and Realty	Full development of the SEZ for utility-scale solar energy production (80% of the total area) could disturb up to 85,217 acres (35 km^2) and would establish a large industrial area that would exclude many existing and potential uses of the land, perhaps in perpetuity. Since the SEZ is largely undeveloped and rural, utility-scale solar energy development would be a new and discordant land use to the area.	None.
	A total of 1,200 acres (5 km^2) of state lands and approximately 2,400 acres (10 km^2) of private lands located within or adjacent to the exterior boundaries of the SEZ could be developed in a similar or complementary manner to the public lands with the landowners' permission. Development of additional industrial or support activities also could be induced on additional private and state lands near the SEZ.	None.
	Cadiz Road provides access through the SEZ and would likely remain open under any development scenario; however, access to the east of the SEZ toward the Turtle Mountains could be obstructed by solar development.	None.
	There is a potential hazard associated with unexploded military ordnance that could remain on the SEZ from past military training activities.	Survey of solar energy development sites for possible unexploded military ordnance would be required.
Specially Designated Areas and Lands with Wilderness Characteristics	Wilderness characteristics within the Turtle Mountains, Old Woman Mountains, and Palen-McCoy WAs would be adversely affected by solar development within the SEZ. Scenic resources in the Turtle Mountains ACEC would also be adversely affected.	Application of SEZ-specific design features for visual resource impacts (Section 9.2.14) may reduce the visual impact on wilderness characteristics, scenic resources, and on night sky viewing opportunities.
	Solar facility development in the SEZ could adversely affect the quality of the night sky environment as viewed from Joshua Tree NP.	None.

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Rangeland Resources: Livestock Grazing	None.	None.
Rangeland Resources: Wild Horses and Burros	None.	None.
Recreation	Recreational users would lose the use of any portions of the SEZ developed for solar energy production. Because of the impacts of a large and highly visible industrial type of development in the SEZ, opportunities for an undeveloped and primitive recreation experience in and around the SEZ would be lost or reduced.	None.
	Wilderness recreation use in the Turtle Mountains, Old Woman Mountains, and Palen-McCoy WAs would likely be adversely affected.	None.
	Development of solar facilities in the SEZ and in adjacent areas currently under solar application would cause the loss of the expansive and undeveloped viewshed over a very large area.	None.
Military and Civilian Aviation	The development of any solar energy or transmission facilities that encroach into the airspace of MTRs would create safety issues and would conflict with military training activities.	None.
Geologic Setting and Soil Resources	Impacts on soil resources would occur mainly as a result of ground-disturbing activities (e.g., grading, excavating, and drilling) during the construction phase. Impacts include soil compaction, soil horizon mixing, soil erosion and deposition by wind, soil erosion by water and surface runoff, sedimentation, and soil contamination. These impacts may be impacting factors for other resources (e.g., air quality, water quality, and vegetation). Danby Lake may not be a suitable location for construction.	None.

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Minerals (fluids, solids, and geothermal resources)	Designation of the SEZ would affect the Danby Lake KSLA in the northwest corner of the SEZ. About 23,000 acres (93 km^2) of the KSLA is within the boundary of the SEZ and there are three active and two pending sodium leases which are prior existing rights.	The presence of the KSLA must be addressed to evaluate the compatibility of solar development in the KSLA with continuation of sodium mineral leasing. Alternatively, the KSLA could be excluded from the SEZ.
	Designation of the SEZ could make sand and gravel resources unavailable.	Planning and identification for retention of sand and gravel resources within the SEZ should be completed prior to authorization of solar energy leases.
Water Resources	Ground-disturbance activities (affecting 8% of the total area in the peak construction year) could affect surface water quality due to surface runoff, sediment erosion, and contaminant spills. Construction activities may require up to 6,813 ac-ft (8.4 million m^3) of water during peak construction year. Construction activities would generate as much as 222 ac-ft (273,800 m^3) of sanitary wastewater. Assuming full development of the SEZ, the following amounts of water would be used during operations: ▪ For parabolic trough facilities (17,044-MW capacity), 12,170 to 25,805 ac-ft/yr (15.0 million to 31.8 million m^3/yr) for dry-cooled systems (wet cooling not feasible with respect to water requirements); • For power tower facilities (9,469-MW capacity), 6,734 to 14,309 ac-ft/yr (8.3 million to 17.6 million m^3/yr) for dry-cooled systems (wet cooling not feasible with respect to water requirements);	Water resource analysis indicates that wet-cooling options would not be feasible. Other technologies should incorporate water conservation measures. Land disturbance activities should avoid impacts to the extent possible in the vicinity of Danby Lake to reduce impacts on the regional drainage outlet and salt-mining operations. During site characterization, hydrologic investigations would need to identify 100-year floodplains and potential jurisdictional water bodies subject to Clean Water Act Section 404 permitting. Siting of solar facilities and construction activities should avoid areas identified as within a 100-year floodplain. During site characterization, coordination and permitting with CDFG regarding California's Lake and Streambed Alteration Program would be required for any proposed alterations to surface water features (both perennial and ephemeral).

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Water Resources *(Cont.)*	• For dish engine facilities (9,469-MW capacity), 4,840 ac-ft/yr (6.0 million m^3/yr); and ▪ For PV facilities (9,469-MW capacity), 484 ac-ft/yr (597,000 m^3/yr). Assuming full development of the SEZ, operations would generate up to 239 ac-ft/yr (294,800 m^3/yr) of sanitary wastewater and up to 4,842 ac-ft/yr (6.0 million m^3/yr) of blowdown water.	The groundwater-permitting process should be in compliance with the San Bernardino County groundwater ordinance. Construction of groundwater production wells in the Danby Lake region should be avoided because the water is nonpotable and contains corrosive levels of TDS. Groundwater monitoring and production wells should be constructed in accordance with standards set forth by the State of California and San Bernardino County. Stormwater management plans and BMPs should comply with standards developed by the California Stormwater Quality Association. Water for potable uses would have to meet or be treated to meet the water quality standards in the California Safe Drinking Water Act.
	Hydrology disturbances near Danby Lake could cause localized flooding and erosion, affect groundwater recharge and discharge processes, and disrupt salt-mining operations. High TDS values of groundwater near the Danby Lake region could produce water that is nonpotable and corrosive to infrastructure.	

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Vegetation[b]	Up to 80% (85,217 acres [345 km^2]) of the SEZ would be cleared of vegetation; re-establishment of shrub communities in disturbed areas would likely be very difficult because of the arid conditions. Sand dune, playa, desert chenopod scrub, riparian, and dry wash communities are important sensitive habitats within the SEZ that could be affected. Noxious weeds could become established in disturbed areas and colonize adjacent undisturbed habitats, thus reducing restoration success and potentially resulting in widespread habitat degradation. The deposition of fugitive dust from disturbed soil areas in habitats outside the SEZ area could result in reduced productivity or changes in plant community composition. Groundwater withdrawals could affect riparian areas or groundwater-dependent communities, such as mesquite bosque.	An Integrated Vegetation Management Plan, addressing invasive species control, and an Ecological Resources Mitigation and Monitoring Plan, addressing habitat restoration should be approved and implemented to increase the potential for successful restoration of affected Sonoran Desert habitats and to minimize the potential for the spread of invasive species, such as tamarisk, cheatgrass, and sahara mustard. Invasive species control should focus on biological and mechanical methods where possible to reduce the use of herbicides. Riparian, playa, chenopod scrub, sand dune, and desert dry wash habitats should be avoided to the extent practicable, and any impacts should be minimized and mitigated. A buffer area should be maintained around riparian areas, playas, and dry washes to reduce the potential for impacts on these habitats on or near the SEZ. Appropriate engineering controls should be used to minimize impacts on these areas resulting from surface water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition to these habitats. Appropriate buffers and engineering controls would be determined through agency consultation. Groundwater withdrawals should be limited to reduce the potential for indirect impacts on riparian habitat that is associated with groundwater discharge or groundwater-dependent communities, such as mesquite bosque.

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Wildlife: Amphibians and Reptiles[b]	The red-spotted toad is the main amphibian expected to occur within the Iron Mountain SEZ, but its occurrence within the SEZ would be spatially limited. Several other amphibian species could inhabit the Colorado River Aqueduct south of the SEZ. These species, which include the bullfrog, Colorado River toad, Rio Grande leopard frog, and Woodhouse's toad, would not be expected to occur within the SEZ. Thirty-one reptile species (the desert tortoise, which is a federally and state-listed species, 13 lizards, and 17 snakes) could occur within the SEZ. Direct impacts on amphibian and reptile species from SEZ development would be moderate (1.7 to 2.7% of potentially suitable habitats identified for the species in the SEZ region would be lost). With implementation of proposed design features, indirect impacts would be expected to be negligible.	Design features should be implemented to reduce the potential for direct effects on amphibians and reptiles that depend on specific habitat types that can be easily avoided (e.g., CRA, Homer Wash, and portions of Danby Lake).
Wildlife: Birds[b]	Nearly 100 species of birds have a range that encompasses the Iron Mountain SEZ region. However, potentially suitable habitats for about 40 of these species either do not occur on or are limited within the SEZ (e.g., habitat for waterfowl and wading birds). Direct impacts from habitat disturbance and long-term habitat reduction/fragmentation would be small to moderate (<0.01 to 7.5% of potentially suitable habitats identified for the species in the SEZ region would be lost). Other impacts on birds could result from collision with vehicles and facility structures, surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, noise, lighting, spread of invasive species, accidental spills, and harassment.	Pre-disturbance surveys should be conducted within the SEZ for bird species listed under the Migratory Bird Treaty Act. Impacts on potential nesting habitat of these species should be avoided, particularly during the nesting season. Pre-disturbance surveys should be conducted within the SEZ for the following desert bird focal species (CalPIF 2009): ash-throated flycatcher, black-tailed gnatcatcher, black-throated sparrow, burrowing owl, common raven, Costa's hummingbird, crissal thrasher, ladder-backed woodpecker, Le Conte's thrasher, phainopepla, and verdin. Impacts on potential nesting habitat of these species should be avoided.

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Wildlife: Birds[b] *(Cont.)*	Indirect impacts on areas outside the SEZ (e.g., impacts caused by dust generation, erosion, and sedimentation) are expected to be negligible with implementation of proposed design features.	Plant species that positively influence the presence and abundance of the desert bird focal species should be avoided to the extent practicable. These species include Goodding's willow, yucca, Joshua tree, mesquite, honey mesquite, screwbean, desert mistletoe, big saltbush, smoketree, and catclaw acacia. Take of golden eagles and other raptors should be avoided. Mitigation regarding the golden eagle should be developed in consultation with the USFWS and CDFG. A permit may be required under the Bald and Golden Eagle Protection Act. Minimize development in Danby Lake and preclude development on Homer Wash. This could reduce impacts on species such as the killdeer, least sandpiper, ash-throated flycatcher, black-tailed gnatcatcher, Costa's hummingbird, Le Conte's thrasher, and verdin.
Wildlife: Mammals[b]	Direct impacts on small game, furbearers, and small mammals on the SEZ from habitat disturbance and long-term habitat reduction/fragmentation would be moderate (1.7 to 3.0% of potentially suitable habitats identified for the species in the SEZ region would be lost). Other impacts on mammals could result from collision with vehicles and fences, surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, noise, lighting, spread of invasive species, accidental spills, and harassment.	Development in Homer Wash should be avoided in order to reduce impacts on species such as the round-tailed ground squirrel, white-tailed antelope squirrel, little pocket mouse, long-tailed pocket mouse, and any other mammal species that inhabit wash habitats.

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Wildlife: Mammals[b] *(Cont.)*	Indirect impacts on areas outside the SEZ (e.g., impacts caused by dust generation, erosion, and sedimentation) are expected to be negligible with implementation of proposed design features.	
Wildlife: Aquatic Biota[b]	No permanent water bodies, perennial streams, or wetlands are present within the boundaries of the Iron Mountain SEZ. A dry lake (Danby Lake) and ephemeral washes are present, but are not likely to contain aquatic habitat or communities. There is the potential for impacts on aquatic biota resulting from ground disturbance, contaminant inputs, and soil deposition from water and airborne pathways. Indirect effects on the CRA and wetlands near the SEZ may result from water withdrawal within the vicinity of the SEZ and from changes in water quality due to inputs of dust, sediment, and contaminants from the SEZ.	The amount of ground disturbance near Danby Lake should be minimized.
Special Status Species[b]	Potentially suitable habitat for 43 special status species occurs in the affected area of the Iron Mountain SEZ. For most of these special status species, between 1% and 6% of the potentially suitable habitat in the region occurs in the area of direct effects.	Pre-disturbance surveys should be conducted within the SEZ to determine the presence and abundance of special status species. Disturbance to occupied habitats for these species should be avoided or minimized to the extent practicable. If avoiding or minimizing impacts on occupied habitats is not possible for some species, translocation of individuals from areas of direct effects or compensatory mitigation of direct effects on occupied habitats could reduce impacts. A comprehensive mitigation strategy for special status species that used one or more of these options to offset the impacts of development should be developed in coordination with the appropriate federal and state agencies.

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Special Status Species[b] *(Cont.)*		Disturbance of desert riparian, wash, and playa habitats within the SEZ should be avoided or minimized to the extent practicable. In particular, development should be avoided within Danby Lake, which covers approximately 25,000 acres (100 km^2), and within Homer Wash. Avoiding or minimizing disturbance of these habitats could reduce impacts on four special status species. Avoiding or minimizing disturbance of sand dunes and sand transport systems, rocky cliffs, and outcrops on the SEZ could reduce impacts on 15 special status species. Consultations with the USFWS and the CDFG should be conducted to address the potential for impacts on the desert tortoise, a species listed as threatened under the ESA and CESA. Consultation would identify an appropriate survey protocol, avoidance measures, and, if appropriate, reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions for incidental take statements. Harassment or disturbance of special status species and their habitats in the affected area should be mitigated. This can be accomplished by identifying any additional sensitive areas and implementing necessary protection measures based upon consultation with the USFWS and CDFG.

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Air Quality and Climate	*Construction*: Temporary exceedances of AAQS for PM_{10} and $PM_{2.5}$ at the SEZ boundaries possible during construction; higher concentrations would be limited to the immediate area surrounding the SEZ boundary and would decrease quickly with distance. Modeling indicates that Class I PSD PM_{10} increments at the nearest federal Class I area (Joshua Tree NP) could be exceeded, but only under conservative assumptions (e.g., three simultaneous construction projects occurring in close proximity to the western SEZ boundary). In addition, construction emissions from the engine exhaust of heavy equipment and vehicles could cause some impacts on air-quality-related values (e.g., visibility and acid deposition) at the nearest federal Class I area, Joshua Tree NP. *Operations*: Positive impact due to avoided emission of air pollutants from combustion-related power generation: 16 to 28% of total SO_2, NO_x, Hg, and CO_2 emissions from electric power systems in the state of California avoided (up to 3,818 tons/yr SO_2, 6,271 tons/yr NO_x, 0.06 tons/yr Hg, and 14,836,000 tons/yr CO_2).	None.
Visual Resources	Large visual impacts on the SEZ and surrounding lands within the SEZ viewshed due to major modification of the character of the existing landscape; potential additional impacts from construction and operation of transmission lines and access roads within the transmission line and road viewsheds. The SEZ is located approximately 9.9 mi (15.9 km) northeast of Joshua Tree NP and Joshua Tree WA at the point of closest approach. Because of the short distance and elevated viewpoints, weak to moderate visual contrasts could be observed by NP or WA visitors near the point of closest approach. The SEZ is located within the CDCA. CDCA lands within the SEZ viewshed would be subject to visual impacts from solar development within the SEZ.	Within the SEZ, in areas visible from and within 1 mi (1.6 km) of the boundary of the Old Woman Mountains WA, visual impacts associated with solar energy project operation should be consistent with VRM Class II management objectives, as experienced from KOPs (to be determined by the BLM) within the WA; and in areas visible from between 1 and 3 mi (1.6 and 4.8 km) visual impacts should be consistent with VRM Class III management objectives. Within the SEZ, in areas visible from and south of State Highway 62, visual impacts associated with solar energy project operation should be consistent with VRM Class III management objectives, as

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Visual Resources *(Cont.)*	The SEZ is located approximately 6.6 mi (10.6 km) northwest of the Rice Valley WA at the point of closest approach. Moderate visual contrasts could be observed by WA visitors. The SEZ is located approximately 1.6 mi (2.6 km) north of the Palen-McCoy WA at the point of closest approach. Because of the short distance and elevated viewpoints, strong visual contrasts could be observed by WA visitors. The SEZ is adjacent to the Old Woman Mountains WA. Because of the short distance and elevated viewpoints, moderate to strong visual contrasts could be observed by WA visitors. The SEZ is adjacent to the Turtle Mountains WA, Turtle Mountains Scenic ACEC, and Turtle Mountains NNL. Because of the short distance and elevated viewpoints, moderate to strong visual contrasts could be observed by WA visitors. Portions of State Route 62 and Cadiz Road intersect the SEZ. Strong contrasts may be observed by travelers on these roads.	experienced from KOPs (to be determined by the BLM) within the Palen-McCoy WA. Within the SEZ, in areas visible from and within 3 mi (4.8 km) of the boundary of the Turtle Mountains WA, visual impacts associated with solar energy project operation should be consistent with VRM Class II management objectives, as experienced from KOPs (to be determined by the BLM) within the WA; and in areas visible from between 3 and 5 mi (4.8 and 8 km), visual impacts should be consistent with VRM Class III management objectives.
Acoustic Environment	*Construction*. Estimated noise levels at the nearest residences located near the west-central SEZ boundary (0.5 mi [0.8 km] from the SEZ boundary) would be about 50 dBA, which is higher than a typical daytime mean rural background level of 40 dBA but is below the San Bernardino County regulation of 55 dBA daytime L_{eq}. For 10-hour daytime work schedule, 47 dBA L_{dn} would be below the EPA guideline of 55 dBA for residential areas. *Operations*. Noise levels at the nearest residences from a parabolic trough or power tower facility would be about 45 dBA, which is higher than typical daytime mean rural background level of 40 dBA but well below	Noise levels from cooling systems equipped with TES should be managed so that levels at the nearest residences to the west of the west-central SEZ are kept within applicable guidelines. This could be accomplished in several ways, for example, through placing the power block approximately 1 to 2 mi (1.6 to 3 km) or more from residences, limiting operations to a few hours after sunset, and/or installing fan silencers.

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Acoustic Environment *(Cont.)*	the San Bernardino County regulation of 55 dBA daytime L_{eq}. For 12-hour daytime operation, the estimated 44 dBA L_{dn} falls well below the EPA guideline of 55 dBA for residential areas. However, in the case of 6-hour TES, the estimated nighttime noise level at the nearest residences would be 55 dBA, which is higher than the San Bernardino County regulation of 45 dBA nighttime L_{eq}. The day-night average noise level is estimated to be about 57 dBA L_{dn}, which is a little higher than the EPA guideline of 55 dBA L_{dn} for residential areas. If 80% of the SEZ were developed with dish engine facilities, the estimated noise level of 54 dBA at the nearest residences is higher than a typical daytime mean rural background level of 40 dBA but just below the San Bernardino County regulation of 55 dBA daytime L_{eq}. For 12-hour daytime operations, the estimated 51 dBA L_{dn} would be lower than the EPA guideline of 55 dBA L_{dn} for residential areas.	Dish engine facilities within the Iron Mountain SEZ should be located more than 1 to 2 mi (1.6 to 3 km) from the nearest residences, west of the west-central SEZ (i.e., the facilities should be located in other portions of the proposed SEZ). Direct noise control measures applied to individual dish engine systems could also be used to reduce noise impacts at the nearest residences.
Paleontological Resources	The potential for impacts on significant paleontological resources at the Iron Mountain SEZ in Ward Valley is largely unknown. A more detailed investigation of the local geological deposits of the SEZ and their potential depth is needed. The area around Danby Lake within the SEZ has a high potential to contain paleontological deposits and would require a paleontological survey.	The need for and the nature of any SEZ-specific design features would depend on findings of paleontological surveys.
Cultural Resources	Direct impacts on significant cultural resources could occur during site preparation and construction activities in the proposed SEZ; however, a cultural resource survey of the entire area of potential effect would first be required to identify archaeological sites, historic structures and features, and traditional cultural properties, and an evaluation would follow to determine whether any are eligible for listing in the NRHP. Ward Valley as a whole, and in particular the Danby Lake vicinity, was an important gathering area for salt and other natural resources; numerous	Avoidance of significant sites (historic properties) within the proposed Iron Mountain SEZ, specifically in the vicinity of Danby Lake and near the Iron Mountain Divisional Camp is recommended. Because of the possibility of burials in the vicinity of the proposed Iron Mountain SEZ and its location along the Salt Song Trail, it is recommended that for surveys conducted in the SEZ consideration be given

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Cultural Resources *(Cont.)*	prehistoric and Native American sites and trails are potentially located within the SEZ and could be impacted by solar energy development. Potential impacts on locations in the area that are of cultural or religious significance to Native American Tribes must also be evaluated. Activities associated with the WWII Desert Training Center were also prominent in the valley, and physical remnants of those activities are present within the SEZ and could be affected.	to include Native American representatives in the development of survey designs and historic property treatment and monitoring plans. Troops in training for World War II often used the same locations that Native Americans did for similar purposes. Any excavation of historic sites should take into consideration the potential for the co-location of prehistoric and ethnohistoric components. Other possible design features specific to the SEZ would be determined through consultation with the California SHPO and affected Tribes.
Native American Concerns	It is possible that there will be Native American concerns about the Salt Song Trail, which passes just west of the proposed Iron Mountain SEZ. Solar development within the SEZ is likely to be visible from the trail. Additional trail networks may also go through or near the SEZ. As consultations continue, it is possible that other Native American concerns regarding solar energy development within the SEZ will emerge.	The need for and nature of SEZ-specific design features regarding potential issues of concern, such as burials and the Salt Song Trail, would be determined during government-to-government consultation with the affected Tribes.
Socioeconomics	*Construction:* 1,221 to 16,165 total jobs; \$73.2 million to \$969 million income in ROI. *Operations:* 259 to 6,138 annual total jobs; \$9.0 million to \$230.3 million annual income in the ROI.	None.

TABLE 9.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Iron Mountain SEZ	SEZ-Specific Design Features
Environmental Justice	Minority and low-income *individuals* live within 50 mi (80 km) of the SEZ. However, as defined in CEQ guidelines, no low-income or minority *populations* occur within that area; thus, there would be no disproportionately high and adverse human health or environmental effects on low-income or minority populations.	None.
Transportation	The primary transportation impacts would result from commuting worker traffic. State Route 62 provides a regional traffic corridor that could experience moderate impacts for single projects that may have up to an additional 2,000 vehicle trips per day (maximum).	None.

Abbreviations: AAQS = ambient air quality standards; ACEC = Area of Critical Environmental Concern; BLM = Bureau of Land Management; BMP = best management practice; CDFG = California Department of Fish and Game; CEQ = Council on Environmental Quality; CESA= California Endangered Species Act; CO_2 = carbon dioxide; CRA = Colorado River Aqueduct; CSP = concentrating solar power; dBA = A-weighted decibel; DoD = U.S. Department of Defense; EPA = U.S. Environmental Protection Agency; ESA = Endangered Species Act; Hg = mercury; KOP = key observation point; KSLA = known sodium leasing area; L_{dn} = day-night average sound level; L_{eq} = equivalent continuous sound level; MTR = military training route; NNL = National Natural Landmark; NO_x = nitrogen oxides; NP = National Park; NRHP = *National Register of Historic Places*; $PM_{2.5}$ = particulate matter with an aerodynamic diameter of 2.5 µm or less; PM_{10} = particulate matter with an aerodynamic diameter of 10 µm or less; PSD = prevention of significant deterioration; PV = photovoltaic; ROI = region of influence; SEZ = solar energy zone; SHPO = State Historic Preservation Office; SO_2 = sulfur dioxide; TDS = total dissolved solids; TES = thermal energy storage; USFWS = U.S. Fish and Wildlife Service; VRM = visual resource management; WA = Wilderness Area; WWII = World War II.

[a] The detailed programmatic design features for each resource area to be required under BLM's Solar Energy Program are presented in Appendix A, Section A.2.2. These programmatic design features would be required for development in the proposed Iron Mountain SEZ.

[b] The scientific names of all plants, wildlife, aquatic biota, and special status species are provided in Sections 9.2.10 through 9.2.12.

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9.2.2 Lands and Realty

9.2.2.1 Affected Environment

The proposed Iron Mountain SEZ is located in a remote portion of the eastern Mojave Desert about 32 mi (51 km) west of Parker, Arizona, and 45 mi (72 km) southwest of Needles, California. The SEZ contains only BLM-administered lands, but there are about 2,560 acres (10.4 km^2) of private lands and about 640 acres (2.5 km^2) of state lands included within the external boundary of the SEZ. Another 560 acres (2.3 km^2) of state land is located adjacent to the southern boundary of the SEZ. On the western side of the SEZ is land owned by the Metropolitan Water District (MWD) that is surrounded on three sides by the SEZ. The MWD maintains a pumping station in this area that is part of the MWD Colorado River Aqueduct (CRA). The aqueduct essentially forms the southern and western boundaries of the SEZ. State Route 62 crosses through the very southern end of the SEZ, and the Cadiz Road, which is a good quality dirt/gravel road, crosses the area in a northwest–southeast direction. A railroad line and two underground natural gas pipelines parallel the Cadiz Road. A 230-kV power line that services the MWD pumping station passes north to south through the western portion of the SEZ.

As of March 2010, a total of seven solar development applications had been filed by four companies in the Iron Mountain SEZ. There are three active and two pending sodium leases in the northwestern portion of the SEZ in Danby Lake KSLA. There are additional ROWs for telephone and power lines and communication sites within the SEZ (BLM and USFS 2010b).

Most of the desert in and surrounding the SEZ was used for military training during World War II. Live fire exercises were conducted in many places and unexploded military ordnance can still be found in the area. Recently, limited surveys have been conducted to identify areas where military contamination might be present (DOI 2005; USACE 2007; USACE 1956).

The SEZ area is surrounded on three sides by desert mountain ranges designated as wilderness. Much of Joshua Tree National Park, which is about 10 mi (16 km) farther southwest from the SEZ than these three areas, is also designated as wilderness. The overall character of the area in and around the SEZ is rural and undeveloped. The SEZ and the areas surrounding it provide one of the very large and open viewscapes for which the California Desert Conservation Area (CDCA) is known.

9.2.2.2 Impacts

9.2.2.2.1 Construction and Operations

Development of the proposed Iron Mountain SEZ for utility-scale solar energy production would establish a very large industrial area that would exclude many existing and potential uses of the land, perhaps in perpetuity. Since the SEZ is largely undeveloped and rural, utility-scale solar energy development would be a new and discordant land use to the area. It also is possible that the 1,200 acres (5 km^2) of state land and about 2,400 acres (9.7 km^2) of private land located within or adjacent to the exterior boundaries of the SEZ could, with land owner concurrence, be developed in the same or a complementary manner as the public lands. Development of additional industrial or support activities also could be induced on additional private and state lands near the SEZ.

Existing ROW authorizations on the SEZ would not be affected by solar energy development since they are prior rights. Should the SEZ be designated, the BLM would still have discretion to authorize additional ROWs in the area until solar energy development was authorized, and then future ROWs would be subject to the rights granted for solar energy development. It is not anticipated that approval of solar energy development would have a significant impact on land available for ROWs in the area.

Cadiz Road is an important road that provides access through the SEZ and would likely remain open under any development scenario. Access to the east of the SEZ toward the Turtle Mountains could be obstructed by solar development. Access routes are already restricted in this direction since many crossings over the railroad have been removed; development of solar facilities could exacerbate this problem.

There is a potential hazard associated with unexploded military ordnance that could remain on the SEZ from past military training activities. This hazard would need to be addressed prior to ground-disturbing activities in any area of the SEZ, using results of available surveys as a starting point.

9.2.2.2.2 Transmission Facilities and Other Off-Site Infrastructure

An existing 230-kV transmission line runs north–south through the western portion of the SEZ; this line might be available to transport the power produced in this SEZ. Establishing a connection to the existing line would not involve the construction of a new transmission line outside of the SEZ so there would be no additional impact from a new line. At full build-out capacity of the proposed Iron Mountain SEZ, it is clear that substantial new transmission and or upgrades of existing transmission lines would be required to bring electricity from the SEZ to load centers; however, at this time the location and size of such new transmission facilities are unknown. Generic impacts of transmission and associated infrastructure construction and of line upgrades for various resources are discussed in Chapter 5. Project-specific analyses would need to identify the specific impacts of new transmission construction and line upgrades for any solar projects requiring additional transmission capacity.

Road access to the site is good and no new roads to the site would be required. Both internal electric transmission lines and roads would be required to support development of solar energy facilities. See Section 9.2.1.2 for the analysis assumptions for the SEZ.

9.2.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

Implementing the programmatic design features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would provide adequate mitigation for some identified impacts. The exceptions would be impacts related to the exclusion of many existing and potential uses of the public land, perhaps in perpetuity; the visual impact of an industrialized-looking solar facility within an otherwise rural area; and any induced changes in land use on private and state lands.

The following is a proposed design feature specific to the proposed Iron Mountain SEZ:

- Survey of solar energy development sites for possible unexploded military ordnance would be required.

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9.2.3 Specially Designated Areas and Lands with Wilderness Characteristics

9.2.3.1 Affected Environment

The proposed Iron Mountain SEZ is located in the CDCA and also in the center of an area of high wilderness and scenic value. Within 25 mi (40 km) of the area, 11 wilderness areas, including 1 within Joshua Tree National Park, are visible from the SEZ. The Turtle Mountain ACEC, which was designated for its outstanding scenic resources, is included within the boundary of the Turtle Mountains Wilderness. Additionally, the Chemehuevi Desert Wildlife Management Area (DWMA) and the Patton Iron Mountain Divisional Camp ACEC abut the SEZ. The Chemehuevi DWMA also overlaps the Turtle Mountains Wilderness to a great extent. Figure 9.2.3.1-1 shows the relationship of these areas to the SEZ. No lands with wilderness characteristics outside of designated wilderness areas have been identified within 25 mi (40 km) of the SEZ.

As part of the planning process for the BLM-administered lands in the CDCA, all public lands, except for about 300,000 acres (1,214 km^2) of scattered parcels, were designated geographically into one of four multiple-use classes. The classification was based on the sensitivity of resources and the kinds of uses for each geographic area. Four multiple use classes were used (BLM 1999):

- Class C is for lands designated either as wilderness or for wilderness study areas. These lands are managed to protect their wilderness characteristics.

- Class L (Limited Use) protects sensitive, natural, scenic, ecological, and cultural resource values. Public lands designated as Class L are managed to provide for generally lower intensity, carefully controlled multiple use of resources, while ensuring that sensitive values are not significantly diminished.

- Class M (Moderate Use) is based upon a controlled balance between higher intensity use and protection of public lands. This class provides for a wide variety of present and future uses such as mining, livestock grazing, recreation, energy, and utility development. Class M management is also designed to conserve desert resources and to mitigate damage to those resources which permitted uses may cause.

- Class I (Intensive use). Its purpose is to provide for the concentrated use of lands and resources to meet human needs. Reasonable protection will be provided for sensitive natural and cultural values. Mitigation of impacts on resources and rehabilitation of affected areas will occur insofar as possible.

Land within the SEZ is predominantly Class M (93%) with some Class I (6%) and Class L (1%). The Multiple Use Class Guidelines contained in the CDCA Plan indicate that wind, solar, or geothermal electrical generation facilities could be allowed in all these classes.

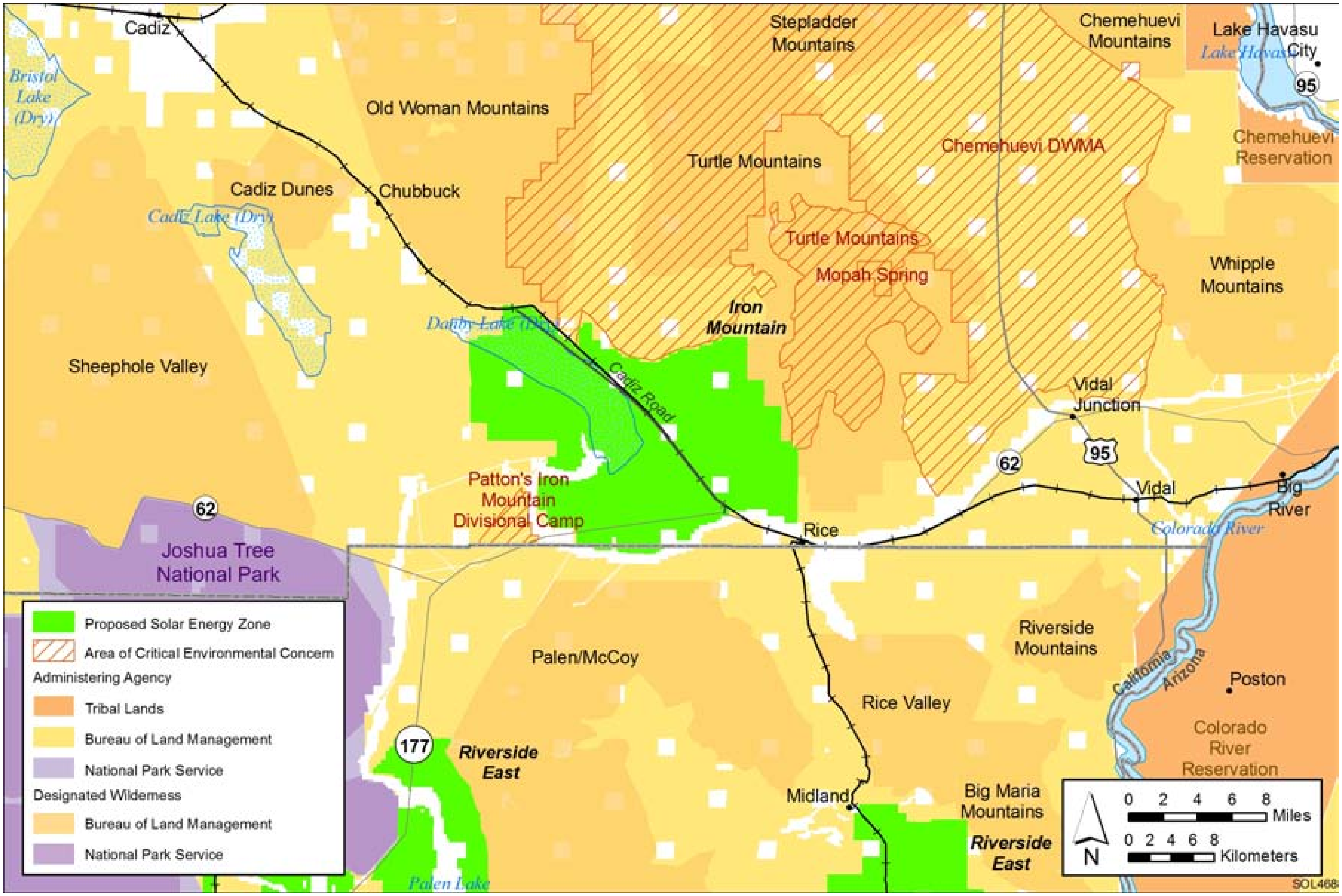

FIGURE 9.2.3.1-1 Specially Designated Areas in the Vicinity of the Proposed Iron Mountain SEZ

9.2.3.2 Impacts

9.2.3.2.1 Construction and Operations

The potential impact on specially designated areas from solar development within the proposed Iron Mountain SEZ is difficult to determine and would vary by solar technology employed, the specific area being affected, and the perception of individuals viewing the development. Development of the SEZ, especially full development, would be a dominating factor in the viewshed from large portions of some of these specially designated areas, as summarized in Table 9.2.3.2-1.

The data provided in Table 9.2.3.2-1 assume the use of the power tower solar energy technology, which because of the potential height of these facilities, could be visible from the largest amount of land of the technologies being considered in the PEIS. The potential visual impacts of solar energy projects in terms of the amount of acreage within specially designated areas within the viewshed of the SEZ could be less for shorter solar energy facilities; however, assessment of the visual impacts of solar development on specially designated areas must be conducted on a site-specific and technology-specific basis to accurately identify impacts. See Section 9.2.14 for a more complete review of the visual impacts for the Iron Mountain SEZ.

In general, the closer a viewer is to solar development, the greater the impact on an individual's perception (see Section 9.2.14 for a more thorough discussion of visual impacts and analysis). The viewing height above a solar energy development area, the size of the solar development area, and the purpose for which a person is visiting an area are also important. Individuals seeking a wilderness experience within these areas could be expected to be more adversely affected than those simply traveling along the highway with another destination in mind. In the case of the Iron Mountain SEZ, the low-lying location of the SEZ in relation to surrounding specially designated areas would tend to highlight the industrial-like development in the SEZ. In addition, because of the generally undeveloped nature of the whole area in and around the SEZ, impacts on wilderness characteristics may be more significant than in other, less pristine areas.

The occurrence of glint and glare at solar facilities could potentially cause large though temporary increases in brightness and visibility of the facilities. The visual contrast levels that were assumed to assess potential impacts on specially designated areas do not account for potential glint and glare effects; however, these effects would be incorporated into a future site- and project-specific assessment that would be conducted for specific proposed utility-scale solar energy projects.

The NPS has identified concerns about the potential impact of solar energy development on natural, cultural, and historical resources inside and outside of the boundaries of Joshua Tree National Park. In addition, because of the lack of development in the immediate region of the SEZ, the night sky is very dark and the NPS also has identified concerns that solar facility development in the SEZ and in areas adjacent to the park could adversely affect the quality of the night sky environment as viewed from the park. The amount of light that may emanate from Iron

TABLE 9.2.3.2-1 Specially Designated Areas Potentially within the Viewshed of Solar Facilities within the Proposed Iron Mountain SEZ[a]

		Acres within 5-mi[b] (8-km) Viewshed		Acres within 15-mi (24-km) Viewshed		Acres within 25-mi (40-km) Viewshed	
Resource	Total Acres	No. of Acres	Percentage of Total Acres	No. of Acres	Percentage of Total Acres	No. of Acres	Percentage of Total Acres
California Desert Conservation Area	25,919,319	308,931	1.2	627,189	2.4	821,521	3.2
Turtle Mountains ACEC	50,057	9,384	18.7	10,024	20.0	10,024	20.0
Joshua Tree NP	793,331			8,931	1.1	14,606	1.8
Wilderness Areas							
Big Maria Mountains	46,056					8,974	19.5
Cadiz Dunes	21,286			79	0.4	1,443	6.8
Joshua Tree NP	586,623			8,898	1.5	14,333	2.4
Old Woman Mountains	183,555	20,092	10.9	74,026	40.3	88,760	48.4
Palen-McCoy	224,414	19,297	8.6	57,313	25.5	60,341	26.9
Rice Valley	43,412			34,944	80.5	40,639	93.6
Riverside Mountains	24,206			688	2.8	818	3.4
Sheephole Valley	195,002			11,755	6.0	37,033	19.0
Stepladder Mountains	84,187					12,833	15.2
Turtle Mountains	182,610	26,358	14.4	70,305	38.5	73,092	40.0
Whipple Mountains	78,484					97	0.1

[a] Identified assuming a power tower facility of 650 ft (198.1 m).

[b] To convert acres to lcm^2, multiply by 0.004047; to convert mi to km, multiply by 1.609.

Mountain solar facilities is not known but it could affect the national park and the surrounding wilderness areas.

The following are descriptions of the potential impacts of solar energy facilities on specially designated areas:

Designated Wilderness within 5 mi (8 km) of the SEZ

- The Turtle Mountains WA abuts the boundary of the SEZ for about 11 mi (17.7 km). The Old Woman Mountains Wilderness is separated from the SEZ by about 0.25 mi (0.40 km), where the railroad and Cadiz Road skirt the northern end of the SEZ. The southern boundary of the SEZ ranges from 2 to 3.5 mi (3.2 to 5.6 km) from the Palen-McCoy Wilderness. Within 5 mi (8 km) of the SEZ, wilderness characteristics would be adversely affected by development within the SEZ. Designated wilderness within the 5-mi (8-km) viewshed of the SEZ includes about 66,000 acres (267 km^2). See Table 9.2.3.2-1 for additional details about the designated wilderness affected by this SEZ.

Designated Wilderness within 15 mi (24 km) of the SEZ

- The boundary of the Rice Valley WA is within 7 mi (11 km) of the SEZ, and 80% of the WA is located in the zone between 5 and 15 mi (9.7 and 24 km) from the SEZ. Because of the distance from the SEZ and because of the possible impact of the intervening development associated with the MWD aqueduct and State Route 62, the impacts on wilderness characteristics in the Rice Valley WA would be expected to be less in this distance zone than those described for the three areas listed above. The reduction of impacts because of increased distance from the SEZ may not be true for the additional acreage in this distance zone in the Turtle Mountains, Old Woman Mountains, and Palen-McCoy WAs because of the potential large expanse of solar development in the SEZ that would be visible. It is anticipated that the wilderness characteristics for these three areas would be adversely affected at distances greater than 5 mi (8 km). As shown in Table 9.2.3.2-1, about 237,000 acres (959 km^2) of these four WAs is within the 15-mi (24-km) viewshed of the SEZ. In addition, at this distance, small portions of four more WAs begin to be included in the viewshed of the Iron Mountain SEZ, including the WA within Joshua Tree NP.

Designated Wilderness within 25 mi (40 km) of the SEZ

- Between 15 and 25 mi (24 and 40 km), the impact of solar development in the Iron Mountain SEZ on wilderness characteristics is expected to be considerably reduced, as development in the SEZ becomes less of a factor in the viewshed. However, as shown in Table 9.2.3.2-1, significant percentages of the Turtle Mountains, Old Woman Mountains, Palen-McCoy, and Rice Valley WAs are included in the viewshed of the SEZ within this distance. The cumulative impact on wilderness characteristics in these four areas would be expected to be more significant because of the large continuous extent of solar development that would be visible from these WAs even at this distance.

Three other areas—Big Maria Mountains, Sheephole Valley, and Stepladder Mountains WAs—also have significant percentages of designated wilderness in the viewshed of the SEZ at this distance, but the impact on these areas from development in the Iron Mountain SEZ is expected to be minor because of the longer distance and the fact there would be little or no intervening views of solar development in the SEZ. It is anticipated that wilderness characteristics in areas within Joshua Tree National Park with views of the SEZ would be affected in the same manner as these three WAs. At this distance, about 338,000 acres (1,368 km^2) of designated wilderness is included in the viewshed of the Iron Mountain SEZ.

Joshua Tree National Park

- The closest boundary of the national park and designated wilderness within the park is located about 10 mi (16 km) from the boundary of the SEZ. Visitors in about 14,606 acres (59 km^2), or 1.8% of the park, would have visibility of solar development within the SEZ. Almost all of this area within the park with visibility of the SEZ is designated wilderness. The NPS has commented that solar energy development on public lands within and outside the study area adjacent to the park have a high potential to adversely affect resources in the Coxcomb Mountains in the northern and eastern portions of the park. Based on visual analysis of the potential impacts of development of the SEZ and largely because of the distance to the park, it is anticipated that solar development would have a minimal impact on the park.

  The eastern portion of the national park affords park visitors with an unimpeded opportunity for night sky viewing. Maintaining the high quality of night sky viewing opportunity in this portion of the park is a major concern for the NPS. The concerns of the NPS relate to any artificially induced light from nighttime maintenance activity and/or security lighting within 20 mi (32 km) of the park's boundaries. At this time no estimate of the potential for impact on night sky viewing can be provided.

ACECs

- The Turtle Mountains ACEC, which was designated for its outstanding scenic resources, is located to the east of the SEZ within the boundaries of the Turtle Mountains Wilderness. The boundary of the scenic ACEC abuts the SEZ in one area, and about 19% of the ACEC is within 5 mi (8 km) and in full view of the SEZ. Although the ACEC would not be directly affected by development in the SEZ, the setting of the area would be adversely affected, and it is likely that visitors to the ACEC would find the scenic resources of the area within view of the SEZ to be adversely affected by the presence of solar facilities.

- The Patton Iron Mountain Divisional Camp ACEC is located near the southwest corner of the SEZ. The area is significant because Patton's Third Army trained there prior to deployment during WWII. The ACEC relates to the cantonment area only, not the entire divisional camp, which includes its related firing ranges. The area would not be directly affected by development of the SEZ, but it is possible that if additional human traffic is drawn to the area because of the solar facilities, increased management efforts may be needed to protect the site.

- The Chemehuevi DWMA is an 875,000-acre (3,540-km^2) area established to provide for the management and protection of the desert tortoise. The DWMA abuts the northern boundary of the SEZ and straddles both the 230-kV transmission line and the main dirt road providing access to the SEZ from the north. Increased traffic on this road accessing the SEZ and an increasing number of people in the area could increase the mortality of the desert tortoise. Since the area is very large, however, it is not anticipated that there would be a significant effect on the function of the DWMA or on the tortoise population.

California Desert Conservation Area

- The viewshed within 25 mi (40 km) of the Iron Mountain SEZ includes about 822,000 acres (3,327 km^2), or about 3.2% of the CDCA (Table 9.2.3.2-1), and the viewshed may extend to 40 mi (64 km). Installation of renewable energy facilities is consistent with the CDCA Plan, but full development of the SEZ would adversely affect wilderness characteristics in three designated WAs, scenic values in one ACEC, and opportunities for undeveloped recreation in and around the SEZ, and would cause a small loss of recreational use within the area of the SEZ. It is anticipated that full development of the SEZ would adversely affect recreational use in about 66,000 acres (267 km^2) of wilderness areas surrounding the SEZ that is located within the most sensitive 5-mi (8-km) visual zone surrounding the proposed SEZ. Overall adverse impacts on the CDCA appear to be significant.

9.2.3.2.2 Transmission Facilities and Other Off-Site Infrastructure

See Section 9.2.2.2.2 for the discussion of the assumptions and requirements regarding construction of new transmission lines or roads; the discussion also applies to impacts on specially designated areas.

9.2.3.3 SEZ-Specific Design Features and Design Feature Effectiveness

Implementing the programmatic design features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would provide some level of mitigation for identified impacts. The exceptions would be that SEZ development would adversely affect wilderness characteristics in the Turtle Mountains, Old Woman Mountains, and Palen-McCoy WAs and scenic resources in the Turtle Mountain ACEC.

Proposed design features specific to the proposed SEZ include the following:

- The application of SEZ-specific design features for visual resource impacts presented in Section 9.2.14 may reduce the visual impacts on wilderness characteristics, scenic resources, and on night sky viewing opportunities.

It is anticipated that even with the adoption of the design features, adverse impacts on wilderness characteristics and scenic resources would not be completely mitigated and residual impacts would remain.

9.2.4 Rangeland Resources

Rangelands resources include livestock grazing and wild horses and burros, both of which are managed by the BLM. These resources and possible impacts on them from solar development within the proposed Iron Mountain SEZ are discussed in Sections 9.2.4.1 and 9.2.4.2.

9.2.4.1 Livestock Grazing

9.2.4.1.1 Affected Environment

The SEZ is not included within a grazing allotment, and grazing is not authorized in the area. There is one allotment located just to the south of the area.

9.2.4.1.2 Impacts

There would be no impact on livestock grazing.

9.2.4.1.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features would be necessary to protect or minimize impacts on livestock grazing.

9.2.4.2 Wild Horses and Burros

9.2.4.2.1 Affected Environment

Section 4.4.2 discusses wild horses (*Equus caballus*) and burros (*E. asinus*) that occur within the six-state study area. Twenty-two wild horse and burro HMAs occur within California. Also, several HMAs in Arizona are located near the Arizona–California border. Three of these HMAs occur within a 50-mi (80-km) radius of the proposed Iron Mountain SEZ (Figure 9.2.4.2.1-1). The closest HMA is the Chemehuevi HMA located in California, which contains only wild burros and is about 20 mi (32 km) east-northeast of the SEZ. The Chemehuevi HMA contains an estimated population of 201 burros (BLM 2009e).

In addition to the HMAs managed by the BLM, the USFS has 51 established wild horse and burro territories in Arizona, California, Nevada, New Mexico, and Utah and is the lead management agency that administers 37 of the territories (Giffen 2009; USFS 2007). The closest territory to the proposed Iron Mountain SEZ is the Big Bear Territory within the San Bernardino

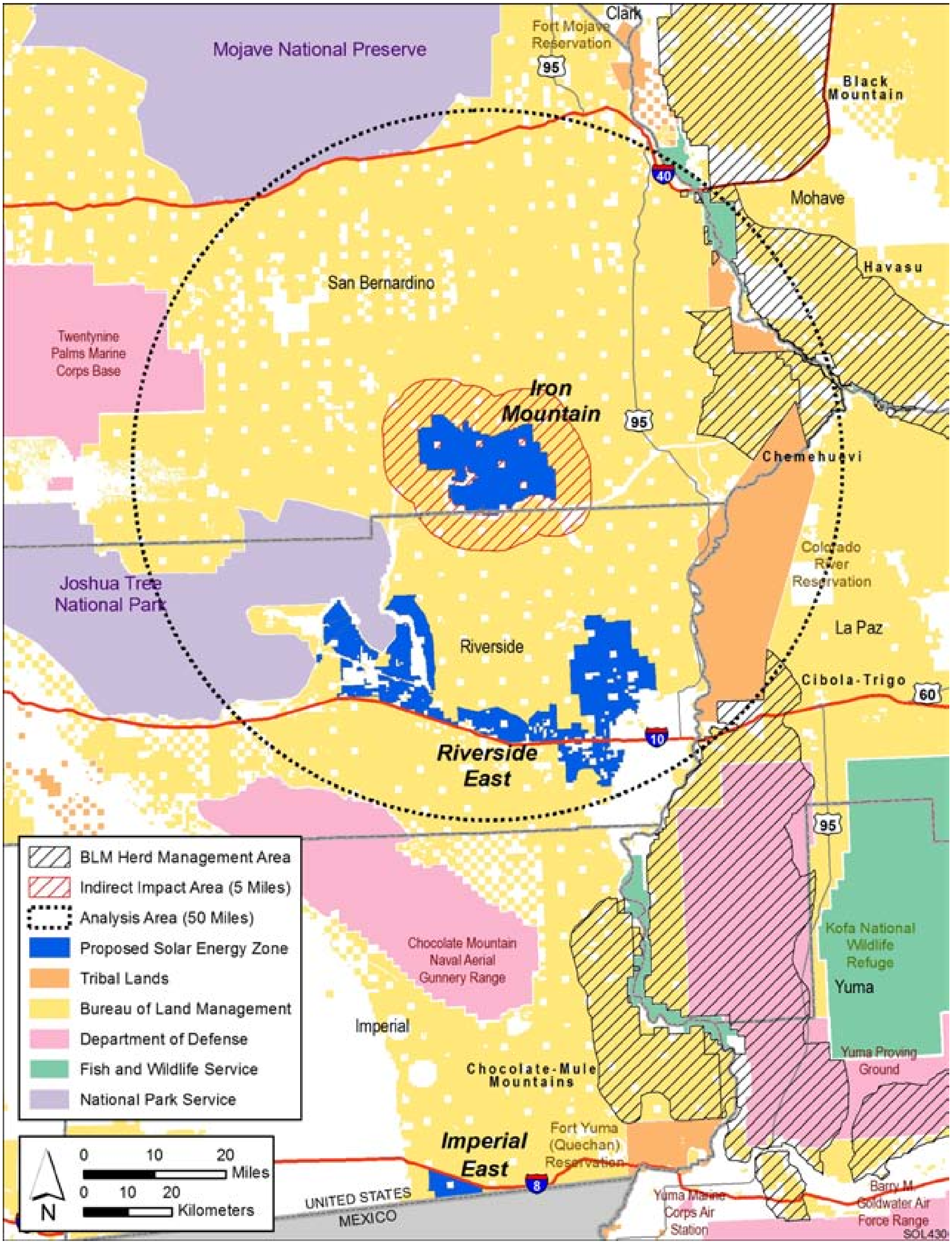

FIGURE 9.2.4.2-1 Wild Horse and Burro Herd Management Areas within the SEZ Region for the Proposed Iron Mountain SEZ (Sources: BLM 2009d; USFS 2007)

National Forest. It is located more than 80 mi (129 km) west of the SEZ. This territory is managed for a population of 60 wild burros (USFS 2007).

9.2.4.2.2 Impacts

Because the proposed Iron Mountain SEZ is 21 mi (34 km) or more from any wild horse and burro HMA managed by the BLM and more than 80 mi (129 km) from any wild horse and burro territory administered by the USFS, solar energy development within the SEZ would not affect wild horses and burros that are managed by these agencies.

9.2.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

The implementation of required programmatic design features described in Appendix A, Section A.2.2, would reduce the potential for effects on wild horses and burros. No proposed Iron Mountain SEZ-specific design features would be necessary to protect or minimize impacts on wild burros.

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9.2.5 Recreation

9.2.5.1 Affected Environment

The proposed Iron Mountain SEZ is flat, and the land is of a type and quality that generally does not attract large numbers of recreational users. Although the area is remote, access into the area is easy, and primarily during the cooler months, low levels of recreational use are likely to occur. The CDCA, like many remote areas of the public lands, attracts individuals and families seeking undeveloped recreation opportunities. Opportunities for exploration of old townsites, mining operations, and old roads as well as for hunting and backcountry camping, hiking, and wildlife and wildflower viewing are important attractions throughout the CDCA. There are areas both in and adjacent to the Iron Mountain SEZ that provide these kinds of attractions.

The SEZ is very large and is part of a large open vista that is still undeveloped. The area was used for military training during WWII, and several of the old military encampment sites outside the SEZ attract visitors interested in the history of that period. Portions of the area are important as access points to the Turtle Mountains WA. Cadiz Road, which passes through the SEZ, is a major access route to backcountry recreation areas outside of the SEZ. In 2004, the area was designated in the Northern and Eastern Mohave Route Designation Amendment to the California Desert Plan as “Limited, Designated Roads and Trails” (BLM 2009b). Subsequently, several road/trail segments in the SEZ have been designated as open to vehicular use.

State Route 62, which passes through the southern end of the SEZ, is a major travel route between the Los Angeles metropolitan area and the Colorado River recreation areas. There are approximately 10 segments of OHV routes designated as open within the proposed Iron Mountain SEZ; these are shown in Figure 9.2.21-1.

9.2.5.2 Impacts

9.2.5.2.1 Construction and Operations

Recreational users would be excluded from developed areas of the SEZ. Although there are no recreation statistics for the SEZ and surrounding lands, it is anticipated that there would be a small loss of recreation use caused by development of the Iron Mountain SEZ. Because of the visual impact of a large and highly visible industrial-type development in the SEZ, opportunities for an undeveloped and primitive recreation experience in and around the SEZ would be lost or reduced. Access through areas developed for solar power production could be closed or rerouted. Access to public lands to the east of the SEZ could be adversely affected by solar energy development if provision is not made to maintain public road access around or through any solar development areas.

Open OHV routes crossing areas granted ROWs for solar facilities would be redesignated as closed. However, a programmatic design feature addressing recreational impacts would require consideration of development of alternative routes that would retain a similar level of access across and to public lands as a part of the project proposal (see Section 5.5.1 for more details on how routes coinciding with proposed solar facilities would be treated).

Based on viewshed analysis (see Section 9.2.14), the Iron Mountain SEZ would be visible from a wide area, perhaps as far away as I-40, about 40 mi (64 km) to the northwest. Solar facilities in the SEZ and in adjacent areas currently under solar application would cause the loss of the currently expansive and undeveloped viewshed over a large area. The viewshed within 25 mi (40 km) of the Iron Mountain SEZ alone includes about 822,000 acres (3,327 km^2) within the CDCA (Table 9.2.3.2-1). The viewshed analysis also shows that the SEZ would be visible from large portions of the surrounding wilderness areas. About 66,000 acres (267 km^2) of designated wilderness in the Turtle Mountains, Old Woman Mountains, and Palen-McCoy WAs is located within the most sensitive 5-mi (8-km) visual zone surrounding the proposed SEZ, and wilderness recreation use in this area would likely be adversely affected by solar development in the SEZ. Because of the continuity of the view of solar development beyond 5 mi (8 km) from these three WAs, the adverse impacts on wilderness recreation use may extend further than 5 mi (8 km) into these areas.

9.2.5.2.2 Transmission Facilities and Other Off-Site Infrastructure

See Section 9.2.2.2.2 for the discussion of the assumptions and requirements regarding construction of new transmission lines or roads that also applies to impacts on recreation use.

9.2.5.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features were identified for addressing impacts on recreation use at the proposed Iron Mountain SEZ. Implementing the programmatic design features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would provide limited mitigation for some identified impacts. The exceptions would be the loss of recreation use within the SEZ and of opportunities for undeveloped and primitive recreation around the SEZ. Wilderness recreation use in the Turtle Mountains, Old Woman Mountains, and Palen-McCoy WAs would also be adversely affected.

9.2.6 Military and Civilian Aviation

9.2.6.1 Affected Environment

The proposed Iron Mountain SEZ is located under five MTRs, which include a mixture of visual and instrument routes; the lowest floor elevation is 200 ft (61 m) AGL. Because of this, the area is identified by the BLM as an area where advance consultation with the DoD is required for approval of activities that could adversely affect the use of the MTRs. The military has indicated that development of portions of this area are compatible with its existing use regardless of the proposed heights of solar facilities, while other portions should have height limits and some areas may be incompatible with existing military use.

There are no civilian aviation facilities in the vicinity of the SEZ that would be affected by construction and operation of solar energy facilities.

9.2.6.2 Impacts

The development of any solar energy or transmission facilities that encroach into the airspace of the MTR could interfere with military training activities. While the military has indicated that solar development on portions of the Iron Mountain SEZ is compatible with existing military use, it has also commented that other portions should have height limits for facilities, and some areas may be incompatible with existing military use.

The system of military airspace in the Southwest overlaps much of the area of highest interest for solar development, and there is potential for solar development to result in cumulative effects on the system of MTRs that stretch beyond just one SEZ or solar project.

There would be no impact on civilian aviation.

9.2.6.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features were identified for addressing impacts on military and civilian aviation at the proposed Iron Mountain SEZ. Implementing the programmatic design features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would provide adequate mitigation for identified impacts.

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9.2.7 Geologic Setting and Soil Resources

9.2.7.1 Affected Environment

9.2.7.1.1 Geologic Setting

Regional Geology

The proposed Iron Mountain SEZ lies within the eastern Mojave Desert region of the Basin and Range physiographic province in southeastern California. The site is at the southern end of Ward Valley, a 53-mi (85-km) long north-trending intermontane basin that is bounded on the west by the Piute, Little Piute, and Old Woman Mountains and on the east by the Sacramento, Stepladder, and Turtle Mountains (National Research Council 1995; Figure 9.2.7.1-1). Ward Valley is one of many internally drained, structural basins typical of the Basin and Range province.

Basin-fill in Ward Valley consists of alluvium, fan deposits, and playa deposits estimated to be as thick as 1,970 ft (600 m). These deposits are generally thickest in the center of the basin, thin out toward the edges, and become more consolidated with depth. The principal water-bearing units in the region are in these deposits. The relative volumes of younger basin-fill and alluvium (Quaternary) and older basin-fill (Miocene and Pliocene) are not known. Ward Valley basin-fill deposits are thought to rest uncomfortably on highly faulted Miocene sedimentary and volcanic rocks that dip to the west (CDWR 2003; National Research Council 1995).

Exposed sediments in Ward Valley are predominantly modern alluvial and playa deposits (Figure 9.2.7.1-2). Dune sands are common, extending from Rice Valley across the southwestern corner of the Iron Mountain SEZ and continuing along the chain of dry lakes (Danby, Cadiz, Bristol) to the northwest.

The surface of Danby Lake is mainly “efflorescent ground,” a white, powdery surface caused by the evaporation of capillary brine; areas of the lakebed on the north and south ends, however, are covered by a salt crystal surface and claypan (smooth, hard, compact clay). Gypsum-capped pedestals within the lake are remnants of a once higher lakebed surface that has since been reduced by deflation and erosion. Two lithologic cores drilled in Danby Lake in the late 1950s found the upper 120 to 130 ft (37 to 40 m) in both cores to be a yellowish-brown silty clay, grading with depth into an olive gray clay with coarse sand grains. Thick sequences of crystalline gypsum occurred in both cores at depths of about 300 ft (91 m)—one thicker than 200 ft (61 m)—but no salt beds were found in either core (although commercial salt deposits are known to exist in these areas). The lack of correlation between core sediments with increasing depth suggests that they were deposited irregularly as a result of intermittent flooding events and not within a perennial lake environment (Bassett et al. 1959).

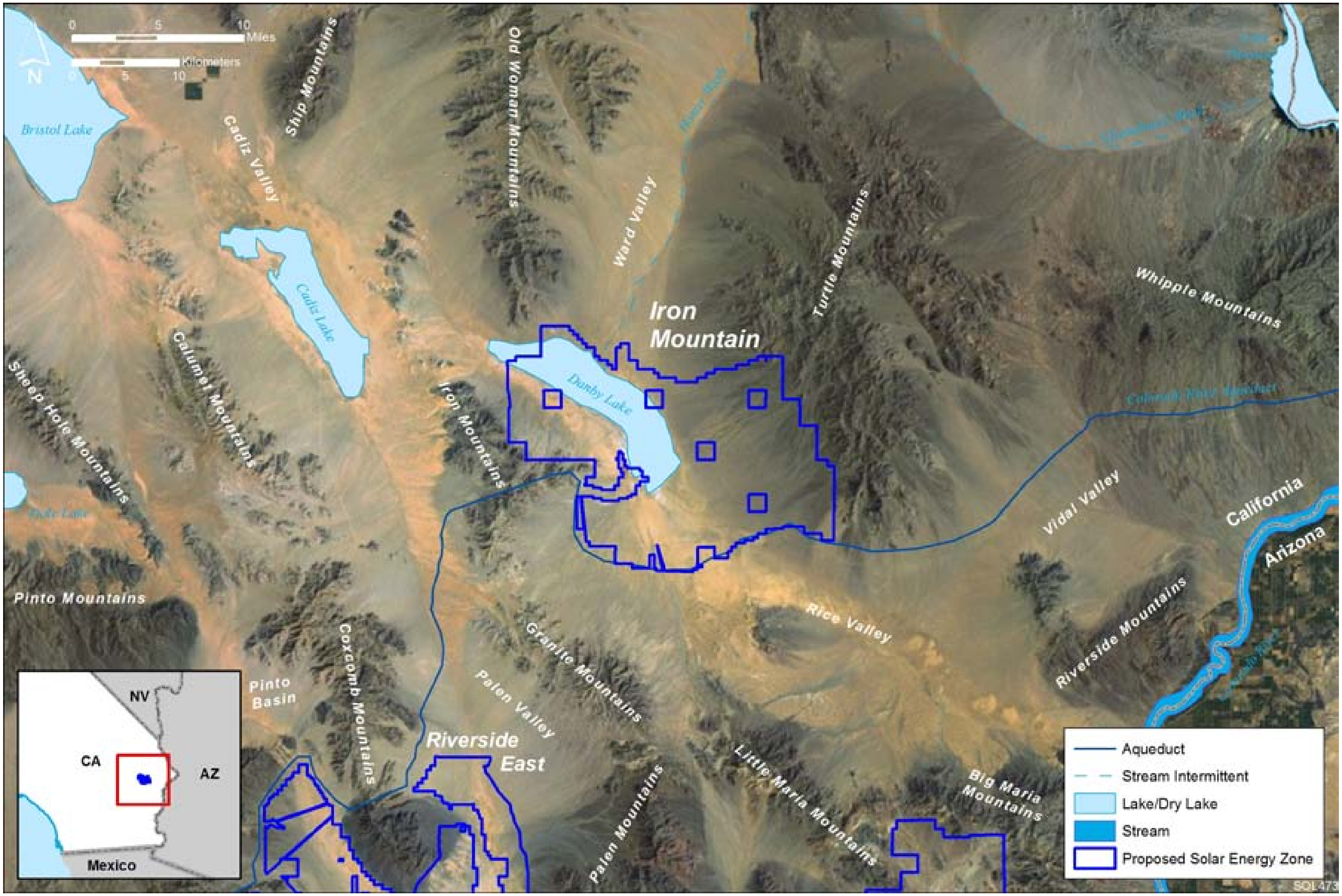

FIGURE 9.2.7.1-1 Physiographic Features in the Ward Valley Region

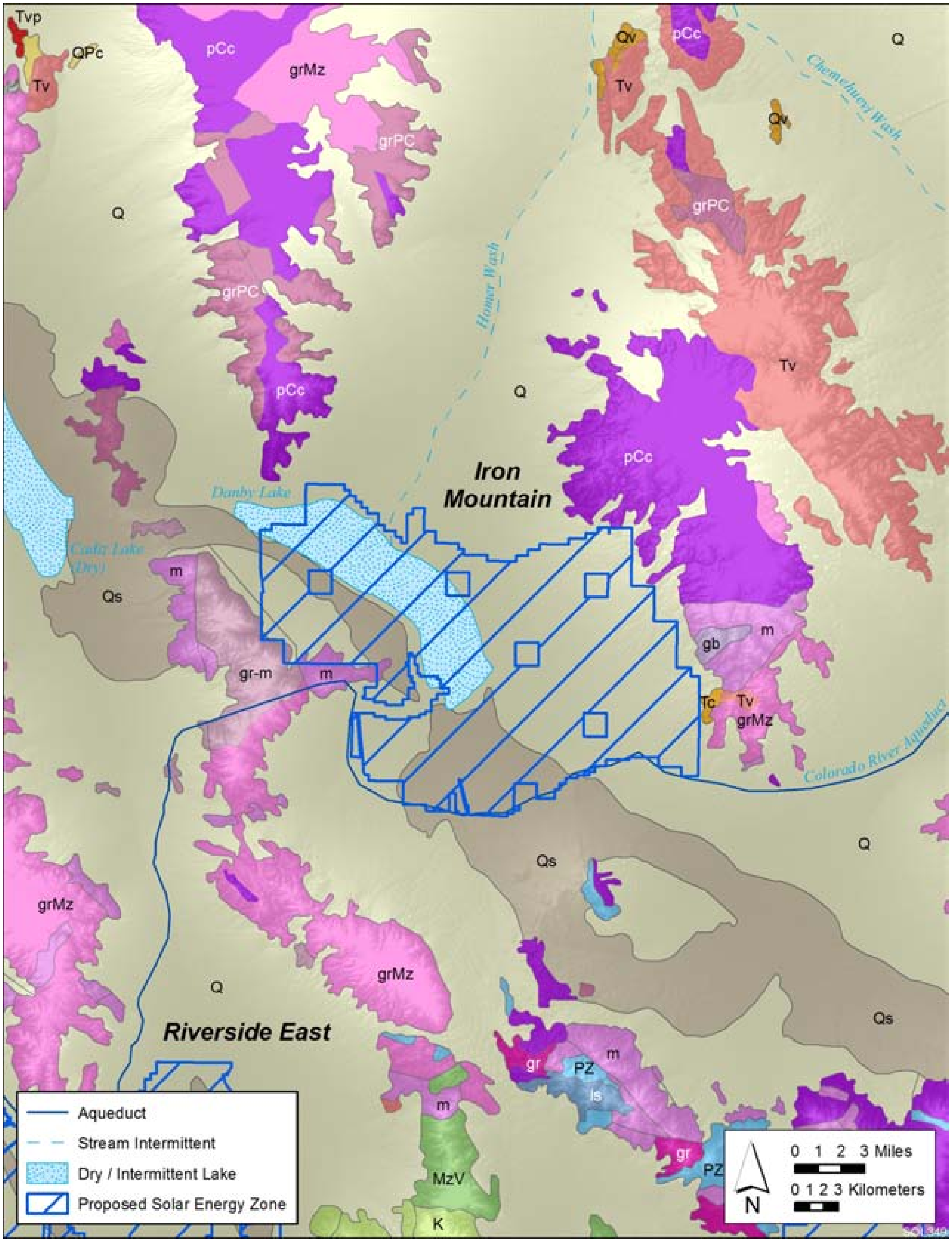

FIGURE 9.2.7.1-2 Geologic Map of the Ward Valley Region (adapted from Ludington et al. 2007 and Gutierrez et al. 2010)

Cenozoic (Quaternary, Tertiary)

- Q — Alluvium, lake, playa and terrace deposits
- Qs — Dune Sand
- QPc — Sandstone, shale and gravel deposits; mostly loosely consolidated (Pliocene and Pleistocene)
- Qv — Volcanic flow rocks; minor pyroclastic deposits
- Tc — Undivided sandstone, shale, conglomerate, breccia and ancient lake deposits
- Tv — Volcanic flow rocks (basalt and andesite); minor pyroclastic deposits
- Tvp — Pyroclastic and volcanic mudflow deposits

Mesozoic

- K — Sandstone, shale and conglomerate, undivided
- grMz — Granite, quartz monzonite, granodiorite and quartz diorite
- gr-m — Granitic and metamorphic rocks; mostly gneiss (Precambrian to Mesozoic)
- MzV — Volcanic and metavolcanic rocks (undivided)
- gr — Granitic rocks (undated)
- gb — Gabbro and dark dioritic rocks

Precambrian to Mesozoic

- ls — Limestone, dolomite and marble
- PZ — Metasedimentary rocks (undivided); includes slate, sandstone, shale, chert, conglomerate, limestone, dolomite, marble, phyllite, schist, hornfels and quartzite
- m — Metasedimentary and metavolcanic rocks; mostly slate, quartzite, hornfels, chert, phyllite, mylonite, schist, gneiss and minor marble
- pCc — Igneous and metamorphic rocks; mostly gneiss and schist intruded by igneous rocks (includes some Mesozoic rocks)
- grPC — Granite, syenite, anorthosite and gabbroic rocks; with various Precambrian plutonic rocks

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FIGURE 9.2.7.1-2 (Cont.)

Topography

Elevations along the axis of Ward Valley range from about 2,130 ft (650 m) near the north end and along the valley sides to about 610 ft (186 m) at the southern end of the valley within Danby Lake. Gently sloping alluvial fan deposits occur along the mountain fronts and coalesce toward the basin center forming a broad, low-relief terrain (bajada). The valley is drained by Homer Wash, an ephemeral stream that flows to the south and discharges into Danby Lake. Waters discharging to Danby Lake drain toward a sump near the southwest edge of the lakebed. Danby Lake is generally dry except for brief periods following heavy rain events (National Research Council 1995; Moyle 1967). The dry lake is bordered to the southwest by active dunes, part of a series of dunes that extend from the Bristol Lake area southeastward into Rice Valley (Figure 9.2.7.1-1).

The proposed Iron Mountain SEZ is located between the Iron Mountains (to the west) and the Turtle Mountains (to the east) in the southern part of Ward Valley, about 20 mi (32 km) northwest of the Colorado River. Elevations range from about 1,772 ft (540 m) in the foothills of the Turtle Mountains just within the northeastern corner of the SEZ to less than 656 ft (200 m) within the dry lakebed (Figure 9.2.7.1-3).

Geologic Hazards

The types of geologic hazards that could potentially affect solar project sites and their mitigation are discussed in Sections 5.7.3 and 5.7.4. The following sections provide a preliminary assessment of these hazards at the proposed Iron Mountain SEZ. Solar project developers may need to conduct a geotechnical investigation to assess geologic hazards locally to better identify facility design criteria and site-specific mitigation measures to minimize their risk.

Seismicity. The proposed Iron Mountain SEZ is located at the eastern margin of the Eastern California Shear Zone and to the northeast of the San Andreas Fault Zone—both seismically active regions dominated by northwest-trending right-lateral strike slip faulting and categorized as "potentially active" (i.e., having surface displacement within the last 11,000 years [Holocene]) under the Alquist-Priolo Earthquake Fault Zoning Act (Figure 9.2.7.1-4). The term "potentially active" generally denotes that a fault has shown evidence of surface displacement during Quaternary time (the last 1.6 million years). However, because there are numerous such faults in California, the State Geologist has introduced new, more discriminating criteria for zoning faults under the Alquist-Priolo Act. Currently, zoned faults include those that are "sufficiently active," that is, showing evidence of surface displacement within the past 11,000 years along one or more of its segments or branches and "well-defined," that is, having a clearly detectable trace at or just below the ground surface (Bryant and Hart 2007).

Ward Valley is about 50 mi (80 km) to the southeast of the East Bullion and Mesquite Lake sections of the Pisgah-Bullion Fault Zone in San Bernardino County. The fault zone is part

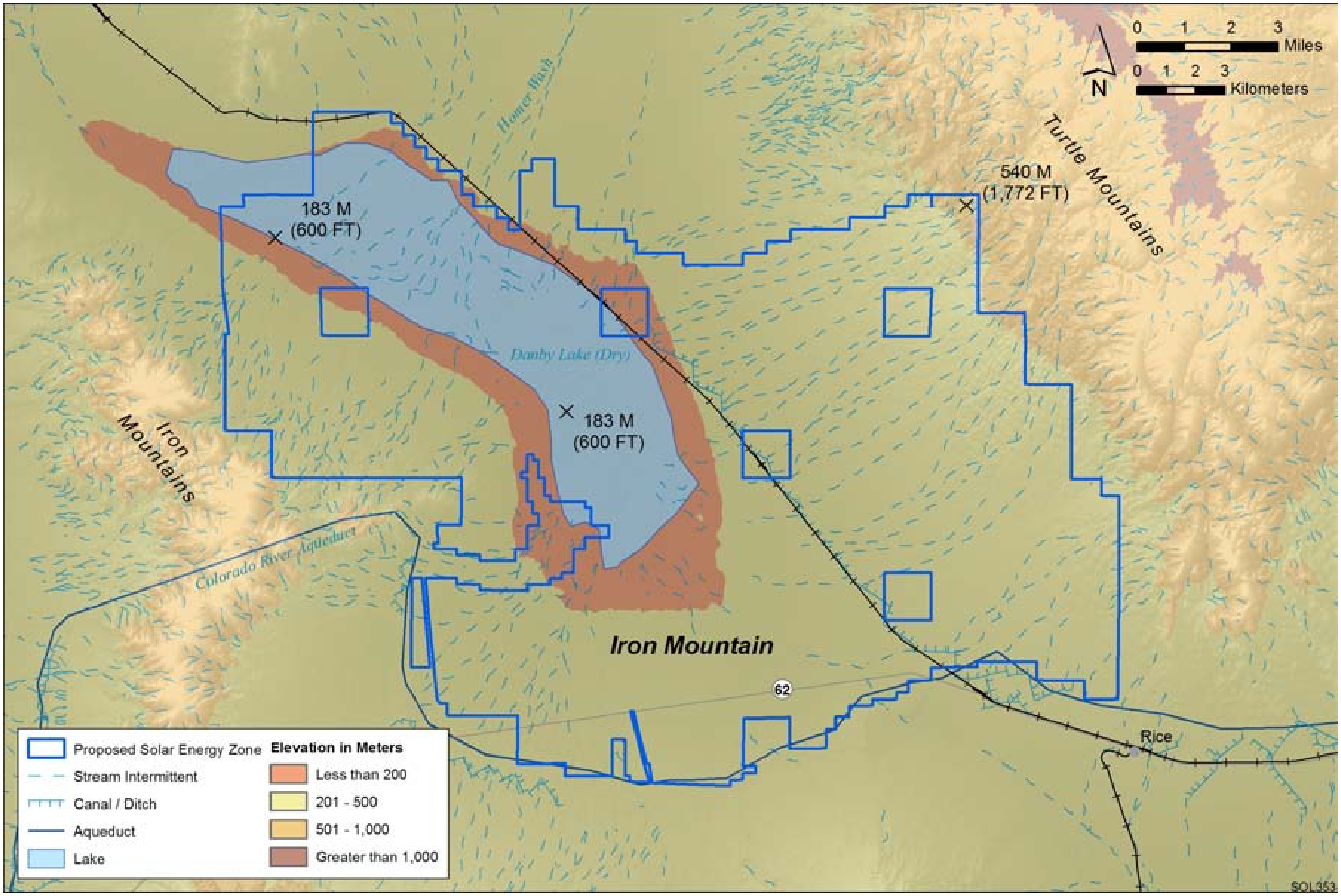

FIGURE 9.2.7.1-3 General Terrain of the Proposed Iron Mountain SEZ

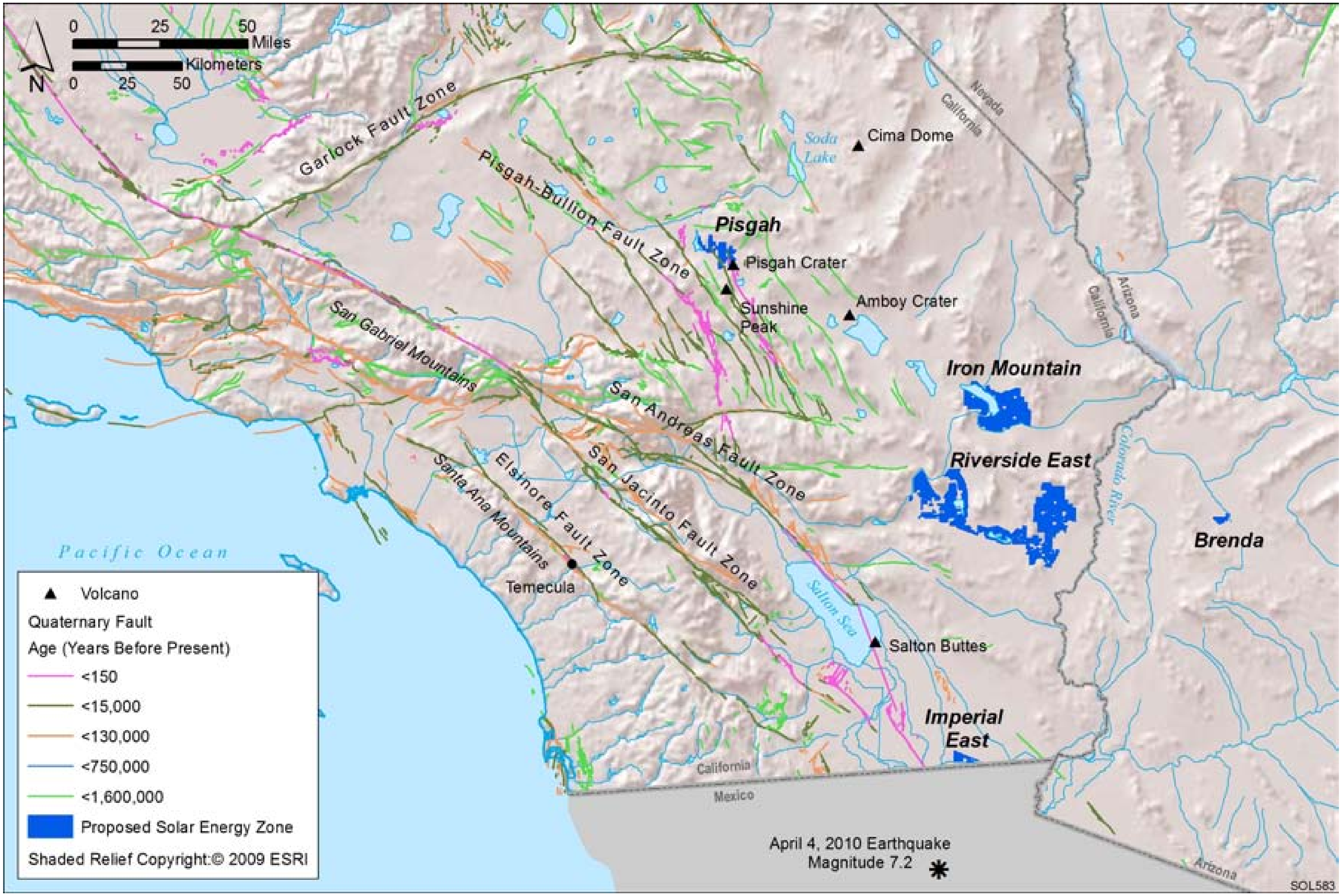

FIGURE 9.2.7.1-4 Quaternary Faults and Volcanoes in Southern California (Sources: USGS and CGS 2009; USGS 2010d)

of a complex of right-lateral strike-slip faults occurring within the Eastern California Shear Zone. Offsets of late Pleistocene and Holocene alluvial, lacustrine, and eolian deposits place the most recent movement along these sections at less than 15,000 years ago. Movement with ground rupture in the northern part of the Mesquite Lake section was reported in 1999 (the Hector Mine earthquake) with a magnitude of 7.1 (Bryant and Hart 2007; Treiman 2003; Bryant 2003).

The Coachella Valley and San Bernardino Mountains sections of the San Andreas Fault Zone are located about 65 mi (105 km) to the southwest of Ward Valley. The fault zone is a network of historically active right-lateral strike-slip faults that together compose the transverse boundary between the North American and Pacific plates. It stretches along most of California's coastline southeast to the northern Transverse Range and inland to the Salton Sea (Figure 9.2.7.1-4). Two major historic earthquakes have occurred along the San Andreas—the 1857 Fort Tejon earthquake (magnitude 7.9) and the 1906 San Francisco earthquake (magnitude 7.8). Several smaller surface-rupturing earthquakes have also occurred in historic time. Quaternary to Holocene creep rates ranging from 23 to 35 mm/yr have been reported for the Coachella Valley and San Bernardino Mountains sections of the fault zone. Average recurrence intervals are estimated to range from 150 to 275 years for the San Bernardino Mountains section and 207 to 233 years for the Coachella Valley section (Bryant and Lundberg 2002a,b; Matti et al. 1992; USGS 1988). The USGS (1988) estimates that the most recent activity along the Coachella Valley section was about 1,680 ± 40 years ago.

Since 1974, about 57 earthquakes have been recorded within a 61-mi (100-km) radius of the Iron Mountain SEZ. During this period, 30 (53%) of the recorded earthquakes had magnitudes greater than 3.0; none were greater than 3.9 (USGS 2010c).

Liquefaction. The proposed Iron Mountain SEZ lies within an area where the peak horizontal acceleration with a 10% probability of exceedance in 50 years is between 0.10 and 0.20 g. Shaking associated with this level of acceleration is generally perceived as weak to light; damage to structures would not be expected (USGS 2008b).

A regional evaluation for liquefaction hazards was completed for the San Bernardino Valley and vicinity in western San Bernardino County by Matti and Carson (1991); the study did not include the eastern part of San Bernardino County where the Iron Mountain SEZ is located. San Bernardino Valley is located between the San Andreas and San Jacinto Fault Zones where the peak horizontal acceleration with a 10% probability of exceedance in 50 years is much higher (between 0.88 and 1.62 g) than that calculated for Ward Valley; therefore, only general conclusions from the study are presented here.

The evaluation considered three aspects of liquefaction: (1) susceptibility, (2) opportunity, and (3) potential. Susceptibility identifies sedimentary materials that are likely to liquefy during a seismic event on the basis of their physical properties, depth to groundwater, expected earthquake magnitude, and strength of ground shaking. Opportunity considers the recurrence intervals for earthquake shaking strong enough to cause liquefaction in susceptible materials. The potential for ground failure due to liquefaction evaluation then combines the results of the susceptibility and opportunity evaluations and identifies areas that are most and least likely to experience liquefaction (Matti and Carson 1991).

Investigators found that the level of liquefaction susceptibility was most dependent on two factors: (1) depth to the groundwater table and (2) the intensity and duration of ground shaking as determined by an earthquake's magnitude and the distance from the causative fault. These factors, in combination with penetration-resistance data from various locations within the San Bernardino valley, allowed them to conclude that liquefaction susceptibility gradually decreases with increasing depth to groundwater, increasing distance away from the causative fault, and increasing geologic age (and induration) of sedimentary materials. Although the playa sediments at Danby Lake could be considered susceptible to liquefaction since groundwater occurs near the surface (Section 9.2.9.1.2), the low intensity of ground shaking estimated for the general area indicates that the potential for liquefaction in Ward Valley sediments is also likely to be low.

Volcanic Hazards. The nearest volcanoes are in the Amboy Crater and lava field (part of the Lavic Lake volcanic field), about 40 mi (65 km) northwest of the Iron Mountain SEZ and immediately northwest of Bristol Dry Lake (Figure 9.2.7.1-4). Amboy Crater is a 250-ft (76-m) high complex basaltic cinder cone surrounded by about 24.1 mi^2 (62 km^2) of mafic lava flows. The basalt fields erupted from several vents about 10,000 years ago. Hazards resulting from these eruptions would likely be less severe than those from more silicic sources; they include the formation of cinder cones, small volumes of tephra, and lava flows (Parker 1963; Miller 1989).

The Pisgah Crater (also part of the Lavic Lake volcanic field) is immediately adjacent to the southeast corner of the Pisgah SEZ, about 75 mi (120 km) northwest of the Iron Mountain SEZ (Figure 9.2.7.1-4). The 328-ft (100-m) high cinder cone is the youngest vent in the basalt field. Lava flows issuing from vents within the basalt field sit above alluvial fan and playa lake deposits. A similar, lesser known cinder cone and lava field also is present in the Sunshine Peak area, about 6 mi (10 km) to the south. Researchers date the most recent activity associated with the Pisgah volcano to about 25,000 years ago (Smithsonian 2010; Bassett and Kupfer 1964). Because of the basaltic composition of the Pisgah Crater lava, hazards likely would be similar to those described for the Amboy Crater but would depend on factors such as location, size, and timing (season).

The Cima dome and volcanic field east of Soda Lake is about 80 mi (130 km) north–northwest of the Iron Mountain SEZ (Figure 9.2.7.1-4). The volcanic field consists of about 40 basaltic cones and more than 60 associated mafic lava flows covering an area of about 58 mi^2 (150 km^2). It has had three periods of activity from the late Miocene through the late Pleistocene, the most recent having occurred about 15,000 years ago (Dohrenwend et al. 1984). Because of the basaltic nature of the Cima volcanic field, hazards associated with it would likely be similar to those described for the Lavic Lake volcanic field, but would depend on factors such as location, size, and timing (season).

The nearest active volcano is Mount St. Helens in the Cascade Range (Washington), about 905 mi (1,460 km) north–northwest of Ward Valley, which has shown some activity as recently as 2008. The nearest volcano that meets the criterion for an unrest episode is the Long Valley Caldera in east-central California, about 320 mi (515 km) northwest, which has experienced recurrent earthquake swarms, changes in thermal springs and gas emissions, and uplift since 1980 (Diefenbach et al. 2009). The Long Valley Caldera is part of the Mono-Inyo Craters volcanic chain that extends from Mammoth Mountain (on the caldera rim) northward about 25 mi (40 km) to Mono Lake. Small to moderate eruptions have occurred at various sites along the volcanic chain in the past 5,000 years at intervals ranging from 250 to 700 years. Windblown ash from some of these eruptions is known to have drifted as far east as Nebraska. While the probability of an eruption within the volcanic chain in any given year is small (less than 1%), serious hazards could result from a future eruption. Depending on the location, size, timing (season), and type of eruption, hazards could include mudflows and flooding, pyroclastic flows, small to moderate volumes of tephra, and falling ash (Hill et al. 1998, 2000; Miller 1989).

Earthquake swarms also occurred at Medicine Lake Volcano in northern California (Cascade Range) for a few months in 1988. Medicine Lake is about 620 mi (1,000 km) northwest of the Iron Mountain SEZ (Diefenbach et al. 2009). The most recent eruption at Medicine Lake was rhyolitic in composition and occurred about 900 years ago (USGS 2010c). Nearby Lassen Peak last erupted between 1914 and 1917; at least two blasts during this period produced mudflows that inundated the valley floors of Hut and Lost Creeks to the east. Tephra from the most violent eruption, occurring on May 22, 1915, was carried by prevailing winds and deposited as far as 310 mi (500 km) to the east (Miller 1989).

Slope Stability and Land Subsidence. The incidence of rock falls and slope failures can be moderate to high along mountain fronts and can present a hazard to facilities on the relatively flat terrain of valley floors like Ward Valley if they are located at the base of steep slopes. The risk of rock falls and slope failures decreases toward the flat valley center.

No land subsidence monitoring has been conducted within the Ward Valley to date; however, 32- to 64-ft (10- to 20-m) long earth fissures and 3-ft (1-m) wide sinkholes associated with subsidence have been documented in the Temecula area of southwestern Riverside County, about 124 mi (200 km) southwest of the proposed Iron Mountain SEZ (Figure 9.2.7.1-4). The subsidence is the result of groundwater overdrafts in the Temecula-Wolf Valley that have caused differential compaction in the sediments of the underlying aquifer. Land failure caused by sinkholes and fissures has been significant enough to damage buildings, roads, potable water and sewer lines, and other infrastructure (Corwin et al. 1991; Shlemon 1995). Land subsidence has also been documented as far back as the 1970s in southern California's San Joaquin Valley, where the maximum subsidence due to extensive groundwater withdrawals for irrigation is greater than 28 ft (9 m) (Galloway et al. 1999) and in the Wilmington Oil Field as a result of oil extraction from the Los Angeles basin in southern Los Angeles County (Kovach 1974).

Other Hazards. Other potential hazards at the Iron Mountain SEZ include those associated with soil compaction (restricted infiltration and increased runoff), expanding clay soils (destabilization of structures), and hydro-compactable or collapsible soil (settlement).

Disturbance of soil crusts and desert varnish on soil surfaces may also increase the likelihood of soil erosion by wind.

Alluvial fan surfaces, such as those typical of Ward Valley, can be the sites of damaging high-velocity flash floods and debris flows during periods of intense and prolonged rainfall. The nature of the flooding and sedimentation processes (e.g., streamflow versus debris flow) will depend on the specific morphology of the fan (National Research Council 1996).

9.2.7.1.2 Soil Resources

Because soil mapping is not complete for the Mojave Desert area, the map unit composition within the proposed Iron Mountain SEZ has not been delineated. Therefore, only soil series are shown in Figure 9.2.7.1-5 and described in Table 9.2.7.1-1. Soils within the SEZ are predominantly gravelly alluvial sands and fine- to medium-grained eolian sands, which together make up about 81% of the site's soil coverage. These soils are characterized as deep and excessively well-drained, with low to high surface-runoff potential and moderate to rapid permeability. The poorly drained soils of Danby Lake make up about 18% of the site's soil coverage. These soils are composed of brine-saturated clay with some silt, fine-grained sand, and evaporite deposits (Moyle 1967; Gale 1951). The fine- to medium-grained sands are highly susceptible to wind erosion, and soil components of clay, silt, and sand could generate fugitive dust if disturbed. Biological soil crusts and desert pavement have not been documented in the SEZ, but they may be present.

9.2.7.2 Impacts

Impacts on soil resources would occur mainly as a result of ground-disturbing activities (e.g., grading, excavating, and drilling), especially during the construction phase of a solar project. These impacts include soil compaction, soil horizon mixing, soil erosion and deposition by wind, soil erosion by water and surface runoff, sedimentation, and soil contamination. Such impacts are common to all utility-scale solar energy facilities in varying degrees and are described in more detail for the four phases of development in Section 5.7 .1.

Because impacts on soil resources result from ground-disturbing activities in the project area, soil impacts would be roughly proportional to the size of a given solar facility, with larger areas of disturbed soil having a greater potential for impacts than smaller areas (Section 5.7.2). The magnitude of impacts would also depend on the types of components built for a given facility, because some components would involve greater disturbance and would take place over a longer time frame.

Danby Lake may not be a suitable location for construction, because lakebed sediments are often saturated with shallow groundwater and likely collapsible. The lake sits within the lowest elevation area of Ward Valley and (especially its southwestern edge) serves as a sump for drainage in the valley.

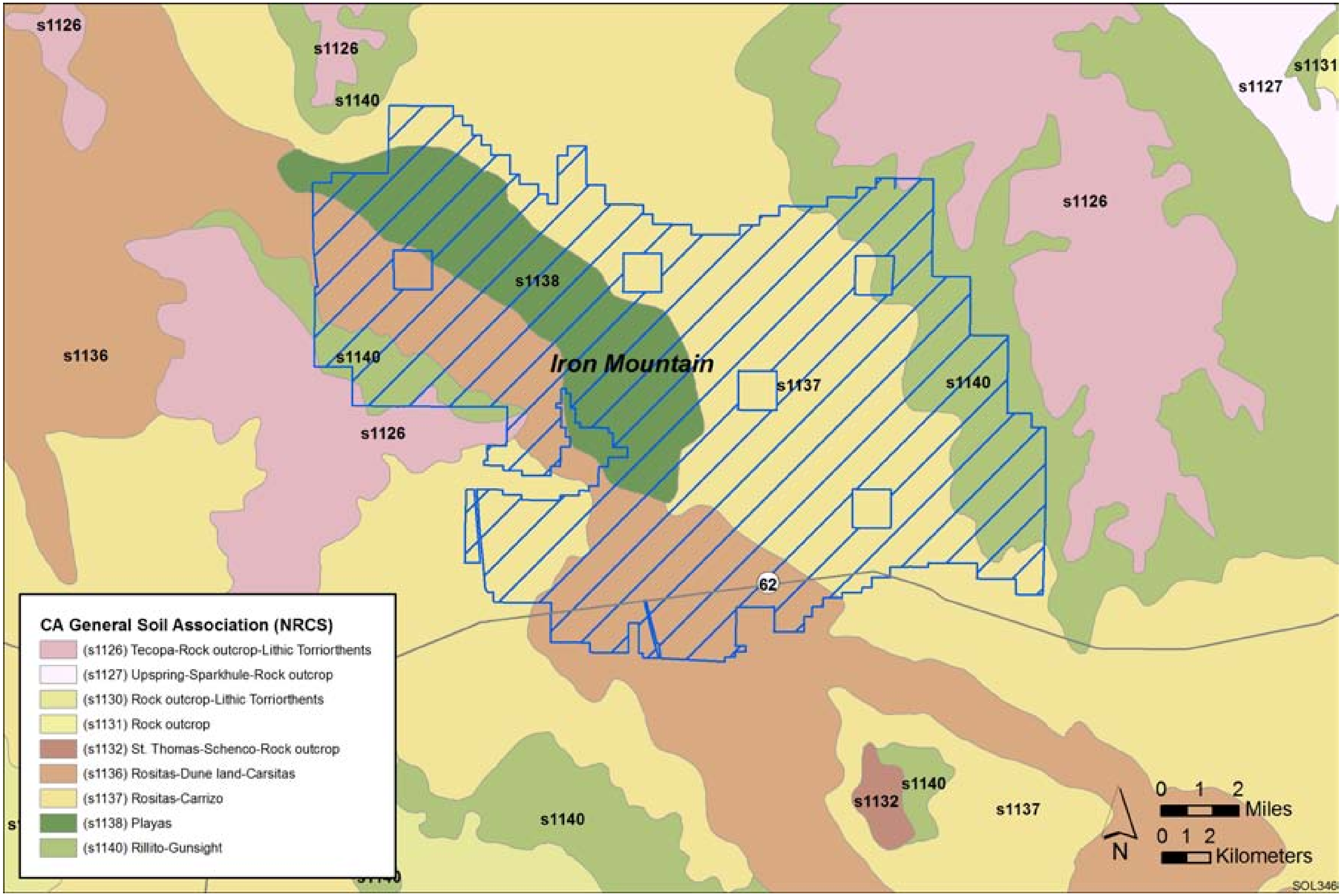

FIGURE 9.2.7.1-5 Soil Map for the Proposed Iron Mountain SEZ (Source: NRCS 2008)

TABLE 9.2.7.1-1 Summary of Soil Series within the Proposed Iron Mountain SEZ

Map Unit Symbol	Map Unit Name	Water Erosion Potential	Wind Erosion Potential	Description	Area in Acres[b] (% of SEZ)
s1137	Rositas-Carrizo	–[a]	–[a]	*Rositas series* are gently sloping soils on dunes and sand sheets (gradients of 0 to 30%). Very deep and somewhat excessively drained with low surface runoff potential (high infiltration rate) and rapid permeability. Typically fine sand. *Carrizo series* are gently sloping soils on floodplains, alluvial fans, fan piedmonts, and bolson floors (gradients of 0 to 15%). Parent material consists of alluvium from mixed sources. Very deep and excessively drained with negligible to very low surface runoff potential and rapid to very rapid permeability. Typically extremely gravelly sand. Aridic soil moisture regime. Used mainly as rangeland and wildlife habitat.	46,028 (43)
s1136	Rositas-Dune land-Carsitas	–	–	*Rositas series* as described above. *Dune land* soils are constantly shifting medium-grained sand deposited by wind blowing across the valley. Parent material consists of eolian sands. Little or no vegetation; very rapid permeability. *Carsitas series* are nearly level to strongly sloping soils on alluvial fans, moderately steep valley fills, and dissected alluvial fan remnants. Excessively drained with slow surface runoff (except during torrential events) and rapid permeability. Typically gravelly sand. Used for watershed and recreation; commercial source of sand and gravel.	24,398 (23)
s1138	Playas	–	–	Very poorly drained soils formed in flats and closed basins; moderately to strongly saline. Medium surface runoff potential and low permeability.	19,054 (18)

TABLE 9.2.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential	Wind Erosion Potential	Description	Area in Acres[b] (% of SEZ)
s1140	Rillito-Gunsight	–	–	*Rillito series* are nearly level to gently sloping soils on fan terraces (gradients of 0 to 3%). Deep and well-drained soils with low to medium surface runoff potential and moderate to moderately rapid permeability. *Gunsight series* are gently sloping to sloping soils on fan or stream terraces (gradients of 0 to 60%). Very deep and somewhat excessively drained with very low to high surface runoff potential and moderate to moderately rapid permeability. Aridic soil moisture regime. Typically very gravelly loam. Used mainly for livestock grazing and recreation.	16,487 (15)
s1126	Tecopa-Rock outcrop Lithic torriorthents	–	–	*Tecopa series* are sloping soils on low hills and low mountain side slopes (gradients of 15 to 75%). Very shallow and well-drained soils formed in residuum and colluvium weathered from metamorphic rocks with medium to rapid surface runoff and moderate permeability. Typically very gravelly sandy loam. Used mainly as desert rangeland. *Rock outcrop* occurs as low ridges or boulder piles and consists of variable rock types. Rapid surface runoff and barren of vegetation. *Lithic Torriorthents* are sloping soils on steep hill and mountain side slopes (gradients 15 to 60% or more) with rapid surface runoff. Typically very gravelly sand loam or loam.	556 (<1)

[a] A dash indicates water and wind erosion potential not rated at the Soil Series taxonomic level.

[b] To convert acres to lcm, multiply by 0.004047.

Source: NRCS (2006).

9.2.7.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features were identified for soil resources at the proposed Iron Mountain SEZ. Implementing the programmatic design features described in Appendix A, Section A.2.2., as required under BLM's Solar Energy Program, would reduce the potential for soil impacts during all project phases.

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9.2.8 Minerals (Fluids, Solids, and Geothermal Resources)

9.2.8.1 Affected Environment

There are no locatable mining claims (BLM and USFS 2010a), or oil and gas or geothermal leases (BLM and USFS 2010b) within the proposed Iron Mountain SEZ. The public land in the SEZ was closed to locatable mineral entry in June 2009, pending the outcome of this solar energy PEIS. In the past much of the area was leased for oil and gas, but no development occurred and the leases were closed. The area is still open for discretionary mineral leasing, including leasing for oil and gas and other leasable and salable minerals. There are sources of sand and gravel within the area that, although not currently economical to develop, could be economical in the future.

Danby Lake in the northwest corner of the SEZ contains about 28,000 acres (113 km^2) of public land that has been determined by the BLM to contain valuable sodium mineral deposits (brines). The area has been classified as the Danby Lake KSLA in accordance with the criteria and review process defined in federal regulations contained in 43 CFR Part 2400. Through a lengthy process—including scientific analysis, administrative decision making, and publication in the *Federal Register*—in 1983 the KSLA was determined to be chiefly valuable for development of the sodium mineral resources to foster the economy of the nation by industrial and mineral development. Under this classification multiple use management may allow for uses other than sodium mineral development, but only if other uses do not interfere with or restrict the production of sodium minerals.

The production of sodium from the KSLA has been ongoing for many years. The main production method has been to pump underground salt brine into evaporation pits that are constructed on the surface of the dry lakebed of Danby Lake and to collect the salt after the water has evaporated. This process is relatively unobtrusive since large structures are not required to harvest the sodium. About 23,000 acres (93 km^2) of the KSLA is within the boundary of the SEZ. Within the SEZ area, there currently are three active and two pending sodium leases.

9.2.8.2 Impacts

If the BLM identifies the area as an SEZ to be used for utility-scale solar development, it would continue to be closed to all incompatible forms of mineral development, with the exception of the KSLA where sodium development is the priority use. Since there are no oil and gas or geothermal leases in the area, it is assumed there would be no significant impacts on these resources if the area were developed for solar energy production. Also, since the area does not contain existing mining claims, it is assumed there would be no loss of locatable mineral production there in the future.

The existing classification of about 23,000 (93 km^2) acres of the SEZ as a KSLA makes that portion of the SEZ unavailable for solar development unless the BLM makes a determination that solar development could be done in such a way that is not inconsistent with the production of sodium, or unless a decision is made that solar energy production should be the dominant use for all or a portion of the area. Additionally, physical conditions on the Danby Lake lakebed do not appear to be conducive to solar development because of periodic flooding, long periods when the lakebed is too wet to support travel, and because of the presence of highly concentrated salt brine, which is corrosive to metals.

If the area is identified as a solar energy development zone, in addition to the continued extraction of sodium, some other mineral uses might be allowed on all or portions of the SEZ. For example, oil and gas development that involves the use of directional drilling to access resources under the area (should any be found) might be allowed. Also, the production of common minerals, such as sand, gravel, and mineral materials for road construction, might take place in areas not directly developed for solar energy production.

9.2.8.3 SEZ-Specific Design Features and Design Feature Effectiveness

Implementing the programmatic design features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would provide adequate mitigation for some identified impacts. The exceptions may be impacts on the KSLA and on the availability of sand and gravel to support construction of roads and infrastructure within the SEZ.

Proposed design features specific to the proposed SEZ include the following:

- The presence of the KSLA must be addressed to evaluate the compatibility of solar development in the KSLA with respect to continuation of sodium mineral leasing. This would likely involve analysis of the physical suitability of the KSLA for solar development, an evaluation of the sodium resource and methods available for its extraction, and a land use planning and decision process to allocate future use of the current KSLA. Alternatively, the KSLA could be excluded from the SEZ.

- Planning and identification for retention of sand and gravel resources within the SEZ should be completed prior to authorization of solar energy ROWs.

9.2.9 Water Resources

9.2.9.1 Affected Environment

The proposed Iron Mountain SEZ is located within the Southern Mojave-Salton Sea subbasin of the California hydrologic region (USGS 2010b) and the Basin and Range physiographic province characterized by intermittent mountain ranges and desert valleys (Planert and Williams 1995). The semi-enclosed Ward Valley encompasses the proposed SEZ and is bounded by the Turtle Mountains to the east and the Iron Mountains to the west. Surface elevations range from 600 to 1650 ft (183 to 503 m); lower elevations occur near the center of the valley. This region is located within the Mojave Desert, which is characterized by extreme daily temperature ranges and low precipitation and humidity (CDWR 2009). Most of the precipitation in this region falls during the winter months of November to March, with a general trend in annual precipitation amounts increasing with elevation from 3.6 in. (9 cm) in the valleys up to 12 in. (30.5 cm) in the mountains (MWD 2001). Evaporation rates are high in this region, with an average annual pan evaporation value of 130 in./yr (330 cm/yr) (Cowherd et al. 1988; WRCC 2010a).

9.2.9.1.1 Surface Waters (Including Drainages, Floodplains, and Wetlands)

The primary surface water features within the proposed Iron Mountain SEZ are several ephemeral washes coming off the Iron Mountains and Turtle Mountains that drain to the Danby Lake region, which covers approximately 31.5 mi^2 (81.5 km^2) of the northwestern portion of the proposed SEZ (Figure 9.2.9.1-1). Danby Lake is an internal drainage area for the Ward Valley and is a region of active salt mining that can be inundated intermittently throughout the year because of natural drainage, releases from the Colorado River Aqueduct (CRA) during maintenance periods, and mining-induced flooding (see Section 9.2.8.1 for more details on mining operations). Homer wash, an intermittent stream, flows north to south along the middle of the Ward Valley, meeting Danby Lake at the northern boundary of the proposed SEZ. The CRA follows the southern boundary of the proposed Iron Mountain SEZ. The CRA delivers Colorado River water from a diversion near Parker Dam on the California–Arizona border (approximately 43 mi [69 km] northeast of the proposed SEZ) to municipalities and water districts of southern California. The CRA conveys flows that range from 550,000 ac-ft/yr up to 1.3 million ac-ft/yr (0.7 billion to 1.6 billion m^3/yr) (MWD 2008). Cadiz Lake, a dry lake, is 6 mi (10 km) west of the proposed SEZ in the adjacent Cadiz Valley.

Flood hazards have not been identified (Zone D) for the region surrounding the proposed Iron Mountain SEZ (FEMA 2009). Intermittent flooding may occur along ephemeral washes and the Danby Lake region (lowest elevation) with temporary ponding and erosion. No wetlands have been identified within the proposed SEZ according to the NWI (USFWS 2009). One intermittently flooded, riverine wetland that covers an area of 74 acres (0.3 km^2) is located 5 mi (8 km) to the south of the proposed SEZ (Figure 9.2.9.1-1).

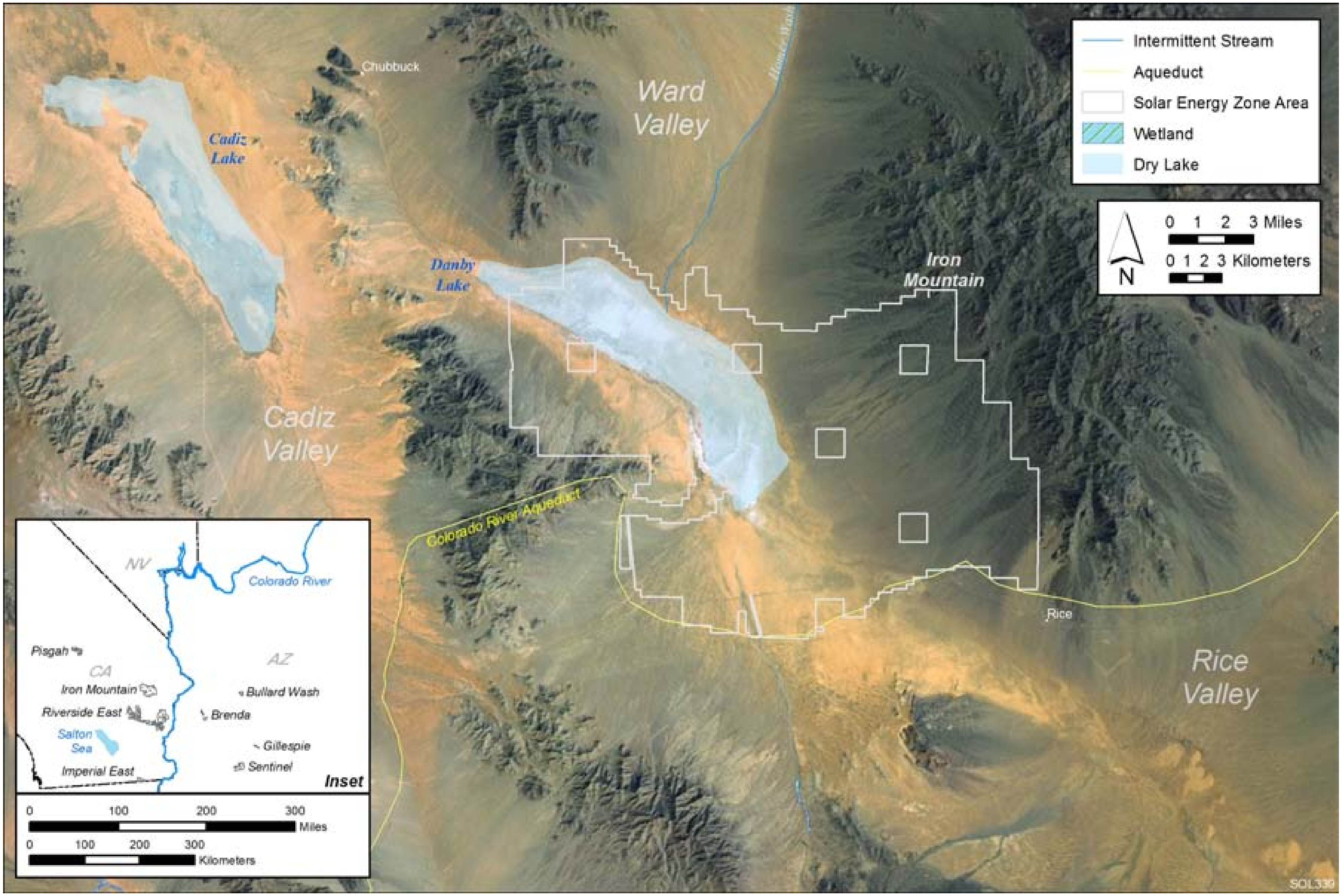

FIGURE 9.2.9.1-1 Surface Water Features near the Proposed Iron Mountain SEZ

9.2.9.1.2 Groundwater

The majority (98%) of the proposed Iron Mountain SEZ is located within the Ward Valley groundwater basin with the southeastern corner (2%) located in the Rice Valley groundwater basin. The Ward Valley and Rice Valley groundwater basins are connected by a low-lying alluvial drainage divide. Groundwater is primarily found in alluvium, alluvial fan, and playa deposits of Holocene and Pleistocene age sediments. These basin-fill aquifers are typically unconfined and can range up to 2000 ft (610 m) in thickness. The alluvial deposits consist of unconsolidated sand, pebbles, and boulders with varying amounts of silts and clays; the fan deposits consist of moderately consolidated gravels, sand, silt, and clay; and the playa deposits consist primarily of sand, silt, and soluble salts (CDWR 2003, groundwater basin number 7-03).

From a regional perspective, groundwater recharge in the eastern Mojave Desert is largely supplied by rainfall and snowmelt runoff at higher elevations, and groundwater discharge is primarily through interbasin flows and evaporation from low-elevation playas (MWD 2001). Information on the groundwater aquifers in the Ward Valley is limited because of the historically low level of development in this region. The groundwater storage capacity for the Ward Valley groundwater basin is estimated to be 8.7 million ac-ft (11 billion m^3) based on the basin size and estimates of alluvium depths. The natural groundwater recharge is estimated to be 2,700 ac-ft/yr (3.3 million m^3/yr), and the groundwater discharge at Danby Lake is estimated to range from 11,000 to 22,000 ac-ft/yr (13.6 million to 27.2 million m^3/yr) (CDWR 2003). Historical groundwater withdrawals have been used to support small farms and vineyards, railroads, and salt-mining industries (MWD 2001). Between 1901 and 1947 groundwater withdrawals averaged 50 ac-ft/yr (61,700 m^3/yr) but dropped off because of the railroads' switch from steam to diesel engines; currently they range from 2 to 8 ac-ft/yr (2,500 to 9,900 m^3/yr) (MWD 2001; CDWR 2003).

Groundwater levels range from near the surface at Danby Lake to 700 ft below the surface (CDWR 2003). A USGS monitoring well located on the northwest corner of the proposed SEZ showed steady groundwater levels at 93 ft (28 m) below the surface from 1964 to 1984 (USGS 2009, well number 341627115102901). Other USGS wells within the adjacent Cadiz Valley and Rice Valley groundwater basins have shown steady groundwater levels as well (USGS 2009, well numbers 340500114505801, 340424114484801, 340300114473301, 342513115220001). Well yields between 10 and 260 gpm (38 and 984 L/min) have been reported within the Ward Valley groundwater basin (CDWR 2003). Cadiz, Inc., reported total groundwater yields of up to 3,700 gpm (14,000 L/min) for its agricultural production wells, which are located 25 mi (40 km) northwest of the proposed SEZ in the Cadiz Valley groundwater basin (MWD 2001). The groundwater quality in this region typically has TDS concentrations of 300 to 500 mg/L, with the exception of the playa deposits near the dry lakebeds. Danby Lake and other dry lakes within the region have reported TDS values up to 298,000 to 321,000 mg/L (MWD 2001; CDWR 2003).

9.2.9.1.3 Water Use and Water Rights Management

In 2005, water withdrawals from surface waters and groundwater in San Bernardino County were 656,900 ac-ft/yr (860 million m^3/yr), of which 57% came from surface waters and 43% came from groundwater. The largest water use category was municipal and domestic supply, at 427,100 ac-ft/yr (527 million m^3/yr). However, the majority of this water is used in the larger cities located in the southwestern portion of San Bernardino County. Agricultural water uses accounted for 167,000 ac-ft/yr (206 million m^3/yr), while industrial and thermoelectric water uses accounted for 29,150 and 33,630 ac-ft/yr (36 million and 41 million m^3/yr), respectively (Kenny et al. 2009).

California uses a "plural" system to manage water resources: a mixture of riparian and prior appropriation doctrines for surface waters, a separate doctrine for groundwater, and pueblo rights (BLM 2001). Several agencies are involved with the management of California's water resources, including federal, state, local, and water/irrigation districts. For example, water rights and water quality are managed by the State Water Board, while the Department of Water Resources manages water conveyance, infrastructure, and flood management (CDWR 2009). Surface water appropriations, for nonriparian rights, begin with a permit application to the State Water Board and a review process that examines the application's beneficial use, pollution potential, and water quantity availability; the permitting, review, and licensing procedure should not take more than 6 months to complete unless the application is protested (BLM 2001).

Groundwater management in California is primarily done at the local level of government through local agencies or ordinances and also can be subject to court adjudication. State statutes provide authority and revenue mechanisms to several types of local agencies to provide water for beneficial uses, as well as to manage withdrawals in order to prevent overdraft[1] of the aquifers. Local ordinances (typically at the county level) also can be used to manage groundwater resources and have been adopted in 27 counties in California. Many of these local groundwater ordinances are focused on controlling water exports out of the basin through permitting processes. Court adjudication is the strongest form of groundwater management used in California and often results in the creation of a court-appointed "watermaster" agency to manage withdrawals for all users to ensure that the court-determined safe-yield[2] is maintained (CDWR 2003).

The CRA is managed and maintained by the MWD, a consortium of 26 municipal and water districts. The primary function of the MWD is to provide drinking water to its members, which are all located in areas of southern California approximately 100 mi (160 km) to the west of the proposed Iron Mountain SEZ. While the CRA conveys substantial water flows along the southern boundary of the proposed SEZ, this water is essentially unavailable for solar energy development because of its location outside of the MWD service area; thus, any water transfers

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[1] Groundwater overdraft is the condition where water extractions from an aquifer exceed recharge processes such that there are substantial and sustained decreases in groundwater flows and groundwater elevations.

[2] Safe-yield is the amount of groundwater that can be withdrawn from a groundwater basin over a period of time without exceeding the long-term recharge of the basin or unreasonably affecting the basin's physical and chemical integrity.

would have to be approved by the MWD board (MWD 2009, Section 4200). Continued low water levels in Lake Mead affect the surplus water supplies provided to the MWD by the Bureau of Reclamation from the Colorado River; in addition, population growth and water supply demands in the MWD service area suggest that water from the CRA would not be made available for uses outside the MWD service area by the member agencies that compose the MWD board (MWD 2008).

The primary water resource available to the proposed Iron Mountain SEZ is groundwater, which is managed through the San Bernardino County groundwater ordinance (Groundwater Management Act, Water Code Section 10750 et seq.). Any water withdrawals greater than 30 ac-ft/yr (37,000 m^3/yr) are subject to a full review process in accordance with the California Environmental Quality Act. The permitting and review process requires the applicant to provide detailed information on the groundwater aquifer, including estimated storage capacity, recharge conditions, water quality, and the anticipated safe-yield. Conditions of approval for the groundwater withdrawal permit may include mitigation actions, as well as the establishment of a groundwater monitoring plan.

9.2.9.2 Impacts

Potential impacts on water resources related to utility-scale solar energy development include direct and indirect impacts on surface waters and groundwater. Direct impacts occur at the place of origin and at the time of the proposed activity, while indirect impacts occur away from the place of origin or later in time. Impacts on water resources considered in this analysis are the result of land disturbance activities (construction, final developed site plan, as well as off-site activities such as road and transmission line construction) and water use requirements for solar energy technologies that take place during the four project phases: site characterization, construction, operations, and decommissioning/reclamation. Both land disturbance and consumptive water use activities can affect groundwater and surface water flows, cause drawdown of groundwater surface elevations, modify natural drainage pathways, obstruct natural recharge zones, and alter surface water-wetland-groundwater connectivity. Water quality also can be degraded through the generation of wastewater, chemical spills, increased erosion and sedimentation, and increased salinity (e.g., by the excessive withdrawal from aquifers).

9.2.9.2.1 Land Disturbance Impacts on Water Resources

Impacts related to land disturbance activities are common to all utility-scale solar energy facilities, which are described in more detail for the four phases of development in Section 5.9.1; these impacts will be minimized through the implementation of the programmatic design features described in Appendix A, Section A.2.2. In addition to the hydrologic evaluation (including identifying 100-year floodplains and jurisdictional waters) described in the design features, coordination and permitting with the CDFG would be needed for any proposed alterations of surface water features (both perennial and ephemeral) in accordance with the Lake and Streambed Alteration Program (CDFG 2010c). The Danby Lake region is the natural drainage outlet for the Ward Valley; the playa sediments contain high soluble salts concentrations. Siting of solar energy facilities in the Danby Lake region could affect the natural drainage patterns of the Ward Valley. As this region is the valley's drainage outlet, facilities here could cause flooding, channel incision, and erosion in upstream drainages. Additionally, the intermittent inundation that occurs in Danby Lake is important to groundwater recharge and discharge processes. Groundwater development in the Danby Lake region would not be feasible for solar energy development because of the very high TDS values (greater than 300,000 mg/L), as well as the shallow groundwater depths in playa sediments that if developed could potentially cause land subsidence.

9.2.9.2.2 Water Use Requirements for Solar Energy Technologies

Analysis Assumptions

A detailed description of the water use assumptions for the four utility-scale solar energy technologies (parabolic trough, power tower, dish engine, and PV systems) is presented in Appendix M. Assumptions regarding water use calculations specific to the proposed Iron Mountain SEZ are as follows:

- On the basis of a total area of greater than 30,000 acres (121 km^2), it is assumed that three solar projects would be constructed during the peak construction year;

- Water needed for making concrete would come from an off-site source;

- The maximum land area disturbed for an individual solar facility during the peak construction year is assumed to be 3,000 acres (12 km^2);

- Assumptions on individual facility size and land requirements (Appendix M), along with the assumed number of projects and maximum allowable land disturbance, results in the potential to disturb up to 8% of the total area of the proposed SEZ;

- Water use requirements for hybrid cooling systems are assumed to be on the same order of magnitude as those using dry-cooling systems (see Section 5.9.2.1); and

- Water from the CRA is assumed to be unavailable to solar energy facilities because of two factors: (1) the mechanisms to obtain CRA water would have to be negotiated with the MWD board on a project-specific basis and (2) current water demands by MWD member agencies suggest minimal water is available.

Site Characterization

During site characterization, water would be used mainly for controlling fugitive dust and for providing the workforce potable water supply. Impacts on water resources during this phase of development are expected to be negligible since activities would be limited in area, extent, and duration; water needs could be met by trucking water in from an off-site source.

Construction

During construction, water would be used mainly for controlling fugitive dust and for providing the workforce potable water supply. Because there are no significant surface water bodies on the proposed Iron Mountain SEZ, the water requirements for construction activities could be met by either trucking water to the sites or by using on-site groundwater resources. Water requirements for dust suppression and potable water supply during construction are shown in Table 9.2.9.2-1 and could be as high as 6,813 ac-ft (8.4 million m^3). Groundwater wells would have to yield an estimated 2,896 to 4,221 gpm (10,963 to 15,978 L/min) to meet the estimated construction water requirements. These yields are on the order of large municipal and agriculture production wells (Harter 2003), so multiple wells may be needed in order to obtain the water requirements. In addition, the generation of up to 222 ac-ft (273,800 m^3) of sanitary wastewater would need to be treated either on-site or sent to an off-site facility.

Information on the available groundwater resources in the Ward Valley groundwater basin is limited because of the historically low development of the region. The estimated total water use requirements during construction are on the order of 1.7 to 2.5 times greater than the estimated natural recharge value of the basin. Groundwater levels have remained steady for decades, but in that time period the highest level of groundwater production has only reached

TABLE 9.2.9.2-1 Estimated Water Requirements during the Peak Construction Year for the Proposed Iron Mountain SEZ

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Water use requirements[a]				
Fugitive dust control (ac-ft)[b,c]	4,452	6,678	6,678	6,678
Potable supply for workforce (ac-ft)	222	135	56	28
Total water use requirements (ac-ft)	4,674	6,813	6,734	6,706
Wastewater generated				
Sanitary wastewater (ac-ft)	222	135	56	28

[a] Assumptions of water use for fugitive dust control, potable supply for workforce, and wastewater generation are presented in Appendix M.

[b] Fugitive dust control estimation assumes a local pan evaporation rate of 130 in./yr (330 cm/yr) (Cowherd et al. 1988; WRCC 2010a).

[c] To convert ac-ft to m^3, multiply by 1,234.

50 ac-ft/yr (61,700 m^3/yr). It is likely that groundwater production at the levels needed to meet the construction requirements suggested in Table 9.2.9.2-1 would cause a substantial decline in groundwater elevations in the alluvial aquifer and, potentially, land subsidence. However, pumping tests would need to be performed during the site characterization phase to better determine the storage capacity and safe-yield of the alluvial aquifer. Additionally, concerns about groundwater quality used for the potable workforce supply would have to be addressed during site characterization. Groundwater used for potable supply must have a TDS of less than 1,500 mg/L and is recommended to be less then 500 mg/L to meet secondary maximum contaminant levels (*California Code*, Title 22, Article 16, Section 64449).

Operations

During operations, water would be required for mirror/panel washing, the workforce potable water supply, and cooling (parabolic trough and power tower only) (Table 9.2.9.2-2). Cooling water is required only for the parabolic trough and power tower technologies. Water needs for cooling are a function of the type of cooling used (dry, wet, hybrid). Further refinements to water requirements for cooling would result from the percentage of time that the option was employed (30 to 60% range assumed) and the power of the system. The differences between the water requirements reported in Table 9.2.9.2-2 for the parabolic trough and power tower technologies are attributable to the assumptions of acreage per megawatt. As a result, the water usage for the more energy-dense parabolic trough technology is estimated to be almost twice as large as that for the power tower technology.

At full build-out capacity, water needs for mirror/panel washing are estimated to range from 473 to 8,522 ac-ft/yr (583,400 to 10.5 million m^3/yr) and for the workforce potable water supply, from 11 to 239 ac-ft/yr (13,600 to 294,800 m^3/yr). The maximum total water usage during operations at full build-out capacity would be greatest for those technologies using the wet-cooling option and is estimated to be as high as 255,892 ac-ft/yr (316 million m^3/yr). Water usage for dry-cooling systems would be as high as 25,805 ac-ft/yr (32 million m^3/yr), approximately a factor of 10 times less than that for the wet-cooling option. Noncooled technologies, dish engine and PV systems, require substantially less water at full build-out capacity at 4,840 ac-ft/yr (6.0 million m^3/yr) for dish engine and 484 ac-ft/yr (597,000 m^3/yr) for PV (Table 9.2.9.2-2). Operations would produce up to 239 ac-ft/yr (294,800 m^3/yr) of sanitary wastewater; in addition, for wet-cooled technologies, up to 4,842 ac-ft/yr (6.0 million m^3/yr) of cooling system blowdown water would need to be treated either on- or off-site. Any on-site treatment of wastewater would have to ensure that treatment ponds are effectively lined in order to prevent any groundwater contamination.

The availability of groundwater resources is not well quantified in the Ward Valley because there is little development in the region, as previously mentioned. Water requirements for potable uses by the workforce are of the same order of magnitude as historical groundwater withdrawals. Water use requirements for panel washing of PV systems are a factor of 10 to 18 times less than those for mirror washing of parabolic trough, power tower, and dish engine systems. The natural estimated groundwater recharge for the Ward Valley is 2,700 ac-ft/yr (3.3 million m^3/yr), which is of the same order of magnitude as the low operation

TABLE 9.2.9.2-2 Estimated Water Requirements during Operations at Full Build-out Capacity at the Proposed Iron Mountain SEZ

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Full build-out capacity (MW)[a,b]	17,044	9,469	9,469	9,469
Water use requirements				
Mirror/panel washing (ac-ft/yr)[c,d]	8,522	4,734	4,734	473
Potable supply for workforce (ac-ft/yr)	239	106	106	11
Dry-cooling (ac-ft/yr)[e]	3,409–17,044	1,894–9,469	NA[f]	NA
Wet-cooling (ac-ft/yr)[e]	76,696–247,131	42,609–137,295	NA	NA
Total water use requirements				
Non-cooled technologies (ac-ft/yr)	NA	NA	4,840	484
Dry-cooled technologies (ac-ft/yr)	12,170–25,805	6,734–14,309	NA	NA
Wet-cooled technologies (ac-ft/yr)	85,457–255,892	47,449–142,135	NA	NA
Wastewater generated				
Blowdown (ac-ft/yr)[g]	4,842	2,690	NA	NA
Sanitary wastewater (ac-ft/yr)	239	106	106	11

[a] Land area for parabolic trough was estimated at 5 acres/MW (0.02 km^2/MW); land area for the power tower, dish engine, and PV technologies was estimated at 9 acres/MW (0.04 km^2/MW).

[b] Water needs are linearly related to power. Water usage for any other size project can be estimated by using multipliers provided in Appendix M, Table M.9-2.

[c] Value assumes a usage rate of 0.5 ac-ft/yr/MW for mirror washing for parabolic trough, power tower, and dish engine technologies and a rate of 0.05 ac-ft/yr/MW for panel washing for PV systems.

[d] To convert ac-ft to m^3, multiply by 1,234.

[e] Dry-cooling value assumes 0.2 to 1.0 ac-ft/yr per MW and wet-cooling value assumes 4.5 to 14.5 ac ft/yr per MW (range in these values represents 30 and 60% operating times) (DOE 2009a).

[f] NA = not applicable.

[g] Value scaled from 250-MW Beacon Solar project with an annual discharge of 44 gpm (167 L/min) (AECOM 2009). Blowdown estimates are relevant to wet cooling only.

(30% operation time) values for dry-cooling water needs. At higher operation times (60%), dry-cooling water demands are 3.5 to 6.3 times the natural groundwater recharge of the Ward Valley. Groundwater withdrawals at these levels are likely to cause drawdown in the alluvial aquifer, which could affect current salt-mining operations in the Danby Lake region that are dependent upon maintaining certain depth-to-groundwater levels. Another potential impact of drawdown in the alluvial aquifer is land surface subsidence. This is of particular concern in the region along the CRA, because cracks in the aqueduct would affect the water quantities and rights of the MWD. Further characterization of groundwater resources is needed in the Ward Valley to better quantify the safe-yield of the basin's alluvial aquifer prior to the evaluation of impacts relating to project-specific groundwater withdrawals. During site characterization, developers should coordinate with San Bernardino County in order to comply with the county's groundwater ordinance and permitting process, as well as to coordinate efforts for the further characterization of the groundwater resources in the Ward Valley basin to ensure that there is adequate groundwater supply and to limit land subsidence effects.

Wet-cooling water requirements are a factor of 2 to 11 times the highest estimate of groundwater discharge that occurs at Danby Lake and approximately 3% of the estimated groundwater storage capacity of the Ward Valley. Additionally, the highest estimated value of water required for wet cooling is approximately one-third of the 801,000 ac-ft/yr (988 million m^3/yr) conveyed by the CRA during the period 2007–2008 (MWD 2008), which supports the water needs of its 26 member agencies. These levels of water use needs for wet cooling are not feasible with the water resources available to the region surrounding the proposed Iron Mountain SEZ.

Decommissioning/Reclamation

During decommissioning/reclamation, all surface structures associated with the solar project would be dismantled, and the site reclaimed to its preconstruction state. Activities and water needs during this phase would be similar to those during the construction phase (dust suppression and potable supply for workers) and may also include water to establish vegetation in some areas. However, the total volume of water needed is expected to be less. Because quantities of water needed during the decommissioning/reclamation phase would be less than those for construction, impacts on surface and groundwater resources also would be less.

9.2.9.2.3 Off-Site Impacts of Roads and Transmission Lines

Impacts associated with the construction of roads and transmission lines primarily deal with water use demands for construction, water quality concerns relating to potential chemical spills, and land disturbance effects on the natural hydrology. A new access road would not be needed because State Route 62 passes through the southern portion of the SEZ, as described in Section 9.2.1.2. It is assumed that existing transmission lines could provide access to the transmission grid, and thus no additional acreage disturbance for transmission line access was assessed.

9.2.9.2.4 Summary of Impacts on Water Resources

The impacts on water resources associated with developing solar energy in the proposed Iron Mountain SEZ are associated with land disturbance effects on natural hydrology, water use requirements for the various solar energy technologies, and water quality associated with potable water supply. Land disturbance in the region of Danby Lake area has the potential to disrupt the natural drainage to this terminal outlet of the Ward Valley, as well as affect current salt-mining operations. Hydrology alterations in the Danby Lake area could result in upstream erosion in ephemeral washes, localized flooding and channel incision, and potential disruption of groundwater recharge and discharge processes. Additionally, the playa sediments with high soluble salts content in the Danby Lake region could produce groundwater with high TDS values, resulting in water that is nonpotable and corrosive to infrastructure.

Impacts from water use requirements vary depending on the type of solar technology built and, for technologies using cooling systems, the type of cooling (wet, dry, or hybrid) employed. Groundwater is the primary water resource available to solar energy facilities in the proposed Iron Mountain SEZ, and information on the groundwater storage capacity, as well as on recharge and discharge processes, is not well quantified because of limited historical development in the region. Given the current estimates of annual precipitation, groundwater recharge, discharge at Danby Lake, and historical groundwater withdrawals and levels in the Ward Valley, solar energy facilities using wet cooling would not be feasible because of the lack of available water resources. Additionally, the water use estimates for dry-cooling (parabolic trough and power tower) and dish engine technologies are larger than groundwater recharge estimates for the Ward Valley. Groundwater drawdown of the alluvial aquifer is likely, as well as the potential for land subsidence, which is of particular concern along the CRA. Further quantification of the groundwater safe-yield for the Ward Valley would be needed prior to the evaluation of impacts associated with project-specific groundwater withdrawals. Water use estimates for PV systems are of a similar order of magnitude of the historically highest groundwater withdrawals; this suggests that groundwater resources are adequate to support PV facilities.

The estimated values of water requirements for the solar energy technologies are a function of the full build-out capacity of the proposed SEZ. Full build-out of the large area of the proposed Iron Mountain SEZ has the theoretical potential to generate 9,469 to 17,044 MW, but would require very large water supplies for water-intensive technologies (Table 9.2.9.2-2). For the purpose of evaluating a more realistic build-out scenario reflecting the available water supplies, an estimate of the maximum power capacity for each technology was made assuming a value for available groundwater resources in the Ward Valley. While groundwater storage, safe-yield, and transport processes would need to be better quantified prior to approval of specific project plans during a site characterization phase, the current estimate of the natural groundwater recharge to the Ward Valley serves as a reasonable estimate of the available groundwater resources. Using this value of 2,700 ac-ft/yr (3.3 million m^3/yr) as an estimate of the maximum available water resources for the proposed Iron Mountain SEZ, parabolic trough and power tower technologies could expect to generate 1 to 6% (wet cooling) and 10 to 40% (dry cooling) of the of the full build-out power capacity. Dish engine facilities could produce 56% of the full build-out power capacity, while water use requirements for PV are lower than this estimate of available water resources.

9.2.9.3 SEZ-Specific Design Features and Design Feature Effectiveness

The program for solar energy development on BLM-administered lands will require that the programmatic design features in Appendix A, Section A.2.2, be implemented, thus mitigating some impacts on water resources. Programmatic design features would focus on coordination with federal, state, and local agencies that regulate the use of water resources to meet the requirements of permits and approvals needed to obtain water for development, and on hydrological studies to characterize the aquifer from which groundwater would be obtained (including drawdown effects, if a new point of diversion is created). The greatest consideration for mitigating water impacts would be in the selection of solar technologies. The mitigation of impacts would be best achieved by selecting technologies with low water demands.

Proposed design features specific to the proposed Iron Mountain SEZ include the following:

- Water resource analysis indicates that wet-cooling options would not be feasible. Other technologies should incorporate water conservation measures.

- Land disturbance activities should avoid impacts to the extent possible in the vicinity of Danby Lake to reduce impacts on the regional drainage outlet and salt-mining operations.

- During site characterization, hydrologic investigations would need to identify 100-year floodplains and potential jurisdictional water bodies subject to Clean Water Act Section 404 permitting. Siting of solar facilities and construction activities should avoid areas identified as being within a 100-year floodplain.

- During site characterization, coordination and permitting with CDFG regarding California's Lake and Streambed Alteration Program would be required for any proposed alterations to surface water features (both perennial and ephemeral).

- The groundwater-permitting process should be in compliance with the San Bernardino County groundwater ordinance.

- Construction of groundwater production wells in the Danby Lake region should be avoided because the water is nonpotable and contains corrosive levels of TDS.

- Groundwater monitoring and production wells should be constructed in accordance with standards set forth by the State of California (CDWR 1991) and San Bernardino County.

- Stormwater management plans and BMPs should comply with standards developed by the California Stormwater Quality Association (CASQA 2003).

- Water for potable uses would have to meet or be treated to meet the water quality standards in the California Safe Drinking Water Act (*California Health and Safety Code*, Chapter 4).

9.2.10 Vegetation

This section addresses vegetation that could occur or is known to occur within the potentially affected area of the proposed Iron Mountain SEZ. The affected area considered in this assessment included the areas of direct and indirect effects. The area of direct effects was defined as the area that would be physically modified during project development (i.e., where ground-disturbing activities would occur) and included only the SEZ. The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ boundary where ground-disturbing activities would not occur but that could be indirectly affected by activities in the area of direct effect. No areas of direct or indirect effects were assumed for new transmission lines or access roads; they are not expected to be needed for facilities on the Iron Mountain SEZ because of the proximity of an existing transmission line and state highway.

Indirect effects considered in the assessment included effects from surface runoff, dust, and accidental spills from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ. This area of indirect effect was identified on the basis of professional judgment and was considered sufficiently large to bound the area that would potentially be subject to indirect effects. The affected area is the area bounded by the areas of direct and indirect effects. These areas are defined and the impact assessment approach is described in Appendix M.

9.2.10.1 Affected Environment

The proposed Iron Mountain SEZ is located within the Sonoran Basin and Range Level III ecoregion (EPA 2007), which supports creosotebush (*Larrea tridentata)* and white bursage (*Ambrosia dumosa*) plant communities with large areas of palo verde (*Cercidium microphyllum*)-cactus shrub and saguaro cactus (*Carnegiea gigantea*) communities (EPA 2002). The dominant species of the Lower Colorado River Valley subdivision of the Sonoran Desert are primarily creosotebush, white bursage, and all-scale (*Atriplex polycarpa*), with big galleta (*Pleuraphis rigida*), Palmer alkali heath (*Frankenia palmeri*), brittlebush (*Encelia farinosa*), and western honey mesquite (*Prosopis glandulosa* var. *torreyana*) dominant in some areas (Turner and Brown 1994). Larger drainageways and washes support species of small trees and shrubs that may also occur in adjacent areas, such as western honey mesquite, ironwood (*Olneya tesota*), and blue palo verde (*Cercidium floridum*) as well as species such as smoketree (*Psorothamnus spinosa*), which are mostly restricted to drainageways. Shrub species found in minor drainages include cat-claw acacia (*Acacia greggii*), burrobrush (*Hymenoclea salsola* var. *pentalepis*), Anderson thornbush (*Lycium andersonii*), and desert broom (*Baccharis sarothroides*). Annual precipitation in the Sonoran Desert occurs in winter and summer (Turner and Brown 1994) and is very low in the area of the SEZ, averaging about 3.4 in. (86.6 mm) at Iron Mountain Station (see Section 9.2.13). The Iron Mountain SEZ is in a transitional area that includes many species associated with the Mojave Desert.

Land cover types, described and mapped under CAReGAP (NatureServe 2009) were used to evaluate plant communities in and near the SEZ. Each cover type encompasses a range of similar plant communities. Land cover types occurring within the potentially affected area of the proposed Iron Mountain SEZ are shown in Figure 9.2.10.1-1. Table 9.2.10.1-1 provides the surface area of each cover type within the potentially affected area.

Lands within the Iron Mountain SEZ are classified primarily as Sonora–Mojave Creosotebush–White Bursage Desert Scrub, North American Warm Desert Playa, North American Warm Desert Wash, and North American Warm Desert Bedrock Cliff and Outcrop. Additional cover types within the SEZ are given in Table 9.2.10.1-1. Creosote was observed to be the dominant species over much of the SEZ in August 2009. Sensitive habitats on the SEZ include desert dry wash and dry wash woodlands, playa, sand dune, riparian, and desert chenopod scrub/mixed salt desert scrub habitats. Characteristic Sonoran Desert species observed on the SEZ include blue palo verde, western honey mesquite, ironwood (*Olneya tesota*), smoketree, and Ocotillo (*Fouquieria splendens*). Cacti species observed within the SEZ were golden cholla (*Opuntia echinocarpa*), beavertail prickly pear (*Opuntia basilaris*), and pencil cholla (*Opuntia arbuscula*).

The area surrounding the SEZ, within 5 mi (8 km), includes 14 cover types, which are listed in Table 9.2.10.1-1. The predominant cover types are Sonora–Mojave Creosotebush–White Bursage Desert Scrub and North American Warm Desert Bedrock Cliff and Outcrop.

There are no wetlands mapped by the NWI that occur within the SEZ or within the 5-mi (8-km) area of indirect effects. NWI maps are produced from high-altitude imagery and are subject to uncertainties inherent in image interpretation (Stout 2009). Larger washes support dense stands of woody vegetation, a small portion of which are mapped as North American Warm Desert Riparian Woodland and Shrubland and include tamarisk, western honey mesquite, blue palo verde, and ironwood. Numerous ephemeral dry washes occur within the SEZ. These dry washes typically contain water for short periods during or following precipitation events, and include temporarily flooded areas, but typically do not support wetland or riparian habitats. Danby Lake, in the northwestern portion of the SEZ, is a dry lakebed most of the year; it is inundated for 3 to 4 days during fall–winter rains in most years with a shallow summer water table 3 to 4 ft below the surface. Danby Lake is primarily classified as North American Warm Desert Playa. The occurrences of the Sonora-Mojave Mixed Salt Desert Scrub, North American Warm Desert Active and Stabilized Dune, and North American Warm Desert Volcanic Rockland cover types in the Iron Mountain SEZ are located within Danby Lake.

The proposed Iron Mountain SEZ is located within the Mojave Weed Management Area (MWMA). Table 9.2.10.1-2 provides a list of problem weed species of the MWMA.

An invasive species known to occur within the SEZ is tamarisk, which occurs along wet areas. In addition, cheatgrass and sahara mustard occur in the BLM Needles Field Office area, which includes the proposed Iron Mountain SEZ. Tamarisk and Sahara mustard are included on the MWMA weed list.

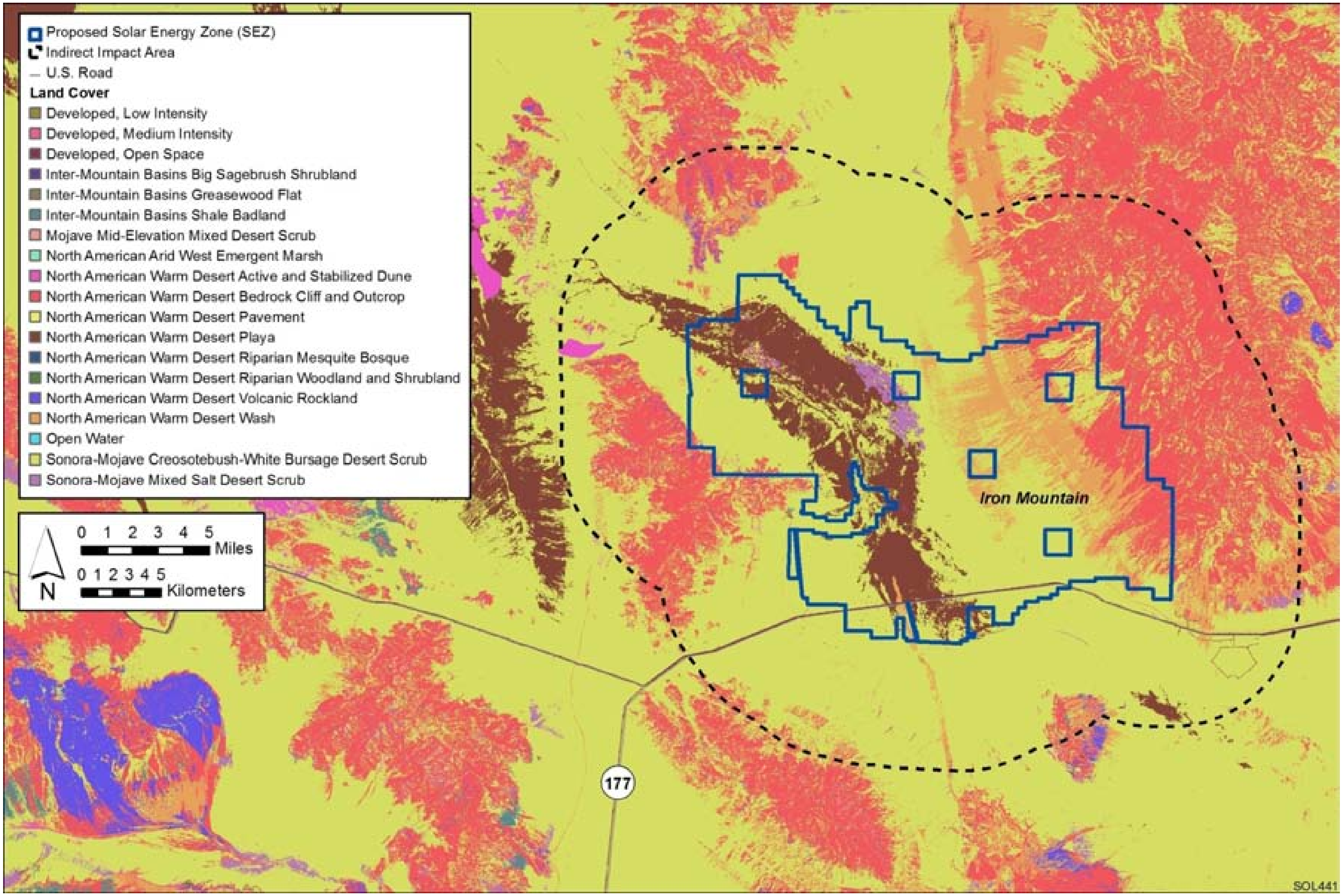

FIGURE 9.2.10.1-1 Land Cover Types within the Proposed Iron Mountain SEZ (Source: NatureServe 2009)

TABLE 9.2.10.1-1 Land Cover Types within the Potentially Affected Area of the Proposed Iron Mountain SEZ and Potential Impacts

	Area of Cover Type Affected (acres)[b]		
Land Cover Type[a]	Within SEZ[c] (Direct Effects)	Outside SEZ[d] (Indirect Effects)	Overall Impact Magnitude[e]
5264 Sonora-Mojave Creosotebush-White Bursage Desert Scrub: Occurs in broad valleys, lower bajadas, plains, and low hills in the Mojave and Sonoran deserts. Shrubs form a sparse to moderately dense cover (2 to 50%), although the ground surface may be mostly barren. The dominant species are typically creosotebush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*). Other shrubs, dwarf-shrubs, and cacti may also be dominant or form sparse understories. Herbaceous species are typically sparse, but may be seasonally abundant.	58,552 acres[f] (2.4%, 3.2%)	156,519 acres (6.4%)	Moderate
3161 North American Warm Desert Playa: Consists of barren and sparsely vegetated areas (generally <10% plant cover) that are intermittently flooded; salt crusts are common. Sparse shrubs occur around the margins, and patches of grass may form in depressions. In large playas, vegetation forms rings in response to salinity. Herbaceous species may be periodically abundant.	22,056 acres (17.9%, 21.1%)	4,422 acres (3.6%)	Large
9151 North American Warm Desert Wash: Consists of intermittently flooded linear or braided strips within desert scrub or grassland landscapes on bajadas, mesas, plains, and basin floors. Although often dry, washes are associated with rapid sheet and gully flow. The vegetation varies from sparse and patchy to moderately dense and typically occurs along the banks, but may occur within the channel. Shrubs and small trees are typically intermittent to open. Common upland shrubs often occur along the edges.	13,490 acres (3.4%, 4.4%)	11,703 acres (3.0%)	Moderate
3120 North American Warm Desert Bedrock Cliff and Outcrop: Occurs on subalpine to foothill steep cliff faces, narrow canyons, rock outcrops, unstable scree and talus slopes. Consists of barren and sparsely vegetated areas (generally <10% plant cover) with desert species, especially succulents. Lichens are predominant in some areas.	9,691 acres (0.8%, 1.0%)	73,420 acres (6.2%)	Small
5265 Sonora-Mojave Mixed Salt Desert Scrub: Extensive open-canopied shrublands in the Mojave and Sonoran deserts, usually occurring around playas and in valley bottoms or basins with saline soils. Vegetation is typically composed of one or more *Atriplex* species; other salt-tolerant plants are often present or even codominant. Grasses occur at varying densities.	1,539 acres (3.4%, 5.1%)	727 acres (1.6%)	Moderate

TABLE 9.2.10.1-1 (Cont.)

Land Cover Type[a]	Area of Cover Type Affected (acres)[b]: Within SEZ[c] (Direct Effects)	Outside SEZ[d] (Indirect Effects)	Overall Impact Magnitude[e]
3143 North American Warm Desert Pavement: Consists of unvegetated to very sparsely vegetated (<2% plant cover) areas, usually in flat basins, with ground surfaces of fine to medium gravel coated with "desert varnish." Desert scrub species are usually present. Herbaceous species may be abundant in response to seasonal precipitation.	503 acres (1.4%, 2.0%	1,393 acres (3.8%)	Moderate
21, 22 Developed, Open Space—Low Intensity: Includes housing, parks, golf courses, and other areas planted in developed settings. Impervious surfaces compose up to 49% of the total land cover.	427 acres (1.3%, 3.2%)	923 acres (2.8%)	Moderate
3121 North American Warm Desert Active and Stabilized Dune: Consists of unvegetated to sparsely vegetated (generally <10% plant cover) active dunes and sandsheets. Vegetation includes shrubs, forbs, and grasses. Includes unvegetated "blowouts" and stabilized areas.	209 acres (0.3%, 0.4%)	695 acres (1.1%)	Small
3180 North American Warm Desert Volcanic Rockland: Consists of barren and sparsely vegetated (<10% plant cover) areas. Vegetation is variable and typically includes scattered desert shrubs.	35 acres (<0.1%, <0.1%)	1,109 acres (0.3%)	Small
3139 Inter-Mountain Basins Shale Badland: Typically occurs on rounded hills and plains. Consists of barren and sparsely vegetated areas (<10% plant cover) with high rate of erosion and deposition. Vegetation consists of sparse dwarf shrubs and herbaceous plants.	26 acres (0.1%, 0.3%)	81 acres (0.4%)	Small
11 Open Water: Plant or soil cover is generally less than 25%.	2 acres (<0.1%, <0.1%)	7 acres (<0.1%)	Small
9182 North American Warm Desert Riparian Woodland and Shrubland: Occurs along medium to large perennial streams in canyons and desert valleys. Consists of a mix of riparian woodlands and shrublands. Vegetation is dependent upon annual or periodic flooding, along with substrate scouring, and/or a seasonally shallow water table.	<1 acre (<0.1%, <0.1%)	72 acres (0.8%)	Small

TABLE 9.2.10.1-1 (Cont.)

	Area of Cover Type Affected (acres)[b]		
Land Cover Type[a]	Within SEZ[c] (Direct Effects)	Outside SEZ[d] (Indirect Effects)	Overall Impact Magnitude[e]
5259 Mojave Mid-Elevation Mixed Desert Scrub: The vegetation composition is quite variable. Dominant species include shrubs forbs, and grasses and may include *Yucca* spp.	0 acres	85 acres (0.3%)	Small
Developed, Medium-High Density: Includes housing and commercial/industrial development. Impervious surfaces compose 50–100% of the total land cover.	0 acres	7 acres (<0.1%)	Small

[a] Land cover descriptions are from NatureServe (2009). Full descriptions of land cover types, including plant species, can be found in Appendix I.

[b] Area in acres, determined from Sanborn Mapping (2008).

[c] Includes the area of the cover type within the SEZ, the percentage that area represents of all occurrences of that cover type within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ), and the percentage that area represents of all occurrences of that cover type on BLM lands within the SEZ region. The SEZ region intersects portions of California and Arizona. However, the SEZ and affected area occur only in California.

[d] Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary where ground-disturbing activities would not occur. Indirect effects include effects from surface runoff, dust, and other factors from project facilities. The potential degree of indirect effects would decrease with increasing distance from the SEZ. Includes the area of the cover type within the indirect effects area and the percentage that area represents of all occurrences of that cover type within the SEZ region.

[e] Overall impact magnitude categories were based on professional judgment and include (1) *small*: a relatively small proportion (≤1%) of the cover type within the SEZ region would be lost; (2) *moderate*: an intermediate proportion (>1 but ≤10%) of a cover type would be lost; (3) *large*: >10% of a cover type would be lost.

[f] To convert acres to km^2, multiply by 0.004047.

TABLE 9.2.10.1-2 Problem Weeds of the Mojave Weed Management Area

Common Name	Scientific Name
Tamarisk	*Tamarix ramosissima*
Halogeton	*Halogeton glomeratus*
White horsenettle	*Solanum elaeagnifolium*
Yellow starthistle	*Centaurea solstitialis*
Dalmatian toadflax	*Linaria dalmatica*
Russian thistle	*Salsola tragus*
Puncture vine	*Tribulus terrestris*
Camelthorn	*Alhagi maurorum*
Giant reed	*Arundo donax*
Sahara mustard	*Brassica tournefortii*
Red brome	*Bromus madritensis* ssp. *rubens*
Fountain grass	*Pennisetum setaceum*
Tree of heaven	*Ailanthus altissima*
Perennial peppercress[a]	*Lepidium latifolium*
Spanish broom[a]	*Spartium junceum*

[a] Additional species identified in MWMA (2008).

Source: MWMA (2002).

9.2.10.2 Impacts

The construction of solar energy facilities within the Iron Mountain SEZ would result in direct impacts on plant communities because of the removal of vegetation within the facility footprint during land-clearing and land-grading operations. Approximately 80% (85,217 acres [344.9 km^2]) of the SEZ would be expected to be cleared with full development of the SEZ. The plant communities affected would depend on facility locations, and could include any of the communities occurring on the SEZ. Therefore, for the purposes of this analysis, all the area of each cover type within the SEZ is considered to be directly affected by removal with full development of the SEZ.

Indirect effects (caused, for example, by surface runoff or dust from the SEZ) have the potential to degrade affected plant communities and may reduce biodiversity by promoting the decline or elimination of species sensitive to disturbance. Indirect effects can also cause an increase in disturbance-tolerant species or invasive species. High impact levels could result in the elimination of a community or the replacement of one community type for another. The proper implementation of programmatic design features, however, would reduce indirect effects to a minor or small level of impact.

Possible impacts from solar energy facilities on vegetation that are encountered within the SEZ are described in more detail in Section 5.10.1. Any such impacts will be minimized through the implementation of required programmatic design features described in Appendix A, Section A.2.2, and from any additional mitigations applied. SEZ-specific design features are described in Section 9.2.10.3.

9.2.10.2.1 Impacts on Native Species

The impacts of construction, operation, and decommissioning were considered small if the impact affected a relatively small proportion (<1%) of the cover type in the SEZ region (within 50 mi [80 km] of the center of the SEZ); a moderate impact (>1 but <10%) could affect an intermediate proportion of cover type; a large impact could affect greater than 10% of a cover type.

Solar facility construction and operation would primarily affect communities of the Sonora–Mojave Creosotebush–White Bursage Desert Scrub, North American Warm Desert Playa, North American Warm Desert Wash, North American Warm Desert Bedrock Cliff and Outcrop cover types. Additional cover types within the SEZ that would be affected include Sonora-Mojave Mixed Salt Desert Scrub, North American Warm Desert Pavement, North American Warm Desert Active and Stabilized Dune, North American Warm Desert Volcanic Rockland, Inter-Mountain Basins Shale Badland, Open Water, North American Warm Desert Riparian Woodland and Shrubland, Mojave Mid-Elevation Mixed Desert Scrub, Developed, Open Space—Low Intensity. The open water areas are likely artificial impoundments, while the developed areas likely support few native plant communities. The potential impacts on native species cover types resulting from solar energy facilities in the proposed Iron Mountain SEZ are summarized in Table 9.2.10.1-1. Many of these cover types are relatively common in the SEZ region; however, several are relatively uncommon, representing less than 1% of the land area within the SEZ region: Inter-Mountain Basins Shale Badland (0.4%), North American Warm Desert Pavement (0.7%), Sonora-Mojave Mixed Salt Desert Scrub (0.9%), and North American Warm Desert Riparian Woodland and Shrubland (0.2%). Sand dune, playa, chenopod scrub/mixed salt desert scrub (primarily associated with Danby Lake), riparian, and dry wash communities are important sensitive habitats in the region.

The construction, operation, and decommissioning of solar projects within the SEZ would result in large impacts on North American Warm Desert Playa. Much of this cover type is associated with Danby Lake; however, solar project development in that area is unlikely (see Section 2.2.2). Solar project development within the SEZ would result in moderate impacts on Sonora-Mojave Creosotebush-White Bursage Desert Scrub, North American Warm Desert Wash, Sonora-Mojave Mixed Salt Desert Scrub, North American Warm Desert Pavement, and Developed, Open Space—Low Intensity, and small impacts on the remaining cover types in the affected area.

Disturbance of vegetation in dune communities within the SEZ, such as from heavy equipment operation, could result in the loss of substrate stabilization. Reestablishment of dune species could be difficult due to the arid conditions and unstable substrates. Because of the arid conditions, reestablishment of shrub communities in temporarily disturbed areas would likely be very difficult and might require extended periods of time. In addition, noxious weeds could become established in disturbed areas and colonize adjacent undisturbed habitats, thus reducing restoration success and potentially resulting in widespread habitat degradation. Cryptogamic soil crusts occur in many of the shrubland communities in the region and likely occur on the SEZ. Damage to these crusts, by the operation of heavy equipment or other vehicles, can alter important soil characteristics, such as nutrient cycling and availability, and affect plant community characteristics (Lovich and Bainbridge 1999).

Communities associated with playa habitats, riparian habitats, or other intermittently flooded areas within or downgradient from solar projects could be affected by ground-disturbing activities. Site-clearing and -grading could disrupt surface water or groundwater flow patterns, resulting in changes in the frequency, duration, depth, or extent of inundation or soil saturation; could potentially alter playa or riparian plant communities, including occurrences outside of the SEZ; and could affect community function. Increases in surface runoff from a solar energy project site could also affect hydrologic characteristics of these communities. The introduction of contaminants into these habitats could result from spills of fuels or other materials used on a project site. Soil disturbance could result in sedimentation in these areas, which could degrade or eliminate sensitive plant communities. Grading could also affect dry washes within the SEZ, and alteration of surface drainage patterns or hydrology could adversely affect downstream dry wash communities. Vegetation within these communities could be lost by erosion or desiccation. See Section 9.2.9 for further discussion of impacts on washes.

Although the use of groundwater within the Iron Mountain SEZ for technologies with high water requirements, such as wet-cooling systems, is considered unlikely, groundwater withdrawals for such systems could reduce groundwater discharge along riparian areas. Communities that depend on accessible groundwater, such as mesquite bosque communities, could become degraded or lost as a result of lowered groundwater levels.

The deposition of fugitive dust from disturbed soil areas in habitats outside a solar project area could result in reduced productivity or changes in plant community composition. Fugitive dust deposition could affect plant communities of each of the cover types occurring within the indirect impact area identified in Table 9.2.10.1-1.

9.2.10.2.2 Impacts from Noxious Weeds and Invasive Plant Species

On February 8, 1999, the President signed E.O. 13112, "Invasive Species," which directs federal agencies to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts of invasive species (*Federal Register*, Volume 64, page 61836, Feb. 8, 1999). Potential impacts of noxious weeds and invasive plant species resulting from solar energy facilities are described in Section 5.10.1. Despite required programmatic design features to prevent the spread of noxious weeds, project disturbance could potentially increase the prevalence of noxious weeds and invasive species in the affected area of the proposed Iron Mountain SEZ, and increase the probability that weeds could be transported into areas that were previously relatively weed-free. This could result in reduced restoration success and possible widespread habitat degradation.

Noxious weeds, including tamarisk, occur on the SEZ. Species that are known to occur in the BLM Needles Field Office include cheatgrass and Sahara mustard. Additional species known to occur in the Mojave Weed Management Area are given in Table 9.2.10.1-2.

Past or present land uses may affect the susceptibility of plant communities to the establishment of noxious weeds and invasive species. Small areas of Developed, Open Space–Low Intensity, totaling about 427 acres (1.7 km^2), occur within the SEZ, and approximately 923 acres (14.6 km^2) occur within the area of indirect effects. Because disturbance may promote the establishment and spread of invasive species, developed areas may provide sources of such species. Disturbance associated with existing roads, transmission lines, rail lines, and recreational OHV use within the SEZ area of potential impacts also likely contributes to the susceptibility of plant communities to the establishment and spread of noxious weeds and invasive species.

9.2.10.3 SEZ-Specific Design Features and Design Feature Effectiveness

The implementation of required programmatic design features described in Appendix A, Section A.2.2, would reduce the potential for impacts on plant communities. While some SEZ-specific design features are best established when project details are considered, design features that can be identified at this time include the following:

- An Integrated Vegetation Management Plan, addressing invasive species control, and an Ecological Resources Mitigation and Monitoring Plan, addressing habitat restoration, should be approved and implemented to increase the potential for successful restoration of affected Sonoran Desert habitats and minimize the potential for the spread of invasive species, such as tamarisk, cheatgrass, and sahara mustard. Invasive species control should focus on biological and mechanical methods where possible to reduce the use of herbicides.

- All riparian, playa, chenopod scrub, sand dune, and sand transport areas and desert dry wash habitats should be avoided to the extent practicable, and any impacts on them should be minimized and mitigated. A buffer area should be maintained around riparian areas, playas, and dry washes to reduce the potential for impacts on these habitats on or near the SEZ. Appropriate engineering controls should be used to minimize impacts on these areas resulting from surface-water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition to these habitats. Appropriate buffers and engineering controls would be determined through agency consultation.

- Groundwater withdrawals should be limited to reduce the potential for indirect impacts on riparian habitat associated with groundwater discharge or groundwater-dependent communities, such as mesquite bosque.

If these SEZ-specific design features are implemented in addition to programmatic design features, it is anticipated that a high potential for impacts from invasive species and impacts on riparian habitat, dunes, and desert dry washes would be reduced to a minimal potential for impact.

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9.2.11 Wildlife and Aquatic Biota

This section addresses wildlife (amphibians, reptiles, birds, and mammals) and aquatic biota that could occur within the potentially affected area of the proposed Iron Mountain SEZ. Wildlife known to occur within 50 mi (80 km) of the SEZ (i.e., the SEZ region) were determined from the California Wildlife Habitat Relationships System (CDFG 2008). Land cover types suitable for each species were determined from SWReGAP (USGS 2004, 2005, 2007). The amount of aquatic habitat within the SEZ region was determined by estimating the length of linear perennial stream and canal features and the area of standing water body features (i.e., ponds, lakes, and reservoirs) within 50 mi (80 km) of the SEZ using available GIS surface water datasets.

The affected area considered in this assessment included the areas of direct and indirect effects. The area of direct effects was defined as the area that would be physically modified during project development (i.e., where ground-disturbing activities would occur within the SEZ). The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ boundary where ground-disturbing activities would not occur but that could be indirectly affected by activities in the area of direct effect (e.g., surface runoff, dust, noise, lighting, and accidental spills from the SEZ). The potential degree of indirect effects would decrease with increasing distance away from the SEZ. This area of indirect effect was identified on the basis of professional judgment and was considered sufficiently large to bound the area that would potentially be subject to indirect effects.

The affected area is the area bounded by the areas of direct and indirect effects. These areas are defined and the impact assessment approach is described in Appendix M. Because of the proximity of existing infrastructure, the impacts of construction and operation of transmission lines outside of the SEZ are not assessed, assuming that the existing transmission might be used to connect some new solar facilities to load centers and that additional project-specific analysis would be conducted for new transmission construction or line upgrades. Similarly, the impacts of construction of or upgrades to access roads were not assessed for this SEZ because of the proximity of the existing state highway (see Section 9.2.1.2 for a discussion of development assumptions for this SEZ).

Dominant vegetation in the affected area is desert scrub, and the primary land cover habitat type within the affected area is Sonoran-Mojave creosotebush-white bursage desert scrub (see Section 9.2.10). Aquatic and riparian habitats in the affected area occur within and along Danby Lake, intermittent desert washes, and the CRA operated by the MWD (see Section 9.2.9; Figure 9.2.9.1-1). Other potentially unique habitats in the affected area in which wildlife species may reside include desert dunes and rocky slopes, cliffs, and outcrops.

9.2.11.1 Amphibians and Reptiles

9.2.11.1.1 Affected Environment

This section addresses amphibian and reptile species that are known to occur, or for which potentially suitable habitat occurs, on or within the potentially affected area of the proposed Iron Mountain SEZ. The list of amphibian and reptile species potentially present in the project area was determined from range maps and habitat information available from the California Wildlife Habitat Relationships System (CDFG 2008). Land cover types suitable for each species were determined from SWReGAP (USGS 2004, 2005, 2007). See Appendix M for additional information on the approach used.

Based on the range, habitat preferences, and/or presence of suitable land cover for the amphibian species that occur within southeastern California (CDFG 2008; USGS 2004, 2005, 2007), the red-spotted toad (*Bufo punctatus*) would be expected to occur within the proposed Iron Mountain SEZ. However, as it prefers dry, rocky areas near temporary sources of standing water, its occurrence within the SEZ would be spatially limited. Danby Lake could provide suitable habitat for the species. Several other amphibian species could inhabit the CRA, immediately south and southwest of the SEZ: the bullfrog (*Rana catesbeiana*), Colorado River toad (*Bufo alvarius*), Rio Grande leopard frog (*Rana berlandieri*), and Woodhouse's toad (*Bufo woodhousii*). Because these species tend to occur within 300 ft (100 m) of permanent water (USGS 2007), they would not be expected to occur within the SEZ.

Thirty-one reptile species could occur within the proposed Iron Mountain SEZ (CDFG 2008). These species include 1 tortoise, 13 lizards, and 17 snakes. Even though it is a federally and state-listed threatened species, the desert tortoise (*Gopherus agassizii*) is relatively common throughout the area of the SEZ. This species is discussed in Section 9.2.12. Among the more common lizard species that could occur within the SEZ are the desert horned lizard (*Phrynosoma platyrhinos*), long-nosed leopard lizard (*Gambelia wislizenii*), Mojave fringe-toed lizard (*Uma scoparia*), side-blotched lizard (*Uta stansburiana*), western banded gecko (*Coleonyx variegatus*), and zebra-tailed lizard (*Callisaurus draconoides*).

The most common snake species expected to occur within the proposed Iron Mountain SEZ are the coachwhip (*Masticophis flagellum*), glossy snake (*Arizona elegans*), gophersnake (*Pituophis catenifer*), groundsnake (*Sonora semiannulata*), and long-nosed snake (*Rhinocheilus lecontei*). The Mojave rattlesnake (*Crotalus scutulatus*) and sidewinder (*C. cerastes*) would be the most common poisonous snake species expected to occur on the SEZ.

Table 9.2.11.1-1 provides habitat information for representative amphibian and reptile species that could occur within the proposed Iron Mountain SEZ.

TABLE 9.2.11.1-1 Representative Amphibians and Reptiles That Could Occur on or in the Affected Area of the Proposed Iron Mountain SEZ and Potential Impacts

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected[a] Within SEZ (Direct Effects)[b]	Maximum Area of Potential Habitat Affected[a] Outside SEZ (Indirect Effects)[c]	Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
Amphibians				
Red-spotted toad (*Bufo punctatus*)	Rocky canyons and gullies in deserts, grasslands, and dry woodlands. When inactive, it occurs under rocks, in rock crevices, or underground. Often found near rocky areas associated with spring seepages, intermittent streams, and cattle tanks. Breeds in shallow water of temporary rain pools, spring-fed pools, and pools along intermittent streams. About 2,626,400 acres[f] of potentially suitable habitat occurs in the SEZ region.	60,091 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat)	157,331 acres of potentially suitable habitat (6.0% of available potentially suitable habitat)	Moderate. Minimize development within Danby Lake.
Lizards				
Desert horned lizard (*Phrynosoma platyrhinos*)	Deserts dominated by sagebrush, creosotebush, greasewood, or cactus. Occurs on sandy flats, alluvial fans, washes, and edge of dunes. Burrows in soil during periods of inactivity. Common throughout Mojave and Colorado Deserts. About 4,786,300 acres of potentially suitable habitat occurs in the SEZ region.	85,217 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	250,226 acres of potentially suitable habitat (5.2% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Long-nosed leopard lizard (*Gambelia wislizenii*)	Desert and semidesert areas with scattered shrubs. Prefers sandy or gravelly flats and plains. Also prefers areas with abundant rodent burrows that they occupy when inactive. Widely distributed in the Mojave, Colorado, and other desert areas in California. About 2,626,700 acres of potentially suitable habitat occurs in the SEZ region.	60,091 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat)	157,331 acres of potentially suitable habitat (6.0% of available potentially suitable habitat)	Moderate.

TABLE 9.2.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected[a]: Within SEZ (Direct Effects)[b]	Maximum Area of Potential Habitat Affected[a]: Outside SEZ (Indirect Effects)[c]	Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
Lizards (Cont.)				
Mojave fringe-toed lizard (*Uma scoparia*)	Restricted to sparsely vegetated windblown sand of dunes, flats, riverbanks, and washes. Requires fine, loose sand for burrowing. About 2,525,700 acres of potentially suitable habitat occurs in the SEZ region.	58,761 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat)	157,214 acres of potentially suitable habitat (6.2% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash.
Side-blotched lizard (*Uta stansburiana*)	Arid and semi-arid locations with scattered bushes or scrubby trees. Often occurs in sandy washes with scattered rocks and bushes. About 4,160,300 acres of potentially suitable habitat occurs in the SEZ region.	81,733 acres of potentially suitable habitat lost (2.0% of available potentially suitable habitat)	241,727 acres of potentially suitable habitat (5.8% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash.
Western banded gecko (*Coleonyx variegatus*)	Wide variety of habitats, including deserts with creosotebush and sagebrush and pinyon-juniper woodlands. Inhabits both rocky areas and barren dunes. Most abundant in sandy flats and desert washes. Uses rocks, burrows, and spaces beneath vegetative debris or trash during period of inactivity. About 3,156,300 acres of potentially suitable habitat occurs in the SEZ region.	85,217 acres of potentially suitable habitat lost (2.7% of available potentially suitable habitat)	173,528 acres of potentially suitable habitat (5.5% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 9.2.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected[a]		Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
		Within SEZ (Direct Effects)[b]	Outside SEZ (Indirect Effects)[c]	
Lizards (Cont.)				
Zebra-tailed lizard (*Callisaurus draconoides*)	Sparsely vegetated deserts on open sandy washes, dunes, floodplains, beaches, or desert pavement. Common and widely distributed throughout Mojave and Colorado Deserts. About 3,578,200 acres of potentially suitable habitat occurs in the SEZ region.	85,217 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	176,725 acres of potentially suitable habitat (4.9% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Snakes				
Coachwhip (*Masticophis flagellum*)	Wide variety of open terrain habitats. Most abundant in deserts, grasslands, scrub, chaparral, and pastures. Prefers relatively dry open terrain. It seeks cover in burrows, rocks, or vegetation. About 3,801,800 acres of potentially suitable habitat occurs in the SEZ region.	68,452 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	230,634 acres of potentially suitable habitat (6.1% of available potentially suitable habitat)	Moderate.
Glossy snake (*Arizona elegans*)	Variety of habitats, including barren to sparsely shrubby deserts, sagebrush flats, grasslands, and sandhills. Prefers sandy areas with scattered brush, but also occurs in rocky areas. Shelters and lays eggs underground. Common throughout southern California, particularly the desert regions. About 5,034,700 acres of potentially suitable habitat occurs in the SEZ region.	85,217 acres of potentially suitable habitat lost (1.7% of available potentially suitable habitat)	251,163 acres of potentially suitable habitat (5.0% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 9.2.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected[a]		Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
		Within SEZ (Direct Effects)[b]	Outside SEZ (Indirect Effects)[c]	
Snakes (Cont.)				
Gophersnake (*Pituophis catenifer*)	Wide variety of habitats, including deserts, prairies, shrublands, woodlands, and farmlands. May dig its burrow or occupy mammal burrows. Eggs are laid in burrows or under large rocks or logs. Most widespread and common snake in California. About 3,368,100 acres of potentially suitable habitat occurs in the SEZ region.	85,217 acres of potentially suitable habitat lost (2.5% of available potentially suitable habitat)	175,153 acres of potentially suitable habitat (5.2% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Groundsnake (*Sonora semiannulata*)	Arid and semi-arid areas, including desert flats, sand hummocks, rocky hillsides with pockets of loose soil. Ranges from prairie and desert lowlands to pinyon-juniper and oak-pine zone. About 3,009,900 acres of potentially suitable habitat occurs in the SEZ region.	72,251 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	168,917 acres of potentially suitable habitat (5.6% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Long-nosed snake (*Rhinocheilus lecontei*)	Typically inhabits deserts, dry prairies and river valleys. Occurs by day and lays eggs underground or under rocks. Burrows rapidly in loose soil. Common in desert regions. About 554,600 acres of potentially suitable habitat occurs in the SEZ region.	13,699 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	12,470 acres of potentially suitable habitat (2.2% of available potentially suitable habitat)	Moderate.

TABLE 9.2.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected[a] Within SEZ (Direct Effects)[b]	Maximum Area of Potential Habitat Affected[a] Outside SEZ (Indirect Effects)[c]	Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
Snakes (Cont.)				
Mojave rattlesnake (*Crotalus scutulatus*)	Mostly upland desert and lower mountain slopes including barren desert, grasslands, open woodland, and scrubland. Generally avoids broken rocky terrain or densely vegetated areas. Takes refuge in animal burrows or spaces under or among rocks. Widely distributed throughout the Mojave and extreme northern Colorado Deserts. About 2,595,600 acres of potentially suitable habitat occurs in the SEZ region.	58,552 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat)	156,676 acres of potentially suitable habitat (6.0% of available potentially suitable habitat)	Moderate.
Sidewinder (*Crotalus. cerastes*)	Open desert terrain with fine windblown sand, desert flats with sandy washes, or sparsely vegetated sand dunes. Concentrates near washes and areas of relatively dense vegetation where mammal burrows are common. During periods of inactivity, uses underground burrows, occurs under bushes, or almost completely snuggles under sand. Widely distributed and locally abundant in the Mojave and Colorado Deserts. About 2,650,500 acres of potentially suitable habitat occurs in the SEZ region.	58,761 acres of potentially suitable habitat lost (2.2% of available potentially suitable habitat)	157,371 acres of potentially suitable habitat (5.9% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash.

[a] Maximum area of potentially suitable habitat affected relative to total available potentially suitable habitat within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ). Habitat availability was determined from potentially suitable land cover for each species (USGS 2004, 2005, 2007).

[b] Direct effects within the SEZ consist of ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 85,217 acres (345 km^2) would be developed in the SEZ.

[c] The area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, etc., from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ boundary.

Footnotes continued on next page.

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TABLE 9.2.11.1-1 (Cont.)

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[d] Overall impact magnitude categories were based on professional judgment and include (1) *small*: ≤1% of potentially suitable habitat for the species would be lost, and the activity would not result in a measurable change in the carrying capacity or population size in the affected area; (2) *moderate*: >1 but ≤10% of potentially suitable habitat for the species would be lost and the activity would potentially result in a measurable but moderate (not destabilizing) change in the carrying capacity or population size in the affected area; and (3) *large*: >10% of potentially suitable habitat for the species would be lost and the activity would result in a potentially large, measurable, and destabilizing change in the carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.

[e] Species-specific mitigation is presented for those species that have particular habitat features that could be readily avoided. For species or individuals occurring outside the SEZ (in the area of indirect effects), no mitigation measures beyond required programmatic design features have been identified.

[f] To convert acres to km^2, multiply by 0.004047.

Sources: CDFG (2008); NatureServe (2010); USGS (2004, 2005, 2007).

9.2.11.1.2 Impacts

The potential for impacts on amphibians and reptiles from utility-scale solar energy development within the proposed Iron Mountain SEZ is presented in this section. The types of impacts that amphibians and reptiles could incur from construction, operation, and decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any such impacts would be minimized through the implementation of required programmatic design features described in Appendix A, Section A.2.2, and application of any additional mitigation. Section 9.2.11.1.3, below, identifies SEZ-specific design features of particular relevance to the proposed Iron Mountain SEZ.

The assessment of impacts on amphibians and reptile species is based on available information on the presence of species in the affected area, as presented in Section 9.2.11.1.1, following the analysis approach described in Appendix M. Additional NEPA assessments and coordination with state natural resource agencies may be needed to address project-specific impacts more thoroughly. These assessments and consultations could result in additional required actions to avoid or mitigate impacts on amphibians and reptiles (see Section 9.2.11.1.3).

In general, impacts on amphibians and reptiles would result from habitat disturbance (i.e., habitat reduction, fragmentation, and alteration) and from disturbance, injury, or mortality to individual amphibians and reptiles. On the basis of the impacts on amphibians and reptiles summarized in Table 9.2.11.1-1, direct impacts on amphibian and reptile species would be moderate, as 1.7 to 2.7% of potentially suitable habitats identified for the species in the SEZ region would be lost. Larger areas of potentially suitable habitats for most amphibian and reptile species occur within the area of potential indirect effects (e.g., up to 6.1% of available habitat for the coachwhip). Other impacts on amphibians and reptiles could result from surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, accidental spills, collection, and harassment. These indirect impacts are expected to be negligible with implementation of programmatic design features.

Decommissioning of facilities and reclamation of disturbed areas after operations cease could result in short-term negative impacts on individuals and habitats adjacent to project areas, but long-term benefits would accrue if suitable habitats were restored in previously disturbed areas. Section 5.10.2.1.4 provides an overview of the impacts of decommissioning and reclamation on wildlife. Of particular importance for amphibian and reptile species would be the restoration of original ground surface contours, soils, and native plant communities associated with semiarid shrublands.

9.2.11.1.3 SEZ-Specific Design Features and Design Feature Effectiveness

The implementation of required programmatic design features described in Appendix A, Section A.2.2, would reduce the potential for effects on amphibians and reptiles, especially for those species that utilize habitat types that can be avoided (e.g., ephemeral drainages). Indirect impacts could be reduced to negligible levels by implementing programmatic design features, especially those engineering controls that would reduce runoff, sedimentation, spills, and fugitive dust. While SEZ-specific features are best established when project details are considered, the design feature that can be identified at this time includes the following:

- Avoid the CRA, Homer Wash, and portions of Danby Lake.

If this SEZ-specific design feature is implemented in addition to other programmatic design features, impacts on amphibians and reptiles could be reduced. Any residual impacts on amphibians and reptiles are anticipated to be moderate given the relative abundance of potentially suitable habitats in the SEZ region. However, because potentially suitable habitats for a number of the amphibian and reptile species occur throughout much of the SEZ, additional species-specific mitigation of direct effects for those species would be difficult or infeasible.

9.2.11.2 Birds

9.2.11.2.1 Affected Environment

This section addresses bird species that are known to occur, or for which potentially suitable habitat occurs, on or within the potentially affected area of the proposed Iron Mountain SEZ. The list of bird species potentially present in the project area was determined from range maps and habitat information available from the California Wildlife Habitat Relationships System (CDFG 2008). Land cover types suitable for each species were determined from SWReGAP (USGS 2004, 2005, 2007). See Appendix M for additional information on the approach used.

Nearly 100 species of birds have a range that encompasses the proposed Iron Mountain SEZ region. However, potentially suitable habitats for about 40 of these species either do not occur on or are limited within the SEZ (e.g., habitat for waterfowl and wading birds). In addition, the SEZ region is only within the winter range (35 species) or summer range (10 species) of a number of birds. Eleven bird species that may occur within the SEZ are considered focal species for the California Partners in Flight's *Desert Bird Conservation Plan* (CalPIF 2009): ash-throated flycatcher (*Myiarchus cinerascens*), black-tailed gnatcatcher (*Polioptila melanura*), black-throated sparrow (*Amphispiza bilineata*), burrowing owl (*Athene cunicularia*), common raven (*Corvus corax*), Costa's hummingbird (*Calypte costae*), crissal thrasher (*Toxostoma crissale*), ladder-backed woodpecker (*Picoides scalaris*), Le Conte's thrasher (*Toxostoma lecontei*), phainopepla (*Phainopepla nitens*), and verdin (*Auriparus flaviceps*). Habitats for these species are described in Table 9.2.11.2-1. The ash-throated flycatcher would be a summer resident within the SEZ, while the other desert focal bird species could occur year-round (CalPIF 2009).

Desert Focal Bird Species

Bird species whose requirements define spatial attributes, habitat characteristics, and management regimes representative of a healthy desert system (Chase and Geupel 2005).

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TABLE 9.2.11.2-1 Representative Bird Species That Could Occur on or in the Affected Area of the Proposed Iron Mountain SEZ and Potential Impacts

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected[a]		Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
		Within SEZ (Direct Effects)[b]	Outside SEZ (Indirect Effects)[c]	
Shorebirds				
Killdeer (*Charadrius vociferus*)	Widespread throughout California. Open areas such as fields, meadows, lawns, mudflats, and shores. Nests on ground in open dry or gravelly locations. About 299,300 acres[f] of potentially suitable habitat occurs in the SEZ region. Year-round.	22,485 acres of potentially suitable habitat lost (7.5% of available potentially suitable habitat)	5,359 acres of potentially suitable habitat (1.8% of available potentially suitable habitat)	Moderate. Minimize development within Danby Lake. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Least sandpiper (*Calidris minutilla*)	Wet meadows, mudflats, flooded fields, lake shores, edge of salt marshes, and river sandbars. About 40,500 acres of potentially suitable habitat occurs in the SEZ region. Common to abundant in winter.	2 acres of potentially suitable habitat lost (<0.01% of available potentially suitable habitat)	79 acres of potentially suitable habitat (0.2% of available potentially suitable habitat)	Small. Minimize development within Danby Lake. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected[a]: Within SEZ (Direct Effects)[b]	Maximum Area of Potential Habitat Affected[a]: Outside SEZ (Indirect Effects)[c]	Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
Neotropical Migrants				
Ash-throated flycatcher (*Myiarchus cinerascens*)	Common in scrub and woodland habitats, including desert riparian and desert washes. Requires hole/cavity for nesting. Uses shrubs or small trees for foraging perches. About 3,033,400 acres of potentially suitable habitat occurs in the SEZ region. Summer.	73,581 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	169,106 acres of potentially suitable habitat (5.6% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Black-tailed gnatcatcher (*Polioptila melanura*)	Nests in bushes mainly in wooded desert washes with dense mesquite, palo verde, ironwood, and acacia. Also occurs in desert scrub habitat. About 3,017,400 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	72,251 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	168,917 acres of potentially suitable habitat (5.6% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Black-throated sparrow (*Amphispiza bilineata*)	Chaparral and desert scrub habitats with sparse to open stands of shrubs. Often in areas with scattered Joshua trees. Nests in thorny shrubs or cactus. About 3,027,100 acres of potentially suitable habitat occurs in the SEZ region. Year-round	59,325 acres of potentially suitable habitat lost (2.0% of available potentially suitable habitat)	159,882 acres of potentially suitable habitat (5.3% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected[a]: Within SEZ (Direct Effects)[b]	Maximum Area of Potential Habitat Affected[a]: Outside SEZ (Indirect Effects)[c]	Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
Neotropical Migrants (Cont.)				
Brewer's sparrow (*Spizella breweri*)	Common in Mojave and Colorado deserts during winter. Occupies open desert scrub and cropland habitats. About 2,558,400 acres of potentially suitable habitat occurs in the SEZ region.	59,081 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat)	158,150 acres of potentially suitable habitat (6.2% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Cactus wren (*Campylorhynchus brunneicapillus*)	Desert (especially areas with cholla cactus or yucca), mesquite, arid scrub, coastal sage scrub, and trees in towns in arid regions. Nests in *Opuntia* spp.; twiggy, thorny trees and shrubs; and sometimes in buildings. Nests may be used as winter roost. Locally common in the Mojave and Colorado deserts. About 4,169,900 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	81,733 acres of potentially suitable habitat lost (2.0% of available potentially suitable habitat)	241,799 acres of potentially suitable habitat (5.8% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Common poorwill (*Phalaenoptilus nuttallii*)	Scrubby and brushy areas, prairie, desert, rocky canyons, open woodlands, and broken forests. Mostly in arid and semi-arid habitats. Nests in open areas on a bare site. About 4,187,400 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	83,272 acres of potentially suitable habitat lost (2.0% of available potentially suitable habitat)	242,441 acres of potentially suitable habitat (5.8% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected[a] Within SEZ (Direct Effects)[b]	Maximum Area of Potential Habitat Affected[a] Outside SEZ (Indirect Effects)[c]	Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
Neotropical Migrants (Cont.)				
Common raven (*Corvus corax*)	Occurs in most habitats. Trees and cliffs provide cover. Roosts primarily in trees. Nests on cliffs, bluffs, tall trees, or human-made structures. Forages in sparse, open terrain. About 2,793,100 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	60,518 acres of potentially suitable habitat lost (2.2% of available potentially suitable habitat)	158,333 acres of potentially suitable habitat (5.78% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Costa's hummingbird (*Calypte costae*)	Desert and semidesert areas, arid brushy foothills, and chaparral. Main habitats are desert washes, edges of desert riparian and valley foothill riparian areas, coastal shrub, desert scrub, desert succulent shrub, lower-elevation chaparral, and palm oasis. Also in mountains, meadows, and gardens during migration and winter. Most common in canyons and washes when nesting. Nests in trees, shrubs, vines, or cacti. About 3,032,700 acres of potentially suitable habitat occurs in the SEZ region. Common in summer and uncommon in winter in California.	73,581 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	169,106 acres of potentially suitable habitat (5.6% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected[a] Within SEZ (Direct Effects)[b]	Maximum Area of Potential Habitat Affected[a] Outside SEZ (Indirect Effects)[c]	Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
Neotropical Migrants (Cont.)				
Greater roadrunner (*Geococcyx californianus*)	Desert scrub, chaparral, edges of cultivated lands, and arid open areas with scattered brush. Requires thickets, large bushes, or small trees for shade, refuge, and roosting. Usually nests low in trees, shrubs, or clumps of cactus. Rarely nests on ground. About 4,534,000 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	85,217 acres of potentially suitable habitat lost (1.9% of available potentially suitable habitat)	248,575 acres of potentially suitable habitat (5.5% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Horned lark (*Eremophila alpestris*)	Common to abundant resident in a variety of open habitats. Breeds in grasslands, sagebrush, semidesert shrublands, and alpine tundra. During migration and winter, inhabits the same habitats other than tundra, and occurs in agricultural areas. Usually occurs where plant density is low and there are exposed soils. About 2,625,400 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	60,091 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat)	157,331 acres of potentially suitable habitat (6.0% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected[a]: Within SEZ (Direct Effects)[b]	Maximum Area of Potential Habitat Affected[a]: Outside SEZ (Indirect Effects)[c]	Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
Neotropical Migrants (Cont.)				
House finch (*Carpodacus mexicanus*)	Variety of areas, including arid scrub and brush, desert riparian areas, open woodlands, cultivated lands, and savannas. Usually forages in areas with elevated escape perches (e.g., trees, tall shrubs, transmission lines, and buildings). Roosts and nests in sheltered sites in trees; tall, dense shrubs; man-made structures; cliff crevices; or earthen banks. About 165,000 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	427 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	1,002 acres of potentially suitable habitat (0.6% of available potentially suitable habitat)	Small. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Ladder-backed woodpecker (*Picoides scalaris*)	Fairly common in Mojave and Colorado Deserts. Variety of habitats including deserts, arid scrub, riparian woodlands, mesquite, scrub oak, pinyon-juniper woodlands. Digs nest hole in rotted stub or dead or dying branches of various trees. Also nests in saguaro, agave, yucca, fence posts, and utility poles. Nests on ledges; branches of trees, shrubs, and cactus; and holes in trees or walls. About 2,641,688 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	60,091 acres of potentially suitable habitat lost (2.2% of available potentially suitable habitat)	157,403 acres of potentially suitable habitat (6.0% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected[a] Within SEZ (Direct Effects)[b]	Maximum Area of Potential Habitat Affected[a] Outside SEZ (Indirect Effects)[c]	Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
Neotropical Migrants (Cont.)				
Le Conte's thrasher (*Toxostoma lecontei*)	Open desert wash, alkali desert scrub, and desert succulent shrub habitats. Prefers to nest and forage in arroyos and washes lined with dense stands of creosotebush and salt bush. About 3,038,200 acres of potentially suitable habitat occurs in the SEZ region. Year-round, but uncommon to rare.	72,251 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	169,002 acres of potentially suitable habitat (5.6% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Lesser nighthawk (*Chordeiles acutipennis*)	Open country, desert regions, scrub, savanna, and cultivated areas. Usually near water including open marshes, salt ponds, large rivers, rice paddies, and beaches. Roosts on low perches or the ground. Nests in the open on bare sites. About 4,653,600 acres of potentially suitable habitat occurs in the SEZ region. Uncommon summer resident.	84,045 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	245,732 acres of potentially suitable habitat (5.3% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected[a] Within SEZ (Direct Effects)[b]	Maximum Area of Potential Habitat Affected[a] Outside SEZ (Indirect Effects)[c]	Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
Neotropical Migrants (Cont.)				
Loggerhead shrike (*Lanius ludovicianus*)	Open country with scattered trees and shrubs, savanna, desert scrub, desert riparian, Joshua tree, and occasionally, open woodland habitats. Perches on poles, wires, or fence posts (suitable hunting perches are important aspect of habitat). Nests in shrubs and small trees. About 3,159,400 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	74,008 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat)	170,029 acres of potentially suitable habitat (5.4% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Phainopepla (*Phainopepla nitens*)	Common in Mojave and Colorado deserts. Desert scrub, mesquite, juniper and oak woodlands, tall brush, washes, riparian woodlands, and orchards. Nests in dense foliage of large shrubs or trees, sometimes in a clump of mistletoe. About 676,900 acres of potentially suitable habitat occurs in the SEZ region. Year-round, but many move to more western and northern portions of California during summer.	13,699 acres of potentially suitable habitat lost (2.0% of available potentially suitable habitat)	12,555 acres of potentially suitable habitat (1.9% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Say's phoebe (*Sayornis saya*)	Arid open country, deserts, sagebrush plains, dry barren foothills, canyons, cliffs, ranches, and rural homes. Nests in cliff crevices, holes in banks, sheltered ledges, tree cavities, under bridges and roofs, and in mines. About 3,847,000 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	70,209 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	231,674 acres of potentially suitable habitat (6.0% of available potentially suitable habitat)	Moderate. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected[a] Within SEZ (Direct Effects)[b]	Maximum Area of Potential Habitat Affected[a] Outside SEZ (Indirect Effects)[c]	Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
Neotropical Migrants (Cont.)				
Verdin (*Auriparus flaviceps*)	Common to abundant in Colorado Desert, less common in Mojave Desert. Desert riparian, desert wash, desert scrub, and alkali desert scrub areas with large shrubs and small trees. Nests in shrubs, small trees, or cactus. About 4,162,260 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	79,455 acres of potentially suitable habitat lost (1.9% of available potentially suitable habitat)	175,446 acres of potentially suitable habitat (4.2% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
White-throated swift (*Aeronautes saxatalis*)	Mountainous country near cliffs and canyons where breeding occurs. Forages over forest and open situations. Nests in rock crevices and canyons, sometimes in buildings. Ranges widely over most terrain and habitats, usually high in the air. About 434,970 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	17,642 acres of potentially suitable habitat lost (4.1% of available potentially suitable habitat)	20,990 acres of potentially suitable habitat (4.8% of available potentially suitable habitat)	Moderate.
Birds of Prey				
American kestrel (*Falco sparverius*)	Occurs in most open habitats, in various shrub and early successional forest habitats, forest openings, and various ecotones. Perches on trees, snags, rocks, utility poles and wires, and fence posts. Uses cavities in trees, snags, rock areas, banks, and buildings for nesting and cover. About 1,840,900 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	11,692 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat)	76,343 acres of potentially suitable habitat (4.1% of available potentially suitable habitat)	Small.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected[a]: Within SEZ (Direct Effects)[b]	Maximum Area of Potential Habitat Affected[a]: Outside SEZ (Indirect Effects)[c]	Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
Birds of Prey (Cont.)				
Golden eagle (*Aquila chrysaetos*)	Grasslands, shrublands, pinyon-juniper woodlands, and ponderosa pine forests. Occasionally in most other habitats, especially during migration and winter. Nests on cliffs and sometimes trees in rugged areas, with breeding birds ranging widely over surrounding areas. About 4,749,700 acres of potentially suitable habitat occurs in the SEZ region. Winter.	85,217 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	248,057 acres of potentially suitable habitat (5.2% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Bald and Golden Eagle Protection Act.
Prairie falcon (*Falco mexicanus*)	Associated primarily with perennial grasslands, savannahs, rangeland, some agricultural fields, and desert scrub areas. Nests in potholes or well-sheltered ledges on rocky cliffs or steep earth embankments. May also nest in man-made excavations on otherwise unsuitable cliffs and old nests of ravens, hawks, and eagles. Forages in large patch areas with low vegetation. May forage over irrigated croplands in winter. About 4,226,500 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	81,733 acres of potentially suitable habitat lost (1.9% of available potentially suitable habitat)	241,714 acres of potentially suitable habitat (5.7% of available potentially suitable habitat)	Moderate.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected[a]: Within SEZ (Direct Effects)[b]	Maximum Area of Potential Habitat Affected[a]: Outside SEZ (Indirect Effects)[c]	Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
Birds of Prey (Cont.)				
Red-tailed hawk (*Buteo jamaicensis*)	Wide variety of habitats from deserts, mountains, and populated valleys. Open areas with scattered, elevated perch sites such as scrub desert, plains and montane grassland, agricultural fields, pastures urban parklands, broken coniferous forests, and deciduous woodland. Nests on cliff ledges or in tall trees. About 3,836,400 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	69,782 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	230,823 acres of potentially suitable habitat (6.0% of available potentially suitable habitat)	Moderate.
Turkey vulture (*Cathartes aura*)	Occurs in open stages of most habitats that provide adequate cliffs or large trees for nesting, roosting, and resting. Migrates and forages over most open habitats. Will roost communally in trees, exposed boulders, and occasionally transmission line support towers. About 3,727,800 acres of potentially suitable habitat occurs in the SEZ region. Summer.	69,782 acres of potentially suitable habitat lost (1.9% of available potentially suitable habitat)	230,751 acres of potentially suitable habitat (6.2% of available potentially suitable habitat)	Moderate.
Upland Game Birds				
Gambel's quail (*Callipepla gambelii*)	Deserts, especially in areas with brushy or thorny growth, and adjacent cultivated areas. Usually occurs near water. Nests on the ground under cover of small trees, shrubs, and grass tufts. About 4,230,100 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	83,272 acres of potentially suitable habitat lost (2.0% of available potentially suitable habitat)	242,526 acres of potentially suitable habitat (5.7% of available potentially suitable habitat)	Moderate.

TABLE 9.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat and Seasonal Occurrence	Maximum Area of Potential Habitat Affected[a] Within SEZ (Direct Effects)[b]	Maximum Area of Potential Habitat Affected[a] Outside SEZ (Indirect Effects)[c]	Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
Upland Game Birds (Cont.)				
Mourning dove (*Zenaida macroura*)	Habitat generalist, occurring in grasslands, shrublands, croplands, lowland and foothill riparian forests, ponderosa pine forests, deserts, and urban and suburban areas. Rarely in aspen and other forests, coniferous woodlands, and alpine tundra. Nests on ground or in trees. Winters mostly in lowland riparian forests adjacent to cropland. About 3,333,200 acres of potentially suitable habitat occurs in the SEZ region. Year-round.	85,217 acres of potentially suitable habitat lost (2.6% of available potentially suitable habitat)	174,539 acres of potentially suitable habitat (5.2% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

[a] Maximum area of potentially suitable habitat affected relative to total available potentially suitable habitat within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ). Habitat availability was determined from potentially suitable land cover for each species (USGS 2004, 2005, 2007).

[b] Direct effects within the SEZ consist of ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 85,217 acres (345 km^2) would be developed in the SEZ.

[c] The area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, etc., from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ boundary.

[d] Overall impact magnitude categories were based on professional judgment and include (1) *small*: ≤1% of potentially suitable habitat for the species would be lost, and the activity would not result in a measurable change in the carrying capacity or population size in the affected area; (2) *moderate*: >1 but ≤10% of potentially suitable habitat for the species would be lost and the activity would potentially result in a measurable but moderate (not destabilizing) change in the carrying capacity or population size in the affected area; and (3) *large*: >10% of potentially suitable habitat for the species would be lost and the activity would result in a potentially large, measurable, and destabilizing change in the carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.

Footnotes continued on next page.

TABLE 9.2.11.2-1 (Cont.)

[e] Species-specific mitigation is presented for those species that have particular habitat features that could be readily avoided. For species or individuals occurring outside the SEZ (in the area of indirect effects), no mitigation measures beyond required programmatic design features have been identified.

[f] To convert acres to km^2, multiply by 0.004047.

Sources: CDFG (2008); NatureServe (2010); USGS (2004, 2005, 2007).

Waterfowl, Wading Birds, and Shorebirds

As discussed in Section 4.10.2.2.2, waterfowl (ducks, geese, and swans), wading birds (herons and cranes), and shorebirds (avocets, gulls, plovers, rails, sandpipers, stilts, and terns) are among the most abundant groups of birds in the six-state study area. About 20 waterfowl, wading bird, and shorebird species occur within the proposed Iron Mountain SEZ region. Within the SEZ, waterfowl, wading birds, and shorebirds are uncommon because of the lack of potentially suitable habitats. The killdeer (*Charadrius vociferus*) and least sandpiper (*Calidris minutilla*) (shorebird species) would be expected to occur on the SEZ in the area of Danby Lake. Some waterfowl, wading birds, and shorebirds may also make use of the Colorado River Aqueduct that flows along the southern boundary of the SEZ. The Colorado River, located over 20 mi (32 km) southeast of the SEZ, and the Salton Sea, located over 60 mi (96 km) southwest of the SEZ, would provide more productive habitat for this group of birds.

Neotropical Migrants

As discussed in Section 4.10.2.2.3, neotropical migrants represent the most diverse category of birds within the six-state study area. Neotropical migrants expected to occur within the proposed Iron Mountain SEZ throughout the year include the black-tailed gnatcatcher, black-throated sparrow, cactus wren (*Campylorhynchus brunneicapillus*), common poorwill (*Phalaenoptilus nuttallii*), common raven, Costa's hummingbird, crissal thrasher, greater roadrunner (*Geococcyx californianus*), horned lark (*Eremophila alpestris*), house finch (*Carpodacus mexicanus*), ladder-backed woodpecker, Le Conte's thrasher, loggerhead shrike (*Lanius ludovicianus*), phainopepla, Say's phoebe (*Sayornis saya*), verdin, and white-throated swift (*Aeronautes saxatalis*). The winter range for the Brewer's sparrow (*Spizella breweri*), green-tailed towhee (*Pipilo chlorurus*), and sage sparrow (*Amphispiza belli*) encompasses the SEZ, while the summer range for the ash-throated flycatcher (*Myiarchus cinerascens*) and lesser nighthawk (*Chordeiles acutipennis*) encompasses the SEZ (CDFG 2008).

Birds of Prey

Section 4.10.2.2.4 provides an overview of the birds of prey (raptors, owls, and vultures) within the six-state study area. Seventeen bird-of-prey species have ranges that encompass the proposed Iron Mountain SEZ (CDFG 2008). Raptor species expected to could occur within the SEZ include the American kestrel (*Falco sparverius*, year-round), burrowing owl (year-round), ferruginous hawk (*Buteo regalis*, winter), golden eagle (*Aquila chrysaetos*, winter), prairie falcon (*Falco mexicanus*, year-round), red-tailed hawk (*Buteo jamaicensis*, year-round), and turkey vulture (*Cathartes aura*, summer) (CDFG 2008). However, the American kestrel, golden eagle, prairie falcon, and red-tailed hawk only make infrequent use of the desert region within which the proposed Iron Mountain SEZ occurs. The golden eagle is a Fully Protected species by the State of California (CDFG 2010a).

Upland Game Birds

Section 4.10.2.2.5 provides an overview of the upland game birds (primarily pheasants, grouse, quail, and doves) that occur within the six-state study area. Upland game species that could occur year-round within the proposed Iron Mountain SEZ are Gambel's quail (*Callipepla gambelii*) and mourning dove (*Zenaida macroura*) (CDFG 2008). Gambel's quail is common within the Colorado and Mojave Desert areas of California. It prefers riparian areas and also occurs near streams, springs and water holes. While they feed in open habitats, trees or tall shrubs are required for escape cover. They also require a nearby source of water, particularly during hot summer months (CDFG 2008). Up to 400,000 Gambel's quail are harvested annually in California (CDFG 2008). The mourning dove is common throughout California and can be found in a wide variety of habitats. Regardless of habitat occupied, it requires a nearby water source (CDFG 2008).

Table 9.2.11.2-1 provides habitat information for representative bird species that could occur within the proposed Iron Mountain SEZ. Because of their special status standing, the burrowing owl, crissal thrasher, ferruginous hawk, and short-eared owl are discussed in Section 9.2.12.1.

9.2.11.2.2 Impacts

The types of impacts that birds could incur from construction, operation, and decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any such impacts would be minimized through the implementation of required programmatic design features described in Appendix A, Section A.2.2, and through any additional mitigation applied. Section 9.2.11.2.3, below, identifies design features of particular relevance to the proposed Iron Mountain SEZ.

The assessment of impacts on bird species is based on available information on the presence of species in the affected area, as presented in Section 9.2.11.2.1, following the analysis approach described in Appendix M. Additional NEPA assessments and coordination with state natural resource agencies may be needed to address project-specific impacts more thoroughly. These assessments and consultations could result in additional required actions to avoid or mitigate impacts on birds (see Section 9.2.11.2.3).

In general, impacts on birds would result from habitat disturbance (i.e., habitat reduction, fragmentation, and alteration), and from disturbance, injury, or mortality to individual birds. Table 9.2.11.2-1 summarizes the potential impacts on representative bird species resulting from solar energy development in the proposed Iron Mountain SEZ. Direct impacts on bird species would be small for a few species (e.g., least sandpiper, house finch, and American kestrel), as only 0.6% or less of potentially suitable habitats for these species would be lost (Table 9.2.11.2-1). Impacts on the other bird species would be moderate, as solar energy development within the SEZ would impact 1.8 to 7.5% of potentially suitable habitat for these species (Table 9.2.11.2-1). Larger areas of potentially suitable habitat for bird species occur within the area of potential indirect effects (e.g., up to 6.2% of potentially suitable habitat for the

Brewer's sparrow and turkey vulture). Other impacts on birds could result from collision with vehicles and buildings, surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, noise, lighting, spread of invasive species, accidental spills, and harassment. Indirect impacts on areas outside the SEZ (for example, impacts caused by dust generation, erosion, and sedimentation) are expected to be negligible with implementation of programmatic design features.

Decommissioning of facilities and reclamation of disturbed areas after operations cease could result in short-term negative impacts on individuals and habitats adjacent to project areas, but long-term benefits would accrue if suitable habitats were restored in previously disturbed areas. Section 5.10.2.1.4 provides an overview of the impacts of decommissioning and reclamation on wildlife. Of particular importance for bird species would be the restoration of original ground surface contours, soils, and native plant communities associated with semiarid shrublands.

9.2.11.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

The successful implementation of programmatic design features presented in Appendix A, Section A.2.2, would reduce the potential for effects on birds. Indirect impacts could be reduced to negligible levels by implementing programmatic design features, especially those engineering controls that would reduce runoff, sedimentation, spills, and fugitive dust. While some SEZ-specific design features important to reducing impacts on birds are best established when project details are considered, some design features can be identified at this time, as follows:

- Pre-disturbance surveys should be conducted within the SEZ for bird species listed under the Migratory Bird Treaty Act. Impacts on potential nesting habitat of these species should be avoided, particularly during the nesting season.

- Pre-disturbance surveys should be conducted within the SEZ for the following desert bird focal species (CalPIF 2009): ash-throated flycatcher, black-tailed gnatcatcher, black-throated sparrow, burrowing owl, common raven, Costa's hummingbird, crissal thrasher, ladder-backed woodpecker, Le Conte's thrasher, phainopepla, and verdin. Impacts on potential nesting habitat of these species should be avoided.

- Plant species that positively influence the presence and abundance of desert bird focal species should be avoided to the extent practicable. These species include Goodding's willow, yucca, Joshua tree, mesquite, honey mesquite, screwbean, desert mistletoe, big saltbush, smoketree, and catclaw acacia (CalPIF 2009).

- Development in Danby Lake should be minimized and development on Homer Wash precluded.

- Take of golden eagles and other raptors should be avoided. Mitigation regarding the golden eagle should be developed in consultation with the USFWS and CDFG. A permit may be required under the Bald and Golden Eagle Protection Act.

If these SEZ-specific design features are implemented in addition to programmatic design features, impacts on bird species could be reduced. Any residual impacts on birds are anticipated to be small to moderate given the relative abundance of potentially suitable habitats in the SEZ region. However, as potentially suitable habitats for a number of the bird species occur throughout much of the SEZ (including the entire SEZ for the greater roadrunner and mourning dove), additional species-specific mitigation of direct effects for those species would be difficult or infeasible.

9.2.11.3 Mammals

9.2.11.3.1 Affected Environment

This section addresses mammal species that are known to occur, or for which potentially suitable habitat occurs, on or within the potentially affected area of the proposed Iron Mountain SEZ. The list of mammal species potentially present in the project area was determined from range maps and habitat information available from the California Wildlife Habitat Relationships System (CDFG 2008). Land cover types suitable for each species were determined from SWReGAP (USGS 2004, 2005, 2007). See Appendix M for additional information on the approach used. Based on species distributions and habitat preferences, about 35 mammal species could occur within the SEZ (CDFG 2008). The following discussion emphasizes big game and other mammal species that (1) have key habitats within or near the Iron Mountain SEZ, (2) are important to humans (e.g., big game, small game, and furbearer species), and/or (3) are representative of other species that share similar habitats.

Big Game

The desert bighorn sheep (*Ovis canadensis nelsoni*) and mule deer (*Odocoileus hemionus*) are the only big game species expected to occur in the area of the proposed Iron Mountain SEZ. Because it is a BLM-sensitive species, the desert bighorn sheep is discussed in Section 9.2.12. The mule deer is common to abundant throughout California, except in deserts and intensely farmed areas (CDFG 2008). It prefers a mosaic of vegetation that has herbaceous openings, dense brush or tree thickets, riparian areas, and abundant edges. Mule deer are browsers and grazers, feeding on shrubs, forbs, and a few grasses. Brush is important for escape cover and for thermal regulation in winter and summer (CDFG 2008). Mule deer in San Bernardino County are found throughout the mountainous areas at elevations of 4,000 to 8,000 ft (1,219 to 2,438 m) (CDFG 2010d). Therefore, mule deer would not be expected to occur with any regularity within Ward Valley where the proposed Iron Mountain SEZ would be located. The highest elevation of the SEZ is about 1,650 ft (503 m) (Section 9.2.1.1.

Other Mammals

A number of small game and furbearer species occur within the area of the proposed Iron Mountain SEZ. These include the American badger (*Taxidea taxus*), black-tailed jackrabbit (*Lepus californicus*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), desert cottontail (*Sylvilagus audubonii*), round-tailed ground squirrel (*Spermophilus tereticaudus*), and white-tailed antelope squirrel (*Ammospermophilus leucurus*) (CDFG 2008).

Nongame (small) mammal species such as bats, mice, kangaroo rats, and shrews also occur within the area of the Iron Mountain SEZ. These include the cactus mouse (*Peromyscus eremicus*), canyon deermouse (*P. crinitus*), desert kangaroo rat (*Dipodomys deserti*), desert shrew (*Notiosorex crawfordi*), desert woodrat (*Neotoma lepida*), little pocket mouse (*Perognathus longimembris*), long-tailed pocket mouse (*Chaetodipus formosus*), Merriam's kangaroo rat (*Dipodomys merriami*), and southern grasshopper mouse (*Onychomys torridus*) (CDFG 2008). The range of nine bat species encompasses the SEZ: big brown bat (*Eptesicus fuscus*), Brazilian free-tailed bat (*Tadarida brasiliensis*), Californian leaf-nosed bat (*Macrotus californicus*), California mastiff bat (*Eumops perotis californicus*), California myotis (*Myotis californicus*), pallid bat (*Antrozous pallidus*), spotted bat (*Euderma maculatum*), Townsend's big-eared bat (*Corynorhinus townsendii*), and western pipistrelle (*Parastrellus hesperus*). Most bat species would only utilize the SEZ during foraging. Roost sites for the species (e.g., caves, hollow trees, rock crevices, or buildings) are absent to scarce within the SEZ.

Table 9.2.11.3-1 provides habitat information for representative mammal species that could occur within the proposed Iron Mountain SEZ. Due to their special status standing, the California mastiff bat, Californian leaf-nose bat, pallid bat, and Townsend's big-eared bat are discussed in Section 9.2.12.1.

9.2.11.3.2 Impacts

The types of impacts that mammals could incur from construction, operation, and decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any such impacts would be minimized through the implementation of required programmatic design features described in Appendix A, Section A.2.2, and the application of any additional mitigation. Section 9.2.11.3.3, below, identifies design features of particular relevance to the proposed Iron Mountain SEZ.

The assessment of impacts on mammal species is based on available information on the presence of species in the affected area, as presented in Section 9.2.11.3.1, following the analysis approach described in Appendix M. Additional NEPA assessments and coordination with state natural resource agencies may be needed to address project-specific impacts more thoroughly. These assessments and consultations could result in additional required actions to avoid or mitigate impacts on mammals (see Section 9.2.11.3.3).

TABLE 9.2.11.3-1 Representative Mammal Species That Could Occur on or in the Affected Area of the Proposed Iron Mountain SEZ and Potential Impacts

		Maximum Area of Potential Habitat Affected[a]		
Common Name (Scientific Name)	Habitat	Within SEZ (Direct Effects)[b]	Outside SEZ (Indirect Effects)[c]	Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
Small Game and Furbearers				
American badger (*Taxidea taxus*)	Open grasslands and deserts, meadows in subalpine and montane forests, alpine tundra. Digs burrows in friable soils. Most common in areas with abundant populations of ground squirrels, prairie dogs, and pocket gophers. Relatively uncommon throughout California. About 2,597,100 acres[f] of potentially suitable habitat occurs in the SEZ region.	58,552 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat)	156,676 acres of potentially suitable habitat (6.0% of available potentially suitable habitat)	Moderate.
Black-tailed jackrabbit (*Lepus californicus*)	Open plains, fields, and deserts with scattered thickerts or patches of shrubs. Also open, early stages of forests and chaparral habitats. Rests during the day in shallow depressions, and uses shrubs for cover. About 4,592,900 acres of potentially suitable habitat occurs in the SEZ region.	82,404 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	244,526 acres of potentially suitable habitat (5.3% of available potentially suitable habitat)	Moderate.
Bobcat (*Lynx rufus*)	Occurs in nearly all habitats and successional stages. Optimal habitats include mixed woodlands and forest edges, hardwood forests, swamps, forested river bottoms, brushlands, deserts, mountains, and other area with thick undergrowth. Availability of water may limit its distribution in xeric regions. Uses rocky clefts, caves, hollow logs, spaces under fallen trees, and so forth when inactive; usually changes shelter areas daily. About 2,952,500 acres of potentially suitable habitat occurs in the SEZ region.	72,495 acres of potentially suitable habitat lost (2.5% of available potentially suitable habitat)	169,383 acres of potentially suitable habitat (5.7% of available potentially suitable habitat)	Moderate.

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TABLE 9.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected[a]		Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
		Within SEZ (Direct Effects)[b]	Outside SEZ (Indirect Effects)[c]	
Small Game and Furbearers (Cont.)				
Coyote (*Canis latrans*)	Suitable habitat characterized by interspersions of brush and open areas with free water. Least common in dense coniferous forest. Where human control efforts occur, they are restricted to broken, rough country with abundant shrub cover and a good supply of rabbits or rodents. About 4,936,500 acres of potentially suitable habitat occurs in the SEZ region.	85,217 acres of potentially suitable habitat lost (1.7% of available potentially suitable habitat)	251,084 acres of potentially suitable habitat (5.1% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Desert cottontail (*Sylvilagus audubonii*)	Abundant to common in grasslands, open forests, and desert shrub habitats. Can occur in areas with minimal vegetation as long as adequate cover (e.g., rock piles, fallen logs, fence rows) is present. Tickets and patches of shrubs, vines, and brush also used as cover. About 3,067,800 acres of potentially suitable habitat occurs in the SEZ region.	72,469 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	169,145 acres of potentially suitable habitat (5.5% of available potentially suitable habitat)	Moderate.
Round-tailed ground squirrel (*Spermophilus tereticaudus*)	Optimum habitat includes desert succulent shrub, desert wash, desert scrub, alkali desert scrub, and levees in cropland habitat. Also occurs in urban habitats. Burrows usually at base of shrubs. About 2,641,600 acres of potentially suitable habitat occurs in the SEZ region.	60,091 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat)	157,403 acres of potentially suitable habitat (6.0% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash.

TABLE 9.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected[a]: Within SEZ (Direct Effects)[b]	Maximum Area of Potential Habitat Affected[a]: Outside SEZ (Indirect Effects)[c]	Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
Small Game and Furbearers (Cont.)				
White-tailed antelope squirrel (*Ammospermophilus leucurus*)	Common to abundant in California deserts. Optimal habitats are desert scrub, sagebrush, alkali desert scrub, Joshua tree, bitterbrush, and pinyon-juniper. Fairly common in desert riparian, desert succulent shrub, and desert wash habitats. Also occurs in mixed chaparral and annual grassland habitats. Requires friable soil for burrowing. Burrows may be under shrubs or in open, often uses abandoned kangaroo rat burrows. About 4,408,700 acres of potentially suitable habitat occurs in the SEZ region.	85,217 acres of potentially suitable habitat lost (1.9% of available potentially suitable habitat)	251,169 acres of potentially suitable habitat (5.7% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Nongame (small) Mammals				
Big brown bat (*Eptesicus fuscus*)	Deserts, forests and woodlands, old fields, shrublands, and urban/suburban areas. Uncommon in hot desert habitats. Summer roosts are in buildings, hollow trees, rock crevices, tunnels, and cliff swallow nests. Maternity colonies occur in attics, barns tree cavities, rock crevices, and caves. Caves, mines, and manmade structures used for hibernation sites. About 3,914,500 acres of potentially suitable habitat occurs in the SEZ region.	68,672 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	230,876 acres of potentially suitable habitat (5.9% of available potentially suitable habitat)	Moderate.

TABLE 9.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected[a]: Within SEZ (Direct Effects)[b]	Maximum Area of Potential Habitat Affected[a]: Outside SEZ (Indirect Effects)[c]	Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
Nongame (small) Mammals (Cont.)				
Brazilian free-tailed bat (*Tadarida brasiliensis*)	Cliffs, deserts, grasslands, old fields, savannas, shrublands, woodlands, and suburban/urban areas. Roosts in buildings, caves, and hollow trees. May roost in rock crevices, bridges, signs, or cliff swallow nests during migration. Large maternity colonies inhabit caves, buildings, culverts, and bridges. About 4,352,800 acres of potentially suitable habitat occurs in the SEZ region.	82,369 acres of potentially suitable habitat lost (1.9% of available potentially suitable habitat)	243,339 acres of potentially suitable habitat (5.6% of available potentially suitable habitat)	Moderate.
Cactus mouse (*Peromyscus eremicus*)	Deserts, shrublands, chaparral, and coniferous woodlands. Occurs on rocky areas and areas with sandy substrates and loamy soils. Nests in rock heaps, stone walls, burrows, brush fences, and woodrat houses. About 3,041,800 acres of potentially suitable habitat occurs in the SEZ region.	73,581 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	169,106 acres of potentially suitable habitat (5.6% of available potentially suitable habitat)	Moderate.
Californian myotis (*Myotis californicus*)	Cliffs, deserts, forests, woodlands, grasslands, savannas, shrublands and savannas. Often uses manmade structures for night roosts. Uses crevices for summer day roosts. May roost on small desert shrubs or on the ground. Hibernates in caves, mines, tunnels, or buildings. May form maternity colonies in rock crevices, under bark, or under eaves of buildings. About 4,148,500 acres of potentially suitable habitat occurs in the SEZ region.	81,733 acres of potentially suitable habitat lost (2.0% of available potentially suitable habitat)	241,714 acres of potentially suitable habitat (5.8% of available potentially suitable habitat)	Moderate.

TABLE 9.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected[a]: Within SEZ (Direct Effects)[b]	Maximum Area of Potential Habitat Affected[a]: Outside SEZ (Indirect Effects)[c]	Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
Nongame (small) Mammals (Cont.)				
Canyon deermouse (*Peromyscus crinitus*)	Found in most desert and chaparral habitats. Gravelly desert pavement, talus, boulders, cliffs, and slickrock—rocky areas with virtually any type of plant cover. About 2,960,700 acres of potentially suitable habitat occurs in the SEZ region.	60,126 acres of potentially suitable habitat lost (2.0% of available potentially suitable habitat)	158,512 acres of potentially suitable habitat (5.4% of available potentially suitable habitat)	Moderate.
Desert kangaroo rat (*Dipodomys deserti*)	Low deserts, deep wind-drifted sandy soil with sparse vegetation, alkali sinks, and shadscale or creosotebush scrub. Nests in burrows dug in mounds, usually under vegetation. About 452,000 acres of potentially suitable habitat occurs in the SEZ region.	13,699 acres of potentially suitable habitat lost (3.0% of available potentially suitable habitat)	12,398 acres of potentially suitable habitat (5.6% of available potentially suitable habitat)	Moderate.
Desert shrew (*Notiosorex crawfordi*)	Generally found in arid areas with adequate cover for nesting and resting. Deserts, semi-arid grasslands with scattered cactus and yucca, chaparral slopes, alluvial fans, sagebrush, gullies, juniper woodlands, riparian areas, and dumps. About 4,701,400 acres of potentially suitable habitat occurs in the SEZ region.	83,516 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	244,330 acres of potentially suitable habitat (5.2% of available potentially suitable habitat)	Moderate.
Desert woodrat (*Neotoma lepida*)	Sagebrush scrub; chaparral; deserts and rocky slopes with scattered cactus, yucca, pine-juniper, or other low vegetation; creosotebush desert; Joshua tree woodlands; scrub oak woodlands, pinyon-juniper woodlands; and riparian zones. Most abundant in rocky areas with Joshua trees. Dens built of debris on ground, among cacti or yucca, along cliffs, among rocks, or occasionally in trees. About 4,602,100 acres of potentially suitable habitat occurs in the SEZ region.	83,836 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	245,109 acres of potentially suitable habitat (5.3% of available potentially suitable habitat)	Moderate.

TABLE 9.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected[a]: Within SEZ (Direct Effects)[b]	Maximum Area of Potential Habitat Affected[a]: Outside SEZ (Indirect Effects)[c]	Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
Nongame (small) Mammals (Cont.)				
Little pocket mouse (*Perognathus longimembris*)	Common to abundant in southern California deserts. Preferred habitat includes desert riparian, desert scrub, desert wash, and sagebrush. Nests in an underground burrow. Sandy soil preferred for burrowing, but also commonly burrows on gravel washes and on stony soils. About 3,078,900 acres of potentially suitable habitat occurs in the SEZ region.	73,790 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	169,729 acres of potentially suitable habitat (5.5% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash.
Long-tailed pocket mouse (*Chaetodipus formosus*)	Common in sagebrush, desert scrub, and desert succulent shrub habitats with rocky or stony groundcover. Often inhabits rocky washes and canyon mouths. Uses underground burrows. About 4,531,200 acres of potentially suitable habitat occurs in the SEZ region.	83,307 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	243,563 acres of potentially suitable habitat (5.4% of available potentially suitable habitat)	Moderate. Avoid development in Homer Wash.
Merriam's kangaroo rat (*Dipodomys merriami*)	Most widespread kangaroo rat in California. In southern Califorbnia, occurs in desert scrub and alkali desert scrub, sagebrush, Joshua tree, and pinyon-juniper habitats. Uses desert flats or slopes with sparse to moderate canopy coverage and sandy to gravelly subsrates. Uses underground burrows that are often located at the base of a shrub. About 3,121,700 acres of potentially suitable habitat occurs in the SEZ region.	74,293 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	171,122 acres of potentially suitable habitat (4.2% of available potentially suitable habitat)	Moderate.

TABLE 9.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat	Maximum Area of Potential Habitat Affected[a]: Within SEZ (Direct Effects)[b]	Maximum Area of Potential Habitat Affected[a]: Outside SEZ (Indirect Effects)[c]	Overall Impact Magnitude[d] and Species-Specific Mitigation[e]
Nongame (small) Mammals (Cont.)				
Southern grasshopper mouse (*Onychomys torridus*)	Hot, arid valleys and scrub deserts with sparse and scattered vegetation such as mesquite, creosotebush cholla, yucca, and short grasses. Frequents scrub habitats with friable soils for digging. Also uses abandoned underground burrows. About 3,095,700 acres of potentially suitable habitat occurs in the SEZ region.	73,790 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat)	169,801 acres of potentially suitable habitat (5.5% of available potentially suitable habitat)	Moderate.
Spotted bat (*Euderma maculatum*)	Mostly found in the foothills, mountains, and desert regions of southern California. Roosts in caves and cracks or crevices in cliffs and canyons. About 4,836,900 acres of potentially suitable habitat occurs in the SEZ region.	85,217 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	251,169 acres of potentially suitable habitat (5.2% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Western pipistrelle (*Parastrellus esperus*)	Deserts and lowlands, desert mountain ranges, desert scrub flats, and rocky canyons. Roosts mostly in rock crevices, sometimes mines and caves, and rarely in buildings. Suitable roosts occur in rocky canyons and cliffs. Most abundant bat in desert regions. About 4,633,600 acres of potentially suitable habitat occurs in the SEZ region.	85,217 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat)	251,169 acres of potentially suitable habitat (5.4% of available potentially suitable habitat)	Moderate. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

1 **Footnotes on next page.**

TABLE 9.2.11.3-1 (Cont.)

[a] Maximum area of potentially suitable habitat affected relative to total available potentially suitable habitat within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ). Habitat availability was determined from potentially suitable land cover for each species (USGS 2004, 2005, 2007).

[b] Direct effects within the SEZ consist of ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 85,217 acres would be developed in the SEZ.

[c] The area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, etc., from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ boundary.

[d] Overall impact magnitude categories were based on professional judgment and include (1) *small*: ≤1% of potentially suitable habitat for the species would be lost, and the activity would not result in a measurable change in the carrying capacity or population size in the affected area; (2) *moderate*: >1 but ≤10% of potentially suitable habitat for the species would be lost and the activity would potentially result in a measurable but moderate (not destabilizing) change in the carrying capacity or population size in the affected area; and (3) *large*: >10% of potentially suitable habitat for the species would be lost and the activity would result in a potentially large, measurable, and destabilizing change in the carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.

[e] Species-specific mitigation is presented for those species that have particular habitat features that could be readily avoided. For species or individuals occurring outside the SEZ (in the area of indirect effects), no mitigation measures beyond required programmatic design features have been identified.

[f] To convert acres to km^2, multiply by 0.004047.

Sources: CDFG (2008); NatureServe (2010); USGS (2004, 2005, 2007).

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Table 9.2.11.3-1 summarizes the potential impacts on representative mammal species resulting from solar energy development (with the implementation of required programmatic design features) in the proposed Iron Mountain SEZ.

Direct impacts on small game, furbearers, and nongame (small) mammal species would be moderate, as 1.7 to 3.0% of potential habitats identified for the species would be lost (Table 9.2.11.3-1). Larger areas of potentially suitable habitat for these species occur within the area of potential indirect effects (i.e., ranging from 2.7% for the desert kangaroo rat to 6.0% for the American badger and round-tailed ground squirrel). Other impacts on mammals could result from collision with fences and vehicles, surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, noise, lighting, spread of invasive species, accidental spills, and harassment. These indirect impacts are expected to be negligible with implementation of programmatic design features

Decommissioning of facilities and reclamation of disturbed areas after operations cease could result in short-term negative impacts on individuals and habitats adjacent to project areas, but long-term benefits would accrue if suitable habitats were restored in previously disturbed areas. Section 5.10.2.1.4 provides an overview of the impacts of decommissioning and reclamation on wildlife. Of particular importance for mammal species would be the restoration of original ground surface contours, soils, and native plant communities associated with semiarid shrublands.

9.2.11.3.3 SEZ-Specific Design Features and Design Feature Effectiveness

The implementation of required programmatic design features described in Appendix A, Section A.2.2, would reduce the potential for effects on mammals. While some SEZ-specific design features are best established when project details are considered, one design feature that can be identified at this time is as follows:

- Development in Homer Wash should be avoided in order to reduce impacts on species such as the round-tailed ground squirrel, white-tailed antelope squirrel, little pocket mouse, long-tailed pocket mouse, and any other mammal species that inhabit wash habitats.

If this SEZ-specific design feature is implemented in addition to programmatic design features, impacts on mammal species could be reduced. Any residual impacts on mammals are anticipated to be moderate given the relative abundance of suitable habitats in the SEZ region. However, because potentially suitable habitats for a number of the mammal species occur throughout much of the SEZ, additional species-specific mitigation of direct effects for those species would be difficult or infeasible.

9.2.11.4 Aquatic Biota

9.2.11.4.1 Affected Environment

This section addresses aquatic habitats and biota that are known to occur on the proposed Iron Mountain SEZ itself or within an area that could be affected, either directly or indirectly, by activities associated with solar energy development within the SEZ. For the proposed Iron Mountain SEZ, the area of direct effects was considered to be the entire SEZ area. As discussed in Section 9.2.1.1, a new access road would not be needed because State Route 62 passes through the southern portion of the SEZ. Also, for this analysis, the impacts of construction and operation of transmission lines outside of the SEZ were not assessed, assuming that the existing 230-kV transmission line might be used to connect some new solar facilities to load centers and that additional project-specific analysis would be performed for new transmission construction or line upgrades. The area of potential indirect impacts on aquatic biota from SEZ development was considered to extend up to 5 mi (8 km) beyond the SEZ boundary.

No perennial surface water bodies, seeps, or springs are present on the proposed Iron Mountain SEZ. Several ephemeral drainages do cross the site and drain into Danby Lake. Dry lakes and associated wetlands in desert regions typically do not support aquatic habitat, but may temporarily contain aquatic biota adapted to desiccating conditions (Graham 2001). On the basis of information from ephemeral pools in the American Southwest, ostracods (seed shrimp) and small planktonic crustaceans (e.g., copepods or cladocerans) are expected to be present, and larger branchiopod crustaceans such as fairy shrimp could occur (Graham 2001). Various types of insects that have aquatic larval stages, such as dragonflies and a variety of midges and other fly larvae, may also occur depending on pool longevity, distance to permanent water features, and the abundance of other invertebrates for prey (Graham 2001). but site-specific surveys would be necessary to characterize aquatic biota, if present.

The only stream feature within the area considered for indirect effects is the constructed CRA. Approximately 7 mi (11 km) of the aqueduct is immediately adjacent to the southern and western SEZ boundaries, with a total of approximately 33 mi (53 km) of the aqueduct within the area of indirect effects. The aqueduct, which diverts water from the Colorado River to supply drinking water to portions of southern California, can contain some aquatic biota when water is present. In 2007, quagga mussels (*Dreissena rostriformis bugensis*), an invasive nonnative mussel species, was discovered in the aqueduct (USGS 2008a). The presence of these mussels, which can attach to and clog intakes for pumps and other piping systems, is a concern for operations of the aqueduct. As a consequence, various treatment programs have been implemented, including periodic draining of the aqueduct and the periodic use of chlorine to kill aquatic organisms that are present. However, aside from concerns regarding this invasive species, important communities of aquatic biota are not present in portions of the aqueduct system adjacent to the proposed Iron Mountain SEZ.

As described in Section 9.2.9.1.1, no wetlands are present within the proposed SEZ. One intermittently-flooded, riverine wetland is located 5 mi (8 km) south of the proposed SEZ (Figure 9.2.9-1). The NWI classification for this wetland indicates that surface water is usually absent but may be present for variable periods during the year. Precipitation runoff from the SEZ and surrounding areas is transmitted, via ephemeral drainages, to Danby Lake, a normally dry lake bed, in the northwestern portion of the proposed SEZ (Section 9.2.9.1.1). Releases from the CRA are also temporarily directed into Danby Lake during maintenance periods. Aquatic habitat and communities are not likely to be present in Danby Lake for an extended time, although opportunistic crustaceans and aquatic insect larvae adapted to desert conditions may be present during wet periods. More detailed site survey data are needed to characterize the aquatic biota in Danby Lake.

Outside of the indirect effects area, but within 50 mi of the SEZ, there are approximately 2 mi (3 km) of perennial streams, 11 mi (18 km) of intermittent streams, and 124 mi (200 km) of canal (CRA). There are approximately 18,930 acres (77 km^2) of lake and reservoir habitat within 50 mi (80 km) of the SEZ, although there are no lakes or reservoirs within the area considered for analysis of direct or indirect effects. Overall, the combined amount of natural aquatic habitat provided by areas within the SEZ and within the area of potential indirect effects is less than 1% of the amount available within the overall analysis area.

9.2.11.4.2 Impacts

The types of impacts that could occur on aquatic habitats and biota from development of utility-scale solar energy facilities are discussed in Section 5.10.3.

No permanent water bodies, perennial streams, or wetlands are present within the boundaries of the Iron Mountain SEZ. Consequently, there would be no direct impacts on aquatic habitats from construction and operation of utility-scale solar energy facilities within the proposed SEZ. Aquatic communities in Danby Lake, if present, may be affected by ground disturbance, runoff, and fugitive dust during construction. See Section 5.10.3 for a detailed description of potential impacts on aquatic biota resulting from solar energy development activities. More detailed site surveys of ephemeral and intermittent surface waters would be necessary to determine whether solar energy development activities would result in direct or indirect impacts on aquatic biota.

Aside from the CRA, there are no permanent water bodies or perennial streams located within the identified area of indirect effects that extends 5 mi (8 km) from the boundaries of the SEZ. As discussed in Section 9.2.11.4.1, the aqueduct does not contain any important natural aquatic communities. The nearest wetland area that could be indirectly affected by solar energy development activities is approximately 5 mi (8 km) from the SEZ boundaries and water for that wetland does not originate from the Iron Mountain SEZ. Consequently, the potential for impacts on aquatic communities in that wetland would be negligible.

In arid environments, reductions in the quantity of water in aquatic habitats are of particular concern. Because drainage from the Iron Mountain SEZ enters Danby Lake, which is a dry lake that contains no aquatic habitat, there would be no effect on aquatic biota from alterations in site runoff patterns or use of water collected from the SEZ. Water quantity in aquatic habitats could also be affected if significant amounts of surface water or groundwater were utilized for power plant cooling water, for washing mirrors, or for other needs. The greatest need for water would occur if technologies employing wet cooling, such as parabolic trough or power tower, were developed at the site; the associated impacts would ultimately depend on the water source used (including groundwater from aquifers at various depths). As identified in Section 9.2.9.1.3, it seems unlikely that approval could be obtained to withdraw water from the CRA. Nevertheless, the aqueduct itself contains no important aquatic species that need to be protected. Obtaining cooling water from other perennial surface water features in the region could affect water levels and, as a consequence, aquatic organisms in those water bodies. Additional details regarding the volume of water required and the types of organisms present in potentially affected water bodies would be required in order to further evaluate the potential for impacts from water withdrawals.

As described in Section 5.10.3, water quality in aquatic habitats could be affected by the introduction of contaminants such as fuels, lubricants, or pesticides/herbicides during site characterization, construction, operation, or decommissioning for a solar energy facility. There is the potential for runoff containing contaminants to enter Danby Lake especially if construction occurs nearby. Danby Lake is typically dry and is not expected to contain aquatic habitat. However, aquatic biota may be present seasonally, and they could be affected by contaminants. See Section 5.10.3 for a detailed description of potential impacts on aquatic biota resulting from solar energy development activities.

9.2.11.4.3 SEZ-Specific Design Features and Design Feature Effectiveness

The implementation of required programmatic design features described in Appendix A, Section A.2.2, could greatly reduce or eliminate the potential for effects on aquatic biota and aquatic habitats from development and operation of solar energy facilities. While some SEZ-specific design features are best established when project details are being considered, a design feature that can be identified at this time follows:

- The amount of ground disturbance near Danby Lake should be minimized.

If this design feature is implemented in addition to programmatic project design features and if the utilization of water from groundwater or surface water sources is adequately controlled to maintain sufficient water levels in nearby aquatic habitats, the potential impacts on aquatic biota and habitats from solar energy development at the Iron Mountain SEZ would be negligible.

9.2.12 Special Status Species (Threatened, Endangered, Sensitive, and Rare Species)

This section addresses special status species that are known to occur, or for which suitable habitat occurs, on or within the potentially affected area of the proposed Iron Mountain SEZ. Special status species include the following types of species[3]:

- Species listed as threatened or endangered under the ESA;

- Species that are proposed for listing, are under review, or are candidates for listing under the ESA;

- Species that are listed as threatened or endangered by the State of California under the CESA or that are identified as fully protected by the state[4];

- Species that are listed by the BLM as sensitive; and

- Species that have been ranked by the states of California or Arizona as S1 or S2, or species of concern by the state of California or the USFWS; hereafter referred to as "rare" species. Arizona does not yet maintain a separate list of species of concern.

Special status species known to occur within 50 mi (80 km) of the Iron Mountain SEZ center (i.e., the SEZ region) were determined from natural heritage records available through NatureServe Explorer (NatureServe 2010) and information provided by the CWHRS (CDFG 2010a), in the CNDDB (CDFG 2010b), by CAReGAP) (Davis et al. 1998; USGS 2010a), and by SWReGAP (USGS 2004, 2005, 2007). Information reviewed consisted of county-level occurrences as determined from NatureServe, point and polygon element occurrences as determined from CNDDB, as well as modeled land cover types and predicted suitable habitats for the species within the 50-mi (80-km) region as determined from CAReGAP and SWReGAP. The 50-mi (80-km) SEZ region intersects Riverside and San Bernardino Counties, California, and La Paz and Mohave Counties, Arizona. However, the SEZ and affected area occur only in southern San Bernardino County and northern Riverside County, California. See Appendix M for additional information on the approach used to identify species that could be affected by development within the SEZ.

9.2.12.1 Affected Environment

The affected area considered in the assessment included the areas of direct and indirect effects. The area of direct effects was defined as the area that would be physically modified

[3] See Section 4.6.4 for definitions of these species categories. Note that some of the categories of species included here do not fit BLM's definition of special status species as defined in BLM Manual 6840 (BLM 2008a). These species are included here to ensure broad consideration of species that may be most vulnerable to impacts.

[4] State-listed species are those listed as threatened or endangered under the CESA; California fully protected species are species that receive the strictest take provisions as identified by the CDFG.

during project development (i.e., where ground-disturbing activities would occur). For the Iron Mountain SEZ, the area of direct effect was limited to the SEZ itself. Because of the proximity of existing infrastructure, the impacts of construction and operation of transmission lines outside of the SEZ are not assessed, assuming that the existing transmission might be used to connect some new solar facilities to load centers and that additional project-specific analysis would be conducted for new transmission construction or line upgrades. Similarly, the impacts of construction or upgrades to access roads were not assessed for this SEZ because of the proximity of State Route 62 (see Section 9.2.1.2 for a discussion of development assumptions for this SEZ). The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ boundary where ground-disturbing activities would not occur but that could be indirectly affected by activities in the area of direct effect. Indirect effects considered in the assessment included effects from surface runoff, dust, noise, lighting, and accidental spills from the SEZ, but do not include ground-disturbing activities. The potential magnitude of indirect effects would decrease with increasing distance away from the SEZ. This area of indirect effect was identified on the basis of professional judgment and was considered sufficiently large to bound the area that would potentially be subject to indirect effects. The affected area includes both the direct and indirect effects areas.

The primary habitat type in the affected area is Sonoran-Mojave creosotebush-white bursage desert scrub (see Section 9.2.10). Potentially unique habitats in the affected area in which special status species may reside include desert dunes, rocky cliffs and outcrops, and desert playas. Aquatic and riparian habitats in the affected area occur within and along Danby Lake, intermittent desert washes (e.g., Homer Wash), and the CRA operated by the MWD (see Section 9.2.9; Figure 9.2.12.1-1).

All special status species that are known to occur within the Iron Mountain SEZ region (i.e., within 50 mi [80 km] of the center of the SEZ) are listed, with their status, nearest recorded occurrence, and habitats in Appendix J. Of these species, there are 43 that could occur on or in the affected area, based on recorded occurrences or the presence of potentially suitable habitat in the area. These species, their status, and their habitats are presented in Table 9.2.12.1-1. For many of the species listed in the table, their predicted potential occurrence in the affected area is based only on a general correspondence between mapped CAReGAP land cover types and descriptions of species habitat preferences. This overall approach to identifying species in the affected area probably overestimates the number of species that actually occur in the affected area. For many of the species identified as having potentially suitable habitat in the affected area, the nearest known occurrence is more than 20 mi (32 m) away from the SEZ.

Based on CNDDB records and information provided by the CDFG and USFWS, there are five special status species known to occur within the affected area of the Iron Mountain SEZ: Harwood's eriastrum, Mojave fringe-toed lizard, Bendire's thrasher, hepatic tanager, and Nelson's bighorn sheep. In addition, designated critical habitat for the desert tortoise occurs within the affected area adjacent to the SEZ boundary. There are no groundwater-dependent species in the vicinity of the SEZ based upon CNDDB records, comments provided by the USFWS (Stout 2009), and the evaluation of groundwater resources in the Iron Mountain SEZ region (Section 9.2.9).

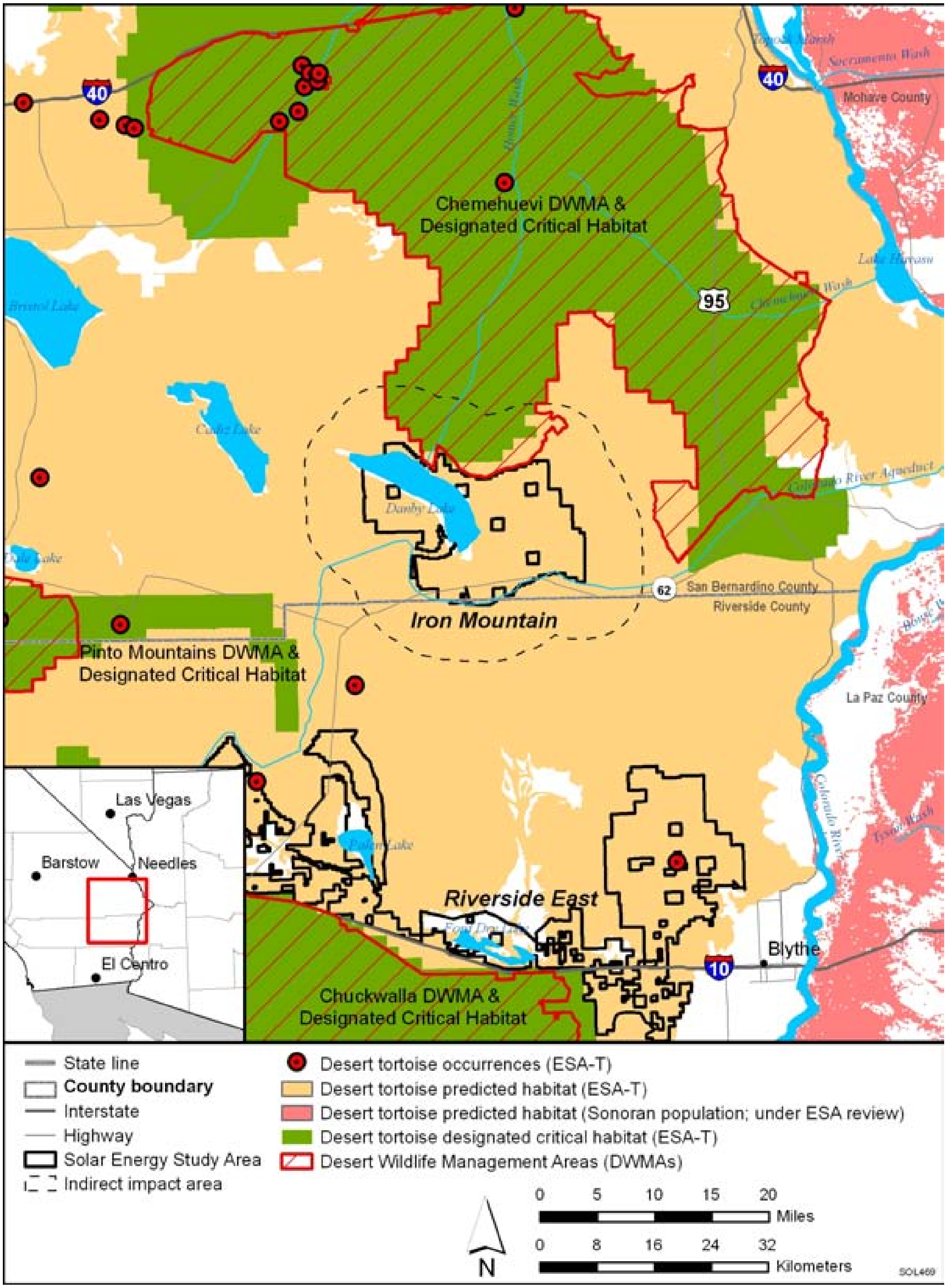

FIGURE 9.2.12.1-1 Known or Potential Occurrences of Species Listed as Endangered, Threatened, or under Review for Listing under the ESA That May Occur in the Proposed Iron Mountain SEZ Affected Area (Sources: CDFG 2010b)

TABLE 9.2.12.1-1 Habitats, Potential Impacts, and Potential Mitigation for Special Status Species That Could Be Affected by Solar Energy Development on the Proposed Iron Mountain SEZ

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants						
Abrams' spurge	*Chamaesyce abramsiana*	CA-S1	Sandy substrates within creosotebush scrub communities in the Mojave and Sonoran Deserts at elevations below 3,000 ft.[h] Nearest recorded occurrence is 38 mi[i] from the SEZ. About 2,463,149 acres[j] of potentially suitable habitat occurs within the SEZ region.	58,552 acres of potentially suitable habitat lost (2.4% of available habitat)	156,519 acres of potentially suitable habitat (6.4% of available habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ; translocation of individuals from areas of direct effects; or compensatory mitigation of direct effects on occupied habitats could reduce impacts. Note that these same potential mitigations apply to all special status plants.
California ditaxis	*Ditaxis serrata* var. *californica*	CA-S2	Sonoran Desert scrub and creosotebush scrub communities at elevations between 100 and 3,300 ft. Nearest recorded occurrence is 33 mi from the SEZ. About 2,597,477 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.3% of available habitat)	157,246 acres of potentially suitable habitat (6.1% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
California satintail	*Imperata brevifolia*	CA-S2	Occurs in chaparral, coastal sage scrub, creosotebush, desert scrub, mesic riparian scrub, and alkaline meadow and seep communities. Elevation ranges between 0 and 1,650 ft. Nearest recorded occurrences are 43 mi from the SEZ. About 2,626,502 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.3% of available habitat)	157,331 acres of potentially suitable habitat (6.0% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Chaparral sand-verbena	*Abronia villosa* var. *aurita*	BLM-S; CA-S2	Endemic to southern California. Inhabits chaparral desert sand dunes at elevations between 350 and 5,250 ft. Historically occurred on and in the vicinity of the SEZ; the species has not been recorded in the project area since 1964. Most recent recorded occurrences are 30 mi south of the SEZ. About 61,037 acres of potentially suitable habitat occurs within the SEZ region.	209 acres of potentially suitable habitat lost (0.3% of available habitat)	695 acres of potentially suitable habitat (1.1% of available habitat)	Small overall impact. Avoiding or minimizing disturbance to desert dunes and sand transport systems could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Coves' cassia	*Senna covesii*	CA-S2	Sonoran Desert dry washes and slopes with sandy substrates within desert scrub and creosotebush scrub communities. Elevation ranges between 1,000 and 3,500 ft. Nearest recorded occurrence is 25 mi from the SEZ. About 3,017,394 acres of potentially suitable habitat occurs within the SEZ region.	73,581 acres of potentially suitable habitat lost (2.4% of available habitat)	169,034 acres of potentially suitable habitat (5.6% of suitable habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Desert pincushion	*Coryphantha chlorantha*	CA-S1	Gravelly bajadas, limestone, or dolomite rocky slopes associated with desert scrub communities within pinyon-juniper woodlands and Joshua tree woodlands. Elevation ranges between 148 and 7,875 ft. Nearest recorded occurrence is 38 mi from the SEZ. About 2,626,374 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.3% of available habitat)	157,331 acres of potentially suitable habitat (6.0% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Desert spike-moss	*Selaginella eremophila*	CA-S2	Gravelly or rocky slopes within creosotebush scrub and Sonoran Desert scrub communities. Elevation ranges between 650 and 2,950 ft. Nearest recorded occurrence is 35 mi from the SEZ. About 2,597,477 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.3% of available habitat)	157,246 acres of potentially suitable habitat (6.1% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Dwarf germander	*Teucrium cubense* ssp. *depressum*	CA-S2	Desert dunes, playas, riparian, creosotebush scrub, and desert scrub communities. Elevation ranges between 150 and 1,300 ft. Nearest recorded occurrence is 35 mi from the SEZ. About 2,832,948 acres of potentially suitable habitat occurs within the SEZ region.	82,356 acres of potentially suitable habitat lost (2.9% of available habitat)	162,520 acres of potentially suitable habitat (5.7% of available habitat)	Moderate overall impact. Avoiding or minimizing disturbance to playas and desert dunes and sand transport systems could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Emory's crucifixion-thorn	*Castela emoryi*	CA-S2	Slightly wet alluvial bottomlands associated with basalt flows within Mojave Desert scrub, non-saline playas, creosotebush scrub, and Sonoran Desert scrub communities. Elevation ranges between 295 and 2,200 ft. Nearest recorded occurrence is 25 mi from the SEZ. About 2,749,714 acres of potentially suitable habitat occurs within the SEZ region.	82,147 acres of potentially suitable habitat lost (3.0% of available habitat)	161,753 acres of potentially suitable habitat (5.9% of available habitat)	Moderate overall impact. Avoiding or minimizing disturbance to playas could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Glandular ditaxis	*Ditaxis claryana*	CA-S1	Sandy substrates within desert scrub communities at elevations below 1,525 ft. Nearest recorded occurrence is 30 mi from the SEZ. About 2,626,372 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.3% of available habitat)	157,331 acres of potentially suitable habitat (6.0% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Harwood's eriastrum[k]	***Eriastrum harwoodii***	BLM-S; CA-S2	Known from fewer than 20 occurrences in southern California on desert dunes and other sandy habitats at elevations between 650 and 3,000 ft. Known to occur on the SEZ and in the affected area. About 60,907 acres of potentially suitable habitat occurs within the SEZ region.	209 acres of potentially suitable habitat lost (0.3% of available habitat)	695 acres of potentially suitable habitat (1.1% of available habitat)	Small overall impact. Avoiding or minimizing disturbance to dunes and sand transport systems could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Harwood's milkvetch	*Astragalus insularis* var. *harwoodii*	CA-S2	Sonoran Desert of Arizona and California on sandy or gravelly substrates of desert dunes within desert scrub communities. Elevation ranges between 0 and 2,325 ft. Nearest occurrences are approximately 37 mi from the SEZ. About 2,687,147 acres of potentially suitable habitat occurs within the SEZ region.	60,300 acres of potentially suitable habitat lost (2.2% of available habitat)	158,026 acres of potentially suitable habitat (5.9% of available habitat)	Moderate overall impact. Avoiding or minimizing disturbance to dunes and sand transport systems could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Howe's hedgehog cactus	*Echinocereus engelmannii* var. *howei*	BLM-S; CA-S1; FWS-SC	Known from two locations near Needles, California in Mojave Desert scrub communities at elevations near 1,475 ft. Nearest recorded occurrences are 45 mi north of the SEZ. About 2,537,769 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.4% of available habitat)	157,331 acres of potentially suitable habitat (6.2% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Jackass-clover	*Wislizenia refracta* ssp. *refracta*	CA-S1	Mojave and northern Sonoran Deserts in dunes, sandy washes, roadsides, and playas within creosotebush scrub, alkali sink, or desert scrub communities. Elevation ranges between 2,000 and 2,600 ft. Nearest recorded occurrence is 20 mi south of the SEZ. About 614,279 acres of potentially suitable habitat occurs within the SEZ region.	36,166 acres of potentially suitable habitat lost (5.9% of available habitat)	17,682 acres of potentially suitable habitat (2.9% of available habitat)	Moderate overall impact. Avoiding or minimizing disturbance to dunes and sand transport systems, playas, or washes could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Lobed ground-cherry	*Physalis lobata*	CA-S1	Northeastern Sonoran and southeastern Mojave Deserts on decomposed granitic substrates within creosotebush scrub, alkali sink, desert scrub, and playas communities. Elevation ranges between 1,650 and 2,600 ft. Nearest recorded occurrences are 25 mi from the SEZ. About 2,749,714 acres of potentially suitable habitat occurs within the SEZ region.	82,147 acres of potentially suitable habitat lost (3.0% of available habitat)	161,753 acres of potentially suitable habitat (5.9% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Munz's cholla	*Opuntia munzii*	BLM-S; CA-S1; FWS-SC	Gravelly or sandy to rocky soils, often on lower bajadas, washes, and flats. Also occurs on hills and in canyons. Occurs in Sonoran Desert creosotebush shrub communities at elevations below 3,280 ft. Nearest recorded occurrences are 50 mi from the SEZ. About 4,404,392 acres of potentially suitable habitat occurs within the SEZ region.	82,271 acres of potentially suitable habitat lost (1.9% of available habitat)	244,144 acres of potentially suitable habitat (5.5% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Orocopia sage	*Salvia greatae*	BLM-S; CA-S2; FWS-SC	Creosotebush scrub communities and dry washes at elevations less than 2,600 ft. Nearest recorded occurrence is 33 mi southwest of the SEZ. About 2,854,303 acres of potentially suitable habitat occurs within the SEZ region.	72,042 acres of potentially suitable habitat lost (2.5% of available habitat)	168,222 acres of potentially suitable habitat (5.9% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Parish's club-cholla	*Grusonia parishii*	CA-S2	Silty, sandy, or gravelly flats, dunelets, and hills within Joshua tree woodlands, creosotebush scrub, and desert scrub communities. Elevation ranges between 100 and 5,000 ft. Nearest recorded occurrences are 37 mi from the SEZ. About 2,687,147 acres of potentially suitable habitat occurs within the SEZ region.	60,300 acres of potentially suitable habitat lost (2.2% of available habitat)	158,026 acres of potentially suitable habitat (5.9% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Pink fairy-duster	*Calliandra eriophylla*	CA-S2	Sandy or rocky substrates in creosote and desert scrub communities. Elevation ranges between 390 and 4,900 ft. Nearest recorded occurrence is 35 mi from the SEZ. About 2,626,372 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.3% of available habitat)	157,331 acres of potentially suitable habitat (6.0% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Playa milkvetch	*Astragalus allochrous* var. *playanus*	CA-S1	Known from the eastern Mojave Desert on sandy soils within desert scrub communities at elevations near 2,600 ft. Nearest occurrences are approximately 15 mi from the SEZ. About 2,537,900 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.4% of available habitat)	157,331 acres of potentially suitable habitat (6.2% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Saguaro cactus	*Carnegiea gigantea*	CA-S1	Endemic to the Sonoran Desert along the Colorado River from the Whipple Mountains to Laguna Dam on rocky substrates within Sonoran desert scrub and creosote scrub communities at elevations between 160 and 4,900 ft. Nearest recorded occurrence is 35 mi from the SEZ. About 2,921,907 acres of potentially suitable habitat occurs within the SEZ region.	60,126 acres of potentially suitable habitat lost (2.1% of available habitat)	158,355 acres of potentially suitable habitat (5.4% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Sand evening-primrose	*Camissonia arenaria*	CA-S2	Sandy washes and rocky slopes within Sonoran Desert scrub communities at elevations below 3,000 ft. Nearest recorded occurrence is 48 mi from the SEZ. About 3,313,061 acres of potentially suitable habitat occurs within the SEZ region.	73,616 acres of potentially suitable habitat lost (2.2% of available habitat)	170,058 acres of potentially suitable habitat (5.1% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Small-flowered androstephium	*Androstephium breviflorum*	CA-S1	Dry sandy to rocky soil substrates within creosotebush scrub and Mojave Desert scrub at elevations between 720 and 2,100 ft. Nearest occurrences are approximately 15 mi from the SEZ. About 2,598,676 acres of potentially suitable habitat occurs within the SEZ region.	60,300 acres of potentially suitable habitat lost (2.3% of available habitat)	158,026 acres of potentially suitable habitat (6.1% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Spear-leaf matelea	*Matelea parvifolia*	CA-S2	Endemic to southeastern California on rocky substrates within creosotebush and desert scrub communities at elevations between 1,450 and 3,600 ft. Nearest recorded occurrences are 35 mi from the SEZ. About 2,626,372 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.3% of available habitat)	157,331 acres of potentially suitable habitat (6.0% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Spiny cliff-brake	*Pellaea truncata*	CA-S2	Rocky slopes and cliffs of volcanic or granitic derivation within pinyon-juniper woodlands. Elevation ranges between 4,000 and 7,000 ft. Nearest recorded occurrences are 45 mi from the SEZ. About 1,563,400 acres of potentially suitable habitat occurs within the SEZ region.	10,000 acres of potentially suitable habitat lost (0.6% of available habitat)	76,000 acres of potentially suitable habitat (4.9% of available habitat)	Small overall impact. Avoiding or minimizing disturbance to rocky cliffs and outcrops could reduce impacts. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Three-awned grama	*Bouteloua trifida*	CA-S2	Eastern Mojave Desert mountains on dry, rocky, often calcareous slopes within desert scrub communities. Elevation ranges between 2,300 and 6,500 ft. Nearest recorded occurrence is 19 mi east of the SEZ. About 2,537,769 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.4% of available habitat)	157,331 acres of potentially suitable habitat (6.2% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
White-margined beardtongue	*Penstemon albomarginatus*	BLM-S; CA-S1; FWS-SC	Sand dune habitats and Mojave Desert scrub communities at elevations below 3,600 ft. Nearest recorded occurrences are 25 mi northwest of the SEZ. About 2,598,676 acres of potentially suitable habitat occurs within the SEZ region.	60,300 acres of potentially suitable habitat lost (2.3% of available habitat)	158,026 acres of potentially suitable habitat (6.1% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.
Wiggins' cholla	*Opuntia wigginsii*	CA-S1	Sandy substrates of small washes and flats within creosotebush scrub and Sonoran desert scrub communities. Elevation ranges between 100 and 2,900 ft. Nearest recorded occurrences are 50 mi from the SEZ. About 2,900,300 acres of potentially suitable habitat occurs within the SEZ region.	73,581 acres of potentially suitable habitat lost (2.5% of available habitat)	168,949 acres of potentially suitable habitat (5.8% of available habitat)	Moderate overall impact. See Abrams' spurge for a list of potential mitigations applicable to all special status plant species.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Arthropods						
Bradley's cuckoo wasp	*Ceratochrysis bradleyi*	CA-S1	Endemic to California where it is known only from eastern Riverside County in Sonoran Desert scrub, creosotebush scrub, yucca and cholla cactus, saltbush, and desert dune communities. Nearest recorded occurrence is 30 mi south of the SEZ. About 2,687,147 acres of potentially suitable habitat occurs within the SEZ region.	60,300 acres of potentially suitable habitat lost (2.2% of available habitat)	158,026 acres of potentially suitable habitat (5.9% of available habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Riverside cuckoo wasp	*Hedychridium argenteum*	CA-S1	Endemic to California where it is known only from eastern Riverside County in Sonoran Desert scrub, creosotebush scrub, yucca and cholla cactus, saltbush, and desert dune communities. Nearest recorded occurrence is 33 mi south of the SEZ. About 2,687,147 acres of potentially suitable habitat occurs within the SEZ region.	60,300 acres of potentially suitable habitat lost (2.2% of available habitat)	158,026 acres of potentially suitable habitat (5.9% of available habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Reptiles						
Desert tortoise	***Gopherus agassizii***	ESA-T; CA-T; CA-S2	Mojave and Sonoran Deserts in desert creosote bush communities on firm soils for digging burrows, along riverbanks, washes, canyon bottoms, creosote flats, and desert oases. Nearest CNDDB occurrences are 10 mi (16 km) southwest of the SEZ, but designated critical habitat within the Chemehuevi DWMA exists adjacent to the northern boundary of the SEZ within the area of indirect effects. About 4,376,963 acres of potentially suitable habitat occurs within the SEZ region.	86,823 acres of potentially suitable habitat lost (2.0% of available habitat)	248,196 acres of potentially suitable habitat (5.7% of available habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ; translocation of individuals from areas of direct effects; or compensatory mitigation of direct effects on occupied habitats could reduce impacts. The potential for impact and need for mitigation should be determined in consultation with the USFWS and CDFG.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Reptiles (Cont.)						
Mojave fringe-toed lizard	***Uma scoparia***	BLM-S; CA-SC	Sandy habitats in the Mojave Desert from Death Valley south to the Colorado River near Blythe, California, and extreme western Arizona. Sparsely vegetated desert areas with fine windblown sand, including dunes, flats, and washes at elevations below 3,000 ft. Known to occur on the SEZ and in the affected area. About 3,205,349 acres of potentially suitable habitat occurs within the SEZ region.	42,102 acres of potentially suitable habitat lost (1.3% of available habitat)	151,467 acres of potentially suitable habitat (4.7% of available habitat)	Moderate overall impact. Avoiding or minimizing disturbance of desert dunes and sand transport systems or washes could reduce impacts. In addition, pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ or compensatory mitigation of direct effects could reduce impacts.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Birds						
Bendire's thrasher	***Toxostoma bendirei***	BLM-S; CA-SC	Summer resident in localized areas throughout the region in a variety of desert habitats with fairly large shrubs or cacti and open ground, or open woodland with scattered shrubs and trees, between 0 and 550 m elevation. Nearest recorded occurrences are 3 mi east of the SEZ within the area of indirect effects. Suitable habitat exists on the site. About 2,908,797 acres of potentially suitable habitat occurs within the SEZ region.	60,091 acres of potentially suitable habitat lost (2.1% of available habitat)	157,331 acres of potentially suitable habitat (5.4% of available habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Ferruginous hawk	*Buteo regalis*	BLM-S; FWS-SC	Winter resident in the SEZ region in open grasslands, sagebrush flats, desert scrub, desert valleys, and fringes of pinyon-juniper habitats. Known to occur in San Bernardino County, California, in the region of the SEZ. About 2,504,054 acres of potentially suitable foraging habitat may occur within the SEZ and throughout the affected area.	60,502 acres of potentially suitable habitat lost (2.4% of available habitat)	158,193 acres of potentially suitable habitat (6.3% of available habitat)	Moderate overall impact on foraging habitat only. Avoidance of direct impacts on all foraging habitat is not feasible because suitable foraging habitat is widespread in the area of direct effects.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Birds (Cont.)						
Hepatic tanager	***Piranga flava***	CA-S1	Summer resident in SEZ region in open coniferous forests, montane pine-oak forests, riparian woodlands, and pine savanna. Nests high in coniferous or deciduous trees. Nearest recorded occurrences are within 5 mi from the SEZ within the area of indirect effects. About 22,181 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	72 acres of potentially suitable habitat (0.3% of available habitat)	Small overall impact; no direct impact. No species-specific mitigation is warranted.
Western burrowing owl	*Athene cunicularia hypugaea*	BLM-S; CA-SC; CA-S2	Year-round resident within the SEZ region. Open areas with short sparse vegetation, including grasslands, agricultural fields, and disturbed areas. Nests in burrows created by mammals or tortoises. Nearest recorded occurrence is 35 mi southeast of the SEZ. About 4,749,768 acres of potentially suitable habitat occurs within the SEZ region.	40,772 acres of potentially suitable habitat lost (0.9% of available habitat)	251,180 acres of potentially suitable habitat (5.3% of available habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied burrows and habitats in the area of direct effects or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Mammals						
Arizona myotis	*Myotis occultus*	CA-S2; CA-SC; FWS-SC	Colorado River lowlands and adjacent desert mountain ranges in ponderosa pine and oak-pine woodlands in close proximity to water and in riparian forests within desert areas along the Colorado River. Nearest recorded occurrences are 40 mi from of the SEZ. About 157,649 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	72 acres of potentially suitable habitat (<0.1% of available habitat)	Small overall impact; no direct impact. No species-specific mitigation is warranted.
California leaf-nosed bat	*Macrotus californicus*	BLM-S; CA-S2; CA-SC; FWS-SC	Year-round resident in SEZ region in desert riparian, desert wash, desert scrub, and palm oasis habitats at elevations below 2,000 ft. Roosts in mines, caves, and buildings. Nearest recorded occurrences are 20 mi north of the SEZ. About 4,097,122 acres of potentially suitable habitat occurs within the SEZ region.	83,272 acres of potentially suitable habitat lost (2.0% of available habitat)	242,454 acres of potentially suitable habitat (5.9% of available habitat)	Moderate overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Mammals (Cont.)						
Colorado Valley woodrat	*Neotoma albigula venusta*	CA-S1	Low-lying desert, creosote-mesquite, and pinyon-juniper habitats strongly influenced by the availability of den-building materials, including litter of cholla, prickly pear, mesquite, and catclaw. Nearest recorded occurrences are 40 mi from of the SEZ. About 1,726,493 acres of potentially suitable habitat occurs within the SEZ region.	11,342 acres of potentially suitable habitat lost (0.7% of available habitat)	15,882 acres of potentially suitable habitat (0.9% of available habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats on the SEZ or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Nelson's bighorn sheep	***Ovis canadensis nelsoni***	BLM-S; FWS-SC	Visually open, steep rocky terrain in mountainous habitats of the eastern Mojave and Sonoran Deserts in California. Rarely uses desert lowlands, except as corridors for travel between mountain ranges. Nearest recorded occurrences are from the Old Woman Mountains Wilderness and the Turtle Mountains Wilderness, within 3 mi northwest and east of the SEZ, respectively. About 2,568,543 acres of potentially suitable habitat occurs within the SEZ region.	16,975 acres of potentially suitable habitat lost (0.7% of available habitat)	33,000 acres of potentially suitable habitat (1.3% of available habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats within the SEZ and habitats that serve as movement corridors could further reduce impacts.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Mammals (Cont.)						
Pallid bat	*Antrozous pallidus*	BLM-S; CA-SC; FWS-SC	Year-round resident in the SEZ region in low-elevation desert communities, including grasslands, shrublands, and woodlands. Roosts in caves, crevices, and mines. Nearest recorded occurrence is from Cadiz Lake, approximately 10 mi northwest of the SEZ. About 3,972,586 acres of potentially suitable habitat occurs within the SEZ region.	69,782 acres of potentially suitable habitat lost (1.8% of available habitat)	230,823 acres of potentially suitable habitat (5.8% of available habitat)	Moderate overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.
Townsend's big-eared bat	*Corynorhinus townsendii*	BLM-S; CA-SC; CA-S2; FWS-SC	Year-round resident in the SEZ region in all habitats but subalpine and alpine habitats. Roosts in caves, mines, tunnels, buildings, or other human-made structures. Nearest recorded occurrence is approximately 25 mi from the SEZ. About 5,026,540 acres of potentially suitable habitat occurs within the SEZ region.	106,522 acres of potentially suitable habitat lost (2.1% of available habitat)	251,169 acres of potentially suitable habitat (5.0% of available habitat)	Moderate overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.

TABLE 9.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Potential Impact Magnitude[f] and Species-Specific Mitigation[g]
Western mastiff bat	*Eumops perotis californicus*	BLM-S; CA-SC; FWS-SC	Year-round resident in the SEZ region in many open semiarid habitats, including conifer and deciduous woodlands, shrublands, grasslands, chaparral, and urban areas. Roosts in crevices in cliff faces, buildings, and tall trees. Nearest recorded occurrence is near the Colorado River, approximately 30 mi east of the SEZ. About 4,589,512 acres of potentially suitable habitat occurs within the SEZ region.	106,522 acres of potentially suitable habitat lost (2.3% of available habitat)	251,169 acres of potentially suitable habitat (5.5% of available habitat)	Moderate overall impact on mostly foraging habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of discovered roost areas on the SEZ could reduce impacts.

[a] BLM-S = listed as a sensitive species by the BLM; CA-S1 = ranked as S1 in the State of California; CA-S2 = ranked as S2 in the State of California; CA-T = listed as threatened by the State of California; ESA-T = listed as threatened under the ESA; FWS-SC = USFWS species of concern. An asterisk denotes that the listing status applies to populations only within the State of Arizona.

[b] For plant and invertebrate species, potentially suitable habitat was determined by using CAReGAP and SWReGAP land cover types. For reptile, bird, and mammal species, potentially suitable habitat was determined by using CAReGAP and SWReGAP habitat suitability models as well as CAReGAP and SWReGAP land cover models. Area of potentially suitable habitat land cover for each species is presented for the SEZ region, defined as the area within 50 mi (80 km) of the SEZ center.

[c] Maximum area of potentially suitable habitat that could be affected relative to availability within the SEZ region. Habitat availability for each species within the region was determined by using CAReGAP and SWReGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area. Impacts of access road and transmission line construction, upgrade, or operation are not assessed in this evaluation because of the proximity of existing infrastructure to the SEZ.

Footnotes continued on next page.

TABLE 9.2.12.2.-1 (Cont.)

[d] Direct effects within the SEZ consist of the ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations.

[e] Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, and so on from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ.

[f] Overall impact magnitude categories were based on professional judgment and are as follows: (1) *small*: ≤1% of the population or its habitat would be lost and the activity would not result in a measurable change in carrying capacity or population size in the affected area; (2) *moderate*: >1 but ≤10% of the population or its habitat would be lost and the activity would result in a measurable but moderate (not destabilizing) change in carrying capacity or population size in the affected area; (3) *large*: >10% of a population or its habitat would be lost and the activity would result in a large, measurable, and destabilizing change in carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.

[g] Species-specific mitigations are suggested here, but final mitigations should be developed in consultation with state and federal agencies and should be based on pre-disturbance surveys.

[h] To convert ft to m, multiply by 0.3048.

[i] To convert mi to km, multiply by 1.609.

[j] To convert acres to km^2, multiply by 0.004047.

[k] Species in bold text have been recorded or have designated critical habitat in the affected area.

9.2.12.1.1 Species Listed under the ESA That Could Occur in the Affected Area

In scoping comments on the proposed Iron Mountain SEZ, the USFWS expressed concern for impacts of project facilities on the desert tortoise, a species listed as threatened under the ESA in the state of California (Stout 2009). The desert tortoise is also listed as a threatened species under the CESA. This species has the potential to occur within the SEZ on the basis of observed occurrences near the SEZ, designated critical habitat within the area of indirect effects, and the presence of apparently suitable habitat in the SEZ (Figure 9.2.12.1-1; Table 9.2.12.1-1). Appendix J provides basic information on life history, habitat needs, and threats to populations of this species.

The desert tortoise occurs in the Chemehuevi DWMA, which is adjacent to the northern boundary of the proposed Iron Mountain SEZ within the area of indirect effects. In 2007, surveys for desert tortoises were conducted by the USFWS Desert Tortoise Recovery Office in the Chemehuevi DWMA, in an area adjacent to the proposed Iron Mountain SEZ (Stout 2009). On the basis of these survey results, USFWS estimated a desert tortoise density of about 5 individuals/km^2 within the 997,808-acre (4,038-km^2) DWMA. The USFWS judged that overall mean density within the SEZ would be less than in the DWMA because much of the SEZ is at very low elevation, and implied that the SEZ may support several hundred to more than 1,000 desert tortoises.

The CNDDB does not have recorded occurrences of the desert tortoise on the SEZ or within the area of indirect effects. However, CAReGAP predicts the presence of potentially suitable habitat for the species on the SEZ and throughout the area of indirect effects (Figure 9.2.12.1-1; Table 9.2.12.1-1). Of this potentially suitable habitat area, the USGS desert tortoise model (Nussear et al. 2009) identifies approximately 20,000 acres (80 km^2) of highly suitable habitat (modeled suitability value $\geq$0.8 out of 1) in the eastern portion of the SEZ. The desert tortoise is also known to occur as near as 10 mi (16 km) southwest of the Iron Mountain SEZ between the Joshua Tree and Palen-McCoy WAs (Figure 9.2.12.1-1).

Designated critical habitat for this species does not occur on the SEZ, but adjacent critical habitat occurs north of the SEZ in the area of indirect effects within the Chemehuevi DWMA. The Iron Mountain SEZ is situated between the Chemehuevi (to the north) and Pinto Mountains (to the southwest) and Chuckwalla Critical Habitat units (Figure 9.2.12-1); therefore, the SEZ may provide important connectivity between these two critical habitat units.

9.2.12.1.2 BLM-Designated Sensitive Species

There are 15 BLM-designated sensitive species that may occur in the affected area of the Iron Mountain SEZ (Table 9.2.12.1-1). These BLM-designated sensitive species include the following: (1) plants—chaparral sand-verbena, Harwood's eriastrum, Howe's hedgehog cactus, Munz's cholla, Orocopia sage, and white-margined beardtongue; (2) reptiles—Mojave fringe-toed lizard; (3) birds—Bendire's thrasher, ferruginous hawk, and western burrowing owl; and (4) mammals—California leaf-nosed bat, Nelson's bighorn sheep, pallid bat, Townsend's big-eared bat, and western mastiff bat. Of these species, Harwood's eriastrum, Mojave fringe-toed lizard, Bendire's thrasher, and Nelson's bighorn sheep have been recorded in the affected area. Habitats in which these species are found, the amount of potentially suitable habitat in the affected area, and known locations of the species relative to the SEZ are discussed below and presented in Table 9.2.12.1-1. Additional life history information for these species is provided in Appendix J.

Chaparral Sand-Verbena

The chaparral sand-verbena is an annual forb herb endemic to southern California. It historically occurred on and in the vicinity of the SEZ, but it is currently known to occur only in Riverside and Orange Counties outside of the area of indirect effects. Although the species has not been recently recorded on the SEZ, according to the CAReGAP land cover model, potentially suitable sand dune habitat still occurs on the SEZ and in other portions of the affected area (Table 9.2.12.1-1).

Harwood's Eriastrum

The Harwood's eriastrum is an annual forb known only from the eastern Mojave Desert in southern California. This species is known to occur on the SEZ. According to the CAReGAP land cover model, potentially suitable desert sand dune habitat occurs on the SEZ and in other portions of the affected area (Table 9.2.12.1-1).

Howe's Hedgehog Cactus

The Howe's hedgehog cactus is a short stout cactus endemic to southern California where it is currently known from two extant occurrences near Needles, California, approximately 45 mi (72 km) north of the SEZ. Populations are not known to occur on the SEZ. According to the CAReGAP land cover model, potentially suitable Mojavean desert scrub habitat may occur on the SEZ and in other portions of the affected area (Table 9.2.12.1-1).

Munz's Cholla

The Munz's cholla is a tree-like cactus endemic to southern California where it is known only from the Chocolate Mountains in Imperial and Riverside Counties as near as 50 mi (80 km) south of the SEZ. The species inhabits Sonoran Desert creosotebush scrub communities. The species is not known to occur on the SEZ. According to the CAReGAP land cover model, potentially suitable habitat occurs on the SEZ and in other portions of the affected area (Table 9.2.12.1-1).

Orocopia Sage

The Orocopia sage is a flowering evergreen shrub endemic to southern California in dry desert washes and floodplains. The species is known to occur as near as 33 mi (53 km) southwest of the SEZ. According to the CAReGAP land cover model, potentially suitable desert scrub habitat for the species occurs on the SEZ and in other portions of the affected area (Table 9.2.12.1-1).

White-Margined Beardtongue

The white-margined beardtongue is a perennial forb that inhabits desert scrub habitats in southeastern California and Arizona. The species is known in California from fewer than 20 occurrences. Populations are known to occur as near as 25 mi (40 km) northwest of the SEZ. According to the CAReGAP land cover model, potentially suitable habitat for the species may occur on the SEZ and in other portions of the affected area (Table 9.2.12.1-1).

Mojave Fringe-Toed Lizard

The Mojave fringe-toed lizard is a fairly small smooth-skinned lizard that inhabits desert sand dune habitats in southeastern California and western Arizona. The species occurs as scattered populations in specialized dune habitats composed of fine, loose, wind-blown sand deposits. The species is known to occur on the SEZ and in portions of the area of indirect effects. According to the CAReGAP habitat suitability model, potentially suitable habitat for this species occurs on the SEZ and in other portions of the affected area (Table 9.2.12.1-1).

Bendire's Thrasher

The Bendire's thrasher is a small neotropical migrant bird that is a summer breeding resident in southern California. This species inhabits desert succulent shrub and Joshua tree (*Yucca brevifolia*) habitats in the Mojave Desert, where it is associated with sagebrush (*Artemisia* sp.), pinyon-juniper woodlands, cholla (*Opuntia* sp.) cactus, Joshua tree, palo verde (*Cercidium* sp.), mesquite (*Prosopis* sp.), and agave species. Nearest recorded occurrences are 3 mi (5 km) east of the SEZ. According to the CAReGAP land cover model, Mojave Desert scrub habitats that may be potentially suitable foraging or nesting habitat occurs on the SEZ and in other portions of the affected area (Table 9.2.12.1-1).

Ferruginous Hawk

The ferruginous hawk is a winter resident and migrant in the Iron Mountain SEZ region. The species' winter range includes the entire SEZ region. The species inhabits open grasslands, sagebrush flats, desert scrub, and the fringes of pinyon-juniper woodlands. This species is known to occur in the SEZ region in Riverside County, California, and according to the CAReGAP land cover model, potentially suitable foraging habitat occurs on the SEZ and in other portions of the SEZ region (Table 9.2.12.1-1).

Western Burrowing Owl

The western burrowing owl is a year-round resident of open, dry grasslands and desert habitats in southern California and Arizona. Populations occur locally in open areas with sparse vegetation. Nearest recorded occurrences are 35 mi (56 km) southeast of the SEZ. According to the CAReGAP habitat suitability model, potentially suitable habitat occurs on the SEZ and in other portions of the affected area (Table 9.2.12.1-1). The availability of nest sites (burrows) within the affected area has not been determined; shrubland habitat that may be suitable for either foraging or nesting occurs throughout the affected area.

California Leaf-Nosed Bat

The California leaf-nosed bat is a large-eared bat with a leaflike flap of protective skin on the tip of its nose. It primarily occurs along the Colorado River from southern Nevada, through Arizona and California, to Baja, California, and Sinaloa, Mexico. The species forages in a variety of desert habitats including desert riparian, desert wash, desert scrub, and palm oasis. It roosts in caves, crevices, and mines. Nearest recorded occurrences are 20 mi (32 km) north of the SEZ. According to the CAReGAP land cover model, potentially suitable habitat may occur on the SEZ and in other portions of the affected area (Table 9.2.12.1-1). The potentially suitable habitat on the SEZ and in the area of indirect effects could include foraging and roosting habitat. On the basis of an evaluation of land cover types, approximately 10,000 acres (40 km^2) and 76,000 acres (308 km^2) of rocky cliffs and outcrops on the SEZ and in the area of direct effects, respectively, could be potentially suitable roosting habitat for this species.

Nelson's Bighorn Sheep

The Nelson's bighorn sheep is one of several subspecies of bighorn sheep known to occur in the southwestern United States. This species occurs in desert mountain ranges in Arizona, California, Nevada, Oregon, and Utah. The Nelson's bighorn sheep uses primarily montane shrubland, forest, and grassland habitats and may utilize desert valleys as corridors for travel between range habitats. In California, the species is known from the desert mountain ranges from the White Mountains, south to the San Bernardino Mountains, and southeastward to the Mexican border. Nearest recorded occurrences are from the Old Woman Mountains Wilderness and the Turtle Mountains Wilderness within 3 mi (5 km) northwest and east of the SEZ, respectively. According to the CAReGAP habitat suitability model, the SEZ and other portions of the affected area may provide important habitat for sheep travelling between these two ranges (Table 9.2.12.1-1). This species may utilize portions of the SEZ as migratory habitat between the Coxcomb, Old Woman, and Turtle Mountains.

Pallid Bat

The pallid bat is a large pale bat with large ears locally common in desert grasslands and shrublands in the southwestern United States. It roosts in caves, crevices, and mines. The species is a year-round resident throughout southern California. The nearest recorded occurrence is from Cadiz Lake, approximately 10 mi (16 km) northwest of the SEZ. According to the CAReGAP land cover model, potentially suitable habitat may occur on the SEZ and in other portions of the affected area (Table 9.2.12.1-1). The potentially suitable habitat on the SEZ and in the area of indirect effects could include foraging and roosting habitat. On the basis of an evaluation of land cover types, approximately 10,000 acres (40 km^2) and 76,000 acres (308 km^2) of rocky cliffs and outcrops on the SEZ and in the area of direct effects, respectively, could be potentially suitable roosting habitat for this species.

Townsend's Big-Eared Bat

The Townsend's big-eared bat is widely distributed throughout the western United States. In California, the species forages year-round in a wide variety of desert and non-desert habitats. The species roosts in caves, mines, tunnels, buildings, and other man-made structures. Nearest recorded occurrences are approximately 25 mi (40 km) from the SEZ. According to the CAReGAP land cover model, potentially suitable habitat may occur on the SEZ and in other portions of the affected area (Table 9.2.12.1-1). The potentially suitable habitat on the SEZ and in the area of indirect effects could include foraging and roosting habitat. On the basis of an evaluation of land cover types, approximately 10,000 acres (40 km^2) and 76,000 acres (308 km^2) of rocky cliffs and outcrops on the SEZ and in the area of direct effects, respectively, could be potentially suitable roosting habitat for this species.

Western Mastiff Bat

The western mastiff bat is a large uncommon resident of southern California and western Arizona. The species forages in many open semiarid habitats including conifer and deciduous woodlands, shrublands, grassland, and urban areas. It roosts in crevices, trees, and buildings. Nearest recorded occurrences are from the Colorado River, approximately 30 mi (48 km) east of the SEZ. According to the CAReGAP land cover model, potentially suitable habitat may occur on the SEZ and in other portions of the affected area (Table 9.2.12.1-1). The potentially suitable habitat on the SEZ and in the area of indirect effects could include suitable foraging and roosting habitat. On the basis of an evaluation of land cover types, approximately 10,000 acres (40 km^2) and 76,000 acres (308 km^2) of rocky cliffs and outcrops on the SEZ and in the area of direct effects, respectively, could be potentially suitable roosting habitat for this species.

9.2.12.1.3 State-Listed Species

The desert tortoise is the only species listed by the State of California that may occur in the Iron Mountain SEZ affected area (Table 9.2.12.1-1). This species is listed as threatened under the CESA; it is also listed as threatened under the ESA and is previously discussed in Section 9.2.12.1.1.

9.2.12.1.4 Rare Species

There are 42 species that have a state rank of S1 or S2 in California or that are considered species of concern by the State of California or USFWS that may occur in the affected area of the Iron Mountain SEZ (Table 9.2.12.1-1). Of these species, there are 27 that have not been discussed as ESA-listed (Section 9.2.12.1.1), BLM-designated sensitive (Section 9.2.12.1.2), or state-listed (Section 9.2.12.1.3).

9.2.12.2 Impacts

The potential for impacts on special status species from utility-scale solar energy development within the proposed Iron Mountain SEZ is discussed in this section. The types of impacts that special status species could incur from construction and operation of utility-scale solar energy facilities are discussed in Section 5.10.4.

The assessment of impacts on special status species is based on available information on the presence of species in the affected area as presented in Section 9.2.12.1 following the analysis approach described in Appendix M. It is assumed that, prior to development, surveys would be conducted to determine the presence of special status species and their habitats in and near areas where ground-disturbing activities would occur. Additional NEPA assessments, ESA consultations, and coordination with state natural resource agencies may be needed to address project-specific impacts more thoroughly. These assessments and consultations could result in additional required actions to avoid, minimize, or mitigate impacts on special status species (see Section 9.2.12.3).

Solar energy development within the Iron Mountain SEZ could affect a variety of habitats (see Section 9.2.10). These impacts on habitats could in turn affect special status species that are dependent on those habitats. Based on CNDDB records and information provided by the CDFG and USFWS, there are five special status species known to occur within the affected area of the Iron Mountain SEZ: Harwood's eriastrum, Mojave fringe-toed lizard, Bendire's thrasher, hepatic tanager, and Nelson's bighorn sheep. In addition, designated critical habitat for the desert tortoise occurs within the affected area adjacent to the SEZ boundary. These species are listed in bold in Table 9.2.12.1-1. Other special status species may occur on the SEZ or within the affected area based upon the presence of potentially suitable habitat. As discussed in Section 9.2.12.1, this approach to identifying the species that could occur in the affected area probably overestimates the number of species that actually occur in the affected area, and may therefore overestimate impacts on some special status species.

Potential direct and indirect impacts on special status species within the SEZ and in the area of indirect effect outside the SEZ are presented in Table 9.2.12.1-1. In addition, the overall potential magnitude of impacts on each species (assuming design features are in place) is presented along with any potential species-specific mitigation measures that could further reduce impacts.

Impacts on special status species could occur during all phases of development (construction, operation, and decommissioning and reclamation) of a utility-scale solar energy project within the SEZ. Construction and operation activities could result in short- or long-term impacts on individuals and their habitats, especially if these activities are sited in areas where special status species are known to or could occur. As presented in Section 9.2.1.2, impacts of access road and transmission line construction, upgrade, or operation are not assessed in this evaluation because of the proximity of existing infrastructure to the SEZ.

Direct impacts would result from habitat destruction or modification. It is assumed that direct impacts would occur only within the SEZ where ground-disturbing activities are expected to occur. Indirect impacts could result from surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, accidental spills, harassment, and lighting. No ground-disturbing activities associated with project development are anticipated to occur within the area of indirect effects. Decommissioning of facilities and reclamation of disturbed areas after operations cease could result in short-term negative impacts on individuals and habitats adjacent to project areas, but long-term benefits would accrue if original land contours and native plant communities were restored in previously disturbed areas.

The successful implementation of programmatic design features (discussed in Appendix A, Section A.2.2) would reduce direct impacts on some special status species, especially those that depend on habitat types that can be easily avoided (e.g., dunes and sand transport systems, playa and desert wash habitats). Indirect impacts on special status species could be reduced to negligible levels by implementing programmatic design features, especially those engineering controls that would reduce runoff, sedimentation, spills, and fugitive dust.

9.2.12.2.1 Impacts on Species Listed under the ESA

The desert tortoise is the only species listed under the ESA that has the potential to occur in the affected area of the proposed Iron Mountain SEZ and is the only ESA-listed species that the USFWS identified as potentially affected by solar energy development on the Iron Mountain SEZ (Stout 2009). The tortoise is known to occur in the Chemehuevi DWMA adjacent to the northern boundary of the SEZ in the area of indirect effects; populations are also known to occur south of the SEZ near the Pinto Mountains DWMA (Figure 9.2.12.1-1). According to the CAReGAP habitat suitability model, approximately 86,823 acres (351 km^2) of potentially suitable habitat for the desert tortoise could be directly affected by construction and operations of solar energy facilities on the SEZ (Table 9.2.12.1-1). This direct effects area represents about 2.0% of available suitable habitat of the desert tortoise in the SEZ region. Of this habitat, the USGS desert tortoise habitat suitability model (Nussear et al. 2009) identified the highest suitability in the eastern portion of the SEZ. About 248,196 acres (1,000 km^2) of suitable habitat occurs in the area of potential indirect effects; this area represents about 5.7% of the available suitable habitat in the SEZ region (Table 9.2.12.1-1).

On the basis of surveys of the desert tortoise conducted in the adjacent Chemehuevi DWMA, the USFWS estimated that full-scale solar energy facilities on the SEZ may directly affect between several hundred to more than 1,000 desert tortoises on the SEZ (Stout 2009). In addition to direct impacts, facilities on the SEZ could indirectly affect desert tortoises by fragmenting and degrading their adjacent habitat (refer to Section 5.10.4 for a discussion of possible indirect impacts). Fragmentation would be exacerbated by the installation of exclusionary fencing at the perimeter of the SEZ or individual project areas. The SEZ is situated between the Chemehuevi and Pinto Mountains DWMAs (these DWMAs also contain USFWS-designated critical habitat), and terrestrial habitats within the SEZ may provide important linkages between the DWMAs. Therefore, facilities on the SEZ may disrupt desert tortoise population dynamics in nearby DWMAs and designated critical habitat.

The overall impact on the desert tortoise from construction, operation, and decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is considered moderate, because the amount of potentially suitable habitat for this species in the area of direct effects represents between 1% and 10% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features alone is unlikely to substantially reduce these impacts. Avoidance of all potentially suitable habitats for this species is not a feasible means of mitigating impacts, because these habitats (desert scrub) are widespread throughout the area of direct effects.

Development of actions to reduce impacts (e.g., reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions) for the desert tortoise, including a survey protocol, avoidance measures, minimization measures, and, potentially, translocation actions, and compensatory mitigation, would require consultations formal consultation with the USFWS under Section 7 of the ESA. These consultations may be used to authorize incidental take statements per Section 10 of the ESA (if necessary). In addition, the CESA provides authority to the CDFG to regulate potential impacts on the desert tortoise and other species listed under the CESA. Therefore, formal consultation with the CDFG also would be required to permit the incidental take of desert tortoises in the SEZ.

There are inherent dangers to tortoises associated with their capture, handling, and translocation from the SEZ. These actions, if done improperly, can result in injury or death. To minimize these risks (and as stated above), the desert tortoise translocation plan should be developed in consultation with the USFWS and the CDFG and follow the *Guidelines for Handling Desert Tortoises During Construction Projects* (Desert Tortoise Council 1994) and other current translocation guidance provided by the USFWS and CDFG. Consultation will identify potentially suitable recipient locations, density thresholds for tortoise populations in recipient locations, procedures for pre-disturbance clearance surveys and tortoise handling, as well as disease testing and post-translocation monitoring and reporting requirements. Despite some risk of mortality or decreased fitness, translocation is widely accepted as a useful strategy for the conservation of the desert tortoise (Field et al. 2007).

To offset impacts of solar development on the SEZ, compensatory mitigation may be needed to balance the acreage of habitat lost with acquisition of lands that would be improved and protected for desert tortoise populations (USFWS 1994). Compensation can be accomplished by improving the carrying capacity for the desert tortoise on the acquired lands. Other mitigation actions may include funding for the habitat enhancement of the desert tortoise on existing federal lands. Consultations with the USFWS and CDGF would be necessary to determine the appropriate mitigation ratio to acquire, enhance, and preserve desert tortoise compensation lands.

9.2.12.2.2 Impacts on BLM-Designated Sensitive Species

Impacts on the 15 BLM-designated sensitive species that have potentially suitable habitat within the SEZ (i.e., the area of direct effect) are discussed below.

Chaparral Sand-Verbena

The chaparral sand-verbena historically occurred on and in the vicinity of the SEZ, but it is currently known to occur only as near as Riverside County, California, outside of the area of indirect effects. According to the CAReGAP land cover model, approximately 209 acres (1 km^2) of potentially suitable desert sand dune habitat within the SEZ may be directly affected by project construction and operations (Table 9.2.12.1-1). This direct impact area represents 0.3% of available suitable habitat in the SEZ region. About 695 acres (3 km^2) of potentially suitable habitat occurs within the area of indirect effects; this area represents about 1.1% of the available suitable habitat in the SEZ region (Table 9.2.12.1-1).

The overall impact on the chaparral sand-verbena from construction, operation, and decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is considered small, because the amount of potentially suitable habitat for this species in the area of direct effects represents less than 1% of potentially suitable habitat in SEZ region. The implementation of programmatic design features would reduce indirect impacts to negligible levels.

Chaparral sand-verbena habitat (desert sand dunes) occurs in a limited portion of the SEZ and could be avoided during the development of facilities and protected from indirect effects. Avoiding or minimizing disturbance to occupied habitats and dunes and sand transport systems would further reduce impacts on this species. If avoidance or minimization is not feasible, plants could be translocated from the area of direct effects to protected areas that would not be affected directly or indirectly by future development. Alternatively, or in combination with translocation, a compensatory mitigation plan could be developed and implemented to mitigate direct effects on occupied habitats. Compensation could involve the protection and enhancement of existing occupied or suitable habitats to compensate for habitats lost to development. A comprehensive mitigation strategy that used one or more of these options could be designed to completely offset the impacts of development. The need for mitigation, other than programmatic design features, should be determined by conducting pre-disturbance surveys for the species and its habitat on the SEZ.

Harwood's Eriastrum

The Harwood's eriastrum is known to occur on and in the vicinity of the Iron Mountain SEZ. According to the CAReGAP land cover model, approximately 209 acres (1 km^2) of suitable desert sand dune habitat on the SEZ could be directly affected by construction and operations (Table 9.2.12.1-1). This direct impact area represents about 0.3% of available suitable habitat in the SEZ region. About 695 acres (3 km^2) of suitable habitat occurs in the area of potential indirect effects; this area represents about 1.1% of the available suitable habitat in the SEZ region (Table 9.2.12.1-1).

The overall impact on the Harwood's eriastrum from construction, operation, and decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is considered small, because the amount of potentially suitable habitat for this species in the area of direct effects represents <1% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features is expected to reduce indirect impacts to negligible levels.

Harwood's eriastrum habitat (desert sand dunes) occupies a limited portion of the SEZ and could be avoided during solar development and protected from indirect effects. Avoiding or minimizing disturbance to occupied habitats and dunes and sand transport systems, and the mitigation measures described previously for the chaparral sand-verbena, could further reduce impacts on this species.

Howe's Hedgehog Cactus

The Howe's hedgehog cactus is not known to occur in the affected area of the Iron Mountain SEZ; however, according to the CAReGAP land cover model, approximately 60,091 acres (243 km^2) of potentially suitable desert scrub habitat on the SEZ could be directly affected by construction and operations (Table 9.2.12.1-1). This direct impact area represents 2.4% of available suitable habitat in the SEZ region. About 157,331 acres (637 km^2) of potentially suitable habitat occurs in the area of potential indirect effects; this area represents about 6.2% of the available suitable habitat in the SEZ region (Table 9.2.12.1-1).

The overall impact on the Howe's hedgehog cactus from construction, operation, and decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is considered moderate, because the amount of potentially suitable habitat for this species in the area of direct effects represents more than 1% but less than 10% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features is expected to reduce indirect impacts to negligible levels.

The avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts on the Howe's hedgehog cactus, because these habitats (mostly desert scrub) are widespread throughout the area of direct effects. However, the implementation of mitigation options described previously for the chaparral sand-verbena could reduce impacts on this species.

Munz's Cholla

The Munz's cholla is not known to occur in the affected area of the Iron Mountain SEZ. According to the CAReGAP land cover model, however, approximately 82,271 acres (333 km^2) of potentially suitable desert scrub and wash habitats on the SEZ could be directly affected by construction and operations (Table 9.2.12.1-1). This direct impact area represents about 1.9% of available suitable habitat in the SEZ region. About 244,144 acres (988 km^2) of potentially suitable habitat occurs in the area of potential indirect effects; this area represents about 5.5% of the available suitable habitat in the SEZ region (Table 9.2.12.1-1).

The overall impact on the Munz's cholla from construction, operation, and decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is considered moderate, because the amount of potentially suitable habitat for this species in the area of direct effects represents more than 1% but less than 10% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features is expected to reduce indirect impacts to negligible levels.

Avoidance of all potentially suitable habitats to mitigate impacts on the Munz's cholla is not feasible, because these habitats (mostly desert scrub) are widespread throughout the area of direct effects. However, the implementation of mitigation options described previously for the chaparral sand-verbena could reduce impacts on this species.

Orocopia Sage

The Orocopia sage is not known to occur in the affected area of the Iron Mountain SEZ. According to the CAReGAP land cover model, however, approximately 72,042 acres (333 km^2) of potentially suitable desert scrub and wash habitats on the SEZ could be directly affected by construction and operations (Table 9.2.12.1-1). This direct impact area represents about 2.5% of available suitable habitat in the SEZ region. About 168,222 acres (680 km^2) of potentially suitable habitat occurs in the area of potential indirect effects; this area represents about 5.9% of the available suitable habitat in the SEZ region (Table 9.2.12.1-1).

The overall impact on the Orocopia sage from construction, operation, and decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is considered moderate, because the amount of potentially suitable habitat for this species in the area of direct effects represents more than 1% but less than 10% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features is expected to reduce indirect impacts to negligible levels.

Avoidance of all potentially suitable habitats to mitigate impacts on the Orocopia sage is not feasible, because potentially suitable desert scrub habitats are widespread throughout the area of direct effects. However, the implementation of mitigation options described previously for the chaparral sand-verbena could reduce impacts on this species.

White-Margined Beardtongue

The white-margined beardtongue is not known to occur in the affected area of the Iron Mountain SEZ. According to the CAReGAP land cover model, however, approximately 60,300 acres (244 km^2) of potentially suitable desert scrub and dune habitats on the SEZ could be directly affected by construction and operations (Table 9.2.12.1-1). This direct impact area represents about 2.3% of available suitable habitat in the SEZ region. About 158,026 acres (640 km^2) of potentially suitable habitat occurs in the area of potential indirect effects; this area represents about 6.1% of the available suitable habitat in the SEZ region (Table 9.2.12.1-1).

The overall impact on the white-margined beardtongue from construction, operation, and decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is considered moderate, because the amount of potentially suitable habitat for this species in the area of direct effects represents more than 1% but less than 10% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features is expected to reduce indirect impacts to negligible levels.

Avoidance of all potentially suitable habitats to mitigate impacts on the white-margined beardtongue is not feasible, because potentially suitable desert scrub habitats are widespread throughout the area of direct effect. However, the implementation of mitigation options described previously for the chaparral sand-verbena could reduce impacts on this species.

Mojave Fringe-Toed Lizard

The Mojave fringe-toed lizard is known to occur on and in the vicinity of the Iron Mountain SEZ in specialized desert dune habitats within desert scrub communities. According to the CAReGAP habitat suitability model, approximately 42,102 acres (170 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 9.2.12.1-1). This direct impact area represents about 1.3% of available suitable foraging habitat in the SEZ region. About 151,467 acres (613 km^2) of potentially suitable foraging habitat occurs in the area of potential indirect effects; this area represents about 4.7% of the available suitable habitat in the SEZ region (Table 9.2.12.1-1).

The overall impact on the Mojave fringe-toed lizard from construction, operation, and decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is considered moderate, because the amount of potentially suitable habitat for this species in the area of direct effects represents more than 1% but less than 10% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features is expected to reduce indirect impacts to negligible levels.

Although the Mojave fringe-toed lizard is dependent upon unique sandy habitats such as dunes, washes, and sand transport systems, these habitats may be localized and widespread throughout the Iron Mountain SEZ. Avoiding or minimizing disturbance to occupied habitats, dune and sand transport systems, and desert wash habitats would reduce impacts on this species. If avoidance or minimization is not feasible, impacts could be reduced by conducting pre-disturbance surveys and avoiding or minimizing impacts on occupied habitats on the SEZ. If avoidance or minimization is not feasible, a compensatory mitigation plan could be developed and implemented to mitigate direct effects on occupied habitats. Compensation could involve the protection and enhancement of existing occupied or suitable habitats to compensate for habitats lost to development. A comprehensive mitigation strategy that uses one or both of these options could be designed to completely offset the impacts of development.

Bendire's Thrasher

The Bendire's thrasher is a summer resident in southern California and is known to occur within the affected area as near as 3 mi (5 km) east of the Iron Mountain SEZ. According to the CAReGAP land cover model, approximately 60,091 acres (243 km^2) of potentially suitable desert shrub-scrub and arid woodland habitats on the SEZ could be directly affected by construction and operations (Table 9.2.12.1-1). This direct impact area represents about 2.1% of available suitable habitat in the SEZ region. About 157,331 acres (637 km^2) of potentially suitable habitat occurs in the area of potential indirect effect; this area represents about 5.4% of the available suitable habitat in the SEZ region (Table 9.2.12.1-1).

The overall impact on the Bendire's thrasher from construction, operation, and decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is considered moderate, because the amount of potentially suitable habitat for this species in the area of direct effects represents more than 1% but less than 10% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features is expected to reduce indirect impacts to negligible levels.

Avoidance of all potentially suitable habitats to mitigate impacts on the Bendire's thrasher is not feasible, because potentially suitable desert scrub habitats are widespread throughout the area of direct effects. Impacts could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied and potentially suitable habitats on the SEZ, especially nesting habitats. If avoidance or minimization is not a feasible option, a compensatory mitigation plan could be developed and implemented to mitigate direct effects on occupied habitats. Compensation could involve the protection and enhancement of existing occupied or suitable habitats to compensate for habitats lost to development. A comprehensive mitigation strategy that uses one or both of these options could be designed to completely offset the impacts of development.

Ferruginous Hawk

The ferruginous hawk is a winter resident in southern California within the Iron Mountain region. According to the CAReGAP land cover model, approximately 60,502 acres (245 km^2) of potentially suitable foraging habitat on the SEZ could be directly affected by construction and operations (Table 9.2.12.1-1). This direct impact area represents about 2.4% of available suitable habitat in the SEZ region. About 158,193 acres (640 km^2) of potentially suitable habitat occurs in the area of potential indirect effect; this area represents about 6.3% of the available suitable habitat in the SEZ region (Table 9.2.12.1-1).

The overall impact on the ferruginous hawk from construction, operation, and decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is considered moderate because the amount of this habitat in the area of direct effects represents more than 1% but less than 10% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts on this species to negligible levels. Avoidance of direct impacts on all potentially suitable foraging habitat is not a feasible way to mitigate impacts on the ferruginous hawk because potentially suitable shrubland habitat is widespread throughout the area of direct effects and readily available in other portions of the affected area.

Western Burrowing Owl

The western burrowing owl is not known to occur in the affected area of the Iron Mountain SEZ. However, according to the CAReGAP habitat suitability model, approximately 40,772 acres (165 km^2) of potentially suitable desert scrub habitat on the SEZ could be directly affected by construction and operations (Table 9.2.12.1-1). This direct impact area represents about 0.9% of available suitable habitat in the SEZ region. About 251,180 acres (1,016 km^2) of potentially suitable habitat occurs in the area of potential indirect effects; this area represents about 5.3% of the available suitable habitat in the SEZ region (Table 9.2.12.1-1). Most of this area could serve as foraging and nesting habitat (shrublands). The abundance of burrows suitable for nesting on the SEZ and in the area of indirect effects has not been determined.

The overall impact on the western burrowing owl from construction, operation, and decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is considered small, because the amount of potentially suitable habitat for this species in the area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts on this species to negligible levels.

Avoidance of all potentially suitable habitats is not feasible to mitigate impacts on the western burrowing owl because potentially suitable shrubland habitats are widespread throughout the area of direct effect and readily available in other portions of the SEZ region. However, impacts on the western burrowing owl could be reduced by avoiding or minimizing disturbance to occupied burrows and habitat in the area of direct effects. If avoidance or minimization of disturbance to all occupied habitat is not a feasible option, a compensatory mitigation plan could be developed and implemented to mitigate direct effects. Compensation could involve the protection and enhancement of existing occupied or suitable habitats to compensate for habitats lost to development. A comprehensive mitigation strategy that used one or both of these options could be designed to completely offset the impacts of development. The need for mitigation, other than programmatic design features, should be determined by conducting pre-disturbance surveys for the species and its habitat within the area of direct effects.

California Leaf-Nosed Bat

The California leaf-nosed bat is a year-round resident in southern California within the Iron Mountain SEZ region. According to the CAReGAP land cover model, approximately 83,272 acres (337 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 9.2.12.1-1). This direct impact area represents about 2.0% of available suitable foraging habitat in the SEZ region. About 242,454 acres (981 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 5.9% of the available suitable foraging habitat in the region (Table 9.2.12.1-1). The potentially suitable habitat on the SEZ is primarily foraging habitat (desert shrubland); however, suitable roosting habitat may occur on the SEZ. On the basis of an evaluation of land cover types, approximately 10,000 acres (40 km^2) of rocky cliffs and outcrops that may be potentially suitable roosting habitat occurs on the SEZ. An additional 76,000 acres (308 km^2) of rocky cliffs and outcrops occurs in the area of direct effects.

The overall impact on the California leaf-nosed bat from construction, operation, and decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is considered moderate, because the amount of potentially suitable habitat for this species in the area of direct effects represents more than 1% but less than 10% of potentially suitable foraging habitat in the SEZ region. The implementation of programmatic design features is expected to reduce indirect impacts to negligible levels.

Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because suitable foraging habitat (shrublands) is widespread in the area of direct effects and readily available in other portions of the affected area. However, avoiding or minimizing disturbance of all potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ is feasible and could reduce impacts. If avoiding or minimizing disturbance of all occupied or suitable roosting habitat is not a feasible option, a compensatory mitigation plan could be developed and implemented to mitigate direct effects. Compensation could involve the protection and enhancement of existing occupied or suitable habitats to compensate for habitats lost to development. A comprehensive mitigation strategy that used one or both of these options could be designed to completely offset the impacts of development. The need for mitigation, other than programmatic design features, should be determined by conducting pre-disturbance surveys for the species and its habitat within the area of direct effects.

Nelson's Bighorn Sheep

The Nelson's bighorn sheep is known to occur in the Old Woman Mountains Wilderness and Turtle Mountains Wilderness within the affected area of the SEZ, and the species may utilize habitats within the SEZ as migration corridors between ranges. According to the CAReGAP habitat suitability model, approximately 16,975 acres (69 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 9.2.12.1-1). This direct impact area represents about 0.7% of available suitable habitat in the SEZ region. About 33,000 acres (134 km^2) of potentially suitable habitat occurs in the area of potential indirect effect; this area represents about 1.3% of the available suitable habitat in the SEZ region (Table 9.2.12.1-1).

The overall impact on the Nelson's bighorn sheep from construction, operation, and decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is considered small, because the amount of potentially suitable habitat for this species in the area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features may be sufficient to reduce indirect impacts on this species to negligible levels.

Impacts on the Nelson's bighorn sheep could be further reduced by conducting preconstruction surveys and avoiding or minimizing disturbance to all occupied or suitable habitats and important movement corridors on the SEZ. If avoidance or minimization is not a feasible option, a compensatory mitigation plan could be developed and implemented to mitigate direct effects on occupied habitats. Compensation could involve the protection and enhancement of existing occupied or suitable habitats to compensate for habitats lost to development. A comprehensive mitigation strategy that used one or both of these options could be designed to completely offset the impacts of development.

Pallid Bat

The pallid bat is a year-round resident in southern California within the Iron Mountain region. According to the CAReGAP land cover model, approximately 69,782 acres (282 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 9.2.12.1-1). This direct impact area represents about 1.8% of available suitable foraging habitat in the SEZ region. About 230,823 acres (934 km^2) of potentially suitable habitat occurs in the area of potential indirect effect; this area represents about 5.8% of the available suitable foraging habitat in the SEZ region (Table 9.2.12.1-1). The potentially suitable habitat on the SEZ is primarily foraging habitat (desert shrubland); however, suitable roosting habitat may occur on the SEZ. On the basis of an evaluation of land cover types, approximately 10,000 acres (40 km^2) of rocky cliffs and outcrops that may be potentially suitable roosting habitat occurs on the SEZ. An additional 76,000 acres (308 km^2) of rocky cliffs and outcrops occurs in the area of direct effects.

The overall impact on the pallid bat from construction, operation, and decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is considered moderate, because the amount of potentially suitable habitat for this species in the area of direct effects represents more than 1% but less than 10% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features is expected to reduce indirect impacts to negligible levels.

Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because suitable foraging habitat (shrublands) is widespread in the area of direct effects and readily available in other portions of the affected area. However, avoiding or minimizing disturbance of all potential roosting habitat (rocky cliffs and outcrops) on the SEZ is feasible and could reduce impacts. If avoidance or minimization of disturbance to all occupied or suitable roosting habitat is not a feasible option, a compensatory mitigation plan could be developed and implemented to mitigate direct effects. Compensation could involve the protection and enhancement of existing occupied or suitable habitats to compensate for habitats lost to development. A comprehensive mitigation strategy that used one or both of these options could be designed to completely offset the impacts of development. The need for mitigation, other than programmatic design features, should be determined by conducting pre-disturbance surveys for the species and its habitat within the area of direct effects.

Townsend's Big-Eared Bat

The Townsend's big-eared bat is a year-round resident in southern California within the Iron Mountain SEZ region. According to the CAReGAP land cover model, approximately 106,522 acres (431 km^2) of potentially suitable foraging habitat on the SEZ could be directly affected by construction and operations (Table 9.2.12.1-1). This direct impact area represents about 2.1% of available suitable foraging habitat in the SEZ region. About 251,169 acres (1,016 km^2) of potentially suitable foraging habitat occurs in the area of potential indirect effects; this area represents about 5.0% of the available suitable foraging habitat in the SEZ region (Table 9.2.12.1-1). The potentially suitable habitat on the SEZ is primarily foraging habitat (desert shrubland); however, suitable roosting habitat may occur on the SEZ. On the basis of an evaluation of land cover types, approximately 10,000 acres (40 km^2) of rocky cliffs and outcrops that may be potentially suitable roosting habitat occurs on the SEZ. An additional 76,000 acres (308 km^2) of rocky cliffs and outcrops occurs in the area of direct effects.

The overall impact on the Townsend's big-eared bat from construction, operation, and decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is considered moderate, because the amount of potentially suitable habitat for this species in the area of direct effects represents more than 1% but less than 10% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features is expected to reduce indirect impacts to negligible levels.

Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because suitable foraging habitat (shrublands) is widespread in the area of direct effects and readily available in other portions of the affected area. However, avoiding or minimizing disturbance of all potential roosting habitat (rocky cliffs and outcrops) on the SEZ is feasible and could reduce impacts. If avoidance or minimization of disturbance to all occupied or suitable roosting habitat is not feasible, a compensatory mitigation plan could be developed and implemented to mitigate direct effects. Compensation could involve the protection and enhancement of existing occupied or suitable habitats to compensate for habitats lost to development. A comprehensive mitigation strategy that uses one or both of these options could be designed to completely offset the impacts of development. The need for mitigation, other than programmatic design features, should be determined by conducting pre-disturbance surveys for the species and its habitat within the area of direct effects.

Western Mastiff Bat

The western mastiff bat is a year-round resident in southern California within the Iron Mountain region. According to the CAReGAP land cover model, approximately 106,522 acres (431 km^2) of potentially suitable foraging habitat on the SEZ could be directly affected by construction and operations (Table 9.2.12.1-1). This direct impact area represents about 2.3% of available suitable foraging habitat in the SEZ region. About 251,169 acres (1,016 km^2) of potentially suitable foraging habitat occurs in the area of potential indirect effects; this area represents about 5.5% of the available suitable foraging habitat in the SEZ region (Table 9.2.12.1-1). The potentially suitable habitat on the SEZ is primarily foraging habitat (desert shrubland); however, suitable roosting habitat may occur on the SEZ. On the basis of an evaluation of land cover types, approximately 10,000 acres (40 km^2) of rocky cliffs and outcrops that may be potentially suitable roosting habitat occurs on the SEZ. An additional 76,000 acres (308 km^2) of rocky cliffs and outcrops occurs in the area of direct effects.

The overall impact on the western mastiff bat from construction, operation, and decommissioning of utility-scale solar energy facilities within the Iron Mountain SEZ is considered moderate, because the amount of potentially suitable habitat for this species in the area of direct effects represents more than 1% but less than 10% of potentially suitable habitat in the SEZ region. . The implementation of programmatic design features is expected to reduce indirect impacts to negligible levels.

Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because suitable foraging habitat (shrublands) is widespread in the area of direct effects and readily available in other portions of the affected area. However, avoiding or minimizing disturbance of all potential roosting habitat (rocky cliffs and outcrops) on the SEZ is feasible and could reduce impacts. If avoidance or minimization of disturbance to all occupied or suitable roosting habitat is not feasible, a compensatory mitigation plan could be developed and implemented to mitigate direct effects. Compensation could involve the protection and enhancement of existing occupied or suitable habitats to compensate for habitats lost to development. A comprehensive mitigation strategy that uses one or both of these options could be designed to completely offset the impacts of development. The need for mitigation, other than programmatic design features, should be determined by conducting pre-disturbance surveys for the species and its habitat within the area of direct effects.

9.2.12.2.3 Impacts on State-Listed Species

The desert tortoise is the only species listed by the State of California that may occur in the Iron Mountain SEZ affected area (Table 9.2.12.1-1). This species is listed as threatened under the CESA; it is also listed as threatened under the ESA. Impacts on this species are discussed in Section 9.2.12.2.1.

9.2.12.2.4 Impacts on Rare Species

There are 42 species with a state status of S1 or S2 in California or species of concern by the State of California or USFWS that may occur in the affected area of the Iron Mountain SEZ. Impacts have been previously discussed for 15 of these species that are also ESA-listed (Section 9.2.12.2.1), BLM-designated sensitive (Section 9.2.12.2.2), or state-listed (Section 9.2.12.2.3). Impacts on the remaining 27 rare species that do not have any other special status designation are presented in Table 9.2.12.1-1.

9.2.12.3 SEZ-Specific Design Features and Design Feature Effectiveness

The implementation of required programmatic design features described in Appendix A, Section A.2.2, would greatly reduce or eliminate the potential for effects of utility-scale solar energy development on special status species. While some SEZ-specific design features are best established when project details are being considered, some design features can be identified at this time, including the following:

- Pre-disturbance surveys should be conducted within the SEZ to determine the presence and abundance of all special status species, including those identified in Table 9.2.12.1-1; disturbance to occupied habitats for these species should be avoided or minimized to the extent practicable. If avoiding or minimizing impacts on occupied habitats is not possible, translocation of individuals from areas of direct effect or compensatory mitigation of direct effects on occupied habitats could reduce impacts. A comprehensive mitigation strategy for special status species that uses one or more of these options to offset the impacts of development should be developed in coordination with the appropriate federal and state agencies.

- All desert riparian, wash, and playa habitats within the SEZ should be avoided to the extent practicable. In particular, development should be avoided within Danby Lake, which covers approximately 25,000 acres (100 km^2), and within Homer Wash. Adverse impacts on the following special status species could be reduced with the avoidance of desert riparian, wash, and playa habitats: dwarf germander, Emory's crucifixion jackass-clover, and Mojave fringe-toed lizard.

- Avoidance or minimization of disturbance to desert dunes and sand transport systems on the SEZ could reduce impacts on several special status species, including the chaparral sand-verbena, dwarf germander, Harwood's eriastrum, Harwood's milkvetch, jackass-clover, small-flowered androstephium, Bradley's cuckoo wasp, Riverside cuckoo wasp, and Mojave fringe-toed lizard.

- Avoidance or minimization of disturbance to rocky cliff and outcrop habitats on the SEZ could reduce impacts on several special status species, including the spiny cliff-brake, California leaf-nosed bat (roosting), Nelson's bighorn sheep, pallid bat (roosting), Townsend's big-eared bat (roosting), and western mastiff bat (roosting).

- Consultations with the USFWS and the CDFG should be conducted to address the potential for impacts on the desert tortoise a species listed as threatened under the ESA and CESA. Consultation would identify an appropriate survey protocol, avoidance measures, and, if appropriate, reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions for incidental take statements.

- Harassment or disturbance of special status species and their habitats in the affected area should be mitigated. This can be accomplished by identifying any additional sensitive areas and implementing necessary protection measures based upon consultation with the USFWS and CDFG.

If these SEZ-specific design features are implemented in addition to required programmatic design features, impacts on special status species would be reduced.

9.2.13 Air Quality and Climate

9.2.13.1 Affected Environment

9.2.13.1.1 Climate

The proposed Iron Mountain SEZ is located mostly in the southeastern portion of San Bernardino County with a small, southern portion in Riverside County, in southeastern California. The SEZ has an average elevation of about 850 ft (259 m) and lies in the southernmost portion of the Mojave Desert, which has a low desert climate. As a result, the area surrounding the SEZ experiences an extremely arid climate, which is marked by mild winters and hot summers, large daily temperature swings, scant precipitation, high evaporation rates, low relative humidity, and abundant sunshine. Meteorological data collected at the Blythe Airport and Iron Mountain station, which are about 33 mi (53 km) south–southeast of and about 0.6 mi (1 km) west of the Iron Mountain SEZ, respectively, are summarized below.

A wind rose from the Blythe Airport in Blythe, California, for the 5-year period 2005 to 2009 and taken at a level of 33 ft (10 m) is presented in Figure 9.2.13.1-1. During this period, the annual average wind speed at the airport was about 7.6 mph (3.4 m/s), with a prevailing wind direction from the south (about 12.6% of the time) and secondarily from the north–northwest (about 9.0% of the time), parallel to nearby mountain ranges. Wind directions alternated between north–northwest (March, May, August, and October) and south (the rest of the months) throughout the year. In California, general wind flow is from the west or northwest throughout the year, but prevailing wind direction for a given site is influenced by local terrain (NCDC 2010b). Wind speeds categorized as calm (less than 1.1 mph [0.5 m/s]) occurred frequently (almost one-fifth of the time) because of the stable conditions caused by strong radiative cooling from late night to sunrise. Average wind speeds were relatively uniform with the highest in summer and fall at 7.8 mph (3.5 m/s); lower in winter at 7.4 mph (3.3 m/s); and lowest in spring at 7.2 mph (3.2 m/s).

For the 1935 to 2009 period, the annual average temperature at Iron Mountain was 73.7°F (23.2°C) (WRCC 2010b). January was the coldest month with an average minimum temperature of 42.8°F (6.0°C), and July was the warmest month with an average maximum of 108.3°F (42.4°C). On most days in summer, daytime maximum temperatures were in the 100s, and minimums were in the mid-70s or higher. The minimum temperatures recorded were below freezing (≤32°F [0°C]) on fewer than two days of each of the colder months (November through February), but subzero temperatures were never recorded. During the same period, the highest temperature, 122°F (50.0°C), was reached in July 1998, and the lowest, 21°F (–6.1°C), was reached in January 1937. In a typical year, about 168 days had a maximum temperature of ≥90°F (32.2°C), while about 3 days had a minimum temperature at or below freezing.

Pacific air masses lose most of their moisture on the windward side of mountain ranges parallel to the California coastline. Thus, leeward areas like the Iron Mountain SEZ experience a lack of precipitation. For the 1935 to 2009 period, annual precipitation at Iron Mountain

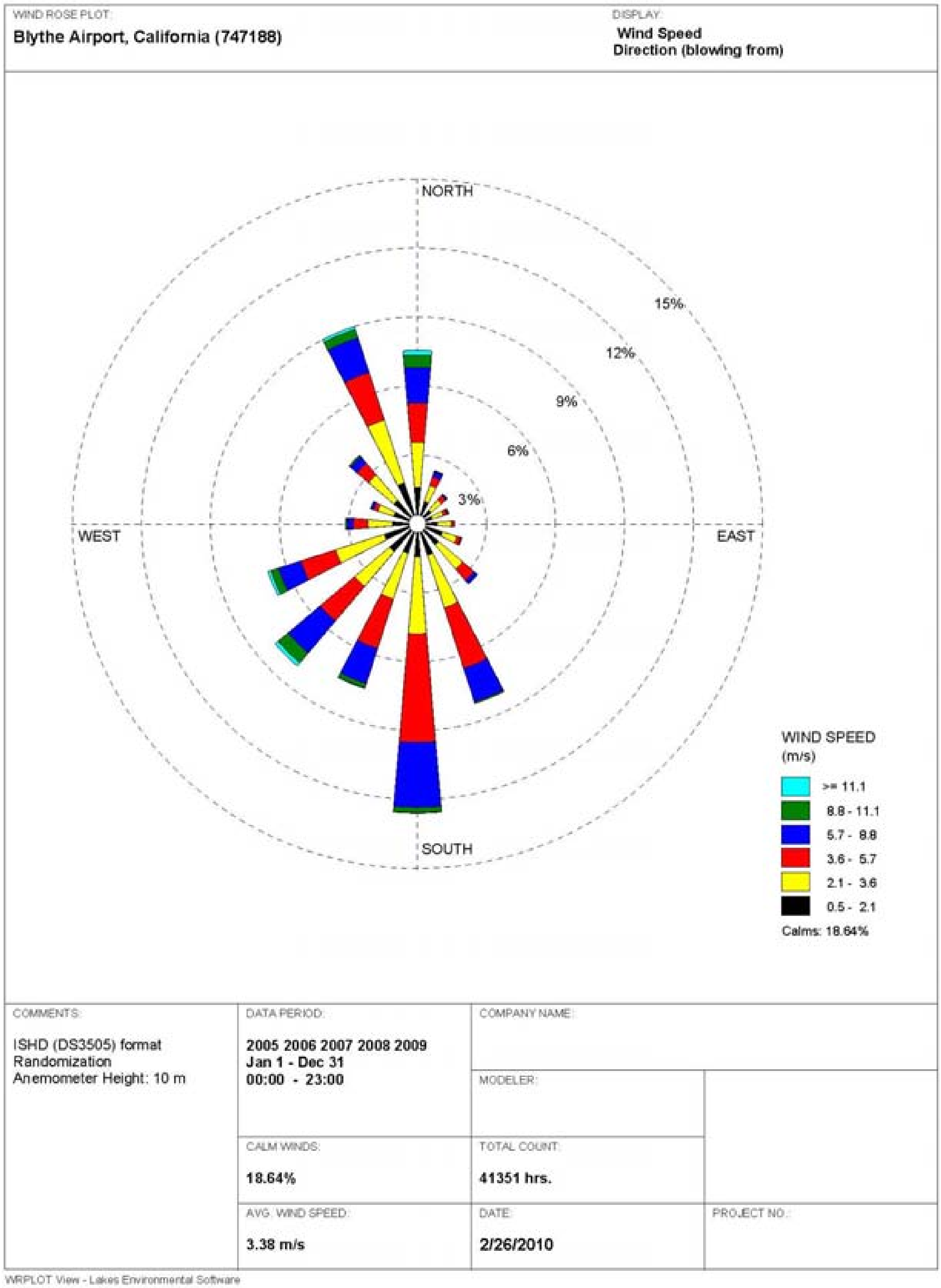

FIGURE 9.2.13.1-1 Wind Rose at 33-ft (10-m) Height at Blythe Airport, Blythe, California, 2005–2009 (Source: NCDC 2010a)

averaged about 3.41 in. (8.7 cm) (WRCC 2010b). There are an average of 19 days annually with measurable precipitation (0.01 in. [0.025 cm] or higher). About 42% of the annual precipitation occurs during winter months, and the remaining precipitation is relatively evenly distributed over the other seasons. Snowfall at Iron Mountain is uncommon and limited to January. The annual average snowfall is about 0.1 in. (0.3 cm), and the highest monthly snowfall recorded was 2.5 in. (6.4 cm) in January 1937.

Because the area surrounding the proposed Iron Mountain SEZ is far from major water bodies (more than 150 mi [240 km]) and because surrounding mountain ranges block air masses from penetrating into the area, severe weather events, such as hurricanes and tornadoes, are rare.

Each year some flash flooding is reported as a result of thunderstorms with heavy rains, especially in areas with steep slopes. Since 1993, 281 floods (mostly flash floods) with peaks in July and August were reported in San Bernardino County (NCDC 2010c), which did cause 12 deaths, 48 injuries, and considerable property and crop damage in total.

In San Bernardino County, 51 hailstorms in total have been reported since 1966, which caused minor property damage. Hail measuring 2.0 in. (5.1 cm) in diameter was reported in 1999. In San Bernardino County, 129 high-wind events, which peaked in winter months, have been reported since 1996; these caused 8 deaths, 70 injuries, and significant property and crop damage (NCDC 2010c). A high-wind event with a maximum wind speed of 120 mph (53.5 m/s) occurred in 1999. Since 1957, 101 thunderstorms, which peaked in summer months, have been reported; these caused 1 death, 5 injuries, and minor property damage. Many thunderstorms in California are accompanied by little to no precipitation, and lightning strikes sometimes cause forest fires (NCDC 2010b).

Since 1998, seven dust storms have been reported in San Bernardino County (NCDC 2010c). The ground surface of the SEZ is covered predominantly with gravelly alluvial sands and fine- to medium-grained eolian sands, which have relatively high duststorm potential. High winds can trigger large amounts of blowing dust in areas of San Bernardino County that have dry and loose soils with sparse vegetation. Dust storms can deteriorate air quality and visibility and have adverse effects on health, particularly for people with asthma or other respiratory problems.

Hurricanes and tropical storms formed off the coast of Central America and Mexico weaken over the cold waters off the California coast. Accordingly, hurricanes rarely hit California. Historically, three tropical storms/depressions have passed within 100 mi (160 km) of the proposed Iron Mountain SEZ (CSC 2010). Tornadoes in San Bernardino County, which encompasses the proposed Iron Mountain SEZ, occur infrequently. In the period 1950 to June 2010, a total of 29 tornadoes (0.5 per year) were reported in San Bernardino County (NCDC 2010c). However, most tornadoes occurring in San Bernardino County were relatively weak (i.e., seven were uncategorized, twenty were F0 or F1, and two were F2 on the Fujita tornado scale). Several of these tornadoes caused three injuries and minor property damage in total. Most tornadoes in San Bernardino County were reported far from the proposed Iron Mountain SEZ.

9.2.13.1.2 Existing Air Emissions

San Bernardino County, which encompasses most of the proposed Iron Mountain SEZ, has many industrial emission sources, which are mainly concentrated over the Valley Region near the City of San Bernardino. No point source emissions are located around the proposed SEZ, except for the Iron Mountain Pumping Station (IMPS). Its annual emissions are relatively minor. Mobile source emissions are substantial because the county is crossed by several interstate highways, including I-10, I-15, I-40, and I-215. Data on annual emissions of criteria pollutants and VOCs in San Bernardino County are presented in Table 9.2.13.1-1 for 2002 (WRAP 2009). Emission data are classified into six source categories: point, area, onroad mobile, nonroad mobile, biogenic, and fire (wildfires, prescribed fires, agricultural fires, structural fires). In 2002, nonroad sources were major contributors to total SO_2 emissions (about 43%) and secondary contributors to total NO_x emissions (about 28%). Point sources were secondary contributors to SO_2 emissions (about 38%), but with contributions comparable to nonroad sources. Onroad sources were major contributors to NO_x and CO emissions (about 31% and 43%, respectively). Biogenic sources (i.e., vegetation— including trees, plants, and crops— and soils) that release naturally occurring emissions accounted for most of VOC emissions (about 91%) and secondarily contributed to CO emissions (about 19%). Area sources accounted for about 70% of PM_{10} and 47% of $PM_{2.5}$. Fire sources are secondary contributors to $PM_{2.5}$ emissions (about 27%).

TABLE 9.2.13.1-1 Annual Emissions of Criteria Pollutants and VOCs in San Bernardino County, California, Encompassing the Proposed Iron Mountain SEZ, 2002[a]

Pollutant[b]	Emissions (tons/yr)
SO_2	3,774
NO_x	102,722
CO	373,128
VOCs	512,377
PM_{10}	44,722
$PM_{2.5}$	17,879

a Includes point, area, onroad and nonroad mobile, biogenic, and fire emissions.

b Notation: CO = carbon monoxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter with a diameter of ≤2.5 μm; PM_{10} = particulate matter with a diameter of ≤10 μm; SO_2 = sulfur dioxide; and VOCs = volatile organic compounds.

Source: WRAP (2009).

In 2006, California produced about 483.9 MMt of *gross*[5] carbon dioxide equivalent (CO_2e)[6] emissions (CARB 2010a). GHG emissions in California increased by about 12% from 1990 to 2006, which was three-fourths of the increase in the national rate (about 16%). In 2006, transportation (38.4%) and electricity use (21.9%) were the primary contributors to gross GHG emission sources in California. Fossil fuel use in the residential, commercial, and industrial (RCI) sectors combined accounted for about 29.0% of total state emissions. California's *net* emissions were about 479.8 MMt CO_2e, considering carbon sinks from forestry activities and agricultural soils throughout the state. The U.S. EPA (2009a) also estimated 2005 emissions in California. Its estimate of CO_2 emissions from

5 Excluding GHG emissions removed as a result of forestry and other land uses and excluding GHG emissions associated with exported electricity.

6 A measure used to compare the emissions from various GHGs on the basis of their global warming potential, defined as the cumulative radiative forcing effects of a gas over a specified time horizon resulting from the emission of a unit mass of gas relative to a reference gas, CO_2. The CO_2e for a gas is derived by multiplying the mass of the gas by the associated global warming potential.

fossil fuel combustion was 390.6 MMt, which was comparable to the state's estimate. The transportation and RCI sectors accounted for about 58.7% and 30.5% of the CO_2 emissions total, respectively, while electric power generation accounted for the remainder (about 10.8%).

9.2.13.1.3 Air Quality

CAAQS address the same six criteria pollutants as the NAAQS (CARB 2010b; EPA 2010a): SO_2, NO_2, CO, O_3, PM; PM_{10}, $PM_{2.5}$, and Pb. CAAQS are more stringent than the NAAQS for most of criteria pollutants. In addition, California has set standards for some pollutants that are not addressed by the NAAQS: visibility-reducing particles, sulfates, hydrogen sulfide, and vinyl chloride. The NAAQS and CAAQS for criteria pollutants are presented in Table 9.2.13.1-2.

Most of San Bernardino County is located administratively within the Southeast Desert Intrastate Air Quality Control Region (AQCR) (Title 40, Part 81, Section 167 of the *Code of Federal Regulations* [40 CFR 81.167]), along with parts of Kern, Los Angeles, and Riverside Counties, and all of Imperial County. In addition, the Iron Mountain SEZ is located within the Mojave Desert Air Basin, one of 15 geographic air basins designated for the purpose of managing air resources in California, which also includes the desert portions of Kern, Los Angeles, Riverside, and San Bernardino Counties. Currently, the area surrounding the proposed SEZ is designated as being in attainment of NAAQS for all criteria pollutants, except PM_{10} (40 CFR 81.305). However, based on 2006 to 2008 O_3 data, the California Air Resources Board (CARB) recommended designating the area including the Iron Mountain SEZ as a nonattainment area (CARB 2009) under the NAAQS. Further, the area is designated as a nonattainment area for O_3 and PM_{10} based on the CAAQS (CARB 2010c).

With a low population density the Mojave Desert area has no significant emission sources of its own, except mobile emissions along interstate highways. Air quality in the Mojave Desert area primarily depends on upwind emissions transported from the South Coast Air Basin including Los Angeles. As a result of upwind emissions controls, air quality of the Mojave Desert area has improved, but concentrations of ozone are still relatively high.

There are no ambient air-monitoring stations in San Bernardino County near the proposed Iron Mountain SEZ. To characterize ambient air quality around the SEZ, two monitoring stations in San Bernardino County were chosen: Barstow, about 110 mi (177 km) west–northwest, and Victorville, about 120 mi (193 km) west of the SEZ. These monitoring stations are considered as representative of the proposed SEZ. Ambient concentrations of NO_2, CO, O_3, and PM_{10} are recorded at Barstow, while those of SO_2, NO_2, CO, O_3, PM_{10} and $PM_{2.5}$ are recorded at Victorville. No Pb measurements are made in the Mojave Desert area, so Pb measurements from the City of San Bernardino are presented to demonstrate that Pb is not a concern in San Bernardino County. The background concentrations of criteria pollutants at these stations for the 2004 to 2008 period are presented in Table 9.2.13.1-2 (EPA 2010b). Monitored SO_2, NO_2, CO, and Pb levels at either station were lower than their respective standards. Monitored $PM_{2.5}$ levels were approaching the NAAQS and CAAQS, while PM_{10} levels were lower than the NAAQS but higher than the CAAQS. Monitored O_3 concentrations exceeded both the NAAQS and CAAQS.

TABLE 9.2.13.1-2 NAAQS, CAAQS, and Background Concentration Levels Representative of the Proposed Iron Mountain SEZ in San Bernardino County, California, 2004–2008

				Background Concentration Level	
Pollutant[a]	Averaging Time	NAAQS	CAAQS	Concentration[b,c]	Measurement Location, Year
SO_2	1-hour	0.075 ppm[d]	0.25 ppm	0.015 ppm (NA; 6.0%)	Victorville, 2006
	3-hour	0.5 ppm	NA[e]	0.009 ppm (1.8%; NA)	Victorville, 2006
	24-hour	0.14 ppm	0.04 ppm	0.005ppm (3.6%; 13%)	Victorville, 2007
	Annual	0.030 ppm	NA	0.002 ppm (6.7%; NA)	Victorville, 2006
NO_2	1-hour	0.100 ppm[f]	0.18 ppm	0.097 ppm (NA; 54%)	Barstow, 2004
	Annual	0.053 ppm	0.030 ppm	0.023 ppm (43%; 77%)	Barstow, 2004
CO	1-hour	35 ppm	20 ppm	2.6 ppm (7.4%; 13%)	Barstow, 2006
	8-hour	9 ppm	9.0 ppm	1.2 ppm (13%; 13%)	Barstow, 2005
O_3	1-hour	0.12 ppm[g]	0.09 ppm	0.108 ppm (NA; 120%)	Barstow, 2006
	8-hour	0.075 ppm	0.070 ppm	0.090 ppm (120%; 129%)	Barstow, 2008
PM_{10}	24-hour	150 µg/m^3	50 µg/m^3	103 µg/m^3 (69%; 206%)	Barstow, 2007
	Annual	NA[h]	20 µg/m^3	30 µg/m^3 (NA; 150%)	Barstow, 2007
$PM_{2.5}$	24-hour	35 µg/m^3	NA	33 µg/m^3 (94%; NA)	Victorville, 2004
	Annual	15.0 µg/m^3	12 µg/m^3	10.8 µg/m^3 (72%; 90%)	Victorville, 2004
Pb	30-day	NA	1.5 µg/m^3	NA	NA
	Calendar quarter	1.5 µg/m^3	NA	0.02 µg/m^3 (1.3%; NA)	San Bernardino, 2007
	Rolling 3-month	0.15 µg/m^3 [i]	NA	NA	NA

[a] Notation: CO = carbon monoxide; NO_2 = nitrogen dioxide; O_3 = ozone; Pb = lead; $PM_{2.5}$ = particulate matter with a diameter of ≤2.5 µm; PM_{10} = particulate matter with a diameter of ≤10 µm; and SO_2 = sulfur dioxide.

[b] Monitored concentrations are the highest for calendar-quarter Pb; second-highest for all averaging times less than or equal to 24-hour averages, except fourth-highest daily maximum for 8-hour O_3 and the 98th percentile for 24-hour $PM_{2.5}$; and arithmetic mean for annual SO_2, NO_2, PM_{10}, and $PM_{2.5}$.

[c] First and second values in parentheses are background concentration levels as a percentage of NAAQS and CAAQS, respectively. Calculation of 1-hour SO_2, 1-hour NO_2, and rolling 3-month Pb to NAAQS was not made because no measurement data based on new NAAQS are available.

[d] Effective August 23, 2010.

[e] NA = not applicable or not available.

[f] Effective April 12, 2010.

[g] The EPA revoked the 1-hour O_3 standard in all areas, although some areas have continuing obligations under that standard (“anti-backsliding”).

[h] Effective December 18, 2006, the EPA revoked the annual PM_{10} standard of 50 µg/m^3.

[i] Effective January 12, 2009.

Sources: CARB (2010b); EPA (2010a,b).

The PSD regulations (see 40 CFR 52.21), which are designed to limit the growth of air pollution in clean areas, apply to a major new or modification of an existing major source within an attainment or unclassified area (see Section 4.11.2.3). As a matter of policy, the EPA recommends that the permitting authority notify the Federal Land Managers when a proposed PSD source would locate within 62 mi (100 km) of a sensitive Class I area. There are several Class I areas around the Iron Mountain SEZ, only one of which is situated within 62 mi (100 km). The nearest Class I area is the Joshua Tree NP (40 CFR 81.405), about 10 mi (16 km) west-southwest of the Iron Mountain SEZ. This Class I area is not located downwind of prevailing winds at the Iron Mountain SEZ (Figure 9.2.13.1-1). The next nearest Class I areas beyond 62 mi (100 km) are the San Jacinto and San Gorgonio WAs, which are located about 85 mi (136 km) west–southwest and 87 mi (140 km) west of the Iron Mountain SEZ, respectively.

9.2.13.2 Impacts

Potential impacts on ambient air quality associated with a solar project would be of most concern during the construction phase. Impacts on ambient air quality from fugitive dust emissions resulting from soil disturbances are anticipated, but they would be of short duration. During the operations phase, only a few sources with generally low-level emissions would exist for any of the four types of solar technologies evaluated. A solar facility would either not burn fossil fuels or burn only small amounts during operation. (For facilities using HTFs, fuel could be used to maintain the temperature of the HTFs for more efficient daily start-up.) Conversely, solar facilities would displace air emissions that would otherwise be released from fossil fuel power plants.

Air quality impacts shared by all solar technologies are discussed in detail in Section 5.11.1, and technology-specific impacts are discussed in Section 5.11.2. Impacts specific to the proposed Iron Mountain SEZ are presented in the following sections. Any such impacts would be minimized through the implementation of required programmatic design features described in Appendix A, Section A.2.2, and the application of any additional mitigation. Section 9.2.13.3, below, identifies SEZ-specific design features of particular relevance to the Iron Mountain SEZ.

9.2.13.2.1 Construction

The Iron Mountain SEZ has a relatively flat terrain; thus only a minimum number of site preparation activities, perhaps with no large-scale earthmoving operations, would be required. However, fugitive dust emissions from soil disturbances during the entire construction phase would be a major concern, because of the large areas that would be disturbed in a region that experiences windblown dust problems. Fugitive dusts, which are released near ground level, typically have more localized impacts than similar emissions from an elevated stack, which has additional plume rise induced by buoyancy and momentum effects.

Methods and Assumptions

Air quality modeling for PM_{10} and $PM_{2.5}$ emissions associated with construction activities was performed by using the EPA-recommended AERMOD model (EPA 2009b). Details for emissions estimation, the description of AERMOD, input data processing procedures, and modeling assumption are described in Appendix M, Section M.13. Estimated air concentrations were compared with the applicable NAAQS/CAAQS levels at the site boundaries and nearby communities and with PSD increment levels at nearby Class I areas.[7] For the Iron Mountain SEZ, the modeling was conducted based on the following assumptions and input:

- Uniformly distributed emissions over the 3,000 acres (12.1 km^2) each and 9,000 acres (36.4 km^2) in total, and in the west-central portion of the SEZ, close to the nearest residences within IMPS and Joshua Tree NP,

- Surface hourly meteorological data from the Blythe Airport and upper air sounding data from Desert Rock/Mercury, Nevada for the 2005 to 2009 period,

- A regularly spaced receptor grid over a modeling domain of 62 mi × 62 mi (100 km × 100 km) centered on the proposed SEZ, and

- Additional discrete receptors at the SEZ boundaries and at the nearest Class I area—Joshua Tree NP—about 10 mi (16 km) west–southwest of the SEZ.

Results

The modeling results for both PM_{10} and $PM_{2.5}$ concentration increments and total concentrations (modeled plus background concentrations) that would result from construction-related fugitive emissions are summarized in Table 9.2.13.2-1. Maximum 24-hour PM_{10} concentration increments modeled to occur at the site boundaries would be an estimated 498 $\mu g/m^3$, which far exceeds the relevant standard levels of 150 or 50 $\mu g/m^3$. Total 24-hour PM_{10} concentrations of 601 $\mu g/m^3$ would also exceed the standard levels at the SEZ boundary. However, high PM_{10} concentrations would be limited to the immediate area surrounding the SEZ boundary and would decrease quickly with distance. Predicted maximum 24-hour PM_{10} concentration increments would be about 96 $\mu g/m^3$ at the nearest residences within the IMPS, which is located about 0.5 mi west of the SEZ boundary. Except for these residences, no other residences or population centers are located within considerable distances of the SEZ. Predicted maximum 24-hour PM_{10} concentration increments would be about 10 $\mu g/m^3$ at Vidal and Lake

7 To provide a quantitative assessment, the modeled air impacts of construction were compared to the NAAQS/CAAQS levels and the PSD Class I increment levels. Although the Clean Air Act exempts construction activities from PSD requirements, a comparison with the Class I increment levels was used to quantify potential impacts. Only monitored data can be used to determine the attainment status. Modeled data are used to assess potential problems and as a consideration in the permitting process.

TABLE 9.2.13.2-1 Maximum Air Quality Impacts from Emissions Associated with Construction Activities for the Proposed Iron Mountain SEZ

			Concentration (µg/m3)				Percentage of NAAQS/CAAQS[e]	
Pollutant[a]	Averaging Time	Rank[b]	Maximum Increment[b]	Background[c]	Total	NAAQS/ CAAQS[d]	Increment	Total
PM_{10}	24-hour	H6H	498	103	601	150/50	332/997	401/1,203
	Annual	NA[f]	86.5	30	116	NA/20	NA/432	NA/582
$PM_{2.5}$	24-hour	H8H	32.9	33	65.9	35/NA	94/NA	188/NA
	Annual	NA	8.6	10.8	19.4	15.0/12	58/72	130/162

a $PM_{2.5}$ = particulate matter with a diameter of ≤2.5 µm; PM_{10} = particulate matter with a diameter of ≤10 µm.

b Concentrations for attainment demonstration are presented. H6H = highest of the sixth-highest concentrations at each receptor over the 5-year period. H8H = highest of the multiyear average of the eighth-highest concentrations at each receptor over the five-year period. For the annual average, multiyear averages of annual means over the five-year period are presented. Maximum concentrations are predicted to occur at the site boundaries.

c See Table 9.2.13.1-2.

d First and second values are NAAQS and CAAQS, respectively.

e First and second values are concentration levels as a percentage of NAAQS and CAAQS, respectively.

f NA = not applicable.

Tamarisk, which are about 20 mi (32 km) east and 29 mi (47 km) southwest of the SEZ, respectively. Annual average modeled increment and total (increment plus background) PM_{10} concentration increments at the SEZ boundary would be about 86.5 µg/m^3 and 116 µg/m^3, respectively, which are much higher than the CAAQS level of 20 µg/m^3. Annual PM_{10} increments would be much lower, about 8 µg/m^3, at the nearest residences, and less than 0.2 µg/m^3 at Vidal and Lake Tamarisk. Total 24-hour $PM_{2.5}$ concentrations would be 66 µg/m^3 at the SEZ boundary, which is much higher than the NAAQS level of 35 µg/m^3; modeled increment and background concentrations make comparable contributions to this total. The total annual average $PM_{2.5}$ concentration at the SEZ boundary would be 19.4 µg/m^3, which is above the NAAQS and CAAQS levels of 15.0 and 12 µg/m^3, respectively. At the nearest residences, predicted maximum 24-hour and annual $PM_{2.5}$ concentration increments would be about 5.4 and 0.8 µg/m^3, respectively.

Predicted 24-hour and annual PM_{10} concentration increments at the nearest Class I Area—Joshua Tree NP—would be about 28.3 and 0.6 µg/m^3, or 354% and 15% of the PSD increments for Class I Areas, respectively.

In conclusion, predicted 24-hour and annual PM_{10} and $PM_{2.5}$ concentration levels could exceed the standard levels at the SEZ boundaries and immediate surrounding areas during the construction of solar facilities. To reduce potential impacts on ambient air quality and in compliance with programmatic design features, aggressive dust control measures would be used. Potential air quality impacts on the nearest residences within the IMPS and other nearby residences would be much lower. Modeling indicates that construction activities could result in concentrations above 24-hour, but below annual, Class I PSD PM_{10} increments at the nearest federal Class I area (Joshua Tree NP). While construction activities are not subject to the PSD program and the comparison provides only a screen to gauge the size of the impact, the assumed scenario—in which three construction projects would occur simultaneously near the western boundary near the IMPS residences—is quite conservative. If locations of construction were spread across the SEZ or the projects occurred at different times, potential impacts would be anticipated to be much lower than the aforementioned values. Accordingly, it is anticipated that impacts of construction activities on ambient air quality would be moderate and temporary.

Construction emissions from the engine exhaust from heavy equipment and vehicles could cause impacts on AQRVs (e.g., visibility and acid deposition) at the nearby federal Class I area, Joshua Tree NP, which is not located downwind of prevailing winds but is in close proximity to the SEZ (about 10 mi [16 km]). SO_x emissions from engine exhaust would be very low, because programmatic design features would require that ultra-low-sulfur fuel with a sulfur content of 15 ppm be used. NO_x emissions from engine exhaust would be primary contributors to potential impacts on AQRVs. Construction-related emissions are temporary in nature and thus would cause some unavoidable but short-term impacts.

It is assumed that the existing 230-kV transmission line within the SEZ might be used to connect new solar facilities to the regional grid and that additional project-specific analysis would be conducted for new transmission construction or line upgrades. However, some construction of transmission lines could occur within the SEZ. Potential impacts on ambient air quality would be a minor component of construction impacts in comparison with solar facility construction and would be temporary in nature.

9.2.13.2.2 Operations

Emission sources associated with the operation of a solar facility would include auxiliary boilers; vehicle (commuter, visitor, support, and delivery) traffic; maintenance (e.g., mirror cleaning and repair and replacement of damaged mirrors); and drift from cooling towers for the parabolic trough or power tower technology if wet cooling were implemented (drift comprises low-level PM emissions).

The type of emission sources caused by and offset by operation of a solar facility are discussed in Appendix M, Section M.13.4.

Estimates of potential air emissions displaced by the solar project development at the Iron Mountain SEZ are presented in Table 9.2.13.2-2. Total power generation capacity ranging from 9,469 to 17,043 MW is estimated for the Iron Mountain SEZ for various solar technologies (see Section 9.2.2). The estimated amount of emissions avoided for the solar technologies evaluated depends only on the megawatts of conventional fossil fuel–generated power displaced, because a composite emission factor per megawatt-hour of power by conventional

TABLE 9.2.13.2-2 Annual Emissions from Combustion-Related Power Generation Displaced by Full Solar Development of the Proposed Iron Mountain SEZ

Area Size (acres)	Capacity (MW)[a]	Power Generation (GWh/yr)[b]	Emissions Displaced (tons/yr; 10^3 tons/yr for CO_2)[c]			
			SO_2	NO_x	Hg	CO_2
106,522	9,469–17,043	16,589–29,860	2,121–3,818 (12,530–22,555)	3,484–6,271 (18,467–33,240)	0.03–0.06 (0.15–0.26)	8,242–14,836 (13,090–23,561)
Percentage of total emissions from electric power systems in California[d]			16–28%	16–28%	16–28%	16–28%
Percentage of total emissions from all source categories in California[e]			3.0–5.4%	0.3–0.5%	NA[f]	1.9–3.5%
Percentage of total emissions from electric power systems in the six-state study area[d]			0.85–1.5% (5.0–9.0%)	0.94–1.7% (5.0–9.0%)	1.1–1.9% (5.0–9.0%)	3.1–5.7% (5.0–9.0%)
Percentage of total emissions from all source categories in the six-state study area[e]			0.45–0.81% (2.7–4.8%)	0.13–0.23% (0.68–1.2%)	NA (NA)	1.0–1.8% (1.6–2.8%)

[a] It is assumed that the SEZ would eventually have development on 80% of the lands and that a range of 5 acres (0.020 km^2) per MW (for parabolic trough technology) to 9 acres (0.036 km^2) per MW (power tower, dish engine, and photovoltaic technologies) would be required.

[b] Assumed a capacity factor of 20%.

[c] Composite combustion-related emission factors for SO_2, NO_x, Hg, and CO_2 of 0.26, 0.42, 3.7×10^{-6}, and 994 lb/MWh, respectively, were used for the state of California. Values in parentheses are estimated based on composite combustion-related emission factors for SO_2, NO_x, Hg, and CO_2 of 1.51, 2.23, 1.8×10^{-5}, and 1,578 lb/MWh, respectively, averaged over six southwestern states.

[d] Emission data for all air pollutants are for 2005.

[e] Emission data for SO_2 and NO_x are for 2002, while those for CO_2 are for 2005.

[f] NA = not estimated.

Sources: EPA (2009a,c); WRAP (2009).

technologies is assumed (EPA 2009c). If the Iron Mountain SEZ were fully developed, it is expected that emissions avoided would be substantial. Development of solar power in the SEZ would result in avoided air emissions ranging from 16% to 28% of total emissions of SO_2, NO_x, Hg, and CO_2 from electric power systems in the state of California (EPA 2009c). Avoided emissions would be up to 5.7% of total emissions from electric power systems in the six-state study area. When compared with all source categories, power production from the same solar facilities would displace up to 5.4% of SO_2, 0.5% of NO_x, and 3.5% of CO_2 emissions in the state of California (EPA 2009a; WRAP 2009). These emissions would be up to 1.8% of total emissions from all source categories in the six-state study area. Power generation from fossil fuel–fired power plants accounts for only 53% of the total electric power generation in California, most of which is from natural gas combustion. Thus, solar facilities to be built in the

Iron Mountain SEZ could considerably reduce fuel combustion-related emissions in California but relatively less so than those built in other states with higher fossil use rates.

About one-quarter of electricity consumed in California is generated out of state, with about three-quarters of this amount coming from the southwestern states. Thus it is possible that a solar facility in California would replace power from fossil fuel–fired power plants outside of California but within the six-state study area. It is also possible that electric power transfer between the states will increase in the future. To assess the potential region-wide emissions benefit, emissions being displaced were also estimated based on composite emission factors averaged over the six-state study area. For SO_2, NO_x, and Hg, composite emission factors for the six-state study area would be about 5 to 6 times higher than those for California alone. For CO_2, the six-state emission factor is about 60% higher than the California-only emission factor. If the Iron Mountain SEZ were fully developed, emissions avoided would be considerable. Development of solar power in the SEZ would result in avoided air emissions ranging from 5.0 to 9.0% of total emissions of SO_2, NO_x, Hg, and CO_2 from electric power systems in the six southwestern states. These emissions would be up to 4.8% of total emissions from all source categories in the six-state study area.

As discussed in Section 5.11.1.5, the operation of associated transmission lines would generate some air pollutants from activities such as periodic inspections and maintenance. However, these activities would occur infrequently, and the amount of emissions would be small. In addition, transmission lines could produce minute amounts of O_3 and its precursor NO_x associated with corona discharge (i.e., the breakdown of air near high-voltage conductors), which is most noticeable for higher-voltage lines during rain or very humid conditions. Since the Iron Mountain SEZ is located in an arid desert environment, these emissions would be small, and potential impacts on ambient air quality would be negligible, considering the infrequent occurrence and small amount of emissions from corona discharges.

9.2.13.2.3 Decommissioning/Reclamation

As discussed in Section 5.11.1.4, decommissioning/reclamation activities are similar to construction activities but on a more limited scale and of shorter duration. Potential impacts on ambient air quality would be correspondingly less than those from construction activities. Decommissioning activities would last for a short period, and their potential impacts would be moderate and temporary. The same design features adopted during the construction phase would also be implemented during the decommissioning phase (Section 5.11.3).

9.2.13.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features are required. Limiting dust generation during construction and operations at the proposed Iron Mountain SEZ (such as increased watering frequency or road paving or treatment) is a required design feature under BLM's Solar Energy Program. These extensive fugitive dust control measures would keep off-site PM levels as low as possible during construction.

9.2.14 Visual Resources

9.2.14.1 Affected Environment

The proposed Iron Mountain SEZ is located within the CDCA in San Bernardino County in southeastern California. The SEZ occupies 106,522 acres (431 km^2) within the central portion of Ward Valley and extends approximately 19 mi (31 km) east to west and 14 mi (23 km) north to south. The SEZ lies within the Sonoran Basin and Range ecoregion (EPA 2007), typified by small, rocky mountain ranges with jagged peaks alternating with talus slopes and desert floor. Flat basins form broad flat expanses of barren plains, generally with low scrub vegetation and expansive views. Dark browns and garnets are the dominant mountain hues, although blues and purples prevail as viewing distance increases. In contrast, lighter brown and tan soils dominate the desert floor, sparsely dotted with the grey-green of Sonoran creosotebush and golden bursage scrub vegetation (BLM and CEC 2010a). The SEZ and surrounding mountain ranges are shown in Figure 9.2.14.1-1.

The SEZ ranges in elevation from 186 ft (57 m), at a low point in Danby Lake, to 510 ft (155 m), at the base of the Turtle Mountains. The Iron Mountain SEZ is located within the USFS's Cadiz-Vidal subsection, which consists of widely separated mountain ranges in desert plains (USFS 1997).

The SEZ is located within the flat treeless plain of the Ward Valley floor, with the strong horizon line and the forms of surrounding mountain ranges being the dominant visual features. A dry soda lake bed (Danby Lake) is a visually prominent feature in the northwest portion of the SEZ. Danby Lake occupies the lowest portion of the SEZ, and the valley floor slopes gently toward Danby Lake in all directions.

The SEZ is closely bounded by mountain ranges to the east and west, with somewhat more distant mountains to the south and southwest, but much more open views to the southeast and north. The Turtle Mountains rise abruptly directly east of the SEZ, and the Iron Mountains are directly west of the SEZ. The Granite Mountains are located approximately 5 mi (8 km) southwest of the SEZ, and the Little Maria Mountains approximately 10 mi (16 km) to the south. These ranges include peaks generally between 2,000 and 3,500 ft (600 and 1,100 m) in elevation, but some peaks are higher than 5,000 ft (1,524 m) in the Old Woman Mountains. To the southeast, the broad Rice Valley extends more than 15 mi (24 km) to the Big Maria Mountains. The Old Woman Mountains extend northward from the northwest corner of the SEZ, but directly north and slightly east of north from the SEZ, the Ward Valley floor extends more than 25 mi (40 km).

Vegetation is generally sparse in much of the SEZ, with widely spaced shrubs in more or less barren gravel flats. Vegetation within the SEZ is predominantly scrubland, with creosotebush, white bursage, and other low shrubs dominating the Ward Valley floor.

During an August 2009 site visit, the vegetation presented a limited range of greens (mostly the olive green of creosotebushes) and tans (from dried grasses and forbes), with

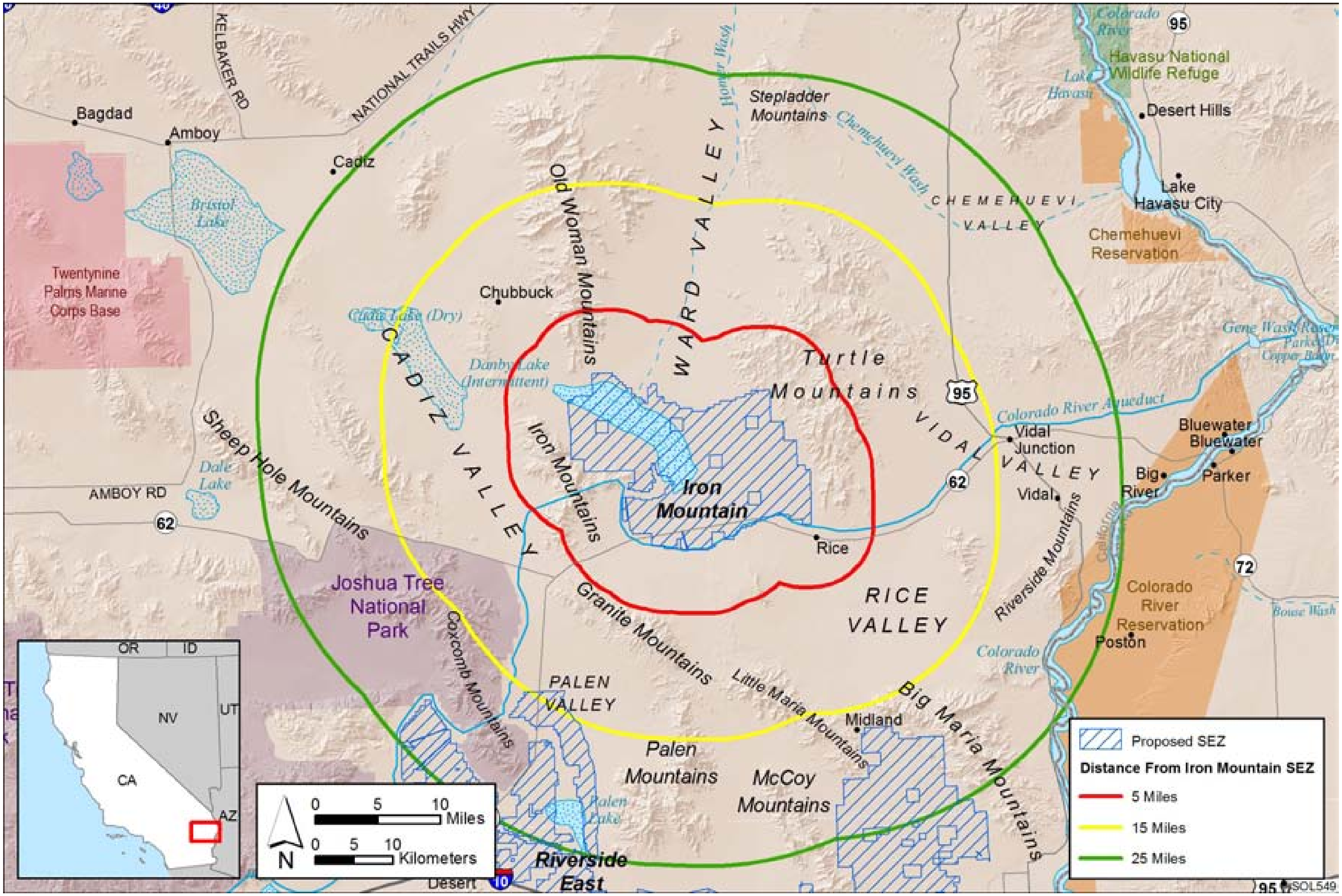

FIGURE 9.2.14.1-1 Proposed Iron Mountain SEZ and Surrounding Lands

medium to coarse textures and generally low visual interest. In the south-central portion of the SEZ, soils are somewhat sandy, finely textured, and very light brown; in other portions of the SEZ the gravel flats present a more coarse texture and light gray color.

There is no permanent surface water within the SEZ; however, Danby Lake in the northwestern portion of the SEZ is subject to periodic flooding. The lake floor is visually conspicuous because of the lack of vegetation and the stark white of the sodium deposits, which contrast in color with the olive green of the creosotebushes and the other colors of the sparse vegetation common to the gravel flats in the surrounding areas.

Cultural disturbances visible within the SEZ include State Route 62, a two-lane highway that passes through the southern edge of the SEZ. While traffic volume on State Route 62 is light, traffic on the highway would be visible from some locations in the southern portion of the SEZ. A railroad traverses the SEZ from the northwest to the southeast, roughly bisecting the SEZ. The railroad in this area is unused or very rarely used, with a few abandoned tank cars present. Cadiz Road is an unpaved road adjacent to and paralleling the railroad. Views to the northeast from Cadiz Road are partially blocked by the railroad embankment. The abandoned town of Milligan is located in the northwest corner of the SEZ. Trailers used by sodium lease operators working the active sodium lease in the northwest portion of the SEZ are visible approximately 1.3 mi (2.2 km) east of Milligan on Cadiz Road. An existing 230-kV transmission line runs north–south through the western portion of the SEZ. These cultural modifications generally detract from the scenic quality of the SEZ; however, the SEZ is so large that from many locations within the SEZ these features are either not visible or so distant as to have minimal effect on views. From most locations within the SEZ, the landscape is generally natural in appearance, with little disturbance visible.

The general lack of topographic relief, water, and variety results in low scenic value within the SEZ itself; however, because of the flatness of the landscape, the lack of trees, and the breadth of the Ward Valley, the SEZ presents a vast panoramic landscape with sweeping views of the surrounding mountains that add significantly to the scenic values within the SEZ viewshed. In general, the mountains appear to be devoid of vegetation, and their generally jagged, irregular form and brown/garnet colors provide dramatic visual contrasts to the strong horizontal line, green vegetation, and light-colored soils of the valley floor, particularly when viewed from nearby locations within the SEZ. Panoramic views of the SEZ are shown in Figures 9.2.14.1-2 and 9.2.14.1-3.

The mountain slopes and peaks around the SEZ are, in general, visually pristine, because they are largely within congressionally designated WAs. The boundary of the Turtle Mountains WA is immediately adjacent to the eastern edge of the SEZ; the Palen-McCoy WA is visible to the south; and Old Woman Mountains WA is adjacent to the northwest corner of the SEZ, and they are separated only by the railroad and an adjacent narrow strip of land. Southeast of the SEZ, the dunes of Rice Valley WA rise 30 to 40 ft (9 to 12 m) above the surface to form a long, narrow band running through the middle of the valley floor. The Iron Mountains immediately west of the SEZ are not within a WA, and a pumping station managed by the MWD and located at the eastern base of the Iron Mountains is visible from nearby portions of the SEZ, as is the

FIGURE 9.2.14.1-2 Approximately 180° Panoramic View of the Proposed Iron Mountain SEZ, Including Granite Mountains at Far Left (Southwest), Iron Mountains at Center (West), Old Woman Mountains at Right (Northwest), and Cadiz Road in Foreground

FIGURE 9.2.14.1-3 Approximately 180° Panoramic View of the Proposed Iron Mountain SEZ, Including Turtle Mountains at Left and Center (North and East), Railroad, Cadiz Road, and Arica Mountains at Right (Southeast)

service road to the pumping station. In this same general area, remnants of the WWII training camps are visible but detract little from scenic values of the SEZ.

Views of the valley floor from the mountains are also important in terms of scenic quality, because much of the region's recreation takes place at higher elevations. Some of these peaks are popular with climbers, and hiking trails provide opportunities for solitude. In addition to the four WAs discussed above, important scenic resources within the 25-mi (40-km) viewshed of the SEZ are Joshua Tree NP, Joshua Tree WA, Big Maria Mountains WA, Riverside Mountains WA, Whipple Mountains WA, Stepladder Mountains WA, Cadiz Dunes WA, Sheephole Valley WA, Turtle Mountains Scenic ACEC, and Turtle Mountains NNL.

The BLM conducted a VRI for the SEZ and surrounding lands in 2010 (BLM 2010d). The VRI evaluates BLM-administered lands based on scenic quality; sensitivity level, in terms of public concern for preservation of scenic values in the evaluated lands; and distance from travel routes or KOPs. Based on these three factors, BLM-administered lands are placed into one of four VRI Classes, which represent the relative value of the visual resources. Class I and II are the most valued; Class III represents a moderate value; and Class IV represents the least value. Class I is reserved for specially designated areas, such as national wildernesses and other congressionally and administratively designated areas, for which decisions have been made to preserve a natural landscape. Class II is the highest rating for lands without special designation. More information about VRI methodology is available in Section 5.12 and in *Visual Resource Inventory*, BLM Manual Handbook 8410-1 (BLM 1986a).

The VRI map for the SEZ and surrounding lands is shown in Figure 9.2.14.1-4. The VRI values for the SEZ and immediate surroundings are VRI Classes IV, III, and II, indicating low, moderate, and high relative visual values, respectively. The majority of the SEZ is rated VRI Class IV or III, with most of the northern portion of the SEZ receiving a Class IV rating, and the southern portion of the SEZ receiving a Class III rating. There are two very small areas of VRI Class II lands in the SEZ. An area of VRI Class II land encompassing about 58 acres (0.23 km^2) is located at the far eastern portion of the SEA in the Iron Mountains, and a larger area (393 acres [1.59 km^2]) is located in the far northeastern portion of the SEZ, at the base of the Turtle Mountains.

The inventory indicates low scenic quality for the SEZ and its immediate surroundings, based in part on the lack of topographic relief and water features and on the relative commonness of the landscape type within the region. Positive scenic quality attributes included some variety in vegetation types and color and attractive off-site views; however, these positive attributes were insufficient to raise the scenic quality to the "Moderate" level. The inventory indicates moderate sensitivity for the northern portion of the SEZ and its immediate surroundings, noting relatively low levels of use and public interest, but high sensitivity for the southern portion of the SEZ within the State Route 62 foreground/middleground viewshed because State Route 62 receives moderate use, and provides access to Joshua Tree National Park, nearby historical military camps, and wilderness areas.

Within the Needles and Palm Springs-South Coast FOs, lands within the 25-mi (40-km), 650-ft (198-m) viewshed of the SEZ contain 114,638 acres (463.924 km^2) of VRI Class I lands,

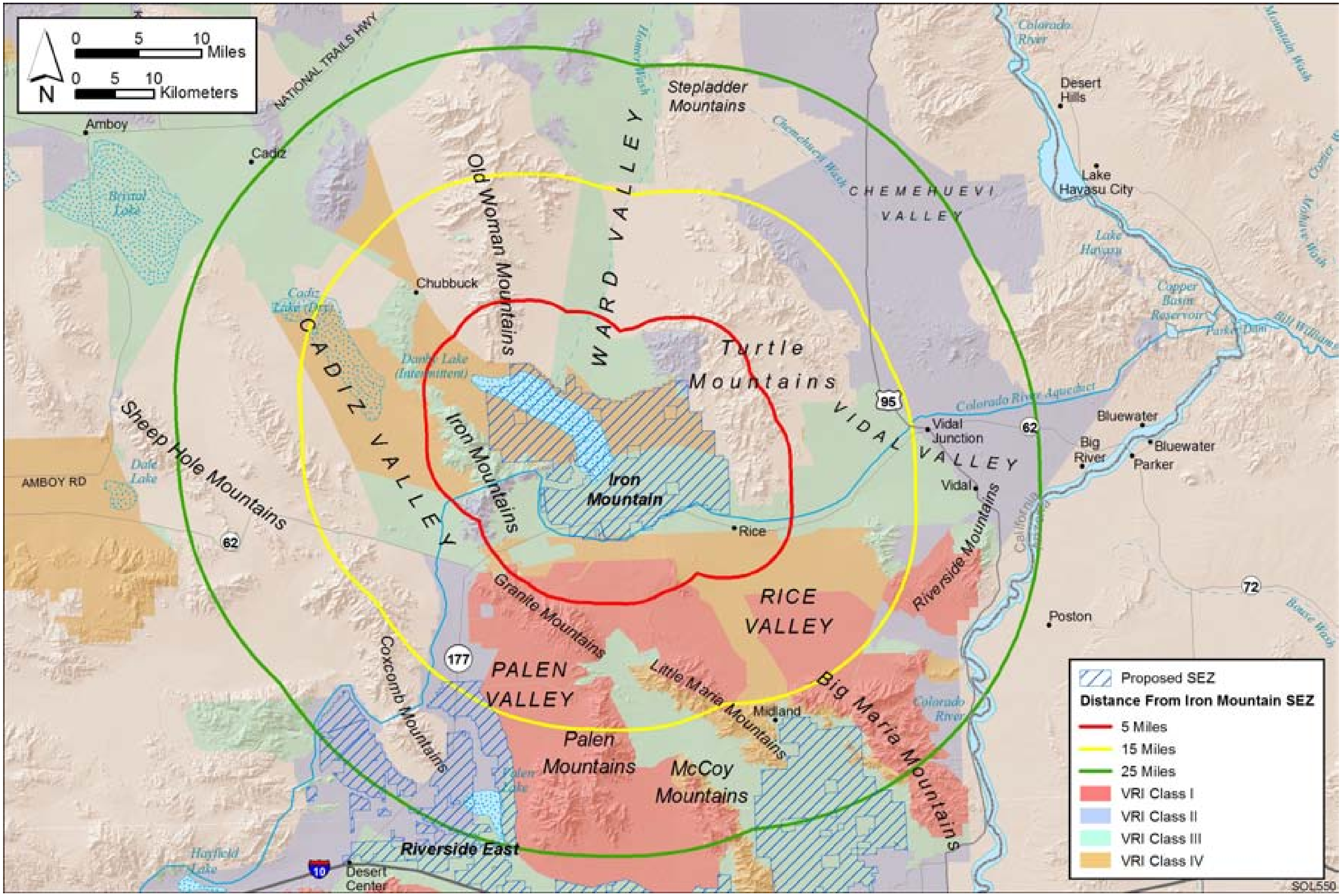

FIGURE 9.2.14.1-4 Visual Resource Inventory Values for the Proposed Iron Mountain SEZ and Surrounding Lands

primarily south of the SEZ in the Granite, Palen, and Big Maria Mountains; 38,979 acres (157.74 km^2) of VRI Class II lands, primarily northeast of the SEZ in the Turtle Mountains and southwest of the SEZ in the Iron Mountains; 244,875 acres (990.974 km^2) of Class III lands, primarily in the Ward, Cadiz, and Vidal Valleys; and 195,350 acres (790.553 km^2) of VRI Class IV lands, primarily in the Ward, Cadiz, and Rice Valleys.

The BLM has not assigned VRM classes to the SEZ and surrounding lands. More information about the BLM VRM program is available in Section 5.12 and in *Visual Resource Management*, BLM Manual Handbook 8400 (BLM 1984).

9.2.14.2 Impacts

The potential for impacts from utility-scale solar energy development on visual resources within the proposed Iron Mountain SEZ and surrounding lands, as well as the impacts of related facilities (e.g., access roads and transmission lines) outside of the SEZ, is presented in this section.

Site-specific impact assessment is needed to systematically and thoroughly assess visual impact levels for a particular project. Without precise information about the location of a project and a relatively complete and accurate description of its major components and their layout, it is not possible to precisely assess the visual impacts associated with the facility. However, if the general nature and location of a facility are known, a more generalized assessment of potential visual impacts can be made by describing the range of expected visual changes and discussing contrasts typically associated with these changes. In addition, a general analysis can identify sensitive resources that may be at risk if a future project is sited in a particular area. Detailed information about the methodology employed for the visual impact assessment used in this PEIS, including assumptions and limitations, is presented in Appendix M.

Potential Glint and Glare Impacts. Similarly, the nature and magnitude of potential glint- and glare-related visual impacts for a given solar facility is highly dependent on viewer position, sun angle, the nature of the reflective surface and its orientation relative to the sun and the viewer, atmospheric conditions, and other variables. The determination of potential impacts from glint and glare from solar facilities within a given proposed SEZ would require precise knowledge of these variables and is not possible given the scope of this PEIS. Therefore, the following analysis does not describe or suggest potential contrast levels arising from glint and glare for facilities that might be developed within the SEZ; however, it should be assumed that glint and glare are possible visual impacts from *any* utility-scale solar facility, regardless of size, landscape setting, or technology type. The occurrence of glint and glare at solar facilities could potentially cause large though temporary increases in brightness and visibility of the facilities. The visual contrast levels projected for sensitive visual resource areas discussed in the following analysis do not account for potential glint and glare effects; however, these effects would be incorporated into a future site- and project-specific assessment that would be conducted for specific proposed utility-scale solar energy projects. For more information about potential glint and glare impacts associated with utility-scale solar energy facilities, see Section 5.12 of this PEIS.

9.2.14.2.1 Impacts on the Proposed Iron Mountain SEZ

Some or all of the SEZ could be developed for one or more utility-scale solar energy projects, utilizing one or more of the solar energy technologies described in Appendix F. Because of the industrial nature and large size of utility-scale solar energy facilities, large visual impacts on the SEZ would occur as a result of the construction, operation, and decommissioning of solar energy projects. In addition, large impacts could occur at solar facilities utilizing highly reflective surfaces or major light-emitting facility components (e.g., solar dish, parabolic trough, and power tower technologies), with lesser impacts associated with reflective surfaces expected from PV facilities. These impacts would be expected to involve major modification of the existing character of the landscape and would likely dominate the nearby views. Additional, and potentially large, impacts would occur as a result of the construction, operation, and decommissioning of related facilities, such as access roads and electric transmission lines. While the primary visual impacts associated with solar energy development within the SEZ would occur during daylight hours, lighting required for utility-scale solar energy facilities would be a potential source of visual impacts at night, both within the SEZ and on surrounding lands.

Common and technology-specific visual impacts from utility-scale solar energy development, as well as impacts associated with electric transmission lines, are discussed in Section 5.12 of this PEIS. Impacts would last throughout construction, operation, and decommissioning, and some impacts could continue after project decommissioning. Visual impacts resulting from solar energy development in the SEZ would be in addition to impacts from solar energy development and other development that may occur on other public or private lands within the SEZ viewshed, and are subject to cumulative effects. For discussion of cumulative impacts, see Section 9.2.22.4.13 of the PEIS.

The changes described above would be expected to be consistent with BLM VRM objectives for VRM Class IV, as seen from nearby KOPs. More information about impact determination using the BLM VRM program is available in Section 5.12 and in *Visual Resource Contrast Rating*, BLM Manual Handbook 8431-1 (BLM 1986b).

Implementation of the programmatic design features intended to reduce visual impacts (described in Appendix A, Section A.2.2, of this PEIS) would be expected to reduce visual impacts associated with utility-scale solar energy development within the SEZ. However, the degree of effectiveness of these design features could be assessed only at the site- and project-specific assessment level. Because of the large scale, reflective surfaces, and strong regular geometry of utility-scale solar energy facilities and the lack of screening vegetation and landforms within the SEZ viewshed, siting the facilities away from sensitive visual resource areas and other sensitive viewing areas would be the primary means of mitigating visual impacts. The effectiveness of other visual impact mitigation measures would generally be limited, but would be important to reduce visual contrasts to the greatest extent possible.

9.2.14.2.2 Impacts on Lands Surrounding the Proposed Iron Mountain SEZ

Because of the large size of utility-scale solar energy facilities and the generally flat, open nature of the proposed SEZ, lands outside the SEZ would be subjected to visual impacts related to the construction, operation, and decommissioning of utility-scale solar energy facilities. The affected areas and extent of impacts would depend on a number of visibility factors and viewer distance (for a detailed discussion of visibility and related factors, see Section 5. 12). A key component in determining impact levels is the intervisibility between the project and potentially affected lands; if topography, vegetation, or structures screen the project from viewer locations, there is no impact.

Preliminary viewshed analyses were conducted to identify which lands surrounding the proposed SEZ could have views of solar facilities in at least some portion of the SEZ (see Appendix N for important information on assumptions and limitations of the methods used). Four viewshed analyses were conducted, assuming four different heights representative of project elements associated with potential solar energy technologies: PV and parabolic trough arrays (24.6 ft [7.5 m]), solar dishes and power blocks for concentrating solar power (CSP) technologies (38 ft [11.6 m]), transmission towers and short solar power towers (150 ft [45.7 m]), and tall solar power towers (650 ft [198.1 m]). Viewshed maps for the SEZ for all four solar technology heights are presented in Appendix N.

Figure 9.2.14.2-1 shows the combined results of the viewshed analyses for all four solar technologies. The colored segments indicate areas with clear lines of sight to one or more areas within the SEZ and from which solar facilities within these areas of the SEZ would be expected to be visible, assuming the absence of screening vegetation or structures and adequate lighting and other atmospheric conditions. The light brown areas are locations from which PV and parabolic trough arrays located in the SEZ could be visible. Solar dishes and power blocks for CSP technologies would be visible from the areas shaded in light brown and the additional areas shaded in light purple. Transmission towers and short solar power towers would be visible from the areas shaded light brown and light purple and the additional areas shaded in dark purple. Power tower facilities located in the SEZ could be visible from areas shaded light brown, light purple, and dark purple, and at least the upper portions of power tower receivers could be visible from the additional areas shaded in medium brown.

For the following visual impact discussion, the tall solar power tower (650 ft [198.1 m]) and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds are shown in the figures and discussed in the text. These heights represent the maximum and minimum landscape visibility for solar energy technologies analyzed in this PEIS. Viewsheds for solar dish and CSP technology power blocks (38 ft [11.6 m]) and for transmission towers and short solar power towers (150 ft [45.7 m]) are presented in Appendix N. The visibility of these facilities would fall between that for tall power towers and PV and parabolic trough arrays.

Impacts on Selected Federal-, State-, and BLM-Designated Sensitive Visual Resource Areas

Figure 9.2.14.2-2 shows the results of a GIS analysis that overlays selected federal, state, and BLM-designated sensitive visual resource areas onto the combined tall solar power tower (650 ft [198.1 m]) and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds, in order to illustrate which of these sensitive visual resource areas could have views of solar facilities within

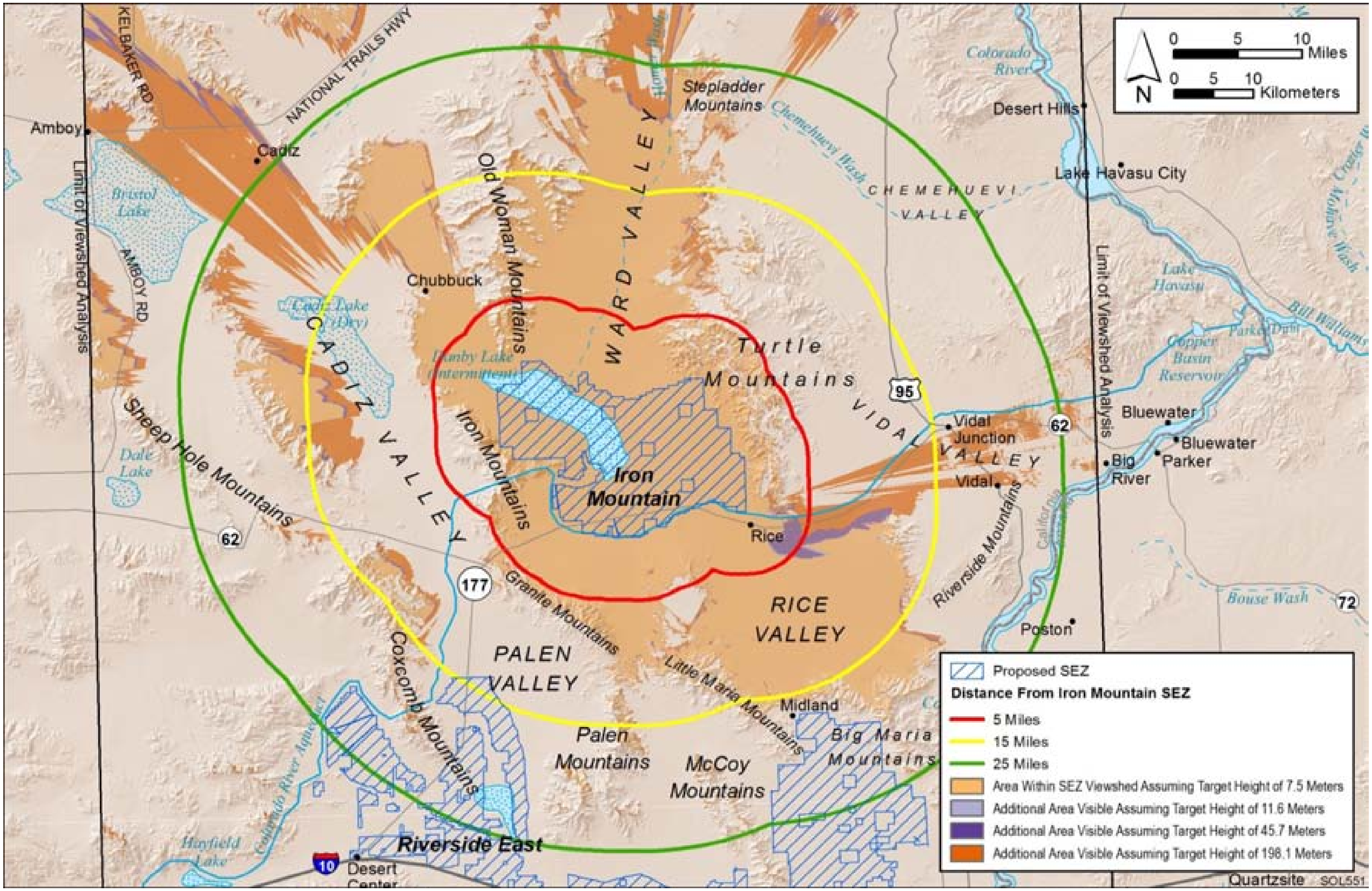

FIGURE 9.2.14.2-1 Viewshed Analyses for the Proposed Iron Mountain SEZ and Surrounding Lands, Assuming Solar Technology Heights of 24.6 ft (7.5 m), 38 ft (11.6 m), 150 ft (45.7 m), and 650 ft (198.1 m) (shaded areas indicate lands from which solar development within the SEZ could be visible)

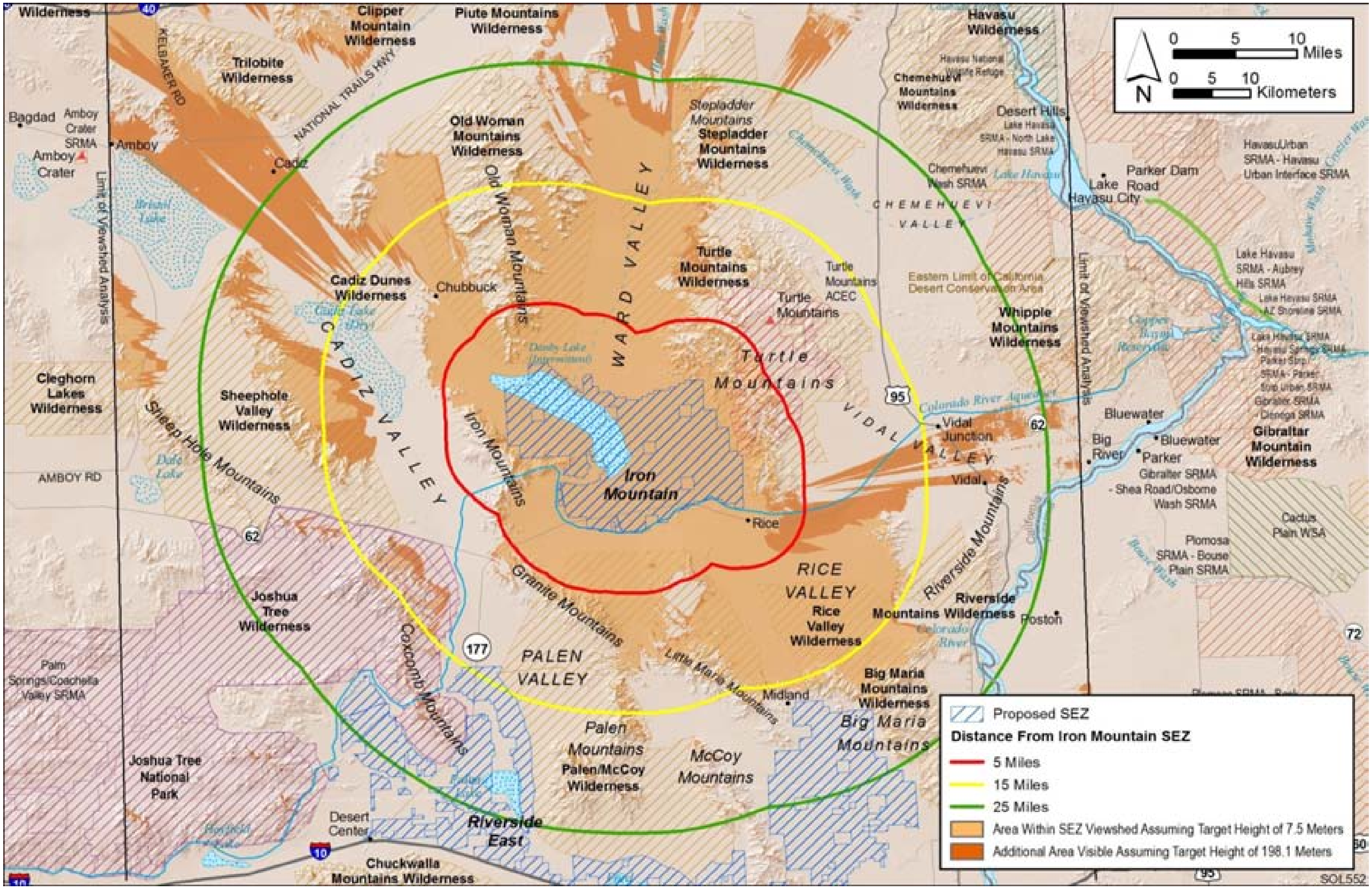

FIGURE 9.2.14.2-2 Overlay of Selected Sensitive Visual Resource Areas onto Combined 650-ft (198.1-m) and 24.6-ft (7.5-m) Viewsheds for the Proposed Iron Mountain SEZ

the SEZ and therefore potentially would be subject to visual impacts from those facilities. Distance zones that correspond with the BLM's VRM system-specified foreground–middleground distance (5 mi [8 km]), background distance (15 mi [24 km]), and a 25-mi (40-km) distance zone are shown as well, in order to indicate the effect of distance from the SEZ on impact levels, which are highly dependent on distance.

The scenic resources included in the analyses were as follows:

- National Parks, National Monuments, National Recreation Areas, National Preserves, National Wildlife Refuges, National Reserves, National Conservation Areas, National Historic Sites;

- Congressionally authorized Wilderness Areas;

- Wilderness Study Areas;

- National Wild and Scenic Rivers;

- Congressionally authorized Wild and Scenic Study Rivers;

- National Scenic Trails and National Historic Trails;

- National Historic Landmarks and National Natural Landmarks;

- All-American Roads, National Scenic Byways, State Scenic Highways; and BLM- and USFS-designated scenic highways/byways;

- BLM-designated Special Recreation Management Areas; and

- ACECs designated because of outstanding scenic qualities.

Potential impacts on specific sensitive resource areas visible from and within 25 mi (40 km) of the proposed Iron Mountain SEZ are discussed below. The results of this analysis are also summarized in Table 9.2.14.2-1. Further discussion of impacts on these areas is presented in Sections 9.2.3 (Specially Designated Areas and Lands with Wilderness Characteristics) and 9.2.17 (Cultural Resources) of this PEIS.

The following visual impact analysis describes *visual contrast levels*, rather than *visual impact levels*. *Visual contrasts* are changes in the seen landscape, including changes in the forms, lines, colors, and textures of objects seen in the landscape. A measure of *visual impact* includes potential human reactions to the visual contrasts arising from a development activity, based on viewer characteristics, including attitudes and values, expectations, and other characteristics that are viewer- and situation-specific. Accurate assessment of visual impacts requires knowledge of the potential types and numbers of viewers for a given development and their characteristics and expectations; specific locations where the project might be viewed from; and other variables that were not available or not feasible to incorporate in this PEIS analysis. These variables would be

GOOGLE EARTH™ VISUALIZATIONS

The visual impact analysis discussion in this section utilizes three-dimensional Google Earth™ perspective visualizations of hypothetical solar facilities placed within the SEZ. The visualizations include simplified wireframe models of a hypothetical solar power tower facility. The models were placed at various locations within the SEZ as visual aids for assessing the approximate size and viewing angle of utility-scale solar facilities. The visualizations are intended to show the apparent size, distance, and configuration of the SEZ, as well as the apparent size of a typical utility-scale solar power tower project and its relationship to the surrounding landscape, as viewed from potentially sensitive visual resource areas within the viewshed of the SEZ.

The visualizations are not intended to be realistic simulations of the actual appearance of the landscape or of proposed utility-scale solar energy projects. The placement of models within the SEZ did not reflect any actual planned or proposed projects within the SEZ and did not take into account engineering or other constraints that would affect the siting or choice of facilities for this particular SEZ. The number of facility models placed in the SEZ does not reflect the 80% development scenario analyzed in this PEIS, but the discussion of expected visual contrast levels does account for the 80% development scenario. A solar power tower was chosen for the models because the unique height characteristics of power tower facilities make their visual impact potential extend beyond other solar technology types.

incorporated into a future site- and project-specific assessment that would be conducted for specific proposed utility-scale solar energy projects. For more discussion of visual contrasts and impacts, see Section 5.12 of the PEIS.

National Parks

- Joshua Tree—Joshua Tree National Park is located approximately 9.9 mi (15.9 km) southwest of the SEZ at the point of closest approach. The vast park is a popular winter climbing area and contains paved roads popular for scenic driving, several miles of hiking trails, and four-wheel drive roads. There are campgrounds, and backcountry camping and hiking are allowed. Stargazing is popular year round, as is bird watching. Most of the park's services and facilities are in the western portion of the park, as is most recreational use; however, the undeveloped wilderness portions of the park, including those areas near the SEZ, are visited by persons seeking solitude, or wilderness experiences or engaging in other activities appropriate to the relatively undisturbed environment.

  As shown in Figure 9.2.14.2-2, solar energy facilities within the SEZ could be visible from the far northeastern and eastern portions of the park (approximately 14,606 acres [59.108 km^2] in the 650-ft [198.1-m] viewshed, or 1.8% of the total park acreage, and 7,551 acres [30.56 km^2] in the 24.6-ft [7.5 m] viewshed, or 1.0% of the total park acreage). The area of the national park with potential visibility of solar facilities in the SEZ extends approximately 21 mi (33 km) from the southwestern boundary of the SEZ. This area includes the northeast-facing slopes of the Coxcomb Mountains,

TABLE 9.2.14.2-1 Selected Potentially Affected Sensitive Visual Resources within 25-mi Viewshed of the Proposed Iron Mountain SEZ, Assuming a Target Height of 650 ft (198.1 m)

		Feature Area or Linear Distance[a]		
			Visible between	
Feature Type	Feature Name (Total Acreage)	Visible within 5 mi	5 mi and 15 mi	15 mi and 25 mi
National Park	Joshua Tree (793,331 acres)	0 acres	8,931 acres (1.1%)[b]	5,675 acres (0.7%)
National Conservation Area	California Desert (25,919,319 acres)	308,931 acres (1.2%)	318,258 acres (1.2%)	194,332 acres (0.7%)
WAs	Big Maria Mountains (46,056 acres)	0 acres	0 acres	8,974 acres (19.5%)
	Cadiz Dunes (21,286 acres)	0 acres	79 acres (0.4%)	1,394 acres (6.6%)
	Joshua Tree (586,623 acres)	0 acres	8,898 acres (1.5%)	5,435 acres (0.9%)
	Old Woman Mountains (183,555 acres)	20,092 acres (10.9%)	53,934 acres (29.4%)	14,734 acres (8.0%)
	Palen-McCoy (224,414 acres)	19,297 acres (8.6%)	38,016 acres (16.9%)	14,734 acres (6.6%)
	Rice Valley (43,412 acres)	0 acres	34,944 acres (80.5%)	5,695 acres (13.1%)
	Riverside Mountains (24,206 acres)	0 acres	688 acres (2.8%)	130 acres (0.5%)
	Sheephole Valley (195,002 acres)	0 acres	11,755 acres (6.0%)	25,278 acres (13.0%)
	Stepladder Mountains (84,187 acres)	0 acres	0 acres	12,833 acres (15.2%)
	Turtle Mountains (182,610 acres)	26,358 acres (14.4%)	43,947 acres (24.1%)	2,787 acres (1.5%)
	Whipple Mountains (78,484 acres)	0 acres	0 acres	97 acres (0.1%)

TABLE 9.2.14.2-1 (Cont.)

Feature Type	Feature Name (Total Acreage)	Feature Area or Linear Distance[a]		
		Visible within 5 mi	Visible between 5 mi and 15 mi	Visible between 15 mi and 25 mi
National Natural Landmark	Turtle Mountains (50,057 acres)	9,384 acres (18.7%)	640 acres (1.3%)	0 acres
ACEC designated for outstanding scenic values	Turtle Mountains (50,057 acres)	9,384 acres (18.7%)	640 acres (1.3%)	0 acres

[a] To convert acres to km^2, multiply by 0.004047, to convert mi to km, multiply by 1.609.

[b] Percentage of total feature area for areal features.

down to approximately 1,150 ft (350 m) in elevation at the lowest points. Visitation to this part of the park is low.

Figure 9.2.14.2-3 is Google Earth visualization of the SEZ as seen from an unnamed peak in the northeastern portion of the national park, approximately 14 mi (23 km) from the southeast portion of the SEZ. The viewpoint is 3,000 ft (900 m) higher in elevation than the SEZ. The visualization includes simplified wireframe models of a hypothetical solar power tower facility. The models were placed within the SEZ as a visual aid for assessing the approximate size and viewing angle of utility-scale solar facilities. The receiver towers depicted in the visualization are properly scaled models of a 459-ft (139.9-m) power tower with an 867-acre (3.5-km^2) field of 12-ft (3.7-m) heliostats, each representing approximately 100 MW of electric generating capacity. Five groups of four models were placed in the SEZ for this and other visualizations shown in this section of this PEIS. In the visualization, the SEZ area is depicted in orange, the heliostat fields in blue.

The upper slopes and peaks of the Coxcomb Mountains are barren, with little opportunity for screening. As shown in the visualization, a substantial portion of the SEZ would be visible from this location through a gap between the Iron Mountains to the west and the Granite Mountains to the east. At the higher elevations within the national park, the angle of view would be great enough that the tops of solar collector/reflector arrays might be visible in some locations. At lower elevations the angle of view would be lower, so that solar collector/reflector arrays would repeat the line of the plain in which the SEZ is located, tending to reduce contrast. If power towers were present within the SEZ, when operating, the receivers would likely appear as distant points of light against the backdrop of the valley floor, or possibly the Turtle Mountains, depending on viewing angle and facility location.

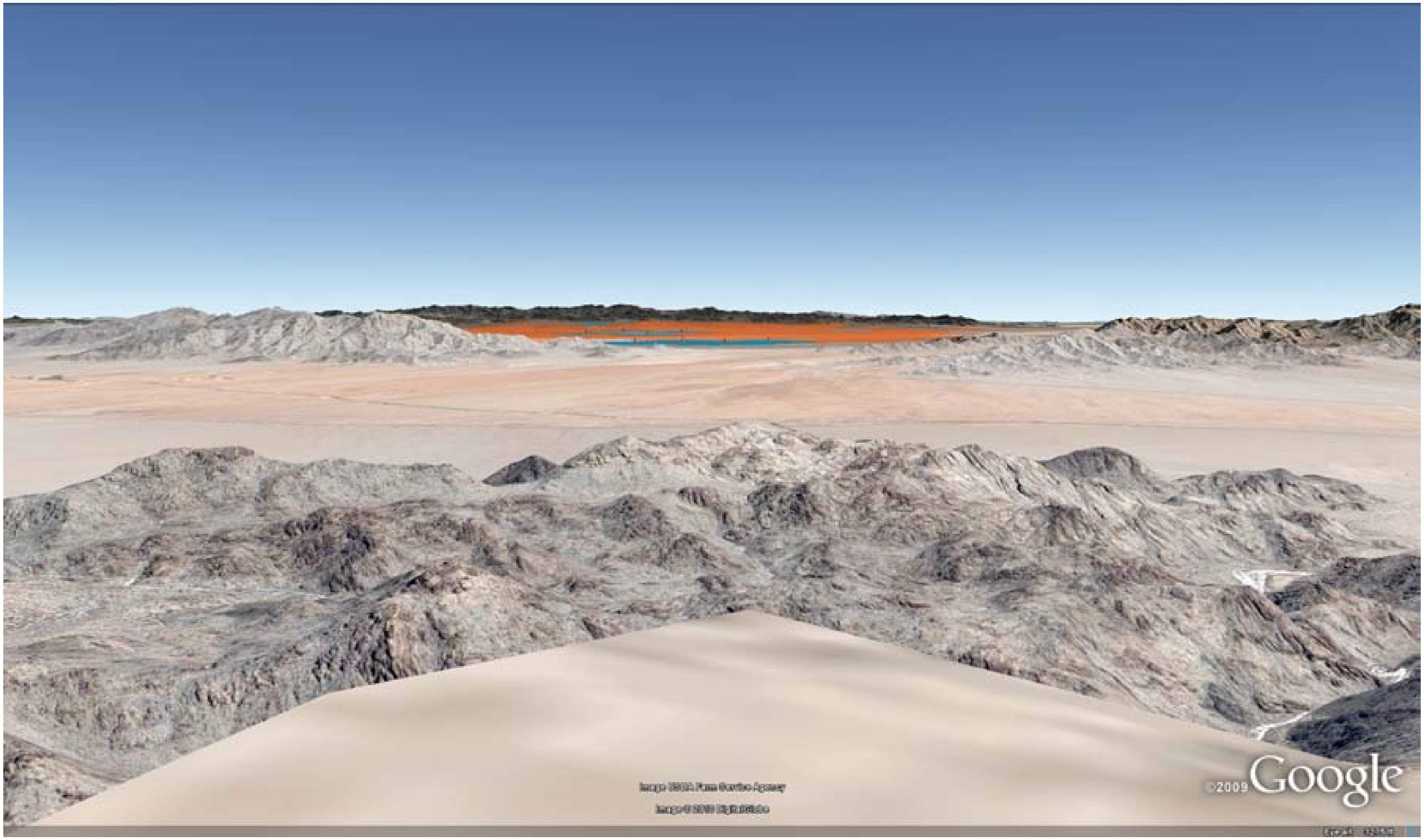

FIGURE 9.2.14.2-3 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Viewpoint within Joshua Tree National Park

At night, if sufficiently tall, the power towers could have red or white flashing hazard navigation lights that would likely be visible in the national park and could attract attention, given the dark night skies in the vicinity of the SEZ. Other lighting associated with solar facilities in the SEZ could potentially be visible as well.

The range of contrasts from solar facilities within the SEZ that would be visible in the national park would be highly dependent on viewer location within the national park, especially with respect to the gap between the Iron Mountains and the Granite Mountains; these mountains restrict the view from many locations within the park. Under the 80% development scenario analyzed in this PEIS, solar facilities within the SEZ would be expected to create weak to moderate visual contrasts as viewed from the national park. The highest levels of visual contrast would be expected for viewing locations at higher elevations in the far northeastern portion of the park, with less visibility and lower contrast levels expected at lower elevations and/or more distant locations.

This location also has partial views of the much closer proposed Riverside East SEZ. Under the development scenario analyzed in this PEIS, solar energy development in the Riverside SEZ would be expected to result in much larger visual impacts than development within the Iron Mountain SEZ, when viewed from this and nearby locations within the national park, especially for those portions of the park closest to the Riverside East SEZ.

National Conservation Area

- *California Desert*—The CDCA is a 26-million-acre (105,000-km^2) parcel of land in southern California designated by Congress in 1976 through the Federal Land Policy and Management Act. About 10 million acres (40,000 km^2) of the CDCA is administered by the BLM. The proposed Iron Mountain SEZ is located within the CDCA.

  The CDCA management plan notes the "superb variety of scenic values" in the CDCA (BLM 1999) and lists scenic resources as needing management to preserve their value for future generations. The CDCA management plan divides CDCA lands into multiple-use classes based on management objectives. The class designations govern the type and degree of land use actions allowed within the areas defined by class boundaries. All land use actions and resource management activities on public lands within a multiple-use class delineation must meet the guidelines given for that class.

  Most of the proposed SEZ is classified as multiple-use class "M." This class provides for a wide variety of present and future uses, such as mining, livestock grazing, recreation, energy, and utility development. Class M management is also designed to conserve desert resources and to mitigate damage to those resources caused by permitted uses.

Two small portions of the SEZ along the eastern SEZ boundary and another very small parcel north of the Milligan town site are classified as multiple-use class "L." Multiple-Use Class L (Limited Use) protects sensitive, natural, scenic, ecological, and cultural resource values. Public lands designated as Class L are managed to provide for generally lower intensity, carefully controlled multiple use of resources, while ensuring that sensitive values are not significantly diminished.

A larger area in the far northwestern portion of the SEZ is classified as multiple-use class "I." Multiple-Use Class I is an "Intensive Use" class. Its purpose is to provide for concentrated use of lands and resources to meet human needs. Reasonable protection will be provided for sensitive natural and cultural values. Mitigation of impacts on resources and rehabilitation of affected areas will occur insofar as possible.

Utility-scale solar development within the SEZ would be an allowable use under the CDCA management plan for areas classified as multiple-use classes "M" and "I," assuming mitigation measures would be used to minimize visual impacts. However, construction and operation of solar facilities under the PEIS development scenario would result in substantial visual impacts on the SEZ and some surrounding lands within the SEZ viewshed that could not be completely mitigated.

Portions of the CDCA within the 650-ft (198.1-m) viewshed for the Iron Mountain SEZ include approximately 821,521 acres [3,324.58 km^2], or 3.2% of the total CDCA acreage. Portions of the CDCA within the 24.6-ft (7.5-m) viewshed encompass approximately 708,349 acres (2,866.59 km^2), or 2.7% of the total CDCA acreage. Absent screening and other visibility factors that would prevent viewers from seeing solar energy facilities within the SEZ, all CDCA lands within the SEZ viewshed would be subject to visual impacts from solar development within the SEZ. The nature of the visual contrasts observed would vary with the distance from the SEZ, the angle of view, project numbers, sizes and locations, and other project- and site-specific factors.

Wilderness Areas

- *Whipple Mountains*—The Whipple Mountains Wilderness is a 78,484-acre (317.61 km^2) congressionally designated WA located 22 mi (36 km) at the point of closest approach east–northeast of the SEZ. The east–west oriented Whipple Mountains are the dominant land form within the WA. Hiking, horseback riding, hunting, camping, rock hounding, photography, and backpacking are popular recreational activities for visitors to the WA.

As shown in Figure 9.2.14.2-2, within 25 mi (40 km) of the SEZ, solar energy facilities within the SEZ could be visible from a very small part of the far western portion of the WA (approximately 97 acres [0.39 km^2]) in the 650-ft (198.1-m) viewshed, or 0.1% of the total WA acreage. There would be no visibility for the lower height viewsheds. Within the 25-mi (40-km) radius of analysis, the visible area of the WA extends 25 mi (40 km) from the eastern boundary of the SEZ. Limited visibility extends beyond 25 mi (40 km).

The viewshed analysis suggests that the upper portions of tall power tower receivers located in the extreme southeastern portion of the SEZ would be just visible through a notch in the far southern portion of the Turtle Mountains; however, because of the long distance to the SEZ and the low angle of view, visual impacts on the WA would be expected to be minimal. If one or more power towers were situated so that they were visible through the gap and the towers were of sufficient height, they could have red or white hazard navigation lighting that could potentially be visible at night.

- *Big Maria Mountains*—The Big Maria Mountains Wilderness is a 46,056-acre (186.38 km^2) congressionally designated WA located about 16 mi (25 km) at the point of closest approach southeast of the SEZ. The Big Maria Mountains contain gently sloping bajadas and rough, craggy peaks separated by steep canyons. Camping, hunting, hiking, backpacking, horseback riding, and wildlife viewing are recreational activities in the WA. There are no trails, but abandoned jeep tracks are used for hiking.

  As shown in Figure 9.2.14.2-2, within 25 mi (40 km) of the SEZ, solar energy facilities within the SEZ could be visible from much of the far northern portion of the WA and from scattered locations along the northern portion of the western boundary of the WA. Visible areas of the WA within the 25-mi (40-km) radius of analysis total approximately 8,974 acres (36.32 km^2) in the 650-ft (198.1-m) viewshed, or 19.5% of the total WA acreage, and 8,501 acres (34.40 km^2) in the 24.6-ft (7.5-m) viewshed, or 18.5% of the total WA acreage. The visible area of the WA extends approximately 23.8 mi (38.3 km) from the southeastern corner of the SEZ.

  Figure 9.2.14.2-4 is a Google Earth visualization of the SEZ as seen from an unnamed peak in the northwestern portion of the WA, approximately 18 mi (29 km) from the southeast portion of the SEZ. The viewpoint is about 2,400 ft (730 m) higher in elevation than the SEZ. The SEZ area is depicted in orange, the heliostat fields in blue.

  The upper slopes and peaks of the WA are sparsely vegetated, with little opportunity for screening, and a substantial portion of the SEZ would be

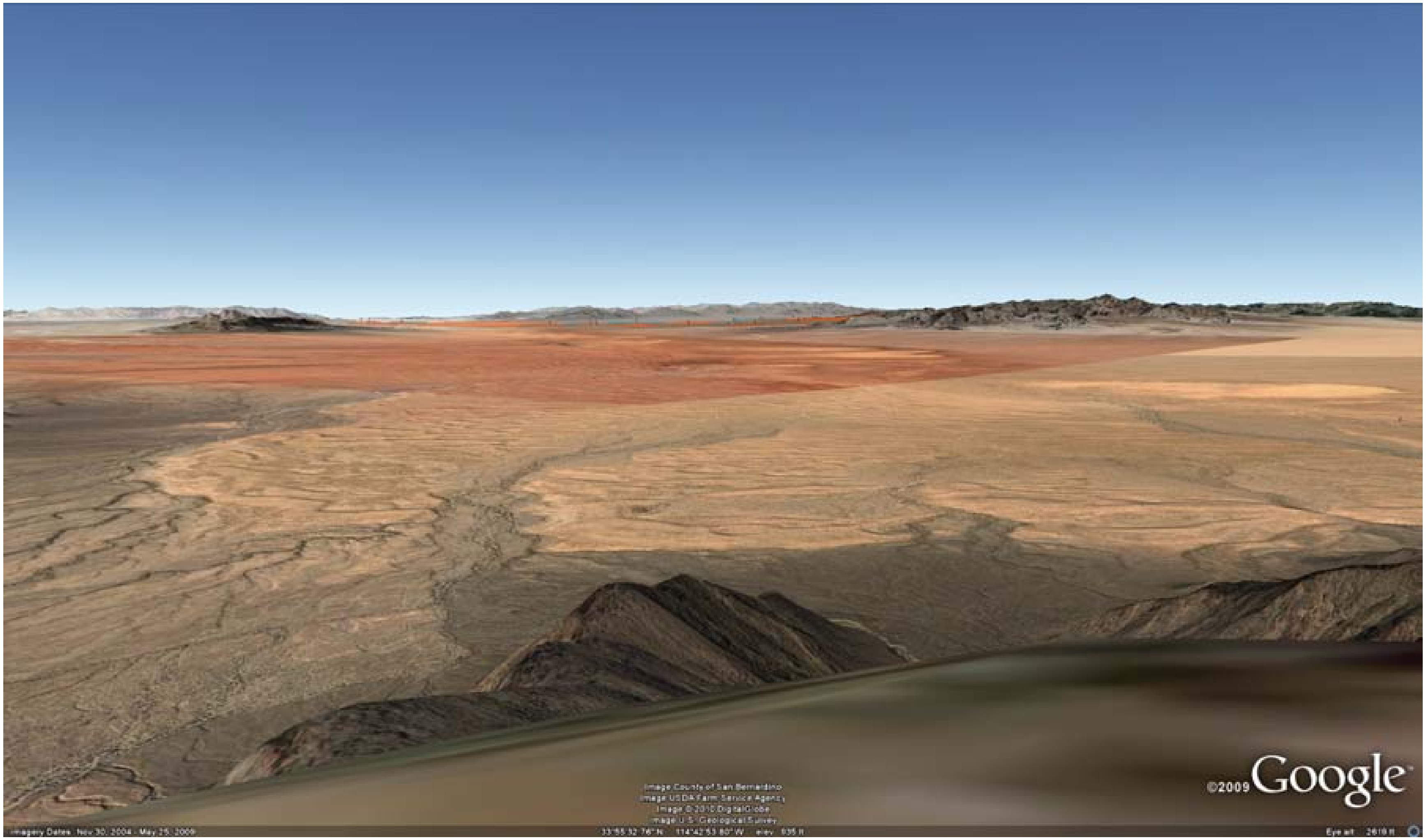

FIGURE 9.2.14.2-4 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in narrow orange and blue tinted band) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Viewpoint within the Big Maria Mountains WA

visible from this location. At the higher elevations within the WA, the angle of view would be great enough that the tops of solar collector/reflector arrays might be visible in some cases. However, because of the long distance to the SEZ, the angle of view would still be low enough that the arrays would repeat the line of the plain in which the SEZ is located and this would tend to reduce contrast. If power towers were present within the SEZ, when operating, the receivers would likely appear as distant points of light against the backdrop of the Iron and Old Woman Mountains. At night, if sufficiently tall, the power towers could have red or white flashing hazard navigation lights that would likely be visible in the WA and could attract attention, given the dark night skies in the vicinity of the SEZ.

The range of visual contrasts associated with solar facilities in the SEZ as observed from the WA would be highly dependent on viewer location within the WA and on project location and design. Under the 80% development scenario analyzed in this PEIS, solar facilities within the SEZ would be expected to create minimal to weak visual contrasts as viewed from the WA. The highest levels of visual contrast would be expected for viewing locations at higher elevations in the far northern portion of the WA, with less visibility and lower contrast levels expected at lower elevations.

This location also has a very open view of the much closer proposed Riverside East SEZ. Under the development scenario analyzed in this PEIS, solar energy development in the Riverside East SEZ would be expected to result in much larger visual impacts than development in the Iron Mountain SEZ, when viewed from this and nearby locations within the WA.

- *Stepladder Mountains*—The Stepladder Mountains Wilderness is an 84,187-acre (340.69-km^2) congressionally designated WA located about 15mi (24 km) at the point of closest approach north of the SEZ. The Stepladder Mountains are a bleak mountain range about 10 mi (14 km) in length north to south. Several trails cross the wilderness, accessible from along Turtle Mountain Road. Camping, hunting, hiking, backpacking, and wildlife viewing are recreational activities in the WA.

  As shown in Figure 9.2.14.2-2, within the 25-mi (40-km) radius of analysis, solar energy facilities within the SEZ could be visible from the far southern portion of the WA (approximately 12,833 acres [51.933 km^2] in the 650-ft [198.1-m] viewshed, or 15.2% of the total WA, and 9,307 acres [37.66 km^2] in the 24.6-ft [7.5-m] viewshed, or 11.1% of the total WA acreage). The visible area of the WA extends beyond 25 mi (40 km) from the northern boundary of the SEZ.

  Figure 9.2.14.2-5 is a Google Earth visualization of the SEZ as seen from an unnamed peak in the far southern portion of the WA, approximately 16 mi

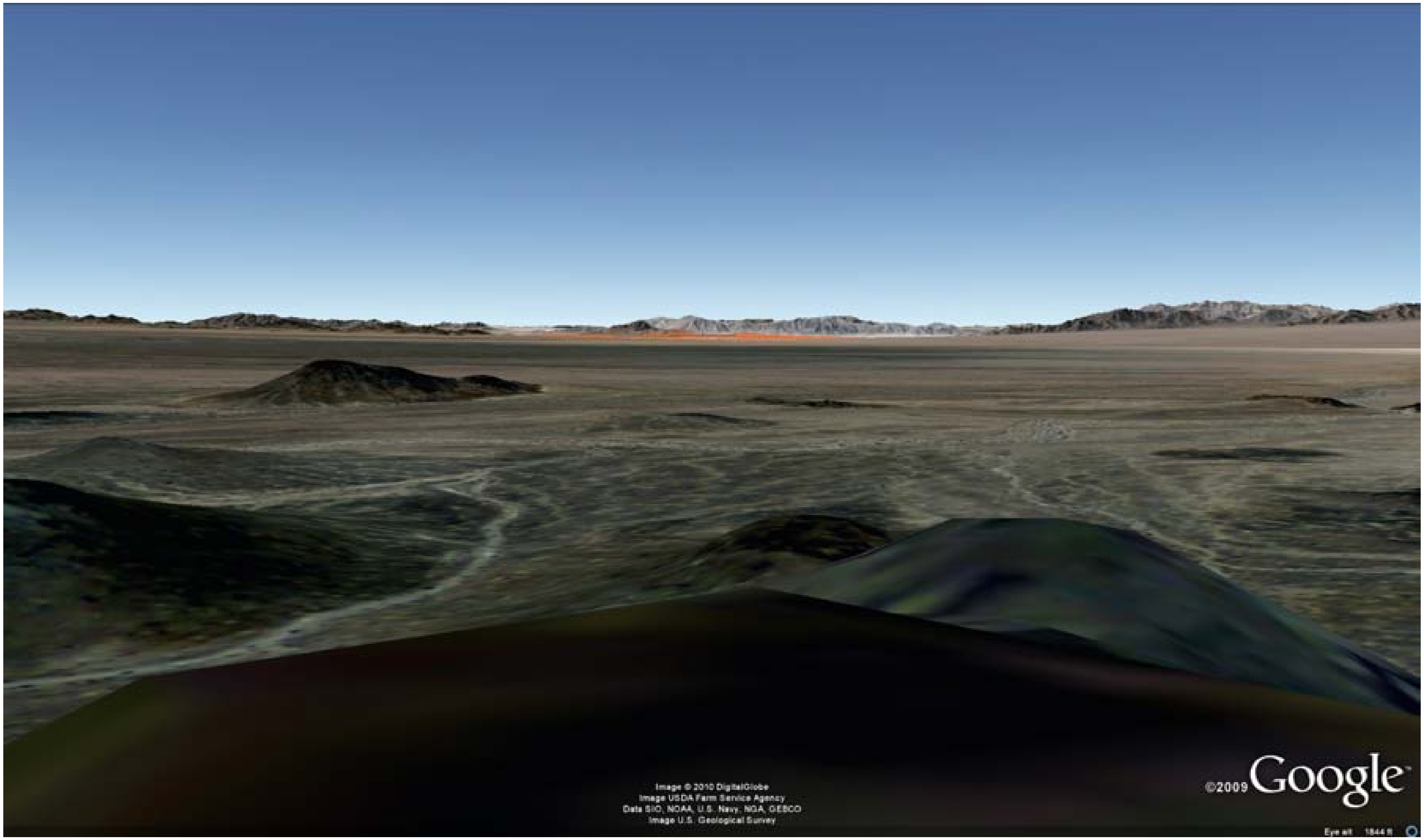

FIGURE 9.2.14.2-5 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Viewpoint within the Stepladder Mountains WA

(26 km) from the northern boundary of the SEZ. The SEZ area is depicted in orange, the heliostat fields in blue.

The upper slopes and peaks of the WA are sparsely vegetated with little opportunity for screening, and the northwestern portion of the SEZ would be visible from this location. Despite the elevated viewpoint, the long distance to the SEZ would make the angle of view low enough that visible solar collector/reflector arrays within the SEZ would repeat the line of the plain in which the SEZ is located and this would tend to reduce contrast. If power towers were present within the SEZ, when operating, the receivers would likely appear as distant points of light against the backdrop of the Iron and Palen-McCoy Mountains.

At night, if sufficiently tall, the power towers could have red or white flashing hazard navigation lights that would likely be visible in the WA, and could be attract attention, given the dark night skies in the vicinity of the SEZ.

The range of impact would be highly dependent on viewer location within the WA and on project location and design. Under the 80% development scenario analyzed in this PEIS, solar facilities within the SEZ would be expected to create minimal to weak visual contrasts as viewed from the WA. The highest levels of visual contrast would be expected for viewing locations at higher elevations in the far southern portion of the WA, with less visibility and lower contrast levels expected at lower elevations.

- *Cadiz Dunes*—The Cadiz Dunes Wilderness is a 21,286-acre (86.141-km^2) congressionally designated WA located about 11 mi (17 km) at the point of closest approach northwest of the SEZ. The WA encompasses a major portion of the Cadiz Dune system and desert shrub lowlands just east of the dunes. The pristine nature of the dunes and the spring display of unique dune plants make the area popular for photography. Camping, hiking, backpacking, and wildlife viewing are recreational activities in the WA.

  The upper portions of sufficiently tall power tower receivers in certain locations within the SEZ could be visible through notches in the Kilbeck Hills from scattered locations in the far northwestern portions of the WA (approximately 1,473 acres [5.961 km^2] in the 650-ft [198.1-m] viewshed, or 6.9% of the total WA acreage). The lower-height viewshed analyses indicate there would be no visibility for solar dishes, parabolic troughs, or PV collector arrays. The visible area of the WA extends approximately 18 mi (29 km) from the northwest corner of the SEZ.

  The portions of the WA with views of the SEZ are lower in elevation than the nearest portions of the SEZ by 100 ft (30 m) or more, so the angle of view is very low. Because of the limited areas of visibility, very low angle of view, and the relatively long distance to the SEZ, visual impacts on the WA would be expected to be minimal.

- *Riverside Mountains*—The Riverside Mountains Wilderness is a 24,206-acre (97.958-km^2) congressionally designated WA located 13.7 mi (22.1 km) at the point of closest approach southeast of the SEZ. The WA includes the Riverside Mountains and bajadas descending to the Colorado River. Camping, hiking, backpacking, horseback riding, hunting, and wildlife viewing are recreational activities in the WA.

  As shown in Figure 9.2.14.2-2, solar energy facilities within the SEZ could be visible from some locations in the far western portion of the WA, from the peak of Riverside Mountain (about 21 mi [34 km] from the SEZ), and, for the upper portions of power tower receivers only, some locations within the WA farther east and higher than 2,000 ft (610 m) in elevation. Total WA acreage within the viewshed of the SEZ is approximately 818 acres (3.31 km^2) in the 650-ft (198.1-m) viewshed, or 3.4% of the total WA acreage, and 488 acres (1.97 km^2) in the 24.6-ft (7.5-m) viewshed, or 2.0% of the total WA acreage. The visible area of the WA extends approximately 21 mi (34 km) from the southeast boundary of the SEZ; however, the main area of visibility is located approximately 16mi (26 km) from the SEZ.

  The upper slopes and peaks of the WA are sparsely vegetated with little opportunity for screening, and the southeastern portion of the SEZ could be visible from these areas. However, because of the long distance to the SEZ, the angle of view is still low enough that solar arrays would repeat the line of the plain in which the SEZ is located, which would tend to reduce contrast. If power towers were present within the SEZ, when operating, the receivers would likely appear as distant points of light against the backdrop of the Iron Mountains and possibly against a sky backdrop between the Iron Mountains and the Old Woman Mountains. At night, if sufficiently tall, the power towers could have red or white flashing hazard navigation lights that would likely be visible in the WA and could attract attention, given the dark night skies in the vicinity of the SEZ.

  Under the 80% development scenario analyzed in this PEIS, solar facilities within the SEZ would be expected to create minimal to weak visual contrasts as viewed from the WA. The highest levels of visual contrast would be expected for viewing locations at higher elevations in the far western portion of the WA, with less visibility and lower contrast levels expected at lower elevations. From the area around Riverside Mountain, minimal to weak levels of visual contrast would be expected from solar energy facilities within the SEZ.

- *Joshua Tree*—The Joshua Tree Wilderness is a 586,623-acre (2,373.98-km^2) congressionally designated WA located entirely within Joshua Tree National

Park. Areas of the WA within the viewshed of the SEZ are identical to those for Joshua Tree National Park, and expected visual contrast levels are the same as those expected for the park (see above).

- *Sheephole Valley*—The Sheephole Valley Wilderness is a 195,002-acre (789.145-km^2) congressionally designated WA located about 11 mi (18 km) at the point of closest approach west of the SEZ. The WA includes the Sheephole Mountains, the Calumet Mountains, and the Sheephole Valley. The Sheepholes are a steep, boulder-strewn mountain range; the Calumets are similar but much lower. Camping, hiking, backpacking, hunting, and wildlife viewing are recreational activities in the WA.

  As shown in Figure 9.2.14.2-2, within 25 mi (40 km) of the SEZ, solar energy facilities within the SEZ could be visible from the eastern portion of the WA (approximately 25,278 acres [102.30 km^2] in the 1650-ft [98.1-m] viewshed, or 13.1% of the total WA acreage, and 17,889 acres [72.394 km^2] in the 7.5 m viewshed, or 9.2% of the total WA acreage). The visible area of the WA extends approximately 25 mi (40 km) from the northwestern boundary of the SEZ. Visible areas include the east-facing slopes of the Calumet Mountains, down to approximately 820 ft (250 m) in elevation at the lowest point on the eastern boundary of the WA.

  Figure 9.2.14.2-6 is a Google Earth visualization of the SEZ as seen from an unnamed peak in the east central portion of the WA, approximately 18 mi (29 km) from the western boundary of the SEZ. The viewpoint is about 2,700 ft (820 m) higher in elevation than the SEZ. The SEZ area is depicted in orange, the heliostat fields in blue.

  The upper slopes and peaks of the WA are sparsely vegetated with little opportunity for screening, and the far northern portion of the SEZ would be visible from this location; however, the Iron Mountains screen much of the view of the SEZ from this and most other locations within the WA. Despite the elevated viewpoint, the 18-mi (29-km) distance to the SEZ would result in an angle of view low enough that visible solar collector/reflector arrays within the SEZ would repeat the line of the plain in which the SEZ is located and this would tend to reduce contrast. If power towers were present within the SEZ, when operating, the receivers would likely appear as distant points of light against the backdrop of the valley floor or the Big Maria Mountains. The range of impact would be highly dependent on viewer location within the WA and on project location and design. Under the 80% development scenario analyzed in this PEIS, solar facilities within the SEZ would be expected to create minimal to weak visual contrasts as viewed from the WA. The highest levels of visual contrast would be expected for viewing locations at higher elevations in the WA, with less visibility and lower contrast levels expected at lower elevations.

FIGURE 9.2.14.2-6 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Viewpoint within the Sheephole Valley WA

- *Rice Valley*—The Rice Valley Wilderness is a 43,412-acre (175.68-km^2) congressionally designated WA located 6.6 mi (10.6 km) at the point of closest approach southeast of the SEZ. The WA includes a portion of the broad, flat plains of Rice Valley, the northwestern tip of the Big Maria Mountains, and a system of small dunes rising 30 to 40 ft (9 to 12 m) above the valley floor. The valley is part of a massive sand sheet that extends from Cadiz Valley through Ward Valley. Camping, hiking, backpacking, hunting, and wildlife viewing are recreational activities in the WA.

  Solar energy facilities within the SEZ could potentially be visible from most of the WA (approximately 40,799 acres [165.11 km^2] in the 650-ft [198.1-m] viewshed, or 94% of the total WA acreage, and 40,329 acres [163.21 km^2] in the 24.6-ft [7.5-m] viewshed, or 92.9% of the total WA acreage). The visible area of the WA extends approximately 18.4 mi (29.6 km) from the southeast corner of the SEZ.

  Most of the Rice Valley WA is located on the Rice Valley floor, which slopes gently upward toward the south. The elevation in the northern portions of the WA is generally as low as or lower than the nearest part of the SEZ, especially in the northern portions of the WA.

  Figure 9.2.14.2-7 is a Google Earth visualization of the SEZ as seen from the Rice Valley floor in the far northwest portion of the WA, near the point of closest approach to the SEZ. The viewpoint is approximately 6.5 mi (10.5 km) from the southeast corner of the SEZ and is about 470 ft (140 m) higher in elevation than the SEZ. The SEZ area is depicted in orange, the heliostat fields in blue.

  The visualization suggests that solar facilities within the SEZ would be visible to the northwest through the gap between the Palen-McCoy Mountains to the west and the Turtle Mountains to the east. To the west, the Rice Valley floor rises enough to screen the western-most portions of the SEZ from view. The SEZ would occupy a moderate amount of the horizontal field of view, but the vertical angle of view would be very low. From this viewpoint, solar energy facilities within the SEZ would appear edge-on or nearly so, which would make the large areal extent and strong regular geometry of the collector/reflector arrays of solar facilities in the SEZ less apparent, and would cause the arrays to appear to repeat the strong line of the horizon, tending to reduce visual contrast.

  Tall power towers, power blocks, plumes, and transmission towers located in the nearest parts of the SEZ would add very short oblique and vertical lines and form elements that would likely project above the solar collector/reflector arrays and tend to increase visual contrast. Depending on project and viewer location, these elements could be viewed against a sky backdrop, the Turtle Mountains, the Old Woman Mountains, or the Iron Mountains.

FIGURE 9.2.14.2-7 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in blue tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Viewpoint on Valley Floor within the Rice Valley WA

The receivers of operating power towers in nearby portions of the SEZ could appear as very bright non-point (i.e., having a cylindrical or rectangular shape) light sources atop discernable tower structures. They would be likely to attract visual attention. At night, if sufficiently tall, the power towers could have red or white flashing hazard navigation lights that would likely be visible in the WA and could be conspicuous from this viewpoint, given the dark night skies in the vicinity of the SEZ. Other lighting associated with solar facilities in the SEZ could potentially be visible as well.

The nature of the visual contrasts from solar facilities in the SEZ as observed from this viewpoint would depend on the numbers, types, sizes, and locations of solar facilities in the SEZ and on other project- and site-specific factors, but under the 80% development scenario analyzed in this PEIS, solar facilities within the SEZ would be expected to create moderate visual contrasts.

Figure 9.2.14.2-8 is a Google Earth visualization of the SEZ as seen from the far southwest portion of the WA, near the northwestern tip of the Big Maria Mountains. The viewpoint is the highest point in the WA, elevated about 2,100 ft (640 m) above the valley floor. The viewpoint is approximately 16 mi (26 km) from the southeast corner of the SEZ. The SEZ area is depicted in orange, the heliostat fields in blue.

The visualization suggests that from this elevated viewpoint, the tops of solar collector/reflector arrays would be visible. Most or all of the SEZ would be visible, but the angle of view would be low enough that visible solar collector/reflector arrays within the SEZ would repeat the line of the plain in which the SEZ is located, which would tend to reduce contrast. Taller solar facility components, such as transmission towers, could be visible, depending on lighting, but might not be noticed by casual observers.

If power towers were present within the SEZ, when operating, the receivers would likely appear as distant points of light against the backdrop of the valley floor or the bajadas of the Iron and Old Woman Mountains. At night, if sufficiently tall, the power towers could have red or white flashing hazard navigation lights that would likely be visible from the WA.

The range of impact would be highly dependent on viewer location within the WA and on the numbers, types, sizes, and locations of solar facilities in the SEZ, and other project- and site-specific factors, but under the 80% development scenario analyzed in this PEIS, solar facilities within the SEZ would be expected to create minimal to moderate visual contrasts as viewed from the WA. In general, the highest levels of visual contrast would be expected for viewing locations closest to the SEZ.

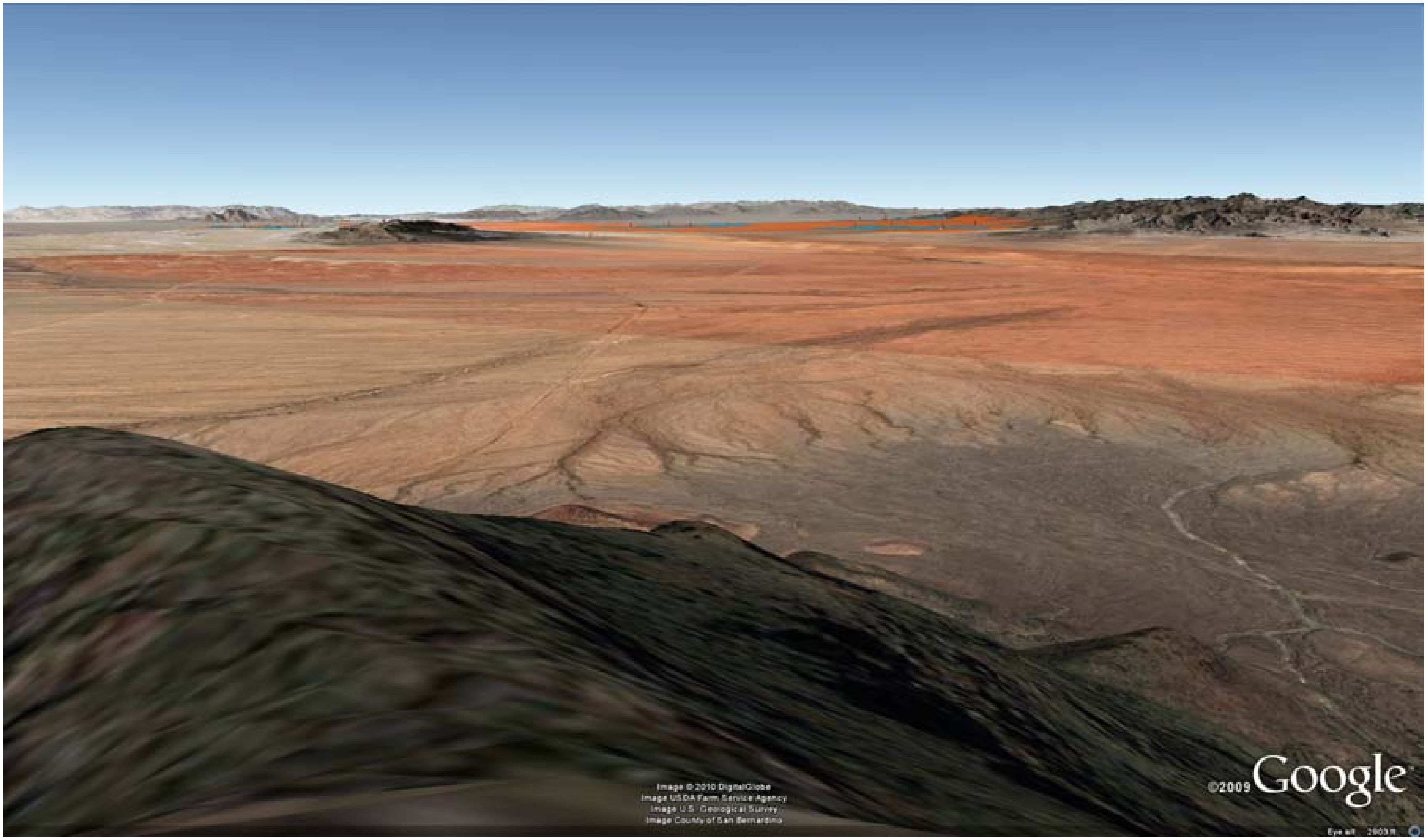

FIGURE 9.2.14.2-8 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange and blue tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from an Elevated Viewpoint within the Rice Valley WA

- *Palen-McCoy*—The Palen-McCoy Wilderness is a 224,414-acre (908.171-km^2) congressionally designated WA located 1.6 mi (2.6 km) at the point of closest approach directly south of the SEZ. The WA contains five separate mountain ranges separated by wide bajadas and encompasses several landscape types, from desert pavement, bajadas, interior valleys, and canyons to dense ironwood forests, steep canyons, and rugged peaks. Unlike most other WAs around the proposed SEZ, the Palen-McCoy WA extends beyond the mountains down the bajada and as much as 10 mi (16 km) out onto the valley floor. Camping, hiking, backpacking, horseback riding, hunting, and wildlife viewing are recreational activities in the WA.

  Solar energy facilities within the SEZ could be visible from much of the WA on the northeast sides of the Granite and Big Maria Mountains (approximately 60,341 acres [244.19 km^2] in the 650-ft [198.1-m] viewshed, or 26.9% of the total WA acreage, and 56,221 acres [227.52 km^2] in the 24.6-ft [7.5-m] viewshed, or 25.1% of the total WA acreage). The visible area of the WA extends approximately 16 mi (26 km) from the southern boundary of the SEZ.

  Figure 9.2.14.2-9 is a Google Earth visualization of the SEZ as seen from the highest peak in the Granite Mountains (unnamed), near the southern end of the mountain range. The viewpoint is the highest point in the WA, elevated about 3,400 ft (1,000 m) above the valley floor at the closest point within the SEZ. The viewpoint is approximately 7.3 mi (11.8 km) from the nearest point on the southern boundary of the SEZ. The nearest power towers in the visualization (at left) are about 9.2 mi (14.8 km) from the viewpoint. The SEZ area is depicted in orange; the heliostat fields in blue.

  The visualization suggests that from this elevated viewpoint the SEZ would be too large to be encompassed in one view, and viewers would need to turn their heads to scan across the whole SEZ. The tops of solar collector/reflector arrays in the closest parts of the SEZ would be visible, and depending on project size and layout, some facilities might not repeat the horizontal line of the valley plain. Because of the relatively high angle of view, the large areal extent, and the strong regular geometry of the collector/reflector arrays, solar facilities in the SEZ would be apparent, tending to increase contrast. The angle of view would be low enough that visible solar collector/reflector arrays in the northeast portion of the SEZ (farthest away from this viewpoint) would repeat the line of the plain in which the SEZ is located, which would tend to reduce contrast.

  Taller ancillary facilities, such as buildings, transmission structures, and cooling towers, and plumes (if present) could be visible, projecting above the collector/reflector arrays, at least for nearby facilities. The ancillary facilities could create form and line contrasts with the strongly horizontal, regular, and repeating forms and lines of the collector/reflector arrays.

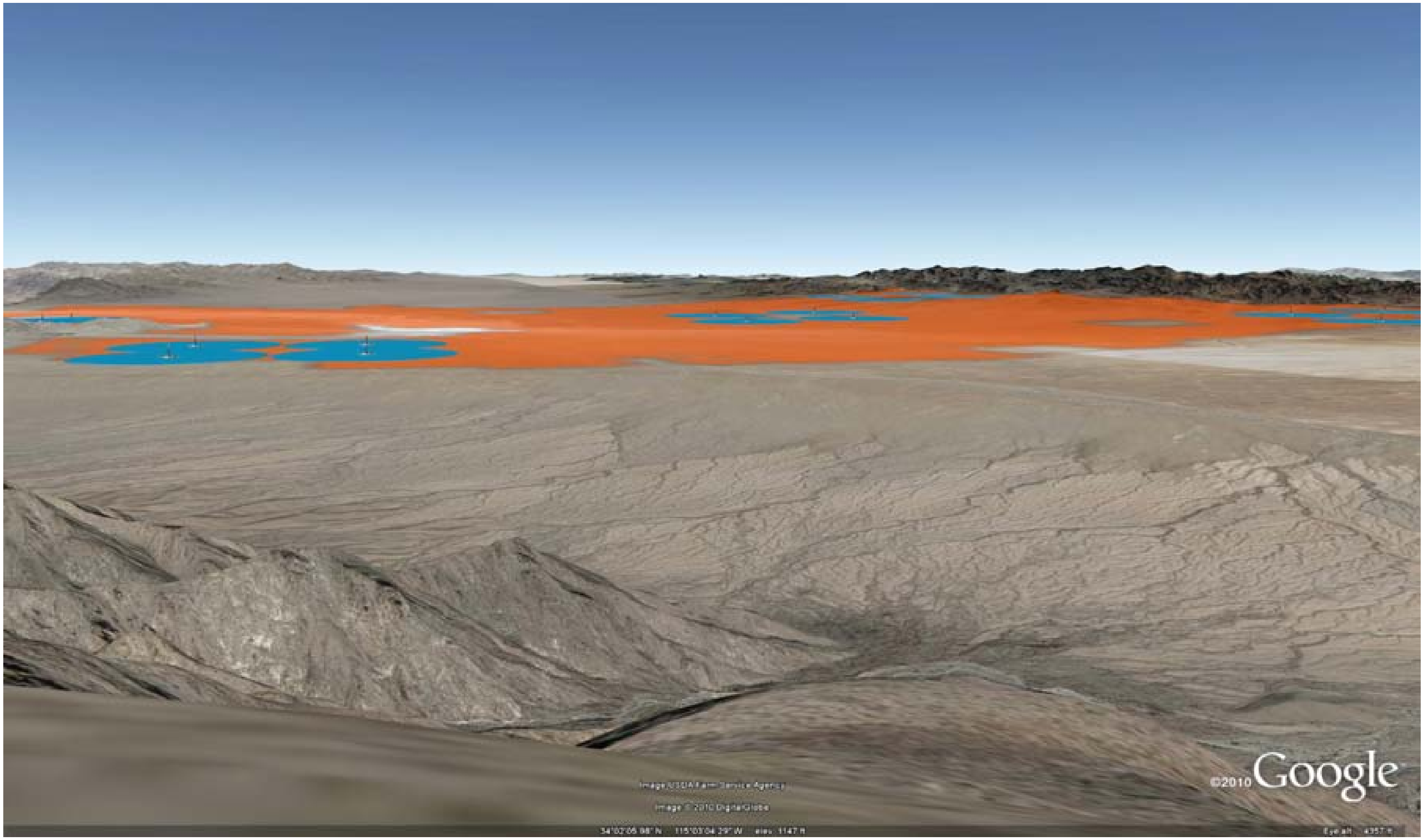

FIGURE 9.2.14.2-9 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from the Granite Mountains in the Palen-McCoy WA

If power towers were present within the SEZ, when operating, the receivers of towers in the nearer parts of the SEZ would likely appear as bright points of light against the backdrop of the valley floor or the bajadas of the Turtle and Old Woman Mountains. At night, if sufficiently tall, the power towers could have red or white flashing hazard navigation lights that would likely be visible from the WA and could be conspicuous, given the dark night skies in the vicinity of the SEZ. Other lighting associated with solar facilities in the SEZ could potentially be visible as well.

The potential visual contrast expected for this viewpoint would vary depending on the numbers, types, sizes, and locations of solar facilities in the SEZ, and other project- and site-specific factors, but under the 80% development scenario analyzed in this PEIS, solar facilities within the SEZ would be expected to create strong visual contrasts as viewed from this location within the WA.

Figure 9.2.14.2-10 is a Google Earth visualization of the SEZ as seen from a ridge in the Arica Mountains in the northeast corner of the WA. The viewpoint is elevated about 1,200 ft (370 m) above the valley floor at the closest point within the SEZ. The viewpoint is approximately 3.8 mi (6.1 km) from the nearest point on the southern boundary of the SEZ. The nearest power tower in the visualization (at right) is about 6.5 mi (10.4 km) from the viewpoint. The SEZ area is depicted in orange, the heliostat fields in blue.

The visualization suggests that from this elevated viewpoint and relatively short distance to the SEZ, the SEZ would be too large to be encompassed in one view, and viewers would need to turn their heads to scan across the whole SEZ. The tops of solar collector/reflector arrays in the closest parts of the SEZ would be visible, but the angle of view is low enough that arrays in the more distant parts of the SEZ would be viewed nearly edge-on, which would make their large areal extent and regular geometry less apparent, and would cause them to appear to repeat the horizontal line of the valley plain.

Taller ancillary facilities, such as buildings, transmission structures, and cooling towers, and plumes (if present) would likely be visible, projecting above the collector/reflector arrays, at least for nearby facilities. The ancillary facilities could create form and line contrasts with the strongly horizontal, regular, and repeating forms and lines of the collector/reflector arrays. Color and texture contrasts would also be possible, but their extent would depend on the materials and surface treatments utilized in the facilities.

If power towers were present within the SEZ, when operating, the receivers of towers in the nearer parts of the SEZ would likely appear as very bright non-point (i.e., having a cylindrical or rectangular shape) against the backdrop of the valley floor or the bajadas of the Turtle and Old Woman Mountains. At night, if sufficiently tall, the power towers could have red or white flashing

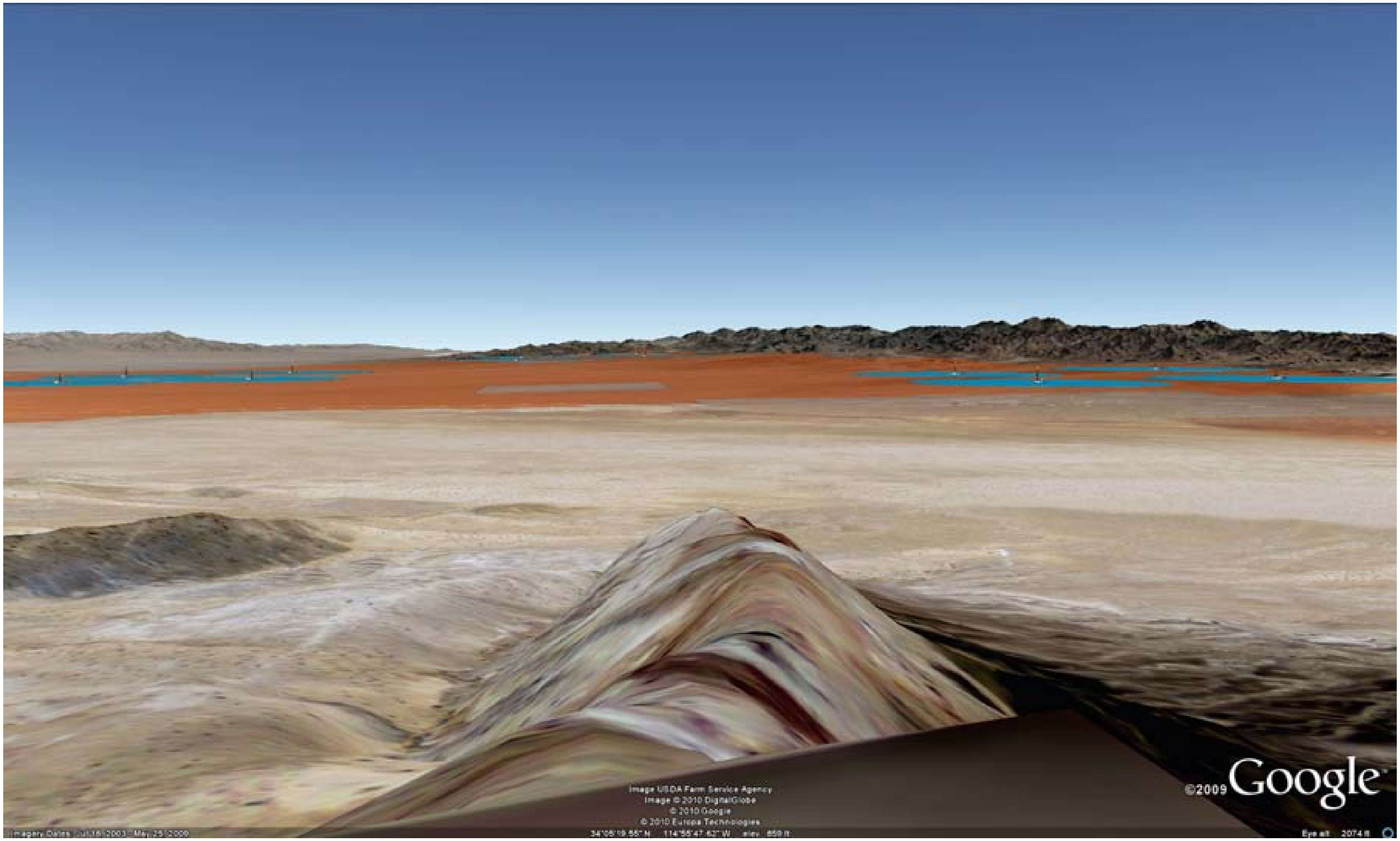

FIGURE 9.2.14.2-10 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from the Arica Mountains in the Palen-McCoy WA

hazard navigation lights that would likely be visible from the WA and could be very conspicuous from this viewpoint, given the dark night skies in the vicinity of the SEZ. Other lighting associated with solar facilities in the SEZ would likely be visible as well.

The potential visual contrast expected for this viewpoint would vary depending on the numbers, types, sizes, and locations of solar facilities in the SEZ, and other project- and site-specific factors, but because the viewpoint is elevated and relatively close to the SEZ, the SEZ would stretch across much of the northern horizon. While one or a few solar facilities within the SEZ might only give rise to moderate levels of visual contrast, under the 80% development scenario analyzed in this PEIS, there could be numerous solar facilities within the SEZ, with a variety of technologies employed, and a range of supporting facilities that would contribute to visual impacts, such as transmission towers and lines, substations, power block components, and roads. Under the 80% development scenario analyzed in this PEIS, solar facilities within the SEZ would be expected to create strong visual contrasts as viewed from this location within the WA.

Figure 9.2.14.2-11 is a Google Earth visualization of the SEZ as seen in a typical view from the bajada below the Granite Mountains in the northeast corner of the SEZ. The viewpoint is elevated about 350 ft (107 m) above the valley floor at the closest point within the SEZ. The viewpoint is approximately 2.7 mi (4.4 km) from the nearest point on the southern boundary of the SEZ. The nearest power tower in the visualization (at left) is about 8.0 mi (12.8 km) from the viewpoint. The SEZ area is depicted in orange, the heliostat fields in blue.

The visualization suggests that from this relatively short distance to the SEZ, the SEZ would be too large to be encompassed in one view, and viewers would need to turn their heads to scan across the whole SEZ. Because of the relatively low elevation difference between the viewpoint and the SEZ, the vertical angle of view would be very low, and solar facilities in the SEZ would appear in a narrow band across the field of view. The collector/reflector arrays of solar facilities in the SEZ would be viewed nearly edge-on, which would make their large areal extent and regular geometry less apparent and would cause them to appear to repeat the horizontal line of the valley plain.

Taller ancillary facilities, such as buildings, transmission structures, and cooling towers; and plumes (if present) could be visible, projecting above the collector/reflector arrays, and their structural details could be evident, at least for nearby facilities. The ancillary facilities could create form and line contrasts with the strongly horizontal, regular, and repeating forms and lines of the collector/reflector arrays. Color and texture contrasts would also be possible, but their extent would depend on the materials and surface treatments utilized in the facilities.

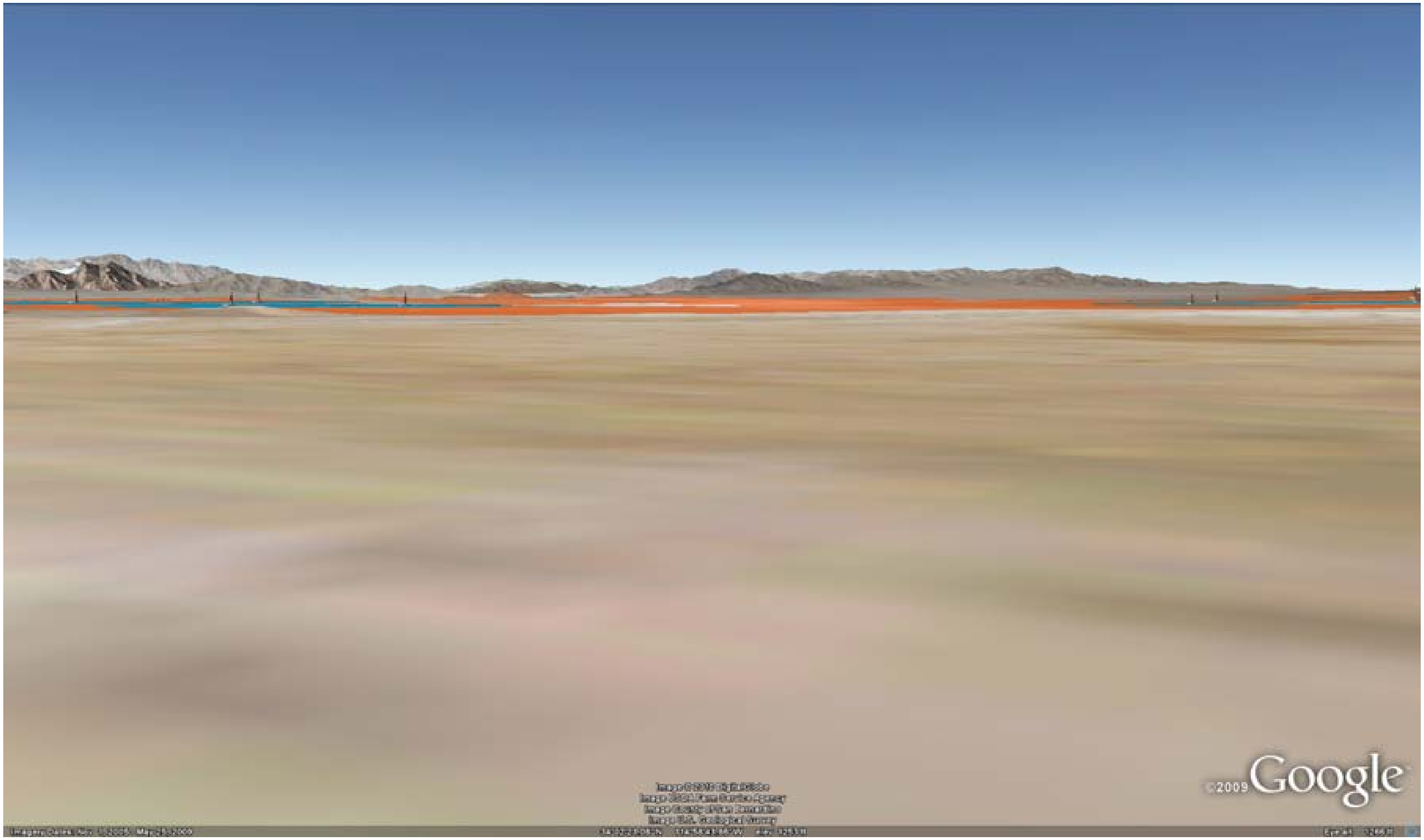

FIGURE 9.2.14.2-11 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Granite Mountains Bajada in the Palen-McCoy WA

If power towers were present within the SEZ, when operating, the receivers of towers in the nearer parts of the SEZ would likely appear as very bright non-point (i.e., having a cylindrical or rectangular shape) against the backdrop of the valley floor or the bajadas of the Turtle and Old Woman Mountains. At night, if sufficiently tall, the power towers could have red or white flashing hazard navigation lights that would likely be visible from the WA and could be very conspicuous from this viewpoint, given the dark night skies in the vicinity of the SEZ. Other lighting associated with solar facilities in the SEZ would likely be visible as well.

The potential visual contrast expected for viewpoints on the bajadas would vary depending on viewpoint location and on facility numbers, locations, and designs as well as on other visibility factors. From some locations at lower elevations, slight variations in topography could screen much of the view of the SEZ, and weak levels of visual contrast might result if the angle of view was sufficiently low. Where there was a clear view of the SEZ from the bajada, under the 80% development scenario analyzed in this PEIS, moderate to strong levels of visual contrast might be observed.

In summary, the Palen-McCoy WA is very close to the SEZ, and many locations within the WA could have clear views of solar facilities in the SEZ across much of the field of view to the north of the WA. Given that there could be numerous solar facilities within the SEZ, with a variety of technologies employed, and a range of supporting facilities that would contribute to visual impacts, such as transmission towers and lines, substations, power block components, and roads, the resulting visually complex landscape would be essentially industrial in appearance and would contrast greatly with the surrounding mostly natural-appearing landscape. Under the 80% development scenario analyzed in this PEIS, strong levels of visual contrast from solar facilities within the SEZ could be observed from many locations within the WA, especially from elevated viewpoints.

- *Old Woman Mountains*—The Old Woman Mountains Wilderness is a 183,555-acre (742.821-km^2) congressionally designated WA. The southern edge of the Old Woman Mountains WA is adjacent to the northwest section of the SEZ. The Old Woman Range encompasses three ecosystems and includes the 5,300-ft (1,600-m) summit of Old Woman Peak. The WA contains trails and old mining roads used for hiking and backpacking. Camping, horseback riding, hunting, and wildlife viewing are other recreational activities in the WA.

  As shown in Figure 9.2.14.2-2, solar energy facilities within the SEZ could be visible from much of the northwest portion of the WA (approximately 88,760 acres [359.20 km^2] in the 650-ft [198.1-m] viewshed, or 48.4% of the total WA acreage, and 83,900 acres [339.53 km^2] in the 24.6-ft [7.5-m] viewshed, or 45.7% of the total WA acreage). The main area of the WA with potential visibility of solar facilities in the SEZ extends approximately 17 mi (27 km) from the far northern boundary of the SEZ, with a few small areas of visibility out to approximately 21 mi (34 km).

The Old Woman Mountains are a north-to-south oriented mountain range, roughly wedge-shaped, with the point of the wedge immediately north of the northwest corner of the SEZ. SEZ visibility on the western side of the Old Woman Mountains is limited to the far western portions of the SEZ, generally west of Danby Lake. The east-facing slopes of the Old Woman Mountains have views of nearly the entire SEZ. The mountains rise abruptly just north of the abandoned town of Milligan, and the WA's southern boundary is less than 0.5 mi (0.8 km) north of the town site. Most views of the SEZ from within the WA would be from more or less elevated viewpoints and, if viewed from the southern end of the mountain range, are very close to the SEZ. Because the SEZ is adjacent to the WA at the south end of the Old Woman Mountains, many of the visible areas at the southern end of the range would be within the BLM-designated foreground–middleground distance of 3 to 5 mi (4.8 to 8 km).

Figure 9.2.14.2-12 is a Google Earth visualization of the SEZ as seen from an unnamed peak in the Old Woman Mountains, elevated about 2,700 ft (820 m) above the valley floor at the closest point within the SEZ and approximately 4.1 mi (6.6 km) from the nearest point on the northern boundary of the SEZ. The SEZ area is depicted in orange, the heliostat fields in blue.

The visualization suggests that from this elevated viewpoint and relatively short distance to the SEZ, the SEZ would be too large to be encompassed in one view, and viewers would need to turn their heads to scan across the whole SEZ. Five clusters of power tower facility models are visible: the left-most model cluster is approximately 16 mi (26 km) from the viewpoint; the center model cluster is 15 mi (24 km) from the viewpoint; and the right-most model cluster is 10 mi (16 km) from the viewpoint (all distances to center points of model clusters). The tops of solar collector/reflector arrays in the closest parts of the SEZ would be visible, but the angle of view is low enough that arrays in the more distant parts of the SEZ would be seen nearly edge-on, which would make their large areal extent and regular geometry less apparent, as well as make them appear to repeat the horizontal line of the valley plain. If power towers were present within the SEZ, when operating, the receivers would likely appear as distant points of light against the backdrop of the valley floor or the bajada of the Turtle Mountains.

The potential visual contrast expected for this view point would vary depending on project locations, technologies, and site designs, but because the viewpoint is elevated and relatively close to the SEZ, the SEZ would occupy much of the field of view. Under the 80% development scenario analyzed in this PEIS, there could be numerous solar facilities within the SEZ, with a

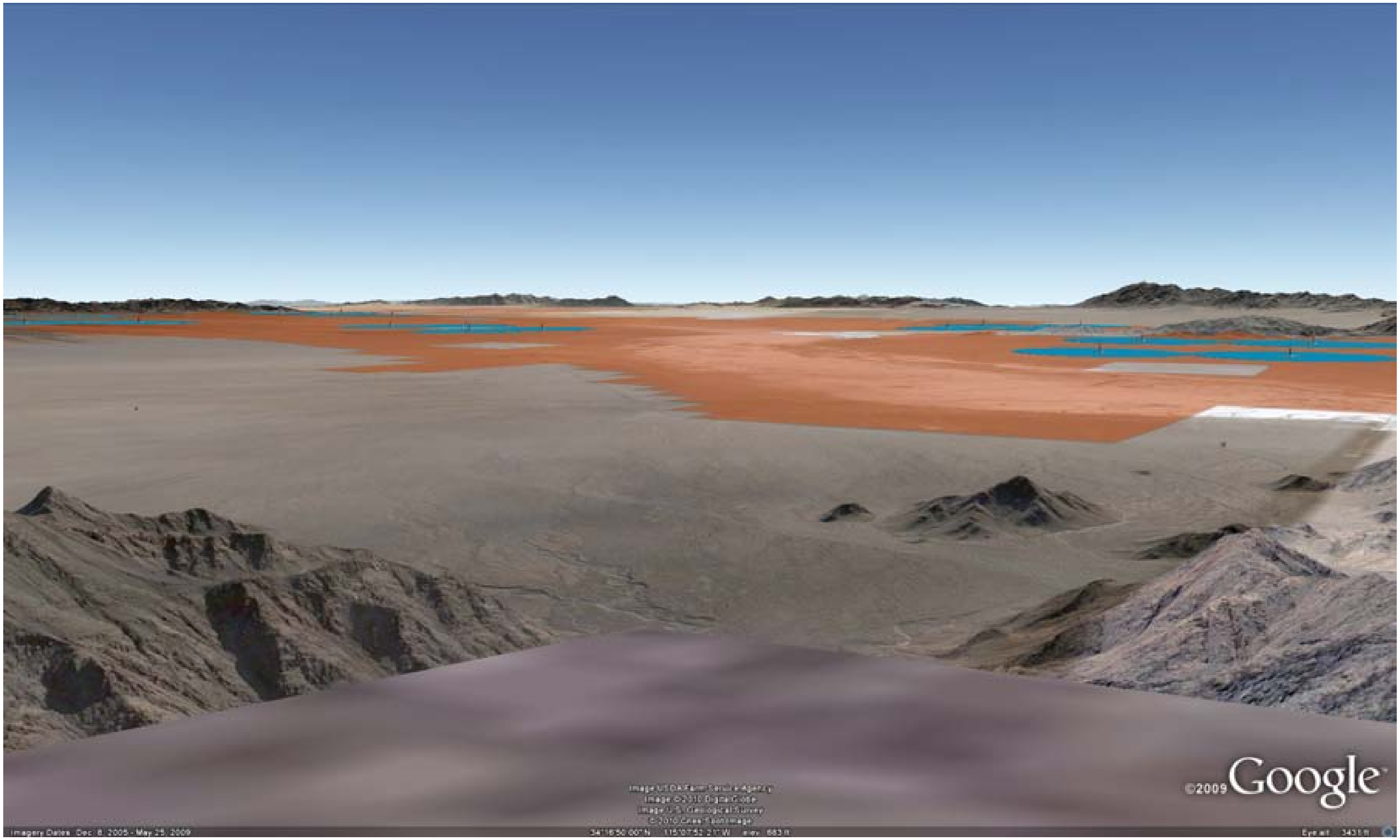

FIGURE 9.2.14.2-12 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Peak in the Old Woman Mountains WA

variety of technologies employed, and a range of supporting facilities that would contribute to visual impacts, such as transmission towers and lines, substations, power block components, and roads. The resulting visually complex landscape could potentially dominate the view from this location. Under the PEIS development scenario, solar facilities within the SEZ would be expected to create moderate to strong visual contrasts as viewed from this location within the WA.

Figure 9.2.14.2-13 is a Google Earth visualization of the SEZ as seen from a much lower unnamed peak in the Old Woman Mountains, at the southern end of the range. The viewpoint is elevated about 860 ft (260 m) above the valley floor at the closest point within the SEZ and approximately 1.4 mi (2.3 km) from the nearest point on the northern boundary of the SEZ.

The visualization suggests that from this elevated viewpoint and very short distance to the SEZ, the SEZ would be too large to be encompassed in one view, and viewers would need to turn their heads to scan across the whole SEZ. Four clusters of power tower facility models are visible: the closer of the left two model clusters is approximately 13.5 mi (21.7 km) from the viewpoint, and the closer of the right two model clusters is 7.3 mi (11.8 km) from the viewpoint (all distances to center points of model clusters). The tops of solar collector/reflector arrays in the closest parts of the SEZ would be visible, but the angle of view is low enough that most facilities would repeat the horizontal line of the valley plain.

Taller ancillary facilities, such as buildings, transmission structures, and cooling towers; and plumes (if present) would likely be visible, projecting above the collector/reflector arrays, at least for nearby facilities. The ancillary facilities could create form and line contrasts with the strongly horizontal, regular, and repeating forms and lines of the collector/reflector arrays. Color and texture contrasts would also be possible for closer facilities, but their extent would depend on the materials and surface treatments utilized in the facilities.

If power towers were present within the SEZ at the distances shown in the visualization, when operating, the receivers would likely appear as points of light against the sky, against the backdrop of the valley floor or against the bajadas of the Iron or Turtle Mountains. Power towers located in the nearest portions of the SEZ could be much brighter and would be likely to strongly attract visual attention from this viewpoint. At night, if sufficiently tall, the power towers could have red or white flashing hazard navigation lights that would likely be visible from this viewpoint and could be very conspicuous, given the dark night skies in the vicinity of the SEZ. Other lighting associated with solar facilities in the SEZ could potentially be visible as well.

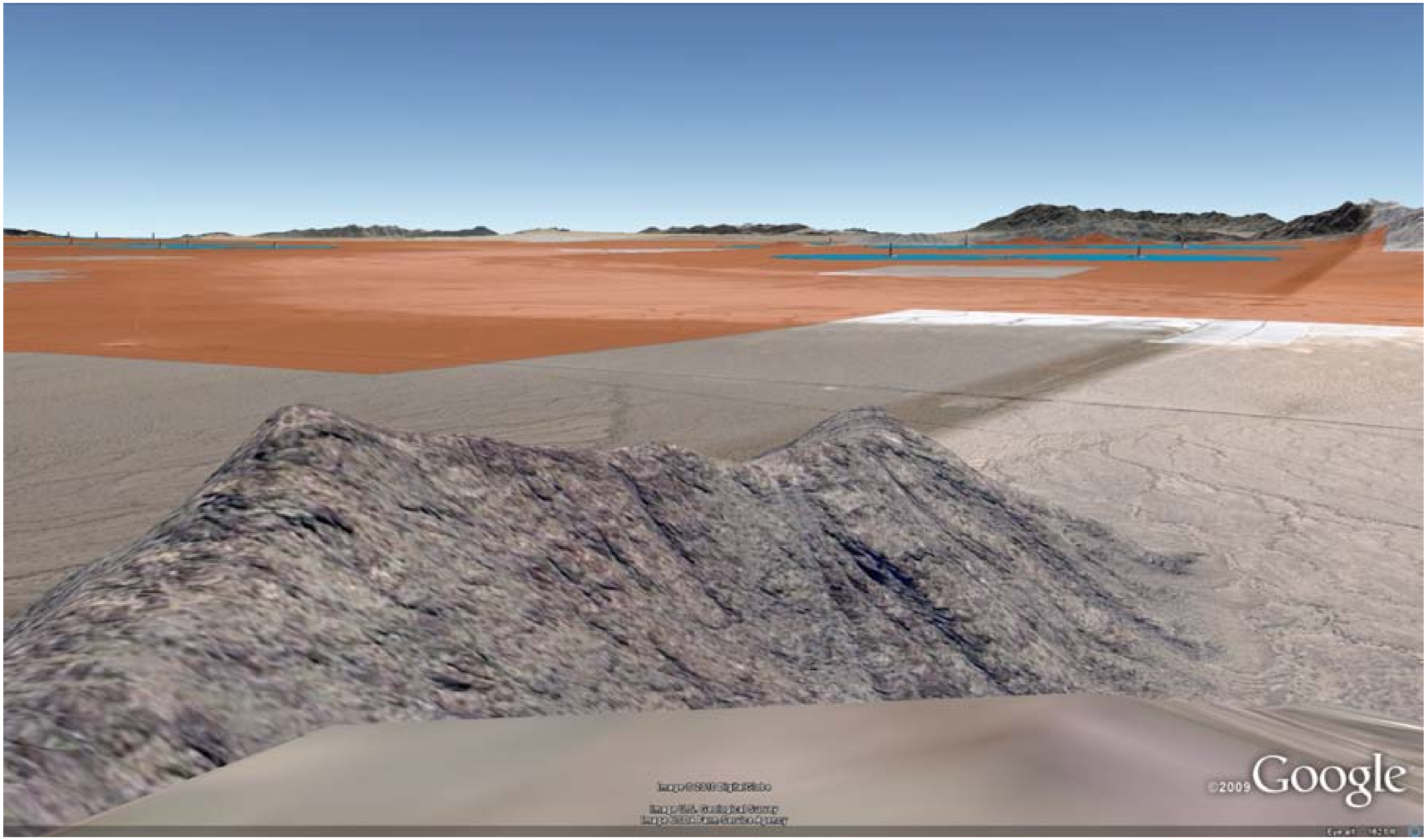

FIGURE 9.2.14.2-13 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Peak in the Southern Portion of the Old Woman Mountains WA

The potential visual contrast expected for this viewpoint would vary depending on the numbers, types, sizes, and locations of solar facilities in the SEZ, and on other project- and site-specific factors, but because the view point is elevated and very close to the SEZ, the SEZ would occupy most of the field of view, and under the 80% development scenario analyzed in this PEIS, solar facilities within the SEZ would likely dominate the view from this location, and strong visual contrast levels would be expected.

In summary, because there could be numerous solar facilities within the SEZ, with a variety of technologies employed, and a range of supporting facilities that would contribute to visual impacts, a visually complex, man-made appearing industrial landscape could result. This essentially industrial-appearing landscape would contrast greatly with the surrounding natural-appearing lands and would be expected to create strong visual contrasts as viewed from many locations within the WA. Weaker levels of contrast would be expected for lower elevation viewpoints in the WA, many of which would have partially screened views of solar facilities in the SEZ.

- *Turtle Mountains*—The Turtle Mountains Wilderness is a 182,610-acre (738.996-km^2) congressionally designated WA. The southwest boundary of Turtle Mountains WA is adjacent to the eastern edge of the SEZ. Above broad, open bajadas, the WA's eroded volcanic peaks, spires, and cliffs in a range of colors constitute a diverse scenic landscape, which includes the Turtle Mountains scenic ACEC and the Turtle Mountains NNL. The WA contains numerous trails. The WA also contains the Mopah Peaks, which are rhyodactic or volcanic plugs, and the northern-most peak in the WA is a landmark known as Mexican Hat. Hiking, horseback riding, hunting, camping, rock hounding, photography, and backpacking are popular recreation activities within the WA. Coffin, Mopah, and Mohawk Springs are popular hiking destinations.

  As shown in Figure 9.2.14.2-2, solar energy facilities within the SEZ could be visible from much of the northwest portion of the WA (approximately 73,092 acres [295.79 km^2] in the 650-ft [198.1-m] viewshed, or 40% of the total WA acreage, and 63,275 acres [256.06 km^2] in the 24.6-ft [7.5-m] viewshed, or 35% of the total WA acreage). The visible area of the WA extends approximately 17 mi (27 km) from the northern boundary of the SEZ and approximately 5 mi (8 km) from the eastern boundary.

  The Turtle Mountains WA includes most of the Turtle Mountains range and a large portion of the Ward Valley floor to the northwest of the Turtle Mountains. The WA thus has both elevated and non-elevated views of the SEZ, and viewing distances range from 0 to 17 mi (0 to 27 km). The SEZ in its entirety is visible from the western slopes of the Turtle Mountains, and large portions of the SEZ are visible from the Ward Valley floor within the WA. Because the SEZ is adjacent to the WA near the Turtle Mountains, most of the visible areas in the mountains are within the BLM-designated foreground–middleground distance of 3 to 5 mi (4.8 to 8 km). Most of the views from the valley floor within the WA are beyond 5 mi (8 km).

Figure 9.2.14.2-14 is a Google Earth visualization of the SEZ as seen from an unnamed peak in the Turtle Mountains, elevated about 1,400 ft (430 m) above the bajada at the closest point within the SEZ and 2,400 ft (730 m) above the lowest point in the SEZ. The viewpoint is approximately 1.4 mi (2.3 km) from the nearest point on the eastern boundary of the SEZ. The SEZ area is depicted in orange, the heliostat fields in blue.

The visualization suggests that from this elevated viewpoint and very short distance to the SEZ, the SEZ would be too large to be encompassed in one view, and viewers would need to turn their heads to scan across the whole SEZ. Four clusters of power tower facility models are visible: the left-most model cluster is approximately 15 mi (24 km) from the viewpoint; the left-center model cluster is 8 mi (13 km) from the viewpoint; the right-center model cluster is 17 mi (27 km) from the viewpoint; and the right-most model cluster is 5 mi (8 km) from the viewpoint (all distances to center points of model clusters).

The tops of solar collector/reflector arrays in the closest parts of the SEZ would be visible, and the angle of view is high enough that these closer facilities would not repeat the horizontal line of the valley plain. Because of the oblique angle of view, the facilities would appear larger in areal extent than from less elevated viewpoints at the same distance.

Taller ancillary facilities, such as buildings, transmission structures, and cooling towers; and plumes (if present) would likely be visible, projecting above the collector/reflector arrays, and their structural details could be evident, at least for nearby facilities. The ancillary facilities could create form and line contrasts with the strongly horizontal, regular, and repeating forms and lines of the collector/reflector arrays. Color and texture contrasts would be possible, but their extent would depend on the materials and surface treatments utilized in the facilities.

If power towers were present within the nearest parts of the SEZ, when operating, the receivers would likely appear as very bright non-point (i.e., having a cylindrical or rectangular shape) point light sources atop discernable tower structures against the backdrop of the valley floor. Operating power towers in the most distant parts of the SEZ would likely appear as star-like points of light against the backdrop of the bajada of the Iron Mountains. At night, if sufficiently tall, the power towers could have red or white flashing hazard navigation lights that would be visible from this viewpoint and could be very conspicuous, given the dark night skies in the

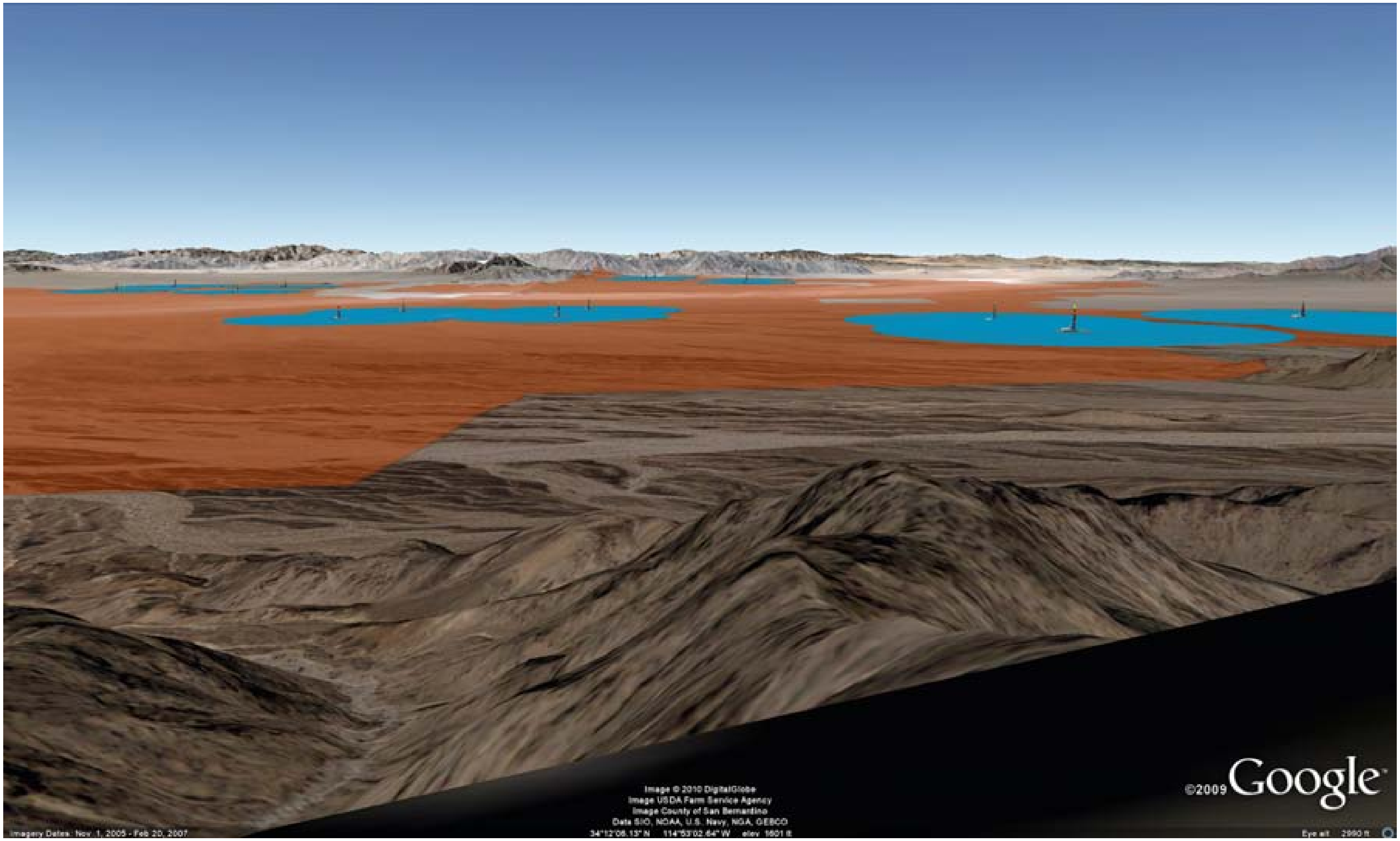

FIGURE 9.2.14.2-14 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Peak in the Western Portion of the Turtle Mountains WA

vicinity of the SEZ. Other lighting associated with solar facilities in the SEZ could potentially be visible as well.

The potential visual contrast expected for this viewpoint would vary depending on the numbers, types, sizes, and locations of solar facilities in the SEZ and on other project- and site-specific factors, but because the viewpoint is elevated and very close to the SEZ, the SEZ would occupy most of the field of view. Under the 80% development scenario analyzed in this PEIS, , solar facilities within the SEZ would likely dominate the view from this location and would be expected to create strong visual contrasts as viewed from this location within the WA.

Figure 9.2.14.2-15 is a Google Earth visualization of the SEZ as seen from an unnamed peak in the Turtle Mountains, near the eastern limit of the visible area within the Turtle Mountains and elevated about 3,300 ft (1,000 m) above the lowest point in the SEZ. The viewpoint is approximately 4.6 mi (7.4 km) from the nearest point on the eastern boundary of the SEZ. The SEZ area is depicted in orange, the heliostat fields in blue.

The visualization suggests that from this elevated viewpoint and short distance to the SEZ, the SEZ would occupy nearly the entire horizontal field of view. Five clusters of power tower facility models are visible: the left-most model cluster is approximately 8 mi (13 km) from the viewpoint; the center model cluster is 18 mi (29 km) from the viewpoint; the right-center model cluster is 11 mi (18 km) from the viewpoint; the distant-right model cluster is 19 mi (31 km)distant; and the right-most, partially visible model cluster is 7 mi (12 km) from the viewpoint (all distances to center points of model clusters).

In this view, the Turtle Mountains west of the viewpoint screen some of the far eastern part of the Ward Valley and could screen solar facilities in the far eastern part of the SEZ. For facilities that are sufficiently far west in the SEZ to avoid screening, the tops of solar collector/reflector arrays could be visible, and the angle of view is high enough that these closer facilities might not repeat the horizontal line of the valley plain. Because of the oblique angle of view, the closer facilities would appear larger in areal extent than they would from less elevated viewpoints at the same distance, and the strong regular geometry of the arrays would be apparent.

Taller ancillary facilities, such as buildings, transmission structures, and cooling towers; and plumes (if present) would likely be visible, projecting above the collector/reflector arrays. The ancillary facilities could create form and line contrasts with the strongly horizontal, regular, and repeating forms and lines of the collector/reflector arrays. Color and texture contrasts would be possible for closer facilities, but their extent would depend on the materials and surface treatments utilized in the facilities.

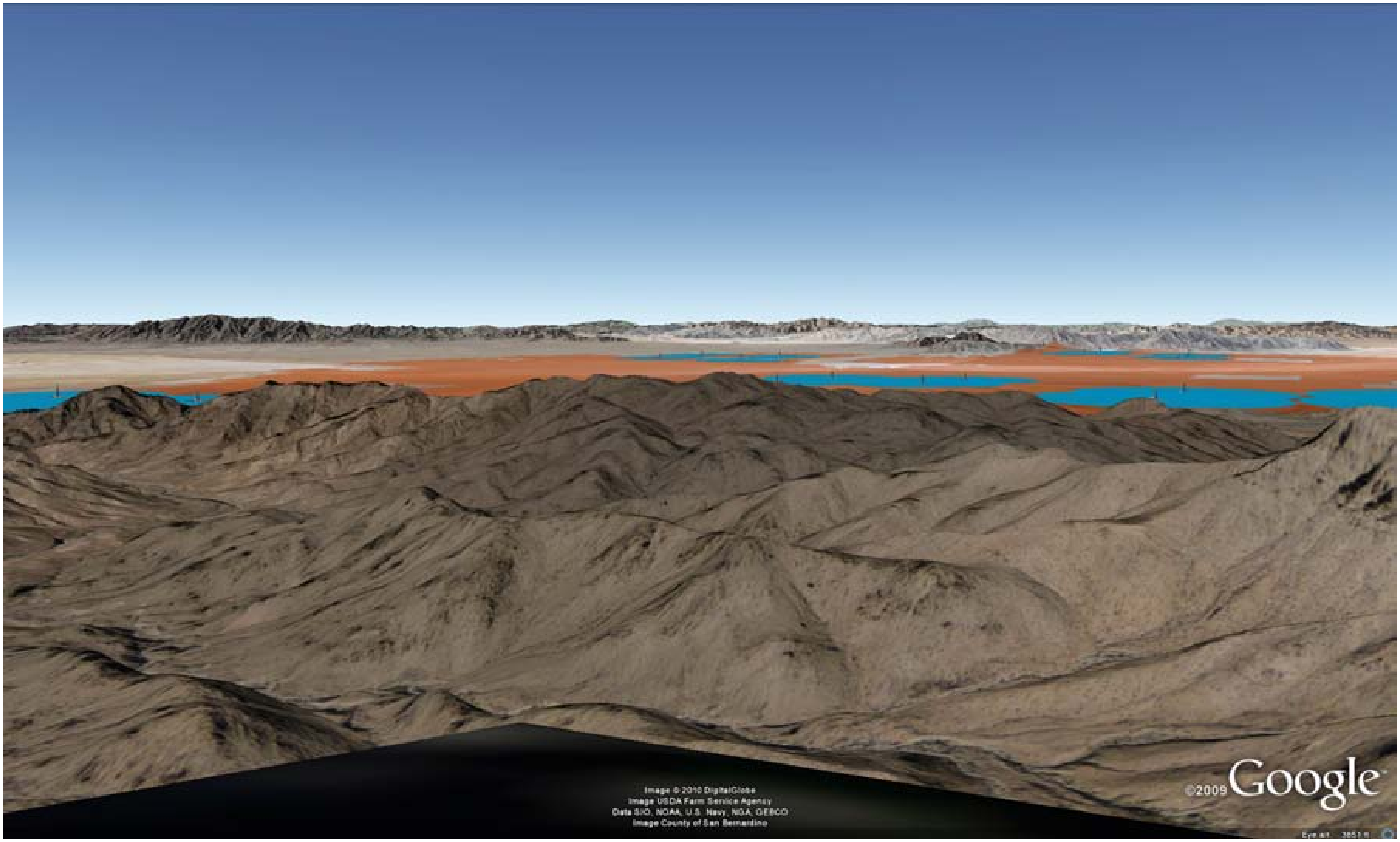

FIGURE 9.2.14.2-15 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Peak in the Eastern Portion of the Turtle Mountains WA

If power towers were present within the SEZ, when operating, the receivers would likely appear as points of light against the backdrop of the valley floor or the bajada of the Iron Mountains. At night, if sufficiently tall, the power towers could have red or white flashing hazard navigation lights that would likely be visible from this location and could be conspicuous, given the dark night skies in the vicinity of the SEZ. Other lighting associated with solar facilities in the SEZ could potentially be visible as well.

The potential visual contrast expected for this viewpoint would vary depending on the numbers, types, sizes and locations of solar facilities in the SEZ, and other project- and site-specific factors, but because the viewpoint is elevated and close to the SEZ, the SEZ would occupy a significant portion of the field of view, even with the foreground screening from the mountains to the west of the viewpoint. Under the 80% development scenario analyzed in this PEIS, solar facilities within the SEZ would likely strongly attract visual attention, could potentially dominate the view from this location, and would be expected to create strong visual contrasts as viewed from this location within the WA.

Figure 9.2.14.2-16 is a Google Earth visualization of the SEZ as seen from within the WA on the floor of Ward Valley, north of the northeastern portion of the SEZ. The viewpoint is approximately 8 mi (13 km) from the nearest point on the northern boundary of the SEZ.

The visualization suggests that from this viewpoint the SEZ would be too large to be encompassed in one view, and viewers would need to turn their heads to scan across the whole SEZ. The bajada of the Turtle Mountains would screen views of the far eastern portion of the SEZ, but the upper portions of sufficiently tall power tower receivers might project beyond the surface of the bajada, depending on their location. Three clusters of power tower facility models are visible. For the left-most model cluster, only the upper portion of the power tower receivers is visible; the cluster is approximately 13 mi (21 km) from the viewpoint. The center model cluster is 17 mi (27 km) from the viewpoint, and the right-most model cluster is 14 mi (23 km) from the viewpoint (all distances to center points of model clusters).

In this view, the bajada of the Turtle Mountains southeast of the viewpoint screens some of the far eastern part of the Ward Valley and could screen solar development in that area. For facilities sufficiently far west in the SEZ to avoid screening, the angle of view is low enough and the SEZ distant enough that solar collector facilities would appear as thin horizontal bands close to the horizon and repeat the strong horizontal line of the valley plain. Power tower receivers, power blocks, transmission towers, and other relatively tall structures could be visible above the solar collector/reflector arrays and would add short vertical line contrasts to the strongly horizontal landscape.

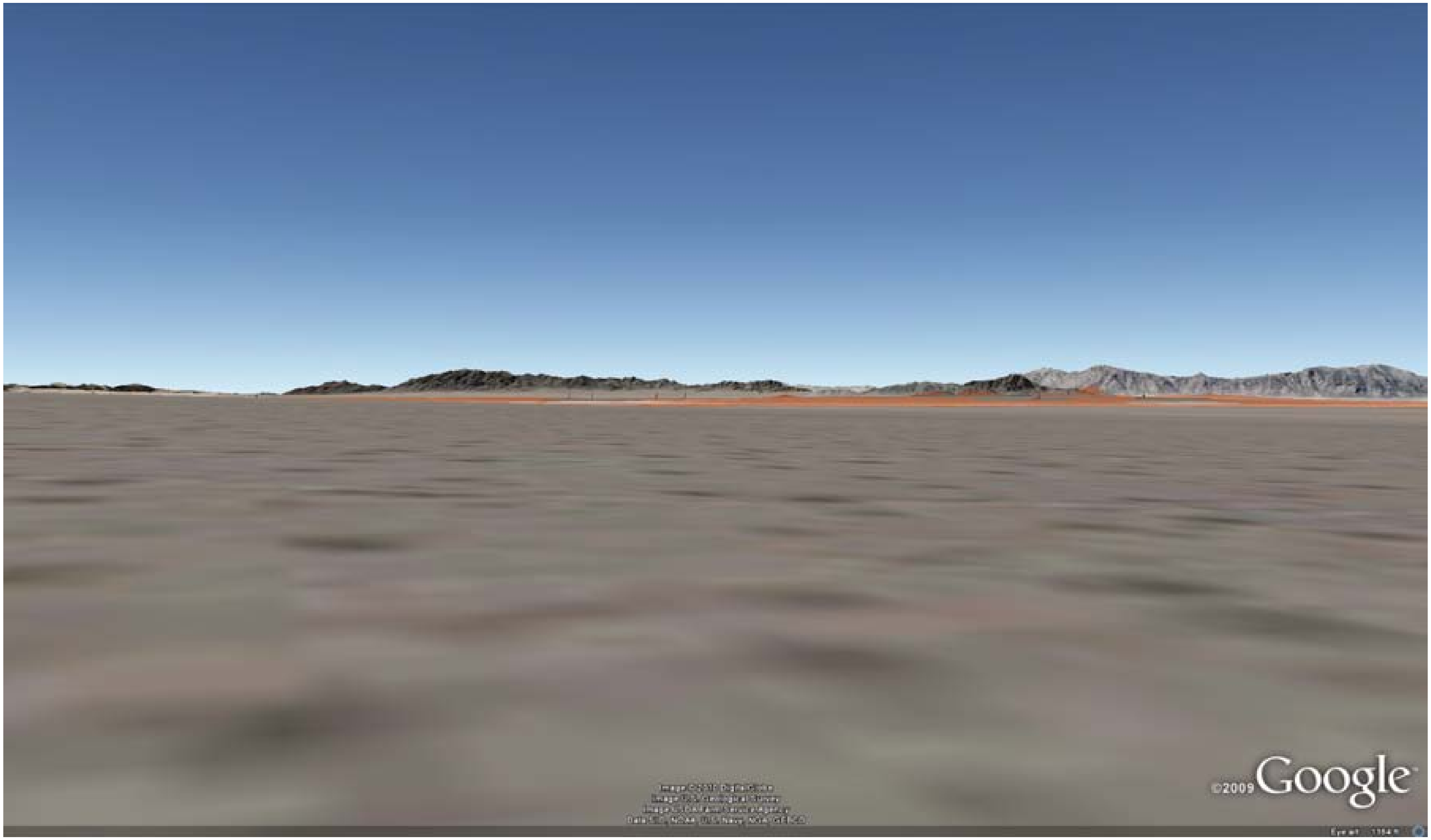

FIGURE 9.2.14.2-16 Google Earth Visualization of the Proposed Iron Mountain SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from the Ward Valley Floor in the Northern Portion of the Turtle Mountains WA

If power towers were present within the SEZ, when operating, the receivers would likely appear as distant points of light against the backdrop of the valley floor or the bajadas of the Palen-McCoy or Granite Mountains. At night, if sufficiently tall, the power towers could have red or white flashing hazard navigation lights that would likely be visible from this viewpoint and could be conspicuous, given the dark night skies in the vicinity of the SEZ. Other lighting associated with solar facilities in the SEZ could potentially be visible as well.

The potential visual contrast expected for this viewpoint would vary depending on the numbers, types, sizes, and locations of solar facilities in the SEZ, and on other project- and site-specific factors, but because the viewpoint is not elevated with respect to the SEZ and is 8 mi (13 km) from the nearest point in the SEZ, the SEZ would occupy a smaller portion of the field of view than from more elevated and/or closer viewpoints. Under the 80% development scenario analyzed in this PEIS, solar facilities within the SEZ would likely attract visual attention, but would be unlikely to dominate the view from this location, and would be expected to create moderate visual contrasts as viewed from this location within the WA.

In summary, the Turtle Mountains WA is adjacent to the SEZ, and many locations within the WA would have clear views of solar facilities in the SEZ across much of the field of view to the west of the WA. Visibility extends far eastward into the interior of the WA. Given that there could be numerous solar facilities within the SEZ, with a variety of technologies employed, and a range of supporting facilities that would contribute to visual impacts, such as transmission towers and lines, substations, power block components, and roads, the resulting visually complex landscape would be essentially industrial in appearance and would contrast greatly with the surrounding mostly natural-appearing landscape. Under the 80% development scenario analyzed in this PEIS, strong levels of visual contrast from solar facilities within the SEZ could be observed from many locations within the WA, especially from elevated viewpoints.

National Natural Landmark

- *Turtle Mountains*—The Turtle Mountains NNL is a 50,057-acre (202.57-km^2) NNL designated for outstanding scenic values, located almost entirely within the Turtle Mountains WA (see above). The Turtle Mountains NNL encompasses the same lands as the Turtle Mountain Scenic ACEC.

  Visual impacts on the Turtle Mountains NNL associated with utility-scale solar energy development in the proposed Iron Mountain SEZ would be similar to those described for the mountainous portions of the Turtle Mountains WA (see above). The two-mountain viewpoint Google Earth visualizations described under the WA impact analysis are from viewpoints within both the NNL and the WA.

ACEC Designated for Outstandingly Remarkable Scenic Values

- *Turtle Mountains*—The Turtle Mountains ACEC is a 50,057-acre (202.57-km^2) ACEC designated by the BLM for its outstanding scenic values, located almost entirely within the Turtle Mountains WA (see above). The ACEC is adjacent to the SEZ at its southern-most point. The ACEC encompasses much of the Turtle Mountains but, unlike the WA, does not extend into the Ward Valley floor. Many locations within the ACEC provide panoramic views of the Ward Valley and the SEZ.

  Solar energy facilities within the SEZ could be visible from the front slopes of the Turtle Mountains in the southwestern portion of the ACEC (approximately 10,024 acres [40.566 km^2] in the 650-ft [198.1-m] viewshed, or 20.0% of the total ACEC acreage, and 8,639 acres [34.96 km^2] in the 24.6-ft [7.5-m] viewshed, or 17.3% of the total ACEC acreage). The main visible area of the ACEC extends approximately 4.4 mi (7.1 km) from the northeast corner of the SEZ, with a separate small area of visibility out to approximately 6.2 mi (10 km).

  Visual impacts on the Turtle Mountains ACEC associated with utility-scale solar energy development in the proposed Iron Mountain SEZ would be similar to those described for the mountainous portions of the Turtle Mountains WA (see above). The two-mountain viewpoint Google Earth visualizations described under the WA impact analysis are from viewpoints within both the ACEC and the WA.

Additional scenic resources exist at the national, state, and local levels, and impacts on both federal and nonfederal lands may occur, including sensitive traditional cultural properties important to Tribes. Note that in addition to the resource types and specific resources analyzed in this PEIS, future site-specific NEPA analyses would include state and local parks, recreation areas, other sensitive visual resources, and communities close enough to the proposed project to be affected by visual impacts. Selected other lands and resources are included in the discussion below.

In addition to impacts associated with the solar energy facilities themselves, sensitive visual resources could be affected by facilities that would be built and operated in conjunction with the solar facilities. With respect to visual impacts, the most important associated facilities would be access roads and transmission lines, the precise location of which cannot be determined until a specific solar energy project is proposed. For this analysis, the impacts of construction and operation of transmission lines outside of the SEZ were not assessed, assuming that the existing 230-kV transmission line might be used to connect some new solar facilities to load centers, and that additional project-specific analysis would be done for new transmission construction or line upgrades. However, transmission lines to connect facilities to the existing line would be required. Note that depending on project- and site-specific conditions, visual impacts associated with access roads, and particularly transmission lines, could be large. Detailed information about visual impacts associated with transmission lines is presented in Section 5.7.1. A detailed site-specific NEPA analysis would be required to precisely determine visibility and associated impacts for any future solar projects, based on more precise knowledge of facility location and characteristics.

Impacts on Selected Other Lands and Resources

State Route 62 and Cadiz Road. State Route 62, a two-lane highway, passes through the southern edge of the Iron Mountain SEZ. The AADT value for State Route 62 at Cadiz Road is 2,000 vehicles (Caltrans 2009), although traffic would increase slightly as a result of solar energy development within the SEZ. Cadiz Road is currently an unpaved road that roughly bisects the SEZ. Under the PEIS development scenario, travelers on both roadways could be subject to large visual impacts from solar energy development within the SEZ.

Solar facilities within the SEZ would be in full view from both roads, and facilities located near the roads would strongly attract the eye and likely dominate views from the roads. Views of the Ward Valley and surrounding mountains could be completely or partially screened by solar facilities, depending on the layout of solar facilities within the SEZ. Because the roads pass through the SEZ, strong visual contrasts could result, depending on solar project characteristics and location within the SEZ. If solar facilities were located on both sides of the roads, the banks of solar collectors on both sides of the roads could form a visual “tunnel” that travelers would pass through.

If power tower facilities were located in the SEZ in close proximity to the roads, the receivers could appear as brilliant light sources as viewed from the roads and, if sufficiently close to the roads, would likely strongly attract views. They could be a distraction to travelers. Also, during certain times of the day from certain angles, sunlight on dust particles in the air might result in the appearance of light streaming down from the tower.

At night, if sufficiently tall, the power towers could have red or white flashing hazard navigation lights, and if the towers were close to the roads, they would be very conspicuous, given the dark night skies in the vicinity of the SEZ. Other lighting associated with solar facilities in the SEZ would likely be visible as well.

Other impacts. In addition to the impacts described for the resource areas above, nearby residents and visitors to the area may experience visual impacts from solar energy facilities located within the SEZ (as well as any associated access roads and transmission lines) from their residences, or as they travel area roads. The range of impacts experienced would be highly dependent on viewer location, and on project types, locations, sizes, and layouts, as well as the presence of screening. However, under the 80% development scenario analyzed in the PEIS, from some locations, strong visual contrasts from solar development within the SEZ could potentially be observed.

9.2.14.2.3 Summary of Visual Resource Impacts for the Proposed Iron Mountain SEZ

Under the 80% development scenario analyzed in this PEIS, there could be multiple solar facilities within the Iron Mountain SEZ, a variety of technologies employed, and a range of supporting facilities that would contribute to visual impacts, such as transmission towers and lines, substations, power block components, and roads. The resulting visually complex landscape would be essentially industrial in appearance and would contrast strongly with the surrounding mostly natural-appearing landscape. Large visual impacts on the SEZ and surrounding lands within the SEZ viewshed would be associated with solar energy development within the SEZ because of major modification of the character of the existing landscape. Additional impacts could occur from construction and operation of transmission lines and access roads within and/or outside the SEZ.

The SEZ is in an area of low scenic quality. Visitors to the area, workers, and residents of nearby areas may experience visual impacts from solar energy facilities located within the SEZ (as well as any associated access roads and transmission lines) as they travel area roads.

Utility-scale solar energy development within the proposed Iron Mountain SEZ is likely to result in strong visual contrasts for some viewpoints in: the Palen-McCoy Wilderness, located 1.6 mi (2.6 km) south of the SEZ; the Old Woman Mountains WA, adjacent to the SEZ; and the Turtle Mountains WA, the Turtle Mountains Scenic ACEC, and the Turtle Mountains NNL, also adjacent to the SEZ.

Portions of State Route 62 and Cadiz Road intersect the SEZ. Travelers on these roads would be likely to observe strong visual contrasts from solar energy development within the SEZ.

Moderate visual contrast levels would be expected for high-elevation viewpoints in Joshua Tree National Park and WA, approximately 9.9 mi (15.9 km) southwest of the SEZ, and in the Rice Valley WA, approximately 6.6 mi (10.6 km) southeast of the SEZ.

Minimal to weak visual contrasts would be expected for some viewpoints within other sensitive visual resource areas within the SEZ 25-mi (40 km) viewshed.

9.2.14.3 SEZ-Specific Design Features and Design Feature Effectiveness

The presence and operation of large-scale solar energy facilities and equipment would introduce major visual changes into non-industrialized landscapes and could create strong visual contrasts in line, form, color, and texture that could not easily be mitigated substantially. However, the implementation of required programmatic design features presented in Appendix A, Section A.2.2, would reduce the magnitude of visual impacts experienced. While the applicability and appropriateness of some design features would depend on site- and project-specific information that would be available only after a specific solar energy project had been proposed, some SEZ-specific design features can be identified for the Iron Mountain SEZ at this time, as follows:

- Within the SEZ, in areas visible from and within 1 mi (1.6 km) of the boundary of the Old Woman Mountains WA, visual impacts associated with solar energy project operation should be consistent with VRM Class II management objectives (see Table 9.2.14.3.-1), as experienced from key observation points (KOPs) (to be determined by the BLM) within the WA (see Table 9.2.14.3-1). In areas visible from between 1 and 3 mi (1.6 and 4.8 km), visual impacts should be consistent with VRM Class III management objectives. The VRM Class II impact-level-consistency mitigation would affect approximately 2,101 acres (8.502 km^2) within the western portion of the SEZ. The VRM Class III impact-level-consistency mitigation would affect approximately 9,311 additional acres (37.68 km^2).

- Within the SEZ, in areas visible from and south of State Route 62, visual impacts associated with solar energy project operation should be consistent with VRM Class III management objectives, as experienced from KOPs (to be

TABLE 9.2.14.3-1 VRM Management Class Objectives

	VRM Management Class Objectives
Class I Objective	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
Class II Objective	The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
Class III Objective	The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
Class IV Objective	The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Source: BLM 1986b.

determined by the BLM) within the Palen-McCoy WA. The VRM Class III impact-level-consistency mitigation would affect approximately 5,725 additional acres (23.168 km^2).

- Within the SEZ, in areas visible from and within 3 mi (4.8 km) of the boundary of the Turtle Mountains WA, visual impacts associated with solar energy project operation should be consistent with VRM Class II management objectives, as experienced from KOPs (to be determined by the BLM) within the WA. In areas visible from between 3 and 5 mi (4.8 and 8 km), visual impacts should be consistent with VRM Class III management objectives. The VRM Class II impact-level-consistency mitigation would affect approximately 21,219 acres (85.871 km^2) within the western portion of the SEZ. The VRM Class III impact-level-consistency mitigation would affect approximately 13,301 additional acres (53.827 km^2).

Because of the overlap in areas affected by the design features specified above, the total acreage affected by the design features is approximately 50,984 acres (206.326 km^2), or 47.9% of the total SEZ acreage. The acreage affected by VRM Class II impact-level consistency is 23,320 acres (94.373 km^2), or 21.9% of the total SEZ acreage. The acreage affected by VRM Class III impact-level consistency is 27,664 acres (111.953 km^2), or 26% of the total SEZ acreage. The areas subject to SEZ-specific design features requiring consistency with VRM Class II and Class III management objectives are shown in Figure 9.2.14.2-17.

Application of the SEZ-specific design features above would substantially reduce visual impacts associated with solar energy development within the SEZ.

Application of the SEZ-specific design feature to restrict allowable visual impacts associated with solar energy project operations to within 3 mi (4.8 km) of the Old Woman Mountains WA would substantially reduce potential visual impacts on the WA by limiting impacts within the BLM-defined foreground of the viewshed of this area, where potential visual impacts would be greatest.

Application of the SEZ-specific design feature to restrict allowable visual impacts associated with solar energy project operations to south of State Route 62 would substantially reduce potential visual impacts on the Palen-McCoy WA by limiting impacts within the BLM-defined foreground of the viewshed of this area, where potential visual impacts would be greatest. This design feature would also reduce impacts on the Turtle Mountains WA, Scenic ACEC, and NNL, as well as on travelers on State Route 62.

Application of the distance-based mitigation to restrict allowable visual impacts associated with solar energy project operations to within 5 mi (8 km) of the Turtle Mountains WA, Scenic ACEC, and NNL would substantially reduce potential visual impacts on these nationally recognized scenic resource areas by limiting impacts within the BLM-defined foreground–middleground distance within the viewshed of these areas, where potential visual impacts would be greatest. This SEZ-specific design feature would also reduce impacts on the Palen-McCoy Mountains WA, Scenic ACEC, and NNL and on travelers on State Route 62 and Cadiz Road.

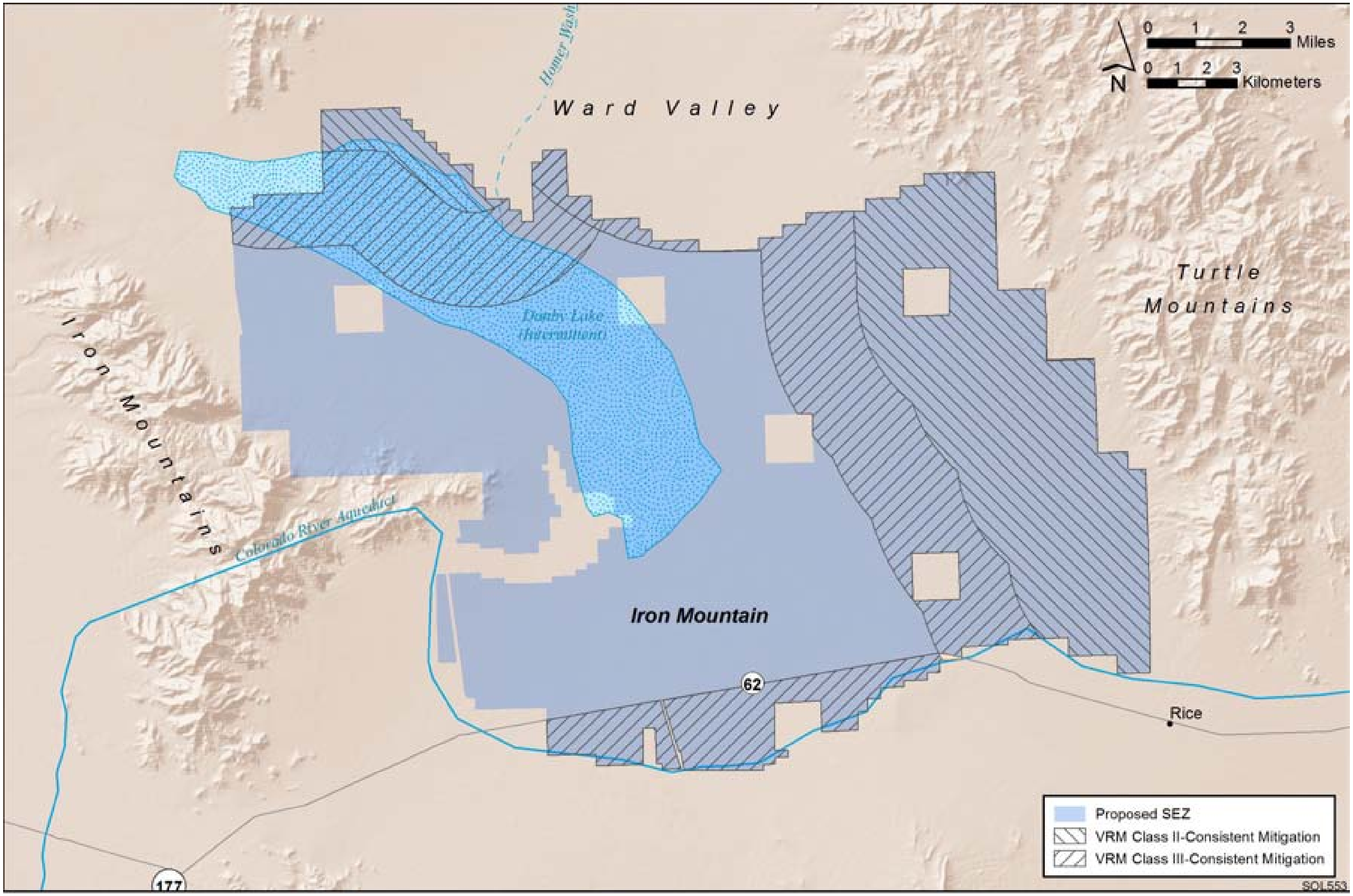

FIGURE 9.2.14.2-17 Areas within the Proposed Iron Mountain SEZ Affected by SEZ-Specific Distance-Based Visual Impact Design Features

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9.2.15 Acoustic Environment

9.2.15.1 Affected Environment

The proposed Iron Mountain SEZ is located mostly in the southeastern portion of San Bernardino County with a small, southern portion in Riverside County, in southeastern California. The County of San Bernardino has established noise standards for stationary sources, mobile sources, and all other structures (County of San Bernardino 2009). Noise standards applicable to solar energy development are those for stationary sources based on affected land use and time of day: 55 dBA daytime L_{eq} and 45 dBA nighttime L_{eq} for residential land use. Combining these two levels is the same as the EPA guideline of 55 dBA as L_{dn} for residential areas. In San Bernardino County, temporary construction activities between 7 a.m. and 7 p.m., except Sundays and federal holidays, are exempted from the noise regulations.

U.S. 95 lies as close as about 13 mi (21 km) east of the proposed SEZ, while State Route 62 passes through the southern portion of the proposed SEZ. Unpaved Cadiz Road runs southeast–northwest across the SEZ. A railroad runs through the SEZ along the Cadiz Road but is unused or rarely used. The nearest airport is Iron Mountain Pumping Plant Airport, located within the southwestern portion of the SEZ. Several airports are within 25 mi (40 km) of the SEZ: Aha-Quin Airport to the southeast, Desert Center Airport to the south–southwest, Cadiz Airstrip to the northwest, and Danby Airstrip to the north-northwest. An industrial area with trailers (East Milligan) in the northwestern portion of the SEZ, about 1 mi (1.6 km) east of Milligan, is currently used by sodium lease operators. There is no evidence of livestock grazing on-site. Therefore, noise sources around the SEZ include road traffic, infrequent railroad traffic, aircraft flyover, industrial activities including sodium mining and pumping activities, and activities and events at nearby IMPS residences. No sensitive receptors (e.g., hospitals, schools, or nursing homes) exist around the Iron Mountain SEZ. The IMPS and a cluster of its employee residences are located about 0.5 mi (0.8 km) west of the west–central portion of the SEZ. No population center with schools is located within a 20-mi (32-km) radius from the proposed Iron Mountain SEZ. The proposed Iron Mountain SEZ is mostly undeveloped, the overall character of which is considered rural to wilderness. To date, no environmental noise survey has been conducted around the Iron Mountain SEZ. On the basis of the population density in San Bernardino County, the day-night average sound level (L_{dn} or DNL) is estimated to be 41 dBA for San Bernardino County, typical of a rural area[8] (Eldred 1982; Miller 2002).

9.2.15.2 Impacts

Potential noise impacts associated with solar projects in the Iron Mountain SEZ would occur during all phases of the projects. During the construction phase, potential noise impacts associated with operation of heavy equipment and vehicular traffic on nearby residences

[8] Rural and undeveloped areas have sound levels in the range of 33 to 47 dBA as DNL (Eldred 1982). Typically, the nighttime level is 10 dBA lower than the daytime level, and it can be interpreted as 33 to 47 dBA (mean 40 dBA) during daytime hours and 23 to 37 dBA (mean 30 dBA) during nighttime hours.

(within 0.5 mi [0.8 km]) would be anticipated, albeit of short duration. During the operations phase, potential impacts on nearby residences would be anticipated, depending on the solar technologies employed. Noise impacts shared by all solar technologies are discussed in detail in Section 5.13.1, and technology-specific impacts are presented in Section 5.13.2. Impacts specific to the Iron Mountain SEZ are presented in this section. Any such impacts would be minimized through the implementation of required programmatic design features described in Appendix A, Section A.2.2, and the application of any additional SEZ-specific design features (see Section 9.2.15.3 below). This section primarily addresses potential noise impacts on humans, although potential impacts on wildlife at nearby sensitive areas are discussed, Additional discussion on potential noise impacts on wildlife is presented in Section 5.10.2.

9.2.15.2.1 Construction

The proposed Iron Mountain SEZ has a relatively flat terrain; thus, minimal site preparation activities would be required, and associated noise levels would be lower than those during general construction (e.g., erecting building structures and installing equipment, piping, and electrical). Solar array construction would also generate noise, but it would be spread over a wide area.

For the parabolic trough and power tower technologies, the highest construction noise levels would occur at the power block area; a maximum of 95 dBA at a distance of 50 ft (15 m) is assumed, if impact equipment such as pile drivers or rock drills is not being used. Typically, the power block area is located in the center of the solar facility, at a distance of more than 0.5 mi (0.8 km) to the facility boundary. However, noise levels from construction of the solar array would be lower than 95 dBA. When geometric spreading and ground effects are considered, as explained in Section 4.13.1, noise levels would attenuate to about 40 dBA at a distance of 1.2 mi (1.9 km) from the power block area. This noise level is typical of daytime mean rural background levels. In addition, mid- and high-frequency noise from construction activities is significantly attenuated by atmospheric absorption under the low-humidity conditions typical of an arid desert environment and by temperature lapse conditions typical of daytime hours; thus noise attenuation to background levels would occur at distances somewhat shorter than 1.2 mi (1.9 km). If a 10-hour daytime work schedule is considered, the EPA guideline level of 55 dBA L_{dn} for residential areas (EPA 1974) would occur at about 1,200 ft (370 m) from the power block area, which would be well within the facility boundary. For construction activities occurring near the residences closest to the west-central SEZ boundary, estimated noise levels at the nearest residences are about 50 dBA, which is higher than a typical daytime mean rural background level of 40 dBA but is below the San Bernardino County regulation of 55 dBA daytime L_{eq}. In addition, 47 dBA L_{dn}[9] at this location falls below the EPA guideline of 55 dBA for residential areas.

It is assumed that a maximum of three projects at any one time would be developed for SEZs larger than 30,000 acres (121.4 km^2) such as the Iron Mountain SEZ. If all three projects

[9] For this analysis, background levels of 40 and 30 dBA for daytime and nighttime hours, respectively, are assumed, which result in day-night average noise level (L_{dn}) of 40 dBA.

were to be built within the SEZ near the residences at the IMPS, that is, south, east, and north of the residences, noise levels would be about 3 dBA higher than the above-mentioned values. While this is an unlikely scenario, combined noise levels would be only a slightly noticeable increase of about 3 dB over a single project.

In addition, noise levels were estimated at the specially designated areas within 5 mi (8 km) of the Iron Mountain SEZ, which is the farthest distance that noise (except extremely loud noise) would be discernable. There are three specially designated areas within the range. Patton Iron Mountain Divisional Camp ACEC lies as close as 0.5 mi (0.8 km) southwest of the SEZ but this ASEC is not a noise-sensitive area (i.e., this area was designated as an ACEC because it contains cultural resources). Chemehuevi Desert Wildlife Management Area (DWMA) and Turtle Mountains Wilderness, where noise might be an issue, are adjacent to the SEZ. For construction activities occurring near these specially designated areas, noise levels are estimated to be about 74 dBA at the boundaries of these specially designated areas, higher than the typical daytime mean rural background level of 40 dBA. Thus, if construction would occur near the specially designated areas, portions of the specially designated areas close to the SEZ (within approximately 1 mi [1.6 km]) could be disturbed by construction noise from the SEZ. However, sound levels above 90 dB are likely to adversely affect wildlife (Manci et al. 1988). Thus construction noise is not likely to adversely affect wildlife except in areas directly adjacent to the construction site.

Depending on the soil conditions, pile driving might be required for installation of solar dish engines. However, the pile drivers used would be relatively small and quiet, such as vibratory or sonic drivers, rather than the impulsive impact pile drivers frequently seen at large-scale construction sites. Potential impacts on neighboring residences would be anticipated to be minor, considering the distance to the nearest residence (more than 0.5 mi [0.8 km] from the SEZ boundary).

It is assumed that most construction activities would occur during the day when noise is better tolerated, than at night, because of the masking effects of background noise. In addition, construction activities for a utility-scale facility are temporary in nature (typically a few years). Construction would cause some unavoidable but localized short-term impacts on neighboring communities, particularly for activities occurring near the west-central SEZ boundary, close to the nearest residences.

Construction activities could result in various degrees of ground vibration, depending on the equipment used and construction methods employed. All construction equipment causes ground vibration to some degree, but activities that typically generate the most severe vibrations are high-explosive detonations and impact pile driving. As for noise, vibration would diminish in strength with distance. For example, vibration levels at receptors beyond 140 ft (43 m) from a large bulldozer (87 VdB at 25 ft [7.6 m]) would diminish below the threshold of perception for humans, which is about 65 VdB (Hanson et al. 2006). During the construction phase, no major construction equipment that can cause ground vibration would be used, and no residences or sensitive structures are located in close proximity. Therefore, no adverse vibration impacts are anticipated from construction activities, including from pile driving for dish engines.

It is assumed that the existing 230-kV transmission line located within the SEZ might be used to connect new solar facilities to the regional grid and that additional project-specific analysis would be conducted for new transmission construction or line upgrades. However, some construction of transmission lines could occur within the SEZ. Potential noise impacts on nearby residences would be a minor component of construction impacts in comparison with solar facility construction and would be temporary in nature.

9.2.15.2.2 Operations

Noise sources common to all or most types of solar technologies include equipment motion from solar tracking; maintenance and repair activities (e.g., washing mirrors or replacing broken mirrors) at the solar array area; commuter/visitor/support/delivery traffic within and around the solar facility; and control/administrative buildings, warehouses, and other auxiliary buildings/structures. Diesel-fired emergency power generators and fire water pump engines would be additional sources of noise, but their operations would be limited to several hours per month (for preventive maintenance testing).

For the main solar energy technologies, noise-generating activities in the PV solar array area would be minimal, related mainly to solar tracking, if used. Dish engine technology, which employs collector and converter devices in a single unit, on the other hand, generally has the strongest noise sources.

For the parabolic trough and power tower technologies, most noise sources during operations would be in the power block area, including the turbine generator (typically in an enclosure), pumps, boilers, and dry or wet-cooling systems. The power block is typically located in the center of the facility. On the basis of a 250-MW parabolic trough facility with a cooling tower (Beacon Solar, LLC 2008), simple noise modeling indicates that noise levels would be more than 85 dBA around the power block, but about 51 dBA at the facility boundary, about 0.5 mi (0.8 km) from the power block area. For the Iron Mountain SEZ, the predicted noise level from the power block would be about 45 dBA at the nearest residences located 0.5 mi (0.8 km) from the facility boundary, which is higher than typical daytime mean rural background level of 40 dBA but well below the San Bernardino County regulation of 55 dBA daytime L_{eq}. If TES were not used (i.e., if the operation were limited to daytime, 12 hours only[10]), the EPA guideline level of 55 dBA (as L_{dn} for residential areas) would occur at about 1,370 ft (420 m) from the power block area and thus would not be exceeded outside of the proposed SEZ boundary. At the nearest residences, about 44 dBA as L_{dn} would be estimated, which is well below the EPA guideline level. As for construction, if three parabolic trough and/or power tower facilities were operating around the residences at the IMPS, combined noise levels would be only about 3 to 4 dBA above that for a single facility. However, day-night average noise levels higher than those estimated above by using the simple noise modeling would be anticipated if TES were used during nighttime hours, as explained below and in Section 4.13.1.

[10] Maximum possible operating hours at the summer solstice, but limited to 7 to 8 hours at the winter solstice.

On a calm, clear night typical of the proposed Iron Mountain SEZ setting, the air temperature would likely increase with height (temperature inversion) because of strong radiative cooling. Such a temperature profile tends to focus noise downward toward the ground. There would be little, if any, shadow zone[11] within 1 or 2 mi (2 or 3 km) of the noise source in the presence of a strong temperature inversion (Beranek 1988). In particular, such conditions add to the effect of noise being more discernable during nighttime hours, when the background levels are the lowest. To estimate day-night average noise level (L_{dn}), 6-hour nighttime generation with TES is assumed after 12-hour daytime generation. For nighttime hours under temperature inversion, 10 dB is added to noise levels estimated from the uniform atmosphere (see Section 4.13.1). On the basis of these assumptions, the estimated nighttime noise level at the nearest residence (about 1 mi [1.6 km]) from the power block area for a solar facility located near the west-central SEZ boundary) would be 55 dBA, which is higher than San Bernardino County regulation of 45 dBA nighttime L_{eq}. The combined day/night noise is estimated to be about 57 dBA as L_{dn}, which is a little higher than the EPA guideline of 55 dBA for residential areas. The assumptions are conservative in terms of operating hours, and no credit was given to other attenuation mechanisms, so it is likely that noise levels would be lower than 57 dBA at the nearest IMPS residences, even if TES were used at a solar facility. If three parabolic trough and/or power tower facilities were operating around the residences at the IMPS, combined noise levels would be about 3 dBA above that for a single facility. Consequently, operating parabolic trough or power tower facilities using TES and located near the west-central SEZ boundary could result in noise levels above background levels, San Bernardino regulation levels, and EPA guidance levels, and corresponding adverse noise impacts on the nearest residences.

For a single solar facility located near the Chemehuevi DWMA or Turtle Mountains Wilderness, estimated daytime noise level at the boundaries of these areas would be about 51 dBA. Thus, areas near the boundary of these specially designated areas (say, within 1 mi [1.6 km]) could be disturbed by the operational noise from the SEZ, but this noise is not anticipated to adversely affect wildlife (Manci et al. 1988).

In the permitting process, refined noise propagation modeling would be warranted along with measurement of background noise levels.

The solar dish engine is unique among CSP technologies, because it generates electricity directly and does not require a power block. A single, large, solar dish engine has relatively low noise levels, but a solar facility might employ tens of thousands of dish engines, which would cause high noise levels around such a facility. For example, the proposed 750-MW SES Solar Two dish engine facility in California would employ as many as 30,000 dish engines (SES Solar Two, LLC 2008). At the Iron Mountain SEZ, on the basis of the assumption of a dish engine facility of up to 9,469 MW covering 80% of the total area (85,217 acres [344.9 km^2]), up to 378,740 25-kW dish engines could be employed. Also, for a large dish engine facility, several thousand step-up transformers would be embedded in the dish engine solar field, along with several substations; however, the noise from these sources would be masked by dish engine noise.

[11] A shadow zone is defined as the region in which direct sound does not penetrate because of upward diffraction.

The composite noise level of a single dish engine would be about 89 dBA at a distance of 3 ft (0.9 m) (SES Solar Two, LLC 2008). This noise level would be attenuated to about 40 dBA (typical of the mean rural daytime environment) within 340 ft (105 m). However, the combined noise level from tens of thousands of dish engines operating simultaneously would be high in the immediate vicinity of the facility, for example, about 53 dBA at 1.0 mi (1.6 km) and 51 dBA at 2 mi (3 km) from the boundary of the square-shaped dish engine solar field, both of which are higher than typical daytime background levels of 40 dBA in rural areas but lower than the San Bernardino County regulation of 55 dBA daytime L_{eq}. These levels would occur at somewhat shorter distances, considering noise attenuation by atmospheric absorption and temperature lapse during daytime hours. To estimate noise levels at the nearest residences, it was assumed that dish engines were placed all over the Iron Mountain SEZ at intervals of 98 ft (30 m). Under these assumptions, the estimated noise levels at the nearest receptor (0.5 mi [0.8 km] from the SEZ boundary) would be about 54 dBA, which is slightly lower than the San Bernardino County regulation of 55 dBA daytime L_{eq}. On the basis of 12-hour daytime operation, the estimated 51 dBA L_{dn} at these residences is below the EPA guideline of 55 dBA L_{dn} for residential areas. Noise from dish engines could cause adverse impacts on the nearest residences, depending on background noise levels and meteorological conditions. Thus, consideration of minimizing noise impacts is very important during the siting of dish engine facilities. Direct mitigation of dish engine noise through noise control engineering could also be considered.

For dish engines placed all over the SEZ, estimated noise levels would be about 59 and 61 dBA at the boundaries of the Chemehuevi DWMA or Turtle Mountains Wilderness, respectively. These levels are higher than the typical daytime mean background level of 40 dBA. However, dish engine noise from the SEZ would not be likely to adversely affect wildlife at nearby specially designated areas (Manci et al. 1988).

During operations, no major ground-vibrating equipment would be used. In addition, no sensitive structures are located close enough to the Iron Mountain SEZ to experience physical damage. Therefore, potential vibration impacts on surrounding communities and vibration-sensitive structures during operation of any solar facility would be minimal.

Transformer-generated humming noise and switchyard impulsive noises would be generated during the operation of solar facilities. These noise sources would be located near the power block area, typically near the center of a solar facility. Noise from these sources would generally be limited within the facility boundary and rarely be heard at nearby residences, assuming a 1-mi (1.6-km) distance (at least 0.5 mi [0.8 km] to the facility boundary and another 0.5 mi [0.8 km] to the nearest residences). Accordingly, potential impacts of these noise sources on the nearest residences would be minimal.

For this analysis, the impacts of construction and operation of transmission lines outside of the SEZ were not assessed, assuming that the existing 230-kV transmission line might be used to connect some new solar facilities to load centers, and that additional project-specific analysis would be done for new transmission construction or line upgrades. However, some construction of transmission lines within the SEZ could occur. For impacts from transmission line corona discharge noise during rainfall events (discussed in Section 5.13.1.5), the noise level at 50 ft (15 m) and 300 ft (91 m) from the center of a 230-kV transmission line towers would be about

39 and 31 dBA (Lee et al. 1996), respectively, typical of daytime and nighttime mean background levels in rural environments. Corona noise includes high-frequency components, considered to be more annoying than low-frequency environmental noise. However, corona noise would not likely cause impacts, unless a residence was located close to it (e.g., within 500 ft [152 m] of a 230-kV transmission line). The Iron Mountain SEZ is located in an arid desert environment, and incidents of corona discharge are infrequent. Therefore, potential impacts on nearby residences from corona noise along the transmission line ROW would be negligible.

9.2.15.2.3 Decommissioning/Reclamation

Decommissioning/reclamation requires many of the same procedures and equipment used in traditional construction. Decommissioning/reclamation would include dismantling of solar facilities and support facilities such as buildings/structures and mechanical/electrical installations; disposal of debris; grading; and revegetation as needed. Activities for decommissioning would be similar to those used for construction but on a more limited scale. Potential noise impacts on surrounding communities would be correspondingly lower than those for construction activities. Decommissioning activities would be of short duration, and their potential impacts would be minor and temporary in nature. The same design features adopted during the construction phase could also be implemented during the decommissioning phase.

Similarly, potential vibration impacts on surrounding communities and vibration-sensitive structures during decommissioning of any solar facility would be lower than those during construction and thus minimal.

9.2.15.3 SEZ-Specific Design Features and Design Feature Effectiveness

The implementation of required programmatic design features described in Appendix A, Section A.2.2, would greatly reduce or eliminate the potential for noise impacts from development and operation of solar energy facilities. While some SEZ-specific design features are best established when project details are being considered, measures that can be identified at this time include the following:

- Noise levels from cooling systems equipped with TES should be managed so that levels at the nearest residences to the west of the west-central SEZ are kept within applicable guidelines. This could be accomplished in several ways, for example, through placing the power block approximately 1 to 2 mi (1.6 to 3 km) or more from residences, limiting operations to a few hours after sunset, and/or installing fan silencers.

- Dish engine facilities within the Iron Mountain SEZ should be located more than 1 to 2 mi (1.6 to 3 km) from the nearest residences located to the west of the west-central SEZ (i.e., the facilities should be located in other portions of the proposed SEZ). Direct noise control measures applied to individual dish engine systems could also be used to reduce noise impacts at the nearest residences.

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9.2.16 Paleontological Resources

9.2.16.1 Affected Environment

The Iron Mountain SEZ is covered predominantly by Quaternary/Tertiary deposits of various types. The eastern half is mostly thick alluvial deposits (more than 100 ft thick), ranging in age from the Miocene to Holocene. The total acreage of the alluvial deposits within the SEZ is 60,421 acres (244 km^2), or 57% of the SEZ. The western half is composed mostly of eolian (dune sand) and playa sediments. The total acreage of eolian sediments within the SEZ is 27,744 acres (112 km^2), or 26% of the SEZ, and the total acreage of playa sediments is 17,469 acres (71 km^2), or 16% of the SEZ. Peripheral sections of the west-central portion and northeast corner of the SEZ are composed of igneous and metamorphic rocks. The total acreage of these volcanic deposits within the SEZ is 887 acres (3.6 km^2), or 1% of the SEZ. In the absence of a PFYC map for the California Desert District, a preliminary classification of PFYC Class 3b is assumed for the alluvial, eolian, and playa deposits. Class 3b indicates that the potential for the occurrence of significant fossil materials is unknown and needs to be investigated further (see Section 4.8 for a discussion of the PFYC system). The PFYC for the volcanic deposits is Class 1, indicating the occurrence of significant fossil materials is nonexistent or extremely rare. On the basis of a sensitivity map supplied by the field archaeologist in the Needles Field Office, areas adjacent to and partially within Danby Lake have been designated as having a high potential for containing paleontological material. Pleistocene paleontological resources including fossil bone and teeth from extinct horse and camel and fossil root casts have been found in remnant lake bed deposits from Danby Lake (Reynolds 1988). These areas include playa sediments, thick alluvial sediments, and eolian sediments (dune sand). This high sensitivity designation would change the preliminary classification mentioned above from a PFYC Class 3b to Class 4/5, and the area would require a paleontological survey. The sensitivity of the remaining areas of the Iron Mountain SEZ is identified as unknown on that map, consistent with a PFYC Class 3b designation.

9.2.16.2 Impacts

The potential for impacts on significant paleontological resources at the Iron Mountain SEZ in Ward Valley is unknown. A more detailed investigation of the local geological deposits of the SEZ and their potential depth is needed. Once a project area has been chosen, a paleontological survey may be needed based on consultation with BLM. The appropriate course of action would be determined as established in BLM IM2008-009 and IM2009-011 (BLM 2007a, 2008b). The area around Danby Lake within the Iron Mountain SEZ has a high potential to contain paleontological deposits and would require a paleontological survey. Section 5.14 discusses the types of impacts that could occur to any significant paleontological resources found to be present within the Iron Mountain SEZ. Impacts will be minimized through the implementation of programmatic design features described in Appendix A, Section A.2.2.

Indirect impacts on paleontological resources outside of the SEZ, such as through looting or vandalism, are unknown but unlikely because any such resources would be below the surface and not readily accessed. Programmatic design features for controlling water runoff and sedimentation would prevent erosion-related impacts on buried deposits outside of the SEZ.

No new roads or transmission lines have been assessed for the proposed Iron Mountain SEZ, assuming existing corridors would be used; impacts on paleontological resources related to the creation of new corridors would be evaluated at the project-specific level if new road or transmission construction or line upgrades are to occur.

A programmatic design feature requiring a stop work order in the event of an inadvertent discovery of paleontological resources would reduce impacts by preserving some information and allowing possible excavation of the resource, if warranted. Depending on the significance of the find, some modification to the project footprint could also result. Since the SEZ is located in an area preliminarily classified as PFYC Class 3b or greater and fossils have been found in deposits associated with Danby Lake, a stipulation would be included in permitting documents to alert solar energy developers to the possibility of a delay if paleontological resources were uncovered during surface-disturbing activities.

9.2.16.3 SEZ-Specific Design Features and Design Feature Effectiveness

Impacts would be minimized through the implementation of required programmatic design features, including a stop-work stipulation in the event that paleontological resources are encountered during construction, as described in Appendix A, Section A.2.2.

The need for and nature of any SEZ-specific design features would depend on findings of paleontological surveys.

9.2.17 Cultural Resources

Although arid and at first glance forbidding, the deserts of southeastern California are rich in cultural resources. The environment provides the conditions necessary for the creation of dramatic resources, such as the desert pavement necessary for the creation of giant geoglyphs or intaglios. Soil and climate combine to preserve the traces of an elaborate prehistoric system of trails and tread imprints of WWII armored vehicles. The desert landscape includes not only the traces of use and occupation by historic and prehistoric peoples, but natural features, including mountains, caves, and hot springs sacred to the region's Native American inhabitants.

9.2.17.1 Affected Environment

9.2.17.1.1 Prehistory

The proposed Iron Mountain SEZ is located in a transitional area between the Colorado Desert to the south and the Mojave Desert to the north. The earliest human use of the Colorado and Mojave Deserts is during the Paleoindian Period sometime between 12,000 and 10,000 B.P. Known sites from the region are predominantly located near inland lakes (now mostly dry, like Danby Lake) and on desert terraces and suggest that subsistence during this time period was focused on large game animals. The hunting-based period ended approximately 7,000 to 8,000 years ago when large game became scarce and ancient pluvial lakes started shrinking. The earliest sites are characterized by Clovis complex fluted points, and later sites (Lake Mojave complex and San Dieguito complex for the Mojave and Colorado Deserts, respectively) contain scrapers, blades, distinctive crescents, and projectile points (Jones and Klar 2007).

The Archaic Period is from approximately 8,000 B.P. to 1500 B.P. The Pinto complex is the primary cultural complex in the Mojave Desert during this time. Very little is known from this period in the Colorado Desert; thus it has become the source of important regional research questions. Archaic Period sites are generally identified through associated material culture, such as distinctive projectile point types and the presence of ground stone tools for processing plant resources. A Gypsum complex has also been identified in the Mojave Desert on the basis of projectile point types for the later portion of this period starting 3,000 to 4,000 years ago, but it does not appear to be present in the southern and eastern reaches of the desert (Jones and Klar 2007). As with earlier sites, Archaic Period sites in valley bottoms that would be suitable for solar energy development would be located near water sources. For example, a Pinto complex site has been recorded along the edge of Danby Lake within the Iron Mountain SEZ (see Section 9.2.17.1.5).

The Late Prehistoric/Protohistoric Period begins about 1,500 years ago and extends into the beginning of Euro-American exploration and colonization of the area. The archaeological Patayan complex is thought to be ancestral to the later Yuman cultural groups discussed in Section 9.2.17.1.2. The archaeological record includes paddle-and-anvil pottery, bow-and-arrow technology, subsistence agriculture along the Colorado and other rivers, rock art and intaglios. It is also a time of expanding trail networks. The following section on ethnohistory describes the cultural history of this time period in greater detail.

9.2.17.1.2 Ethnohistory

Although of diverse linguistic stock, the Native Americans that inhabited the southeastern California deserts when Euro-Americans first arrived lived in similar environments and shared similar lifeways and broadly similar beliefs, norms, and values (Halmo 2003). The mountains, valleys, and lakes provided seasonally available resources that Native American groups exploited in a seasonal round, moving from resource to resource in a regular pattern in lineage-based bands varying in size depending on the abundance of the resource. A pattern of seasonal camps combined with permanent villages emerged. Lineages tended to consider as their own, specific highly productive areas, such as dense stands of mesquite, while the areas between were shared not only with other lineages, but with other Tribes (Lightfoot and Parish 2009). Even when they grew wild, plant resources were often managed; stands of plant resources might be pruned, watered, or burned to encourage growth. The pattern of seasonal migration to exploit particular resources allowed the groups to adapt to changes in their subsistence base with the arrival of new cultural impulses and populations. Floodplain horticulture, adopted from the Southwest, allowed for the establishment of permanent, often multiethnic villages near the Colorado River (Halmo 2003). These became part of the migratory pattern that continued to take some ethnic groups into the highlands to harvest resources available there. Similarly, with the discovery of gold in the nineteenth century and the influx of Euro-American populations in the twentieth century, Native Americans added wage labor in mines and on large irrigated farms to their seasonal rounds (Bean et al. 1978).

The various Native American ethnic groups that inhabited the southeastern California deserts each had an area that they considered their homeland, but the boundaries between these areas were not sharply drawn. Travel to hunt, trade, or just visit neighboring groups was common (Kelly and Fowler 1986). The territorial claims of the different ethnic groups who occupied the Mojave and Colorado Deserts overlap each other. The boundaries between ethnic groups appear to have changed from one time period to another, and groups would sometimes share territory, or a group would invite its neighbors to share an abundant resource (CSRI 2002). In addition, different ethnic groups shared a considerable amount of ritual and world view, including an important religious song cycle sung by all groups in the language of the Mohave. This song cycle was associated with a network of trails, including the Salt Song Trail. This trail is both a physical and a spiritual path, connecting sacred natural features thought to be imbued with power and followed particularly as part of a mortuary ritual to aid the departed in their journey to the afterlife. Points along the trail are often marked with cairns, sometimes covering burials, cleared sleeping circles, panels of petroglyphs, and in some areas geoglyphs and intaglios. Stopping points along the trails are most often associated with springs (CSRI 1987). As discussed below in Section 9.2.18.1 the Native Americans living in southeastern California tend to view the landscape they inhabit holistically, each part intrinsically and inextricably connected to the whole. In some sense, the network of trails tied the landscape together.

The proposed Iron Mountain SEZ lies primarily within the traditional range of the Chemehuevi, a Numic speaking group often considered the southernmost group of the Southern Paiute. Ward Valley was used seasonally by the Mohave Tribe who were Yuman speakers, and before the early nineteenth century, by the Halchidhoma. In addition, the ranges of two Takic-speaking populations, the Cahuilla and the Serrano, closely approach the SEZ on the west. Given the frequent interaction between neighboring groups and the flexibility of the boundaries between them, all four are discussed here.

Chemehuevi

The Chemehuevi, a southern Paiute group, occupied the Parker and Blythe Valleys along the Colorado River at the invitation of the Mohave with whom they were allied, sometime between 1825 and 1830, after the Mohave and Quechan had driven out the Halchidhoma. In the late 1860s, hostilities erupted between the Mohave and Chemehuevi, and part of the Chemehuevi moved west to join Cahuilla and Serrano villages near Twentynine Palms. In 1874, the Office of Indian Affairs set aside part of the Mohave Reservation along the Colorado River for the Chemehuevi, but many did not want to return. In 1907, a separate reservation was established north of Parker, Arizona (Kelly and Fowler 1986).

The Chemehuevi occupied the eastern half of the Mojave Desert from south of Death Valley to Riverside and Imperial Counties. They may be divided into two groups—those that live along the Colorado River and adopted floodplain agriculture, and the Desert Chemehuevi (*Tiiranniwiwi*) who occupy the Chemehuevi Valley away from the river and retained their ties to the surrounding upland mountains and valleys (Farmer et al. 2009). However, even those living along the river retained more reliance on hunting and gathering than their neighbors. The Tiiranniwiwi are more likely to have been periodically present in the Iron Mountain SEZ, perhaps to hunt bighorn sheep, but the river dwellers may have hunted there as well (Farmer et al. 2009). Taken together, they had a diverse subsistence base, including irrigated mixed horticulture, wild plant management, and hunting. Normally they produced a surplus that they were able to trade (Halmo 2003).

Chemehuevi settlements were scattered, and band size varied with the season and available water, plant, and animal resources. Dwellings varied from pole structures covered with brush, to rock shelters, to earth-covered huts often with open fronts, adopted from the Mohave. Other items of Mohave material culture were likewise adopted, including ceramic styles, square metates (grinding stones), storage platforms, and personal adornment (Farmer et al. 2009).

The Chemehuevi maintained a trading relationship with the Cahuilla, and groups of Chemehuevi would travel as far west as the coast to trade for shells and as far east as the Hopi mesas. They were involved in a trade network that stretched from the Channel Islands to the Gila River Valley and the Great Plains, with the potential to bring material culture from some distance away to the Chemehuevi homeland.

Mohave

The Mohave appear to have entered the Mohave Valley some time around A.D. 1150. They resided chiefly along the eastern bank of the Colorado River but travelled widely, both for trade and to harvest seasonally available resources. They lived in sprawling settlements, rather than villages, with houses situated on low hills above the floodplain. They did not engage in irrigation agriculture but relied on seasonal inundation to water and refresh their fields. Unlike most other Colorado Desert Tribes, families owned individual fields and individual mesquite trees (Stewart 1983). Most of the year the Mohave lived on terraces above the Colorado River, moving to the floodplain in the spring to plant crops after seasonal floods receded (Kroeber 1925).

More than most other California Tribes, the Mohave have traditionally thought of themselves as a nation inhabiting a territory under a hereditary great chief of the Malika clan. Divided into patrilineal clans, they came together for warfare and other purposes. War leaders and shamans had great influence, and power was gained by dreaming, often in sacred locations. Their territorial claims are extensive, reflecting their propensity to travel. They claim as their territory a much larger range than other California Tribes, including all the Mojave Desert and as far south as the Turtle, Granite, and Eagle Mountains (CSRI 2002), thus encompassing the Iron Mountain SEZ. This larger range was where they hunted and gathered to supplement their planted crops and the fish they took from the river. They are likely to have traded, hunted, and gathered in the Iron Mountain SEZ area, harvesting mesquite pods to supplement their cultivated crops. Ward Valley has been identified by them as a camping and gathering location (CRSI 1987). They were less reliant on hunting and gathering than the Chemehuevi who hunted and gathered in much of the same area (Farmer et al. 2009).

The Mohave were well known as travelers, both for trade and to visit neighboring Tribes. They established the Mohave Trail and participated in a trading network that stretched from the Pacific Coast to the Pueblos of the Southwest. The Serrano were among their trading partners as were the Chumash and the Chemehuevi.

In addition to travel for trade, war, and recreation, trails often had religious significance. The Salt Song Trail seems to have originated with the Mohave. The Mohave revere other trails such as the Keruk Trail of Dreams. The song cycles that are associated with the trails tied specific songs to specific places. Many of these were considered places of power, where individuals sought enlightenment, skills, and status through dreaming. These trails are considered sacred, and offerings continue to be left at sacred points along them (Halmo 2003).

Halchidhoma

The Halchidhoma were a Yuman-speaking group located south of the Mohave along the Colorado River. Like the Mohave they were floodplain cultivators and active traders. Culturally they were similar to the Mohave and the Quechan, but politically they were their enemies. Their ties were with the Maricopa and Cocopah, also Yuman speakers. Like the Mohave they were great travelers and traders, establishing the Coco-Maricopa or Halchidhoma Trail, and east-west route later followed by Euro-American immigrants. This trail passes well south of the Iron Mountain SEZ (CSRI 2002). Their clashes with the Mohave and Quechan came to a head some time around 1825. The Halchidhoma were defeated and began to move to the Gila River to join their Maricopa allies. This process continued until about 1840 (Harwell and Kelly 1983).

Cahuilla

The Cahuilla occupied the Coachella Valley around Lake Cahuilla. They are believed to have entered the Colorado Desert from the Great Basin sometime between 500 B.C. and A.D. 500. They were hunters and gatherers living in permanent villages near reliable water. They appear to have first settled on the shores of Lake Cahuilla[12] and then moved to the mountains as the lake dried. The Cahuilla tended toward larger groups consisting of multiple lineages (Lightfoot and Parish 2009). Preferred settlement sites were near mesquite stands or palm oases. They considered the latter to be sacred (Bean et al. 1978). While villages were occupied year-round, small groups would move seasonally to temporary camps to collect localized plant resources or to hunt. Larger groups would travel to the mountains together with mountain allies to harvest piñon nuts and acorns. These would be brought to the permanent villages for storage. Species important to the Cahuilla are discussed in Section 9.2.18.

The Cahuilla were long-distance traders. The routes westward through the San Gorgonio Pass to the coast lay within their traditional use area, and the Cahuilla maintained trading relationships east of the Colorado River with the Maricopa. Like the Chemehuevi, they were part of a network that stretched as far east as the Great Plains (Bean et al. 1978).

Serrano

Less is known of the Serrano, whose precise sociopolitical boundaries are difficult to define. They derive their name from a Spanish term for highlander or mountaineer. Most researchers place the Serrano groups in the San Bernardino Mountains east of the Cajon Pass, north of Victorville in the Mojave River drainage and as far east as Twentynine Palms. Because of their relative proximity to the Iron Mountain SEZ and their association with the Chemehuevi, they deserve mention here.

The Serrano were a collection of localized lineages speaking the same language and sharing the same culture, but with little or no overarching political structure. The Serrano appear to have been primarily gatherers, supplementing their plant-based diet with hunting and fishing. The altitude varies considerably within their traditional range, and, as with neighboring groups, resources were collected in a number of environments. Most villages were found in the foothills, but some occurred on the desert floor in locations where good water was available. At higher

[12] Lake Cahuilla formed when the Colorado River shifted course to the west and flowed into the Salton Sea Basin, then dried when the river reverted to its former course. The process of formation and desiccation was cyclical before the construction of dams on the Colorado River, with cycles lasting about 150 years (Redlands Institute 2002).

elevations, they gathered piñon nuts and acorns, and at lower elevations mesquite pods and yucca heads. Where the resource was abundant, lineages might gather to harvest or to communally hunt rabbits or deer (Bean and Smith 1978).

Limited by water supply, villages were small and consisted of clusters of tule-thatched, domed, circular huts. Most often, they also included a larger ceremonial structure where the lineage leader lived. Their material culture included decorated baskets, pottery, hide blankets, stone pipes, yucca fiber cordage, and an assortment of musical instruments of wood, bone, and shell similar to the material culture of the Cahuilla (Farmer et al. 2009).

The Serrano had little contact with the Spanish until 1819 when an *asistencia*, or mission outpost, was established near Redlands. Thereafter, native lifeways rapidly faded as the majority of the population was moved to the missions. By the latter part of the twentieth century, most Serrano lived on the Morongo and San Manuel Reservations (Bean and Smith 1978).

9.2.17.1.3 History

European explorers first entered the southeastern California deserts in the sixteenth century. Early explorers of Alta California reached the Colorado River by way of the Gulf of California and proceeded up stream past the confluence of the Gila River, but explored little of the interior deserts. For the next 200 years, Spanish penetration of the interior deserts was intermittent resulting in a prolonged protohistoric period (see Sections 9.2.17.1.1 and 9.2.17.1.2). Juan Bautista de Anza crossed the Colorado River with the assistance of the Quechan on his way to Monterey in 1774. His route, which is located well south of the Iron Mountain SEZ near the border of California and Mexico, became the main travel corridor between Arizona and central California in the 1800s.

The nineteenth and early twentieth centuries were characterized by mining and prospecting both in the Colorado and Mojave Deserts. Gold, silver, copper, gypsum, borax, and manganese were the primary deposits of interest. A series of military camps and forts were established in Arizona, Nevada, and California between 1848 and 1890 to protect those moving into the area from hostile Tribes; tensions had increased between settlers and Native Americans as a result of mass migration to the area during the Gold Rush. In addition to the trail initially established by de Anza, Jedediah Smith created a new trail into California in 1826 that passed through present-day Needles north of the SEZ. This new development in the deserts was dependent on water and transportation. In 1872, the Southern Pacific Railroad started its way toward California; by 1877, it reached Yuma, Arizona, and by 1880, the Chocolate Mountains southeast of the SEZ. Water did not come to the Colorado Desert until the 1930s when the Metropolitan Water District was created and work began on the CRA from Parker Dam to Los Angeles; it was completed in 1938. Mining increased in the area during World Wars I and II as the need for metals (gold, silver, and manganese) increased.

In 1942, the U.S. Army identified 18,000 mi^2 (46,600 km^2) of desert in California and Arizona for training troops in a desert environment in preparation for combat in North Africa. The area came to be known as the Desert Training Center/California–Arizona Maneuver Area, or DTC/C-AMA, in 1943, as the massive training facility expanded its size to 31,500 mi^2 (81,600 km^2) and its range of activities from training troops, testing and developing equipment and supplies, and developing new techniques and tactics for desert warfare to large-scale training and maneuvering. It is estimated that more than 1 million men trained at the DTC/C-AMA. Although it only operated between 1942 and 1944, it represents a significant period in American history and includes a number of archaeological features of importance, including the remains of training camps, airfields, bivouacs, maneuver areas, and tank tracks (Bischoff 2000).

The larger context for the DTC is the early days of United States involvement in WWII. The German army was advancing across Europe, and the Italian army had struck out in Libya and Egypt. British forces had been able to successfully counterattack the Italian army but resulted in Germany entering North Africa to help the Italians. General Erwin Rommel of the German army was successful with his desert army advancing across Libya and then into Egypt against the British. The prospect of Germany and Italy controlling Egypt and the Japanese successes in India propelling them toward Persia, leaving Russia wide open to attack, made it clear to the United States that it would need to go to North Africa. General Lesley J. McNair, Chief of Staff or the Army General Headquarters, recognized the need for preparing American soldiers for desert warfare in a terrain similar to that of North Africa. He placed Major General George S. Patton, Jr., who had previously conducted successful training maneuvers in Louisiana, in charge of the desert training center project (Bischoff 2000).

The location of the DTC was determined in March of 1942 as General Patton toured the desert. Aside from the mountain ranges, the uninhabited desert of eastern California was deemed sufficiently similar to that of North Africa. Patton believed that the area was ideal for large-scale training exercises because it was remote and desolate, but yet water was available and three railroads supplied the area. In addition, there were other military facilities nearby (in Riverside, Las Vegas, Indio, Yuma, and Blythe). Patton worked out deals with the railroad companies (Union Pacific, Santa Fe, and Southern Pacific) and the Municipal Water District in order to supply transportation and water for the troops. Camp Young was the first camp established near what is today named Chiriaco Summit, and it became the DTC headquarters. Camp Iron Mountain and a camp in Needles were established next. The camps were all of temporary construction, mostly tents with some wooden structures to house administrative centers or hospitals. The only permanent construction was open-air chapels and large relief maps. By late summer of 1942, Patton was ordered to North Africa under Operation Torch, where he successfully commanded the western task force of the operation to victory. The DTC was quickly placed under the command of Major General Alvan Gillem, and the first set of maneuvers was conducted in the fall. This first set of maneuvers was considered unrealistic, and the DTC was ordered to act like a theater of operations in a combat setting, including the establishment of communications zones and combat zones. This was the first time the Army simulated a theater of operation. Riverine operations across the Colorado River were also added. At its height, the DTC contained 14 camps, 11 in California and 3 in Arizona, each capable of holding at least 15,000 soldiers during a typical 14-week training schedule. There were also airfields, hospitals, supply depots, and railheads. Rice Airfield, southeast of the Iron Mountain SEZ, was one of four main army airfields for the DTC; air support was considered an integral part of the desert training experience. On-the-ground troops needed to be able to conceal themselves as much as possible to prevent detection during simulated air attacks. In 1943, as the need for desert training waned with the close of the North African campaign, the concept and name of the DTC changed to the California–Arizona Maneuver Area (C-AMA). Its mission was to conduct broader based large-scale training to toughen soldiers mentally and physically and provide battle conditions for conducting firing training and for testing and developing equipment, supplies, and training methods. The DTC/C-AMA saw its greatest amount of activity during the summer and fall of 1943. In late 1943, personnel shortages (due to the need for personnel overseas) resulted in inefficient operation of the C-AMA, and General McNair recommended that the facility be closed. The DTC/C-AMA was declared surplus in April 1944 by the War Department and was closed by the end of the month (Bischoff 2000).

Of specific interest in the vicinity of the Iron Mountain SEZ are Camp Iron Mountain and Camp Granite. Camp Iron Mountain, located immediately adjacent to the proposed Iron Mountain SEZ to the southwest, was one of the first divisional camps constructed in the spring of 1942. It consisted of 15 shower buildings, 26 latrine buildings, 113 pyramidal tents of varying sizes (single, double, and triple), an amphitheater, two chapels, and several water supply installations (BLM 1984). Four firing ranges associated with the Iron Mountain Divisional Camp were located west and north of the camp; a fifth was located to the south at Palen Pass (BLM 1984). Camp Granite was established the summer of 1943 and contained nine artillery ranges just south of the main camp. It is located at the base of the Granite Mountains south of Camp Iron Mountain.

9.2.17.1.4 Traditional Cultural Properties—Landscape

As mentioned previously, the Tribes in this part of California have a holistic cosmology; they see the features of their environment as an interconnected whole imbued with a life force. Prominent features may be seen as places of power, as sacred places. High hills and mountains tend to be regarded as sacred, although some peaks have special status. Other features that tend to be regarded as sacred include caves, certain rock formations, springs and hot springs. Revered locations include panels of rock art, evidence of ancestral settlements, burial or cremation areas, and systems of trails. Sacred sites are often seen as places of power where offerings are left (Halmo 2003). The Tribes see themselves as exercising divinely given responsibilities of stewardship over the lands where they believe they were created and as retaining a divine birthright to those lands. Specific mountain peaks are seen as points of emergence associated with creation stories. Although adopting much of the Mohave cosmology, the Tribes have retained their own identities. For example, the Chemehuevi have their own mountain of creation, Charleston Peak in Nevada (Halmo 2003), distinct from the Mohave's *Avikwaaame* (Spirit Mountain) or Newberry Peak, also in Nevada. As mentioned previously, there remains considerable interaction among the Tribes that inhabit the southeastern California deserts. A system of alliances furthered trade and the sharing of hunting and gathering grounds.

From the Native American perspective, the Iron Mountain SEZ is situated within a sacred landscape tied together by a network of sacred trails. The Chemehuevi have identified important trails in the general area, one of which may pass through the southern part of the SEZ. The most important trail is the Salt Song Trail. Generally, it runs north–south and links the mountains of creation in Nevada with other sacred mountains in the south—Palo Verde Peak and when tied to the *Xan Kwakham Trail*, *Avikwala*, or Pilot Knob (Johnson 2003). While close to the SEZ, it lies to the west. It follows the western slope of the Old Woman Mountains in Fenner Valley, crosses the smaller western arm of Ward Valley then proceeds southward west of the Iron Mountains into Palen Valley (CSRI 1987). Except where it crosses the shorter arm of Ward Valley, it is separated from the Iron Mountain SEZ by mountains. Native American groups from around the region, including the Fort Mohave, Chemehuevi, Cocopah, Quechan, and Colorado River Indian Tribes, who all share reverence for the Salt Song Trail, protested strenuously when an attempt was made to establish a low-level radioactive waste repository at the northern end of Ward Valley because of its association with the Salt Song Trail and because of concerns over groundwater contamination (Ridder 1998).

Another trail important to the Chemehuevi, leading from the Chemehuevi Valley to Twentynine Palms and the Pacific Coast, although not sacred, crosses Ward Valley well north of the proposed SEZ, while a more southerly east-west route connecting Parker, Arizona, with the coast, crosses Ward Valley to the Iron Mountains, most likely traversing the SEZ.

Other mountains considered sacred include the Big Maria, Coxcomb, Old Woman, Riverside, and Providence Mountains (Halmo 2003). Of these, the Old Woman Mountains are adjacent to and northwest of the Iron Mountain SEZ and form the western wall of Ward Valley. The Riverside and Big Maria Mountains are visible through a gap in the mountains that surround the SEZ, while the other mountains are shielded from view. It is possible that trails connecting the mountains pass through the SEZ. There are other geophysical features that the Chemehuevi deem culturally important and connected to local features. These stretch from the Eagle Mountains to the southwest to the Grand Canyon of the Colorado River to the northeast. These are not visible from the SEZ, nor would development in the SEZ be visible from them. The Chemehuevi have also identified the Cadiz Valley located west of the Iron Mountains as culturally important and have taken refuge in the Turtle Mountains northeast of the SEZ during times of conflict.

The Ward Valley contains extensive seasonal collection areas, some of which are still used by the Chemehuevi. There are temporary and permanent campsites throughout the valley. Danby Lake in the southeastern part of the SEZ was an important area for food and salt collection. Numerous campsites are reported from around the lake. A trail along the southern side of the lake may well be part of the east-west trail leading from Parker, Arizona, to the Pacific Coast (CSRI 1987).

According to a Sacred Lands File Search through the Native American Heritage Commission, Native American burials have been recorded in 12 Township and Range sections wholly or partially included in the proposed Iron Mountain SEZ. An additional burial is located in a section adjacent to the proposed SEZ, and a village site has been recorded in a section that lies partially within the SEZ (Singleton 2010).

9.2.17.1.5 Cultural Surveys and Known Archaeological and Historic Resources

At least three linear surveys have been conducted within the proposed Iron Mountain SEZ, resulting in the recording of three sites within the SEZ and two additional sites just west of the SEZ. Three additional sites, not associated with the linear surveys, have been recorded in the area, for a total of six recorded sites within the SEZ. Approximately seven sites lie within the Ward Valley, including the two mentioned previously, that are located just outside of the SEZ, but within 5 mi (8 km) of it. Five additional sites are recorded within 5 mi (8 km) of the SEZ but are in locations within and/or beyond (on the other side of) the Iron Mountains or Turtle Mountains with respect to the SEZ; these are not in locations that have the potential to be affected by solar development in the valley and are therefore not discussed further.[13]

More specifically, a BLM report was published in 1977 regarding a sample survey of the Cadiz Valley/Danby Lake Interim Critical Management Area 37. Twenty-two transects (0.125 mi × 1.0 mi [0.2 km × 1.6 km]) were randomly selected and systematically surveyed across a 278 mi^2 (720 km^2) area. Twenty-one sites were recorded, including the following two sites in the Iron Mountain SEZ: a salt mine and a prehistoric camp with a very large lithic scatter,[14] and the Iron Mountain Divisional Camp just outside of the SEZ. In 1980, a 200-ft (61-m) wide corridor was surveyed following the centerline of a proposed racecourse, including a portion crossing Danby Lake and the Iron Mountains. An isolated basalt mortar was recorded just west of the SEZ, but no artifacts were recorded within the corridor that was surveyed within the SEZ. In the 1980s, an archaeological survey was conducted for the All-American Pipeline, a 1,223-mi (1,968-km) heated oil pipeline from Santa Barbara, California, to McCamey, Texas. The specific segment of the All-American Pipeline within the proposed Iron Mountain SEZ was surveyed in 1985, and four sites were recorded (two prehistoric artifact scatters and two historic trash scatters).

Of the six sites within the SEZ, three are prehistoric and three are historic. One of the prehistoric sites is clearly eligible for listing on the NRHP and is located on the edge of Danby Lake. It is a Pinto complex site with Pinto series projectile points and milling tools representative of the complex. The other two are predominantly lithic scatters, one of which has some milling tools present. Historic period sites include a surface trash scatter consisting of metal, glass, and ceramic artifacts, a hearth with associated bottle glass and shell bead, and a salt mining evaporation basin (ca. 1920s) within the Danby Lake bed.

A portion of the Iron Mountain Divisional Camp is located within the SEZ. This camp is eligible for the NRHP as representative and the best preserved of the 14 camps within the DTC-C-AMA. Two open-air chapels and a surviving relief map (although affected over time by sheet wash erosion) are extant at the site, as well as stone-lined walkways, unit symbols, and insignias. The 200-ft × 175-ft (61-m × 53-m) relief map represents the entire DTC/C-AMA to scale. The map is now fenced, and a diversion channel was dug uphill to prevent further erosion. There are two other known relief maps, but the one at Iron Mountain is the best preserved. The only other known chapel is at Camp Coxcomb (Bischoff 2000). Camp Granite is located on the other side of the highway just south of the SEZ and Camp Iron Mountain, and Camp Rice and Rice Army Airfield are located to the southeast of the SEZ. Camp Granite, Camp Rice, and Rice Army Airfield are potentially eligible for listing in the NRHP (Bischoff 2000). The close proximity of

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13 Survey and site information was provided by the BLM Needles Field Office.

14 Appears to have been initially recorded as three separate sites out of the 21 recorded, but results in one BLM site form.

these military sites increases the likelihood of military features and artifacts being present within the SEZ. Property types identified as associated with important World War II training activities within the DTC/C-AMA include the divisional camps, airfields, landing strips, bivouacs, maneuver areas, ranges, training areas, campsites, hospitals, quartermaster depots, railroad sidings, tank tracks, and refuse deposits (Bischoff 2000). At least a portion of one of the five firing ranges appears to have been located within the western part of the Iron Mountain SEZ, according to a map referenced in the *Iron Mountain Divisional Camp Resource Management Plan* (BLM 1984). Tank tracks also were observed within portions of the SEZ during a preliminary site visit in August 2009.

Just west of the northwest corner of the SEZ is the railroad section camp and the townsite of Milligan. The camp would have been established around 1913 to 1917 (based on the railroad going in about 1913 and an approximate date for the cemetery at 1917) and likely abandoned in the 1930s. The site has not been formally evaluated for the NRHP, other than being determined potentially eligible for purposes of a sodium-related project in the area. It consists of a few foundations, including a foundation of the station master's house; a cemetery with approximately 10 graves; ornamental rock planters around palo verde trees; a water tank; and an area where tent platforms would have been set up. It is located just south of the Atchison Topeka & Santa Fe Railroad just outside of the sodium mining operations; the cemetery is just north of the tracks. Section camps were strategically established during railroad construction in remote areas near water sources for railroad maintenance purposes. The community population could have reached about 40 people, but was at times as few as 4 to 5 families (Murray 2009).

Also adjacent to the proposed SEZ, in the northwest, is a lithic scatter with Lake Mojave points (possibly reused lanceolate points from an earlier period) on a former Danby Lake shoreline. This site is potentially eligible for listing in the NRHP.

The BLM has designated several locations relatively close to the proposed Iron Mountain SEZ as ACECs because of their significant cultural value. The Iron Mountain Divisional Camp ACEC is adjacent to the SEZ, although portions of the historic archaeological site extend outside the boundaries of the ACEC. It was designated an ACEC in 1980 as the best preserved of the World War II camps in California and Arizona. The Mopah Spring ACEC is 7 mi (11 km) northeast of the SEZ; it was designated for its outstanding scenery and its cultural resources. The Palen Dry Lake ACEC is 25 mi (40 km) south of the SEZ and is designated for its prehistoric sites. Additional ACECs are present beyond a 25-mi (40-km) radius of the SEZ; they have been designated for their archaeological resources and Native American values and are reflective of the cultural landscape. These include the Big Marias ACEC (Arizona) 26 mi (42 km) southeast of the SEZ; Alligator Rock and Corn Springs ACECs 30 mi (38 km) and 34 mi (55 km), respectively, southwest of the SEZ; Whipple Mountains ACEC 33 mi (53 km) east of the SEZ; and Mule Mountains ACEC 38 mi (61 km) south of the SEZ.

National Register of Historic Places

There are no historic properties listed in the NRHP within the SEZ or within 5 mi (8 km) of the SEZ. However, the Iron Mountain Divisional Camp is eligible for listing in the NRHP and has been recommended as a representative site for the DTC/C-AMA for management purposes (BLM 1984). Although it is not yet listed, it has been designated an ACEC by the BLM to better protect its cultural values. The Pinto complex site that is located within the SEZ is also eligible for listing in the NRHP, and so is the Lake Mojave site adjacent to the SEZ.

9.2.17.2 Impacts

Direct impacts on significant cultural resources during site preparation and construction activities could occur in the proposed Iron Mountain SEZ; however, as stated in Section 9.2.17.1, further investigation is needed. A cultural resource survey of the entire area of potential effects would first be required to identify archaeological sites, historic structures and features, and traditional cultural properties, and an evaluation would follow to determine whether any are eligible for listing in the NRHP. Ward Valley, as a whole, and Danby Lake, in particular, were important areas for gathering both salt and food resources for both the Mohave and Chemehuevi. The remains of campsites are scattered throughout the valley, and there are panels of rock art in the adjacent mountains. These locations remain important both as resource areas and for their archaeological sites. Activities associated with the World War II DTC were also prominent in the valley, and physical remnants of those activities, as well as tank tracks, are present within the SEZ. Possible impacts from solar energy development on cultural resources that are encountered within the SEZ or along related ROWs are described in more detail in Section 5.15. Impacts would be minimized through the implementation of required programmatic design features described in Appendix A, Section A.2.2. Programmatic design features assume that the necessary surveys, evaluations, and consultations will occur.

Programmatic design features to reduce water runoff and sedimentation would prevent the likelihood of indirect impacts on cultural resources resulting from erosion outside of the SEZ boundary (including along ROWs). These programmatic design features will be especially important in areas near the Iron Mountain Divisional Camp, as erosion has had an effect on the integrity of several features at the site. Indirect impacts on cultural resources through vandalism or theft are possible given the large size of the SEZ and its accessibility, as well as its proximity to areas of significance to Tribes (see below) and historic resources like the Iron Mountain Camp and Milligan townsite.

No new access roads or transmission lines have been assessed for the proposed Iron Mountain SEZ, assuming existing corridors would be used; impacts on cultural resources related to the creation of new corridors would be evaluated at the project-specific level if new road or transmission construction or line upgrades are to occur.

Because of the interconnectedness of the landscape in Native American cosmology, a change in one part affects the whole; thus damage to one part of the sacred landscape would affect the entire network. The proposed Iron Mountain SEZ is located near to where the Salt Song Trail crosses the southern end of Ward Valley. Native Americans have expressed concern over the visual impacts of development on segments of the Salt Song Trail (Halmo 2003). It is likely that development of the Iron Mountain SEZ would be visible from the southern end of the Old Woman Mountains (see Section 9.2.14). The Iron Mountain SEZ is not pristine wilderness;

it is crossed by a railroad line, includes the remains of an abandoned settlement, is actively leased for sodium extraction, and is scarred by tank tracks dating from World War II. However, the construction of an extensive solar energy facility would very likely have more visual impact on the landscape surrounding the mountains than already exists. Native Americans have also expressed concern over other impacts likely to accompany development (Halmo 2003). The presence of an industrial facility and the associated increase in traffic and workers are likely to have a negative impact on the qualities that render a site sacred. An increase in the number of people in the area would increase the potential for damage to panels of rock art and the disturbance of burials and archaeological sites. While the development of the Iron Mountain SEZ would necessarily increase the number of people coming to and working in Ward Valley, this impact should be greatest during the construction and decommissioning phases of a facility. The operation of a solar facility would require fewer personnel (see Section 9.2.19.2).

9.2.17.3 SEZ-Specific Design Features and Design Feature Effectiveness

Programmatic design features to mitigate adverse effects on significant cultural resources, such as avoidance of burials and significant sites and cultural awareness training for the workforce, are provided in Appendix A, Section A.2.2.

SEZ-specific design features would be determined in consultation with the California SHPO and affected Tribes. Consultation efforts should include discussions on significant archaeological sites and traditional cultural properties and on sacred sites and trails with views of the proposed SEZ. SEZ-specific design features could include the following:

- Avoidance of NRHP-eligible sites (historic properties) within the proposed SEZ, specifically in the vicinity of Danby Lake and near the Iron Mountain Divisional Camp, is recommended.

- Because of the possibility for burials in the vicinity of the proposed Iron Mountain SEZ and its location along the Salt Song Trail interconnecting a sacred landscape and its associated sites, it is recommended that for surveys conducted in the SEZ, consideration be given to include Native American representatives in the development of survey designs and historic property treatment and monitoring plans.

- Troops in training for World War II often used the same locations that Native Americans did for similar purposes (CSRI 1987). Any excavation of historic sites should take into consideration the potential for the co-location of prehistoric and ethnohistoric components.

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9.2.18 Native American Concerns

As discussed in Section 9.2.17, many Native Americans view their environment holistically. This section focuses on concerns that are specific to Native Americans and to which Native Americans bring a distinct perspective. For a discussion of issues of possible Native American concern, several sections in this PEIS should be consulted. General topics of concern are addressed in Section 4.16. Specifically for the proposed Iron Mountain SEZ, Section 9.2.17 discusses archaeological sites, structures, landscapes, trails, and traditional cultural properties; Section 9.2.8 discusses mineral resources; Section 9.2.9.1.3 discusses water rights and water use; Section 9.2.10 discusses plant species; Section 9.2.11 discusses wildlife species, including wildlife migration patterns; Section 9.2.13 discusses air quality; Section 9.2.14 discusses visual resources; Sections 9.2.19 and 9.2.20 discuss socioeconomics and environmental justice, respectively; and issues of human health and safety are discussed in Section 5.21.

Many Native Americans view the whole of the landscape as imbued with a life force, including features and objects viewed by Euro-American cultures as inanimate. The importance of landscapes, geophysical features, trails, rock art, and archaeological sites is discussed in Section 9.2.17. This section focuses on other Native American concerns, including those that have an ecological as well as cultural component. For many Native Americans, the taking of game or the gathering of plants or other natural resources is seen as both a sacred and secular act (Stoffle et al. 1990).

Information has been sought from all federally recognized tribes with traditional ties to the Colorado Desert, including the Iron Mountain SEZ. Because Tribal land claims are overlapping and because conflicts among the Tribes and with Euro-Americans resulted in the dispersal of much of the original population, contacts have been initiated with a wide net of Tribes that are likely to include descendants of the indigenous inhabitants of the area. Table 9.2.18-1 lists the Tribes contacted with traditional ties to the SEZs in southeastern California. Contacts with all federally recognized Tribes are presented in Appendix K. The concerns of Native Americans, including the Chemehuevi, Mohave, Cahuilla, and Serrano, over other energy development projects in the region also have been documented and are summarized in the next section. These comments provide important insights into their concerns over energy development in the area.

9.2.18.1 Affected Environment

As discussed in Section 9.2.17, the territorial boundaries of the tribes that inhabited the Colorado Desert appear to have been fluid over time. At times they overlapped, and resources were shared where abundant. The boundaries considered here are those presented by the tribes themselves to the Indian Claims Commission in the 1950s. While the commission recognized the individual claims for the Chemehuevi, Mohave, and Quechan, most of California, including much of the southeastern part of the state, was judged to be the common territory of the "Indians of California" and is so shown on maps of judicially established Native American land claims (Royster 2008). This category was created by Congress to accommodate the claims of Native Americans who had lost their identity as distinct tribes, bands, or villages because of the arrival

TABLE 9.2.18-1 Federally Recognized Tribes with Traditional Ties to the Southeastern California SEZs

Tribe	Location	State
Agua Caliente Band of Cahuilla Indians	Palm Springs	California
Cabazon Band of Cahuilla Mission Indians	Indio	California
Cahuilla Band of Mission Indians	Anza	California
Campo Kumeyaay Nation	Campo	California
Chemehuevi Indian Tribe	Havasu Lake	California
Cocopah Indian Tribe	Somerton	Arizona
Colorado River Indian Tribes	Parker	Arizona
Ewiiaapaayp Band of Kumeyaay Indians	Alpine	California
Fort Majave Indian Tribe	Needles	California
La Posta Band of Kumeyaay Indians	Boulevard	California
Los Coyotes Band of Cahuilla & Cupeno Indians	Warm Springs	California
Manzanita Band of Kumeyaay Indians	Boulevard	California
Morongo Band of Mission Indians	Banning	California
Quechan Indian Tribe of the Fort Yuma Reservation	Yuma	Arizona
Salt River Prima-Maricopa Indian Community	Scottsdale	Arizona
San Manuel Band of Mission Indians	Patton	California
Soboba Band of Luiseño Indians	San Jacinto	California
Sycuan Band of the Kumeyaay Nation	El Cajon	California
Torres-Martinez Desert Cahuilla Indians	Thermal	California
Twenty-Nine Palms Band of Mission Indians	Coachella	California
Viejas Band of Kumeyaay Indians	Alpine	California

and policies of Euro-Americans (Indian Claims Commission 1958). The claims of the Serrano and Cahuilla lie within the Indians of California territory but were also presented individually to the commission. These claims appear to respect the claims made by neighboring Tribes. The Mohave submitted two claims. One claim accepted by the commission was restricted to areas along the Colorado River, the other, reflecting their view that they were the original inhabitants of southeastern California and all others late-comers, includes much of Chemehuevi and Indians of California territory (Indian Claims Commission 1958; CSRI 2002).

9.2.18.1.1 Territorial Boundaries

Chemehuevi

Maps of Native American territorial boundaries in southeastern California usually show the southern end of Ward Valley, where the proposed Iron Mountain SEZ is located, as being in Chemehuevi territory. Iron Mountain is in the southern lobe of the territory they claimed. Their territory stretches from the Chemehuevi Reservation on the Colorado River on the east, west as far as Soda Lake beyond the Bristol Mountains, and north of the Newberry Mountains (CSRI 2002). Chemehuevi descendants may be found on the Chemehuevi Reservation and among the Twentynine Palms Band of Mission Indians.

Mohave

The territory claimed by the Mohave includes almost all land claimed by the Chemehuevi and overlaps with Serrano claims. It extends as far west as the Tehachapi and San Gabriel Mountains. They see themselves as the original people to dwell in the Colorado Desert. The others are latecomers or distant branches of the Mohave. Their claimed territory includes the northern portion of Ward Valley, and it is likely that the resources of the Iron Mountain SEZ were shared (CSRI 2002). Mohave Indians may be found on the Fort Mohave Reservation and the Colorado River Reservation.

Serrano

The Serrano were friendly trading partners of the Chemehuevi. Their territorial claims lie just to the south of Chemehuevi territory. The proposed Iron Mountain SEZ is close to the border between the two claims. Given the variable nature of the claims and the important salt deposits near Danby Lake, it is likely that the Serrano had access to the valley as well (CSRI 2002). Serrano descendants may be found among the San Manual and Morongo Bands of Mission Indians.

Cahuilla

The Coachella Valley lies at the heart of Cahuilla territory, well to the southwest of the proposed Iron Mountain SEZ. However, their eastward territorial claims extend to just west of Blythe, California, which is south of the proposed Iron Mountain SEZ. However, given their relative proximity and their propensity for long-distance trading and travel, it is likely that the SEZ was part of their broader range (CRSI 2002). Cahuilla descendants may be found on many reservations, including those of the Morongo, Agua Caliente, Cabazon, Cahuilla, Los Coyotes, and Torres-Martinez Bands.

9.2.18.1.2 Plant Resources

The traditional Native American subsistence base in the Colorado Desert was a combination of floodplain agriculture and hunting and gathering. The proportion of farming to gathering varies with the tribe. The margins of Danby Lake may have periodically supported traditional farming, but Ward Valley is more closely associated with the harvesting of wild plants. Traditionally, Native American Tribes in the Colorado Desert practiced a seasonal round in harvesting naturally occurring plant resources. For example, agave heads are harvested in early spring, mesquite produced a summer crop, and fall might include harvests of pine nuts or acorns at higher elevations (Lightfoot and Parish 2009). Proximity to valuable plant resources and water were important factors in determining where Native Americans chose to build their villages and camps. Native Americans commenting on nearby development projects have voiced concern over the loss of culturally important plants used for food, medicine, and ritual purposes and for making tools, implements, and structures. The plant communities observed or likely to be present at the Iron Mountain SEZ are discussed in Section 9.2.10. Danby Lake is classified as North American Warm Desert Playa. While most of the valley floor on either side of the lake has been characterized as Sonora-Mojave Creosotebush-White Bursage Desert Scrub, a small area of Sonora-Mojave Mixed Salt desert Scrub is present to the north of the lake (NatureServe 2008). The valley bottom is dominated by creosote and burrobush, with mesquite present in the washes.

Table 9.2.18.1-2 lists plants important to Native Americans that were either observed at the Iron Mountain SEZ or are possible members of the cover type plant communities that have been defined for the SEZ. These plants are the dominant species; however, other plants important to Native Americans could occur in the SEZ, depending on localized conditions and the season. Food plants are present in the Iron Mountain SEZ, although they do not appear to be dominant. Food plants had other uses as well. The most important is mesquite, found in the washes of the SEZ. Its long bean-like pods are harvested in the summer, can be stored, and were widely traded in the past; its blossoms are also edible. Traditionally, mesquite groves were managed by burning. Mesquite trunks also traditionally served as a source of wood; fiber from its inner bark was made into string, its thorns were used for tattooing; and its gum was used as an adhesive, a cleansing agent, and medicine. Native Americans also harvest and eat a variety of cactus fruits and yucca heads in season. Jojoba produces an edible nut that can be ground into a meal and also has medicinal uses. Saltbush seeds can be harvested, processed, and eaten (Lightfoot and Parish 2009).

TABLE 9.2.18.1-2 Plant Species Important to Native Americans Observed or Likely To Be Present in the Proposed Iron Mountain SEZ

Common Name	Scientific Name	Status
Food		
Beavertail Prickly Pear Cactus	*Opuntia basilaris*	Observed
California Barrel Cactus	*Ferocactus cylindraceus*	Nearby
Cholla Cactus	*Cylindropuntia* spp.	Observed
Honey Mesquite	*Prosopia Glandolosa*	Observed
Jojoba	*Simmondsia chinensis*	Nearby
Saltbush	*Atriplex* spp.	Observed
Yucca	*Yucca* sp.	Observed
Medicine		
Creosotebush	*Larrea tridentata*	Observed
Greasewood	*Adenotsoma fasciculatum*	Observed
Squaw tea	*Ephedra nevadensis*	Possible
Ritual		
Ironwood	*Olneya tesota*	Observed
Raw Material		
Desert-Willow	*Chilopsis linaeris*	Observed

Sources: Field visit; Lightfoot and Parrish (2009); NatureServe (2008).

The proposed Iron Mountain SEZ includes other plants useful to Native Americans. The leaves of the dominant creosotebush are widely made into tea for medicinal purposes. The trunks of greasewood can be used in construction, while its leaves and branches are used in curing, as is a tea made from *Ephedra nevadensis*, or Mormon tea. Desert willow is used in basketry (Lightfoot and Parish 2009), while ironwood is considered sacred by the Cahuilla (Bean et al. 1978).

9.2.18.1.3 Other Resources

The proposed Iron Mountain SEZ was also likely a hunting ground. It lies across the route taken by bighorn sheep, *Ovis Canadensis,* moving from one mountain range to the next. Ward Valley is also known as a good location to hunt rabbits (CSRI 1987). Other animal species traditionally used by Native Americans that are likely to occur in the SEZ are listed in Table 9.2.18.1-3.

Mineral resources important to Native Americans in the Colorado Desert include clay suitable for making pottery, stone suitable for the manufacture of both cutting and grinding tools, hematite for pigment, and quartz crystals considered to have healing properties (Halmo 2003).

As long-time desert dwellers, Native Americans have a great appreciation for the importance of water in a desert environment. They have expressed concern over the use and availability of water for solar energy installations (Halmo 2003; Jackson 2009). One of the main

TABLE 9.2.18.1-3 Animal Species Used by Native Americans Whose Range Includes the Proposed Iron Mountain SEZ

Common Name	Scientific Name	Status
Mammals		
Bighorn sheep	*Ovis Canadensis*	All year
Black-tailed jack rabbit	*Lepus californicus*.	All year
Bobcat	*Lynx rufus*	All year
Coyote	*Canis latrans*	All year
Desert cottontail	*Silvilagus audubonii*	All year
Squirrels	*Spermophilus* sp. & A*mmospermophilus* sp.	All year
Wood rats	*Neotoma* spp.	All year
Birds		
Gambel's quail	*Callipepla gambelii*	All year
Mourning dove	*Zenaida macroura*	All year
Reptiles		
Desert tortoise	*Gopherus Agassizii*	All year
Rattlesnakes	*Crotalus* spp.	All year

Sources: Lightfoot and Parrish (2009); Fowler (1986); Stewart (1983).

concerns over past industrial development planned in Ward Valley was the contamination of ground water, which they see as ultimately flowing to the Colorado River and affecting the basin as a whole (CSRI 1987; Ridder 1998).

Some Tribes share with the populace as a whole concerns over potential danger from electromagnetic fields. In traditional Cahuilla culture, electricity, both natural (lightning) and artificially generated, is considered dangerous and something to be avoided (Bean et al. 1978). They may have concerns over a facility that produces electricity and its associated transmission system.

In addition, Native Americans have expressed concern over ecological segmentation, that is, development that fragments animal habitat and does not provide corridors for movement. They would prefer solar energy development take place on land that has already been disturbed, such as abandoned farmland, rather than on undisturbed ground.

9.2.18.2 Impacts

To date, no comments have been received from the Tribes specifically referencing the proposed Iron Mountain SEZ. However, the Native American Land Conservancy (NALC), an inter-tribal organization, has expressed concern over culturally important sites in the Iron Mountains and sites associated with the Salt Song Trail (Russo 2009). Likewise, the Chemehuevi Indian Tribe has previously expressed concerns over the Salt Song Trail, which passes just west of the SEZ (Ridder 1998; Halmo 2003). Solar development within the SEZ is likely to be visible from the trail. In a response letter, the Quechan Indian Tribe of the Fort Yuma Indian Reservation stressed the importance of evaluating impacts on landscapes as a whole. Because trails have both physical and spiritual components, the intrusion of industrial development nearby would negatively affect the trails (Jackson 2009).

The impacts that would be expected from solar energy development within the Iron Mountain SEZ on resources important to Native Americans fall into two major categories: impacts on the landscape and impacts on discrete localized resources.

Potential landscape-scale impacts are those caused by the presence of an industrial facility within a culturally important landscape that includes sacred mountains and other geophysical features tied together by a network of sacred trails. Impacts may be visual—the intrusion of an industrial feature in sacred space; audible—noise from the construction, operation or decommissioning of a facility detracting from the traditional cultural values of the site; or demographic—the increased presence of outsiders in the area increasing the chance that the sacredness of the area would be degraded by more foot and motorized traffic in the area. As consultation continues and additional analyses are undertaken, it is possible that there will be Native American concerns expressed over potential visual effects of solar energy development within the SEZ on the landscape, such as on Old Woman Mountain, Turtle Mountains, the Salt Song Trail, and/or on the valley as a whole (see also Section 9.2.17).

Localized effects could occur both within the SEZ and in adjacent areas. Within the SEZ these effects would include destroying or degrading important plant resources, destroying the habitat of and impeding the movement of culturally important animal species, destroying archaeological sites and burials, and the degradation or destruction of trails. Known resources of this type within the SEZ tend to be associated with Danby Lake. Any ground-disturbing activity associated with the development within the SEZ has the potential for destruction of localized resources. Since solar energy facilities cover large tracts of ground, even taking into account the implementation of design features, it is unlikely that avoidance of all resources would be possible. Programmatic design features (see Appendix A, Section A.2.2) assume that the necessary cultural surveys, site evaluations, and tribal consultations will occur. As discussed in Sections 9.2.11 and 9.2.12, the effects of development in the proposed SEZ are expected to be moderate. Significant areas of habitat would remain in the region. As discussed in Section 9.2.10.2, effects on native plant species are expected to be small, because the affected cover types would remain abundant in the region.

Affects on resources in surrounding areas include the landscape intrusions discussed above and the potential for the degradation of such features as trails, rock art, shrines, and sacred places in the surrounding mountains. This degradation could result from increased traffic and increased numbers of people in the area, especially during construction and decommissioning phases of the project.

Implementation of programmatic design features, as discussed in Appendix A, Section A.2.2, should eliminate impacts on Tribes' reserved water rights and the potential for groundwater contamination issues.

9.2.18.3 SEZ-Specific Design Features and Design Feature Effectiveness

Programmatic design features to mitigate impacts of potential concern to Native Americans, such as avoidance of burials, sacred sites, water sources, and Tribally important plant and animal species, are provided in Appendix A, Section A.2.2.

The development of solar energy facilities in the state of California requires developers to follow CEC guidelines for interacting with Native Americans in addition to Federal requirements (CEC 2009). Developers must obtain information from California's NAHC on the presence of Native American sacred sites in the project vicinity and a list of Native Americans who want to be contacted about proposed projects in the region. Table 9.2.18.3-1 lists the tribes recommended for contact by the NAHC.

The need for and nature of SEZ-specific design features regarding potential issues of concern, such as burials and the Salt Song Trail, would be determined during government-to-government consultation with affected Tribes.

The NALC has recommended that the agencies hold a series of listening sessions with the affected Tribes (such as those listed in Table 9.2.18.3-1) and meet with the leaders of the Salt Song Tradition to gain a better understanding of the Salt Song cultural landscape (Russo 2009).

TABLE 9.2.18.3-1 Federally Recognized Tribes Listed by the NAHC to Contact Regarding the Proposed Iron Mountain SEZ

Tribe	Location	State
Agua Caliente Band of Cahuilla Indians	Palm Springs	California
Chemehuevi Indian Tribe	Havasu Lake	California
Cocopah Indian Tribe	Somerton	Arizona
Colorado River Indian Tribes	Parker	Arizona
Fort Mojave Indian Tribe	Needles	California
Morongo Band of Mission Indians	Banning	California
Quechan Indian Tribe of the Fort Yuma Reservation	Yuma	Arizona
San Manuel Band of Mission Indians	Patton	California
Torres-Martinez Desert Cahuilla Indians	Thermal	California
Twentynine Palms Band of Mission Indians	Coachella	California

Source: Singleton (2010).

In addition, the Quechan Tribe has requested that it be consulted at the inception of any solar energy project. The Quechan also suggest that the clustering of large solar energy facilities be avoided; that priority for development be given to lands that have already been disturbed by agricultural or military use; and that the feasibility of placing solar collectors on existing structures be considered, thus minimizing or avoiding the use of undisturbed land (Jackson 2009).

Mitigation of impacts on archaeological sites and traditional cultural properties is discussed in Section 9.2.17.3, in addition to programmatic design features for historic properties discussed in Appendix A, Section A.2.2.

9.2.19 Socioeconomics

9.2.19.1 Affected Environment

This section describes current socioeconomic conditions and local community services within the ROI surrounding the proposed Iron Mountain SEZ. The ROI is a two-county area comprising Riverside and San Bernardino Counties in California. It encompasses the area in which workers are expected to spend most of their salaries and in which a portion of site purchases and nonpayroll expenditures from the construction, operation, and decommissioning phases of the proposed SEZ facility are expected to take place.

9.2.19.1.1 ROI Employment

In 2008, employment in the ROI stood at 1,646,312 (Table 9.2.19.1-1). Over the period 1999 to 2008, the annual average employment growth rate was slightly higher in Riverside County (2.5%) than in San Bernardino County (1.2%). At 1.9%, growth rates in the ROI as a whole were higher than the average rate for California (0.9%).

In the ROI in 2006, the services sector provided the highest percentage of employment at 44.9%, followed by wholesale and retail trade at 20.7% (Table 9.2.19.1-2). Smaller employment shares were held by construction (10.7%) and manufacturing (10.7%). Within the two counties in the ROI, the distribution of employment across sectors is similar to that of the ROI as a whole, but employment in construction (13.8%) and in agriculture (3.0%) was higher in Riverside County than in the ROI as a whole.

TABLE 9.2.19.1-1 ROI Employment in the Proposed Iron Mountain SEZ

Location	1999	2008	Average Annual Growth Rate, 1999–2008 (%)
Riverside County	653,552	839,878	2.5
San Bernardino County	712,624	806,434	1.2
ROI	1,366,176	1,646,312	1.9
California	15,566,900	17,059,574	0.9

Sources: U.S Department of Labor (2009a,b).

TABLE 9.2.19.1-2 ROI Employment in the Proposed Iron Mountain SEZ by Sector, 2006

Sector	Riverside County		San Bernardino County		ROI	
	Employment	% of Total	Employment	% of Total	Employment	% of Total
Agriculture[a]	17,064	3.0	5,143	0.9	22,207	1.9
Mining	505	0.1	846	0.1	1,351	0.1
Construction	78,556	13.8	45,700	7.7	124,256	10.7
Manufacturing	56,582	9.9	67,306	11.4	123,888	10.7
Transportation and public utilities	21,835	3.8	49,871	8.5	71,706	6.2
Wholesale and retail trade	116,343	20.4	124,321	21.1	240,664	20.7
Finance, insurance, and real estate	26,964	4.7	28,760	4.9	55,724	4.8
Services	252,847	44.3	267,674	45.4	520,521	44.9
Other	89	0.0	46	0.0	135	0.0
Total	570,468		589,803		1,160,271	

[a] Agricultural employment includes 2007 data for hired farm workers.

Sources: U.S. Bureau of the Census (2009a); USDA (2009).

9.2.19.1.2 ROI Unemployment

Unemployment rates have been similar in both counties in the ROI. Over the period 1999 to 2008, the average rate in Riverside County was 6.0%, slightly higher than the rate in San Bernardino County (5.6%) (Table 9.2.19.1-3). The average rate in the ROI over this period was 5.8%, the same as the average rate for California (5.8%). Unemployment rates for the first 10 months of 2009 contrast with rates for 2008 as a whole; in Riverside County, the unemployment rate increased to 13.8%, while in San Bernardino County the rate reached 13.1%. The average rates for the ROI (13.5%) and for California as a whole (11.6%) were also higher during this period than the corresponding average rates for 2008.

9.2.19.1.3 ROI Urban Population

The population of the ROI in 2006 to 2008 was 74% urban, with the majority of urban areas located in the western portion of the ROI. The largest city, Riverside, had an estimated 2006 to 2008 population of 293,207; other large cities in the western portion of the county include San Bernardino (198,014), Moreno Valley (188,676), Fontana (186,689), Ontario (170,947), and Rancho Cucamonga (170,057) (Table 9.2.19.1-4). In addition, there are 2 cities in the county with a 2008 population of between 100,000 and 150,000, and 16 cities with between 50,000 and 99,999 persons. All these cities are part of the larger urban region that includes Los Angeles, Riverside, and San Bernardino, and most are more than 100 mi (161 km) from the site of the proposed SEZ.

Population growth rates among the larger cities in the western part of the ROI have varied over the period 2000 to 2008 (Table 9.2.19.1-4). Murrieta grew at an annual rate of 10.4% during this period, with higher than average growth also experienced in Lake Elsinore (7.1%), Victorville (6.9%), Temecula (6.5%), San Jacinto (5.9%), Fontana (4.7%), Hesperia (3.9%), and Rancho Cucamonga (3.6%). The cities of Hemet (2.3%), Corona (2.2%), and

TABLE 9.2.19.1-3 ROI Unemployment Rates for the Proposed Iron Mountain SEZ (%)

Location	1999–2008	2008	2009[a]
Riverside County	6.0	8.6	13.8
San Bernardino County	5.6	8.0	13.1
ROI	5.8	8.3	13.5
California	5.8	7.2	11.6

[a] Rates for 2009 are the average for January through November.

Sources: U.S. Department of Labor (2009a–c).

TABLE 9.2.19.1-4 ROI Urban Population and Income for the Proposed Iron Mountain SEZ

City	Population 2000	Population 2008	Population Average Annual Growth Rate, 2000–2008 (%)	Median Household Income ($ 2008) 1999	Median Household Income ($ 2008) 2006–2008	Median Household Income ($ 2008) Average Annual Growth Rate, 1999 and 2006–2008 (%)[a]
Riverside	255,166	293,207	1.8	53,620	56,805	0.6
San Bernardino	185,401	198,014	0.8	40,093	40,764	0.2
Moreno Valley	142,381	188,676	3.6	61,101	55,178	–1.1
Fontana	128,929	186,869	4.7	58,945	62,914	0.7
Ontario	158,007	170,947	1.0	54,658	57,184	0.5
Rancho Cucamonga	127,743	170,057	3.6	78,450	79,455	0.1
Corona	124,966	148,336	2.2	76,755	78,120	0.2
Victorville	64,029	109,313	6.9	46,591	52,507	1.3
Rialto	91,873	98,376	0.9	53,115	50,000	–0.7
Murrieta	44,282	97,935	10.4	78,424	79,135	0.1
Temecula	57,716	95,853	6.5	76,628	77,394	0.1
Hesperia	62,582	85,236	3.9	51,759	48,160	–0.8
Indio	49,116	83,475	6.9	44,579	53,824	2.1
Chino	67,168	82,435	2.6	71,330	72,373	0.2
Chino Hills	66,787	73,527	1.2	100,908	103,706	0.3
Upland	68,393	71,760	0.6	62,746	67,803	0.9
Hemet	58,812	70,821	2.3	34,556	34,974	0.1
Redlands	63,591	69,394	1.1	62,000	65,539	0.6
Perris	36,189	55,150	5.4	45,774	53,442	1.7
Cathedral City	42,647	51,790	2.5	50,068	42,026	–1.9
Highland	44,605	50,870	1.7	53,084	60,963	1.5
Palm Desert	41,155	50,490	2.6	62,208	55,218	–1.3
Colton	47,662	50,333	0.7	46,063	46,411	0.1
Lake Elsinore	28,928	50,229	7.1	53,926	58,496	0.9
La Quinta	23,694	43,229	7.8	70,237	78,898	1.3
Coachella	22,724	39,014	7.0	36,810	40,463	1.1
San Jacinto	23,779	37,475	5.9	39,433	47,127	2.0
Montclair	33,049	36,231	1.2	52,527	58,094	1.1
Twentynine Palms	28,854	33,354	1.8	40,142	43,447	0.9
Adelanto	18,130	28,330	5.7	40,678	41,875	0.3
Norco	24,157	26,455	1.1	80,537	78,141	–0.3
Barstow	21,119	24,392	1.8	45,152	48,042	0.7
Desert Hot Springs	16,582	23,996	4.7	33,459	38,465	1.6
Blythe	12,155	21,650	7.5	45,480	37,937	–2.0
Loma Linda	18,681	21,515	1.8	49,188	55,091	1.3
Yucca Valley	16,865	20,290	2.3	39,166	45,298	1.6
Rancho Mirage	13,249	16,651	2.9	77,027	NA	NA
Grand Terrace	11,626	12,160	0.6	69,074	NA	NA
Canyon Lake	9,952	11,064	1.3	90,263	NA	NA
Calimesa	7,139	7,478	0.6	48,731	NA	NA
Big Bear Lake	5,438	6,102	1.5	44,351	NA	NA
Needles	4,830	5,293	1.2	33,614	NA	NA
Indian Wells	3,816	5,113	3.7	121,008	NA	NA

[a] Data are averages for the period 2006 to 2008.

Source: U.S. Bureau of the Census (2009b–d).

Riverside (1.8%) all experienced lower growth rates between 2000 and 2008. The cities of Rialto (0.9%), San Bernardino (0.8%), Colton (0.7%), and Upland (0.6%) all experienced growth rates of less than 1% between 2000 and 2008.

Riverside County contains a smaller group of cities located about 80 mi (129 km) from the SEZ site: Indio (83,475), Cathedral City (51,790), Palm Desert (50,490), Coachella (39,014), La Quinta (43,229), and Desert Hot Springs (23,996). Population growth in these cities between 2000 and 2008 has been relatively high: La Quinta (7.8%), Coachella (7.0%), Indio (6.9%), and Desert Hot Springs (4.7%). One city, Blythe (21,650), is located on the eastern border of the county, on the Colorado River, less than 10 mi (16 km) from the proposed SEZ location and had a relatively high population growth rate (7.5%) between 2000 and 2008.

A number of smaller cities are located in San Bernardino County, to the east of the San Bernardino area, within about 70 mi (113 km) of the site of the proposed SEZ. Twentynine Palms (2008 population of 33,354) and Yucca Valley (20,290) are located on the perimeter of the Twentynine Palms Marine Corps base and the Joshua Tree National Monument, and are primarily retail centers, while Barstow (24,392) is a rail and road transportation and retail center. Population growth in these cities between 2000 and 2008 has been low, with annual growth rates of 2.3% in Yucca Valley and 1.8% in Twentynine Palms. Needles (5,293) is located on the Colorado River, more than 100 mi (161 km) from the proposed SEZ location, and also had a relatively low population growth rate (1.2%) between 2000 and 2008.

9.2.19.1.4 ROI Urban Income

Median household incomes varied considerably across cities in the ROI. A number of cities in western Riverside County—Murrieta ($79,135), Norco ($78,141), and Temecula ($77,394)—had median incomes in 2006 to 2008 that were higher than the average for the state ($61,154) (Table 9.2.19.1-4). A number of cities in the western portion of the county had relatively low median household incomes, notably Hemet ($34,974) and San Jacinto ($47,127). A number of cities in the western San Bernardino County—Chino Hills ($103,706), Rancho Cucamonga ($79,455), Chino ($72,373), Upland ($67,803), Redlands ($65,539), and Fontana ($62,914)—had median incomes in 2006 to 2008 that were higher than the average for the state ($61,154) (Table 9.3.19.1-4). A number of cities in the western portion of the county had relatively low median household incomes, notably San Bernardino ($40,764), Adelanto ($41,875), Colton ($46,411), and Hesperia ($48,160).

In the western part of Riverside County, median income growth rates between 1999 and 2006 to 2008 were highest in San Jacinto (2.0%), Perris (1.7%), with annual growth rates of less than 1% elsewhere. Moreno Valley (–1.1%) and Norco (–0.3%) had negative growth rates between 1999 and 2006 to 2008. The average median household income growth rate for the state as a whole over this period was less than 0.1%. Among the cities in the western part of San Bernardino County, median income growth rates between 2000 and 2006 to 2008 were highest in Highland (1.5%), Victorville (1.3%), Loma Linda (1.3%), and Montclair (1.1%), with annual growth rates of less than 1% elsewhere. Hesperia (–0.8%) and Rialto (–0.7%) had negative growth rates between 1999 and 2006 to 2008. The average median household income growth rate for the state as a whole over this period was less than 0.1%.

In the cities in central and eastern Riverside County, La Quinta ($78,898) had a median household income higher than the state average between 2006 and 2008, while other cities, Palm Desert ($55,218), Indio ($53,824), Cathedral City ($42,026), Coachella ($40,463), and Desert Hot Springs ($38,465) had median incomes less than the state average. Median income in Blythe in 2006 to 2008 was $37,937. Growth rates in these cities over the period 1999 and 2006 to 2008 varied from 2.1% in Indio to –2.0% in Blythe. Of the cities in central and eastern San Bernardino County, Barstow ($48,042) and Yucca Valley ($45,298) both had median household incomes less than the state average between 2006 and 2008. Median income in Needles in 2000 was $33,614. Growth rates in these cities over the period 1999 and 2006 to 2008 varied from 1.6% in Yucca Valley to 0.9% in Twentynine Palms.

9.2.19.1.5 ROI Population

Table 9.2.19.1-5 presents recent and projected populations in the ROI and state as a whole. Population in the ROI stood at 4,092,831 in 2008, having grown at an average annual rate of 2.9% since 2000. Growth rates for the two counties in the ROI were higher than those in California (1.5%) over the same period.

Both counties in the ROI experienced growth in population between 2000 and 2008; population in Riverside County grew at an annual rate of 3.8%, while in San Bernardino County, population grew by 2.0%. The ROI population is expected to increase to 5,584,241 by 2021 and to 5,780,284 by 2023.

TABLE 9.2.19.1-5 ROI Population for the Proposed Iron Mountain SEZ

Location	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	2021	2023
Riverside County	1,559,039	2,087,917	3.8	2,965,113	3,085,643
San Bernardino County	1,721,942	2,004,914	2.0	2,619,128	2,694,641
ROI	3,280,981	4,092,831	2.9	5,584,241	5,780,284
California	33,871,648	38,129,628	1.5	44,646,420	45,667,413

Sources: U.S. Bureau of the Census (2009e,f); California Department of Finance (2010).

9.2.19.1.6 ROI Income

Total personal income in the ROI stood at $121.2 billion in 2007 and has grown at an annual average rate of 3.4% over the period 1998 to 2007 (Table 9.2.19.1-6). Per-capita income also rose over the same period at a rate of 0.7%, increasing from $27,779 to $29,736. Per-capita incomes were higher in Riverside County ($30,713) than in San Bernardino County ($29,132) in 2007. Growth rates in total personal income have been slightly higher in Riverside County; with growth in per-capita incomes higher in San Bernardino County (0.8%). Personal income growth rates in both counties in the ROI were higher than the state rate (2.5%), but per-capita income growth rates in the ROI (0.7%) were slightly lower than in California as a whole (1.1%).

Median household income in 2006 to 2008 varied from $56,575 in San Bernardino County to $58,168 in Riverside County (U.S. Bureau of the Census 2009d).

9.2.19.1.7 ROI Housing

In 2007, more than 1,433,500 housing units were located in the two ROI counties, with about 53% of these located in Riverside County (Table 9.2.19.1-7). Owner-occupied units

TABLE 9.2.19.1-6 ROI Personal Income for the Proposed Iron Mountain SEZ

Location	1998	2007	Average Annual Growth Rate, 1998–2007 (%)
Riverside County			
Total income[a]	42.2	63.1	4.1
Per-capita income	28,886	30,713	0.6
San Bernardino County			
Total income[a]	44.1	58.1	2.8
Per-capita income	26,797	29,132	0.8
ROI			
Total income[a]	86.3	121.2	3.4
Per-capita income	27,779	29,736	0.7
California			
Total income[a]	1,231.7	1,573.6	2.5
Per-capita income	37,339	41,821	1.1

[a] Unless indicated otherwise, values are reported in $ billion 2008.

Sources: U.S. Department of Commerce (2009); U.S. Bureau of the Census (2009e,f).

TABLE 9.2.19.1-7 ROI Housing Characteristics for the Proposed Iron Mountain SEZ

Parameter	2000	2007[a]
Riverside County		
Owner-occupied	348,532	446,017
Rental	157,686	201,426
Vacant units	78,456	106,972
Seasonal and recreational use	38,208	NA[b]
Total units	584,674	754,415
San Bernardino County		
Owner-occupied	340,933	381,697
Rental	187,661	207,361
Vacant units	72,775	90,111
Seasonal and recreational use	31,657	NA
Total units	601,369	679,169
ROI		
Owner-occupied	689,465	827,714
Rental	345,347	408,787
Vacant units	151,231	197,083
Seasonal and recreational use	69,865	NA
Total units	1,186,043	1,433,584

[a] 2007 data for number of owner-occupied, rental, and vacant units for California counties are not available; data are based on 2007 total housing units and 2000 data on housing tenure.

[b] NA = data not available.

Sources: U.S. Bureau of the Census (2009h–j).

compose approximately 67% of the occupied units in the two counties, with rental housing making up 33% of the total. Vacancy rates in 2007 were 14.2% in Riverside County and 13.3% in San Bernardino County; 6.5% of housing units in Riverside County and 5.3% in San Bernardino County was used for seasonal or recreational purposes. With an overall vacancy rate of 13.7% in the ROI, there were 197,083 vacant housing units in the ROI in 2007, of which 65,156 are estimated to be rental units that would be available to construction workers. There were 69,865 units in seasonal, recreational, or occasional use at the time of the 2000 Census.

Housing stock in the ROI as a whole grew at an annual rate of 2.7% over the period 2000 to 2007, with 247,541 new units added to the existing housing stock (Table 9.2.19.1-6).

The median value of owner-occupied housing in 2008 varied from $366,600 in San Bernardino County to $380,600 in Riverside County (U.S. Bureau of the Census 2009g).

9.2.19.1.8 ROI Local Government Organizations

The various local and county government organizations in Riverside County are listed in Table 9.2.19.1-8. In addition, three Tribal governments are located in the county, with members of other Tribal groups located in the state, but whose Tribal governments are located in adjacent states.

9.2.19.1.9 ROI Community and Social Services

This section describes educational, health care, law enforcement, and firefighting resources in the ROI.

Schools

In 2007, the two-county ROI had a total of 1,019 public and private elementary, middle, and high schools (NCES 2009). Table 9.2.19.1-9 provides summary statistics for enrollment and educational staffing and two indices of educational quality—student-teacher ratios and levels of service (number of teachers per 1,000 population). The student-teacher ratio in Riverside County schools (22.1) is slightly lower than that in San Bernardino County schools (24.3), while the level of service is slightly higher in Riverside County (9.3) than in San Bernardino County, where there are fewer teachers per 1,000 population (8.8).

Health Care

The total number of physicians (4,176) and the number of physicians per 1,000 population (2.1) in San Bernardino County is slightly higher than in Riverside County (3,277, 1.6) (Table 9.2.19.1-10).

Public Safety

Several state, county, and local police departments provide law enforcement in the ROI (Table 9.2.19.1-11). San Bernardino County has 1,783 officers and would provide law enforcement services to the SEZ; there are 1,965 officers in Riverside County. Levels of service of police protection are 1.0 per 1,000 population in Riverside County and 0.9 in San Bernardino County. Currently, there are 3,498 professional firefighters in the ROI (Table 9.2.19.1-11).

9.2.19.1.10 ROI Social Change

Various energy development studies have suggested that once the annual growth in population is between 5 and 15% in smaller rural communities, alcoholism, depression, suicide, social conflict, divorce, and delinquency would increase and levels of community satisfaction

TABLE 9.2.19.1-8 ROI Local Government Organizations and Social Institutions in the Proposed Iron Mountain SEZ

Governments	
City	
Adelanto	Lake Elsinore
Apple Valley	Loma Linda
Barstow	Montclair
Big Bear Lake	Moreno Valley
Blythe	Murrieta
Calimesa	Needles
Canyon Lake	Norco
Cathedral City	Ontario
Chino	Palm Desert
Chino Hills	Perris
Coachella	Rancho Cucamonga
Colton	Rancho Mirage
Corona	Redlands
Desert Hot Springs	Rialto
Fontana	Riverside
Grand Terrace	San Bernardino
Hemet	San Jacinto
Hesperia	Temecula
Highland	Twentynine Palms
Indian Wells	Upland
Indio	Victorville
La Quinta	Yucca Valley
County	
Riverside County	San Bernardino County
Tribal	
Agua Caliente Band of Cahuilla Indians of the Agua Caliente Indian Reservation, California	
Augustine Band of Cahuilla Mission Indians of the Augustine Reservation, California	
Cabazon Band of Mission Indians, California	
Cahuilla Band of Mission Indians of the Cahuilla Reservation, California	
Chemehuevi Indian Tribe of the Chemehuevi Reservation, California	
Ione Band of Miwok Indians of California	
Morongo Band of Cahuilla Mission Indians of the Morongo Reservation, California	
Pechanga Band of Luiseno Mission Indians of the Pechanga Reservation, California	
Ramona Band or Village of Cahuilla Mission Indians of California	
San Manuel Band of Serrano Mission Indians of the San Manuel Reservation, California	
Santa Rosa Band of Cahuilla Indians, California	
Soboba Band of Luiseno Indians, California	
Torres Martinez Desert Cahuilla Indians, California	
Twenty-Nine Palms Band of Mission Indians of California	

Sources: U.S. Bureau of the Census (2009b); U.S. Department of the Interior (2010).

TABLE 9.2.19.1-9 ROI School District Data for the Proposed Iron Mountain SEZ, 2007

Location	Number of Students	Number of Teachers	Student-Teacher Ratio	Level of Service[a]
Riverside County	421,642	19,105	22.1	9.3
San Bernardino County	427,603	17,568	24.3	8.8
ROI	849,245	36,673	23.2	9.1

[a] Number of teachers per 1,000 population.

Source: NCES (2009).

TABLE 9.2.19.1-10 Physicians in the ROI for the Proposed Iron Mountain SEZ, 2007

Location	Number of Primary Care Physicians	Level of Service[a]
Riverside County	3,277	1.6
San Bernardino County	4,176	2.1
ROI	7,453	1.8

[a] Number of physicians per 1,000 population.

Source: AMA (2009).

TABLE 9.2.19.1-11 Public Safety Employment in the ROI for the Proposed Iron Mountain SEZ

Location	Number of Police Officers[a]	Level of Service[b]	Number of Firefighters[c]	Level of Service
Riverside County	1,965	1.0	2,205	1.1
San Bernardino County	1,783	0.9	1,293	0.6
ROI	3,748	0.9	3,498	0.9

[a] 2007 data.

[b] Number per 1,000 population.

[c] 2008 data; number does not include volunteers.

Sources: Department of Justice (2008); Fire Departments Network (2009).

would deteriorate (BLM 1980, 1983, 1996). Data on violent crime and property crime rates and on alcoholism and illicit drug use, metal health, and divorce, which might be used as indicators of social change, are presented in Tables 9.2.19.1-12 and 9.2.19-1.13, respectively.

There is some variation in the level of crime across the ROI, with slightly higher rates of violent crime in San Bernardino County (4.6 per 1,000 population) than in Riverside County (3.5) (Table 9.2.19.1-12). Property-related crime rates are also slightly higher in San Bernardino County (29.6) than in Riverside County (27.5); that is, overall crime rates in San Bernardino County (34.2) were slightly higher than in Riverside County (31.0).

Other measures of social change—alcoholism, illicit drug use, and mental health—are not available at the county level and thus are presented for the SAMHSA region in which the ROI is located. There is some variation across the two regions in which the two counties are located; rates for alcoholism and illicit drug are slightly higher in the region in which Riverside County is located and rates of mental illness are slightly higher in the region in which San Bernardino County is located (Table 9.2.19.1-13).

9.2.19.1.11 ROI Recreation

Various areas in the vicinity of the proposed Iron Mountain SEZ are used for recreational purposes, with natural, ecological, and cultural resources in the ROI attracting visitors for a range of activities, including hunting, fishing, boating, canoeing, wildlife watching, camping, hiking, horseback riding, mountain climbing, and sightseeing. These areas are discussed in Section 9.2.5.

TABLE 9.2.19.1-12 County and ROI Crime Rates for the Proposed Iron Mountain SEZ[a]

	Violent Crime[b]		Property Crime[c]		All Crime	
Location	Offenses	Rate	Offenses	Rate	Offenses	Rate
Riverside County	7,351	3.5	57,839	27.5	65,190	31.0
San Bernardino County	9,657	4.6	61,713	29.6	71,370	34.2
ROI	17,008	4.1	119,552	28.5	135,560	32.6

[a] Rates are the number of crimes per 1,000 population.

[b] Violent crime includes murder and non-negligent manslaughter, forcible rape, robbery, and aggravated assault.

[c] Property crime includes burglary, larceny, theft, motor vehicle theft, and arson.

Sources: U.S. Department of Justice (2009a,b).

TABLE 9.2.19.1-13 Alcoholism, Drug Use, Mental Health, and Divorce in the Proposed Iron Mountain SEZ ROI[a]

Geographic Area	Alcoholism	Illicit Drug Use	Mental Health[b]	Divorce[c]
California Region 12 (includes San Bernardino County)	7.1	2.6	8.8	–[d]
New Mexico Region 13 (includes Riverside County)	8.5	3.2	8.6	–
California				4.3

[a] Data for alcoholism and drug use represent percentage of the population over 12 years of age with dependence or abuse of alcohol, illicit drugs. Data are averages for 2004 to 2006.

[b] Data for mental health represent percentage of the population over 18 years of age suffering from serious psychological distress. Data are averages for 2002 to 2004.

[c] Divorce rates are the number of divorces per 1,000 population. Data are for 1990.

[d] A dash indicates date not available.

Sources: SAMHSA (2009); CDC (2009).

Because the number of visitors using state and federal lands for recreational activities is not available from the various administering agencies, the value of recreational resources in these areas, based solely on the number of recorded visitors, is likely to be an underestimation. In addition to visitation rates, the economic valuation of certain natural resources can also be assessed in terms of the potential recreational destination for current and future users, that is, their nonmarket value (see Section 5.17.1.1).

Another method is to estimate the economic impact of the various recreational activities supported by natural resources on public land in the vicinity of the proposed solar development, by identifying sectors in the economy in which expenditures on recreational activities occur. Not all activities in these sectors are directly related to recreation on state and federal lands, with some activity occurring on private land (e.g., dude ranches, golf courses, bowling alleys, and movie theaters). Expenditures associated with recreational activities form an important part of the economy of the ROI. In 2007, 141,993 people were employed in the ROI in the various sectors identified as recreation, constituting 8.5% of total ROI employment (Table 9.2.19.1-14). Recreation spending also produced almost $3,374 million in income in the ROI in 2007. The primary sources of recreation-related employment were eating and drinking places.

9.2.19.2 Impacts

The following analysis begins with a description of the common impacts of solar development, including common impacts on recreation and on social change. These impacts would occur regardless of the solar technology developed in the SEZ. The impacts of facilities employing various solar energy technologies are analyzed in detail in subsequent sections.

TABLE 9.2.19.1-14 Recreation Sector Activity in the Proposed Iron Mountain SEZ ROI, 2007

ROI	Employment	Income ($ million)
Amusement and recreation services	7,223	221.1
Automotive rental	2,158	112.9
Eating and drinking places	105,700	2,071.9
Hotels and lodging places	11,357	376.2
Museums and historic sites,	432	27
Recreational vehicle parks and campsites	1,389	39.6
Scenic tours	6,211	361.0
Sporting goods retailers	7,523	163.9
Total ROI	141,993	3,373.7

Source: MIG, Inc. (2009).

9.2.19.2.1 Common Impacts

Construction and operation of a solar energy facility at the proposed Iron Mountain SEZ would produce direct and indirect economic impacts. Direct impacts would occur as a result of expenditures on wages and salaries, procurement of goods and services required for project construction and operation, and the collection of state sales and income taxes. Indirect impacts would occur as project wages and salaries, procurement expenditures, and tax revenues subsequently circulate through the economy of each state, thereby creating additional employment, income, and tax revenues. Facility construction and operation would also require in-migration of workers and their families into the ROI surrounding the site, which would affect population, rental housing, health service employment, and public safety employment. Socioeconomic impacts common to all utility-scale solar energy facilities are discussed in detail in Section 5.17. These impacts will be minimized through the implementation of programmatic design features described in Appendix A, Section A.2.2.

Recreation Impacts

Estimating the impact of solar facilities on recreation is problematic because it is not clear how solar development in the SEZ would affect recreational visitation and nonmarket values (i.e., the value of recreational resources for potential or future visits; see Section 5.17.1.2.3). While it is clear that some land in the ROI would no longer be accessible for recreation, the majority of popular recreational locations would be precluded from solar development. It is also possible that solar development in the ROI would be visible from popular recreation locations and that construction workers temporarily residing in the ROI would occupy accommodation otherwise used for recreational visits, thus reducing visitation and consequently affecting the economy of the ROI.

Social Change

Although an extensive literature in sociology documents the most significant components of social change in energy boomtowns, the nature and magnitude of the social impact of energy development in small rural communities is still unclear (see Section 5.17.1.1.4). While some degree of social disruption is likely to accompany large-scale in-migration during the boom phase, there is insufficient evidence to predict the extent to which specific communities are likely to be affected, which population groups within each community are likely to be most affected, and the extent to which social disruption is likely to persist beyond the end of the boom period (Smith et al. 2001). Accordingly, because of the lack of adequate social baseline data, it has been suggested that social disruption is likely to occur once an arbitrary population growth rate associated with solar energy development projects has been reached, with an annual rate of between 5 and 10% growth in population assumed to result in a breakdown in social structures, with a consequent increase in alcoholism, depression, suicide, social conflict, divorce, delinquency, and deterioration in levels of community satisfaction (BLM 1980, 1983, 1996).

In overall terms, the in-migration of workers and their families into the ROI would represent an increase of less than 0.1% in county population during construction of the trough technology, with smaller increases for the power tower, dish engine and PV technologies, and during the operation of each technology. While it is possible that some construction and operations workers will choose to locate in communities closer to the SEZ, the lack of available housing in smaller rural communities in the ROI to accommodate all in-migrating workers and families and insufficient range of housing choices to suit all solar occupations, many workers are likely to commute to the SEZ from larger communities elsewhere in the ROI, thereby reducing the potential impact of solar development on social change. Regardless of the pace of population growth associated with the commercial development of solar resources and the likely residential location of in-migrating workers and families in communities some distance from the SEZ itself, the number of new residents from outside the ROI is likely to lead to some demographic and social change in small rural communities in the ROI. Communities hosting solar development are likely to be required to adapt to a different quality of life, with a transition away from a more traditional lifestyle involving ranching and taking place in small, isolated, close-knit, homogenous communities with a strong orientation toward personal and family relationships, toward a more urban lifestyle, with increasing cultural and ethnic diversity and increasing dependence on formal social relationships within the community.

9.2.19.2.2 Technology-Specific Impacts

The economic impacts of solar energy development in the proposed SEZ were measured in terms of employment, income, state tax revenues (sales and income), population in-migration, housing, and community service employment (education, health, and public safety). More information on the data and methods used in the analysis are provided in Appendix M.

The assessment of the impact of the construction and operation of each technology was based on SEZ acreage, assuming 80% of the area could be developed. To capture a range of possible impacts, solar facility size was estimated on the basis of the land requirements of various solar technologies, assuming that 9 acres/MW (0.04 km^2/MW) would be required for power tower, dish engine, and PV technologies and 5 acres/MW (0.02 km^2/MW) for solar trough technologies. Impacts of multiple facilities employing a given technology at each SEZ were assumed to be the same as impacts for a single facility with the same total capacity. Construction impacts were assessed for a representative peak year of construction, assumed to be 2021 for each technology. Construction impacts assumed that a maximum of three projects could be constructed within a given year, with a corresponding maximum land disturbance of up to 9,000 acres (36 km^2). For operations impacts, a representative first year of operations was assumed to be 2023 for trough and power tower, 2022 for the minimum facility size for dish engine and PV, and 2023 for the maximum facility size for these technologies. The years of construction and operations were selected as representative of the entire 20-year study period because they are the approximate midpoint; construction and operations could begin earlier.

Solar Trough

Construction. Total construction employment impacts in the ROI (including direct and indirect impacts) from the use of solar trough technologies would be up to 16,165 jobs (Table 9.2.19.2-2). Construction activities would constitute 0.7% of total ROI employment. A solar facility would also produce $969.0 million in income. Direct sales taxes would be $41.2 million, and direct income taxes, $18.8 million.

Given the scale of construction activities and the likelihood of local worker availability in the required occupational categories, construction of a solar facility would mean that some in-migration of workers and their families from outside the ROI would be required, with 2,229 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility construction on the number of vacant rental housing units would not be expected to be large, with 1,114 rental units expected to be occupied in the ROI. This occupancy rate would represent 1.2% of the vacant rental units expected to be available in the ROI.

In addition to the potential impact on housing markets, in-migration would affect community service employment (education, health, and public safety). An increase in such employment would be required to meet existing levels of service in the ROI. Accordingly, 21 new teachers, 4 physicians, and 4 public safety employee (career firefighters and uniformed police officers) would be required in the ROI. These increases would represent less than 0.1% of total ROI employment expected in these occupations.

Operations. Total operations employment impacts in the ROI (including direct and indirect impacts) of a build-out using solar trough technologies would be 6,138 jobs (Table 9.2.19.2-2). Such a solar facility would also produce $230.3 million in income. Direct sales taxes would be $0.6 million, and direct income taxes, $5.9 million. Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), acreage rental

TABLE 9.2.19.2-2 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Iron Mountain SEZ with Trough Facilities[a]

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	5,232	3,713
Total	16,165	6,138
Income[b]		
Total	969.0	230.3
Direct state taxes[b]		
Sales	41.2	0.6
Income	18.8	5.9
In-migrants (no.)	2,229	473
BLM payments ($ million 2008)		
Rental	NA[d]	13.4
Capacity[e]	NA	112.0
Vacant housing[c] (no.)	1,114	426
Local community service employment		
Teachers (no.)	21	4
Physicians (no.)	4	1
Public safety (no.)	4	1

a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 1,800 MW (corresponding to 9,000 acres [36 km^2] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 17,043 MW.

b Unless indicated otherwise, values are reported in $ million 2008.

c Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

d Not applicable.

e The BLM annual capacity payment was based on a fee of $6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), assuming a solar facility with no storage capability and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of $7,884 per MW.

payments would be $13.4 million, and solar generating capacity payments, at least $112.0 million.

Given the likelihood of local worker availability in the required occupational categories, operation of a solar facility would mean that some in-migration of workers and their families from outside the ROI would be required, with 473 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility operation on the number of vacant owner-occupied housing units would not be expected to be large, with 426 owner-occupied units expected to be occupied in the ROI.

In addition to the potential impact on housing markets, in-migration would affect community service (health, education, and public safety) employment. An increase in such employment would be required to meet existing levels of service in the provision of these services in the ROI. Accordingly, four new teachers, one physician, and one public safety employee would be required in the ROI.

Power Tower

Construction. Total construction employment impacts in the ROI (including direct and indirect impacts) from the use of power tower technologies would be up to 6,439 jobs (Table 9.2.19.2-3). Construction activities would constitute 0.3% of total ROI employment. Such a solar facility would also produce $385.9 million in income. Direct sales taxes would be less than $16.4 million, with direct income taxes of $7.5 million.

Given the scale of construction activities and the likelihood of local worker availability in the required occupational categories, construction of a solar facility would mean that some in-migration of workers and their families from outside the ROI would be required, with 888 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility construction on the number of vacant rental housing units would not be expected to be large, with 444 rental units expected to be occupied in the ROI. This occupancy rate would represent 0.5% of the vacant rental units expected to be available in the ROI.

In addition to the potential impact on housing markets, in-migration would affect community service (education, health, and public safety) employment. An increase in such employment would be required to meet existing levels of service in the ROI. Accordingly, eight new teachers, two physicians, and two public safety employees would be required in the ROI. These increases would represent less than 0.1% of total ROI employment expected in these occupations.

TABLE 9.2.19.2-3 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Iron Mountain SEZ with Power Tower Facilities[a]

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	2,084	1,917
Total	6,439	2,671
Income[b]		
Total	385.9	93.1
Direct state taxes[b]		
Sales	16.4	0.1
Income	7.5	5.8
BLM payments ($ million 2008)		
Rental	NA[d]	13.4
Capacity[e]	NA	62.2
In-migrants (no.)	888	244
Vacant housing[c] (no.)	444	220
Local community service employment		
Teachers (no.)	8	2
Physicians (no.)	2	<1
Public safety (no.)	2	<1

[a] Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 1,000 MW (corresponding to 9,000 acres [36 km^2] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 9,469 MW.

[b] Unless indicated otherwise, values are reported in $ million 2008.

[c] Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

[d] Not applicable.

[e] The BLM annual capacity payment was based on a fee of $6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), assuming a solar facility with no storage capability and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of $7,884 per MW.

Operations. Total operations employment impacts in the ROI (including direct and indirect impacts) of a build-out using power tower technologies would be 2,671 jobs (Table 9.2.19.2-3). Such a solar facility would also produce $93.1 million in income. Direct sales taxes would be $0.1 million, and direct income taxes, $5.8 million. Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), acreage rental payments would be $13.4 million, and solar generating capacity payments, at least $62.2 million.

Given the likelihood of local worker availability in the required occupational categories, operation of a solar facility means that some in-migration of workers and their families from outside the ROI would be required, with 244 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels and mobile home parks) mean that the impact of solar facility operation on the number of vacant owner-occupied housing units would not be expected to be large, with 220 owner-occupied units expected to be required in the ROI.

In addition to the potential impact on housing markets, in-migration would affect community service (education, health, and public safety) employment. An increase in such employment would be required to meet existing levels of service in the ROI. Accordingly, two new teachers would be required in the ROI.

Dish Engine

Construction. Total construction employment impacts in the ROI (including direct and indirect impacts) from the use of dish engine technologies would be up to 2,618 jobs (Table 9.2.19.2-4). Construction activities would constitute 0.1% of total ROI employment. Such a solar facility would also produce $156.9 million in income. Direct sales taxes would be less than $6.7 million, and direct income taxes, $3.1 million.

Given the scale of construction activities and the likelihood of local worker availability in the required occupational categories, construction of a solar facility would mean that some in-migration of workers and their families from outside the ROI would be required, with 361 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility construction on the number of vacant rental housing units would not be expected to be large, with 180 rental units expected to be occupied in the ROI. This occupancy rate would represent 0.2% of the vacant rental units expected to be available in the ROI.

In addition to the potential impact on housing markets, in-migration would affect community service (education, health, and public safety) employment. An increase in such employment would be required to meet existing levels of service in the ROI. Accordingly, three new teachers, one physician, and one public safety employee would be required in the ROI. These increases would represent less than 0.1% of total ROI employment expected in these occupations.

TABLE 9.2.19.2-4 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Iron Mountain SEZ with Dish Engine Facilities[a]

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	847	1,863
Total	2,618	2,596
Income[b]		
Total	156.9	90.5
Direct state taxes[b]		
Sales	6.7	0.1
Income	3.1	2.9
BLM payments ($ million 2008)		
Rental	NA[d]	13.4
Capacity[e]	NA	62.2
In-migrants (no.)	361	237
Vacant housing[c] (no.)	180	214
Local community service employment		
Teachers (no.)	3	2
Physicians (no.)	1	<1
Public safety (no.)	1	<1

a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 1,000 MW (corresponding to 9,000 acres [36 km^2] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 9,469 MW.

b Unless indicated otherwise, values are reported in $ million 2008.

c Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

d Not applicable.

e The BLM annual capacity payment was based on a fee of $6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), assuming a solar facility with no storage capability and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of $7,884 per MW.

Operations. Total operations employment impacts in the ROI (including direct and indirect impacts) of a build-out using dish engine technologies would be 2,596 jobs (Table 9.2.19.2-4). Such a solar facility would also produce $90.5 million in income. Direct sales taxes would be $0.1 million, and direct income taxes, $2.9 million. Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), acreage rental payments would be $13.4 million, and solar generating capacity payments, at least $62.2 million.

Given the likelihood of local worker availability in the required occupational categories, operation of a dish engine solar facility means that some in-migration of workers and their families from outside the ROI would be required, with 237 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility operation on the number of vacant owner-occupied housing units would not be expected to be large, with 214 owner-occupied units expected to be required in the ROI.

In addition to the potential impact on housing markets, in-migration would affect community service employment (education, health, and public safety). An increase in such employment would be required to meet existing levels of service in the ROI. Accordingly, two new teachers would be required in the ROI.

Photovoltaic

Construction. Total construction employment impacts in the ROI (including direct and indirect impacts) from the use of PV technologies would be up to 1,221 jobs (Table 9.2.19.2-5). Construction activities would constitute 0.1 % of total ROI employment. Such a solar development would also produce $73.2 million in income. Direct sales taxes would be less than $3.1 million, and direct income taxes, $1.4 million.

Given the scale of construction activities and the likelihood of local worker availability in the required occupational categories, construction of a solar facility would mean that some in-migration of workers and their families from outside the ROI would be required, with 168 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility construction on the number of vacant rental housing units would not be expected to be large, with 84 rental units expected to be occupied in the ROI. This occupancy rate would represent 0.1% of the vacant rental units expected to be available in the ROI.

In addition to the potential impact on housing markets, in-migration would affect community service (education, health, and public safety) employment. An increase in such employment would be required to meet existing levels of service in the ROI. Accordingly, two new teachers would be required in the ROI. This increase would represent less than 0.1% of total ROI employment expected in this occupation.

TABLE 9.2.19.2-5 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Iron Mountain SEZ with PV Facilities[a]

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	395	186
Total	1,221	259
Income[b]		
Total	73.2	9.0
Direct state taxes[b]		
Sales	3.1	<0.1
Income	1.4	0.6
BLM payments ($ million 2008)		
Rental	NA[d]	13.4
Capacity[e]	NA	49.8
In-migrants (no.)	168	24
Vacant housing[c] (no.)	84	21
Local community service employment		
Teachers (no.)	2	<1
Physicians (no.)	<1	<1
Public safety (no.)	<1	<1

[a] Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 1,000 MW (corresponding to 9,000 acres [36 km^2] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 9,469 MW.

[b] Unless indicated otherwise, values are reported in $ million 2008.

[c] Construction activities would affect vacant rental housing; operations activities would affect owner-occupied housing.

[d] Not applicable.

[e] The BLM annual capacity payment was based on a fee of $5,256 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), assuming full build-out of the site.

Operations. Total operations employment impacts in the ROI (including direct and indirect impacts) of a build-out using PV technologies would be 259 jobs (Table 9.2.19.2-5). Such a solar facility would also produce $9.0 million in income. Direct sales taxes would be less than $0.1 million, and direct income taxes, less than $0.6 million. Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), acreage rental payments would be $13.4 million, and solar generating capacity payments, at least $49.8 million.

Given the likelihood of local worker availability in the required occupational categories, operation of a solar facility would mean that some in-migration of workers and their families from outside the ROI would be required, with 24 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility operation on the number of vacant owner-occupied housing units would not be expected to be large, with 21 owner-occupied units expected to be required in the ROI.

No new community service employment would be required to meet existing levels of service in the ROI.

9.2.19.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features addressing socioeconomic impacts have been identified for the proposed Iron Mountain SEZ. Implementing the programmatic design features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would reduce the potential for socioeconomic impacts during all project phases.

9.2.20 Environmental Justice

9.2.20.1 Affected Environment

On February 11, 1994, the President signed E.O. 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," which formally requires federal agencies to incorporate environmental justice as part of their missions (*Federal Register*, Volume 59, page 7629, Feb. 11, 1994). Specifically, it directs them to address, as appropriate, any disproportionately high and adverse human health or environmental effects of their actions, programs, or policies on minority and low-income populations.

The analysis of the impacts of solar energy projects on environmental justice issues follows guidelines described in the Council on Environmental Quality's (CEQ's) *Environmental Justice Guidance under the National Environmental Policy Act* (CEQ 1997). The analysis method has three parts: (1) a description of the geographic distribution of low-income and minority populations in the affected area is undertaken; (2) an assessment is conducted to determine whether construction and operation would produce impacts that are high and adverse; and (3) if impacts are high and adverse, a determination is made as to whether these impacts disproportionately affect minority and low-income populations.

Construction and operation of solar energy projects in the proposed Iron Mountain SEZ could affect environmental justice if any adverse health and environmental impacts resulting from either phase of development are significantly high and if these impacts disproportionately affect minority and low-income populations. If the analysis determines that health and environmental impacts are not significant, there can be no disproportionate impacts on minority and low-income populations. In the event impacts are significant, disproportionality would be determined by comparing the proximity of any high and adverse impacts with the location of low-income and minority populations.

The analysis of environmental justice issues associated with the development of solar facilities considered impacts within the SEZ and an associated 50-mi (80-km) radius around the boundary of the SEZ. A description of the geographic distribution of minority and low-income groups in the affected area was based on demographic data from the 2000 Census (U.S. Bureau of the Census 2009k,l). The following definitions were used to define minority and low-income population groups:

- **Minority.** Persons who identify themselves as belonging to any of the following racial groups: (1) Hispanic, (2) Black (not of Hispanic origin) or African American, (3) American Indian or Alaska Native, (4) Asian, or (5) Native Hawaiian or Other Pacific Islander.

  Beginning with the 2000 Census, where appropriate, the census form allows individuals to designate multiple population group categories to reflect their ethnic or racial origin. In addition, persons who classify themselves as being of multiple racial origin may choose up to six racial groups as the basis of their racial origins. The term minority includes all persons, including those classifying themselves in multiple racial categories, except those who classify themselves as not of Hispanic origin and as White or "Other Race" (U.S. Bureau of the Census 2009k).

The CEQ guidance proposed that minority populations should be identified where either (1) the minority population of the affected area exceeds 50% or (2) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

This PEIS applies both criteria in using the Census data for census block groups, wherein consideration is given to the minority population that is both greater than 50% and 20 percentage points higher than in the state (the reference geographic unit).

- **Low-Income.** Individuals who fall below the poverty line. The poverty line takes into account family size and age of individuals in the family. In 1999, for example, the poverty line for a family of five with three children below the age of 18 was $19,882. For any given family below the poverty line, all family members are considered as being below the poverty line for the purposes of analysis (U.S. Bureau of the Census 2009l).

The data in Table 9.2.20.1-1 show the minority and low-income composition of the total population located in the proposed SEZ based on 2000 Census data and CEQ guidelines. Individuals identifying themselves as Hispanic or Latino are included in the table as a separate entry. However, because Hispanics can be of any race, this number also includes individuals identifying themselves as being part of one or more of the population groups listed in the table.

A large number of minority and low-income individuals are located in the 50-mi (80-km) area around the boundary of the SEZ. Within the 50-mi (80-km) radius in California, 47.4% of the population is classified as minority, while 20.7% is classified as low-income. However, the number of minority individuals does not exceed 50% of the total population in the area, and the number of minority individuals exceeds the state average by 20 percentage points or more; thus, there is no minority population in the proposed SEZ area based on 2000 Census data and CEQ guidelines. The number of low-income individuals does not exceed the state average by 20 percentage points or more and does not exceed 50% of the total population in the area; thus, there are no low-income populations in the SEZ.

In the Arizona portion of the 50-mi (80-km) radius, 18.2% of the population is classified as minority, while 12.6% is classified as low-income. The number of minority individuals does not exceed 50% of the total population in the area and the number of minority individuals does not exceed the state average by 20 percentage points or more; thus, there is no minority population in the SEZ area based on 2000 Census data and CEQ guidelines. The number of low-income individuals does not exceed the state average by 20 percentage points or more and does

TABLE 9.2.20.1-1 Minority and Low-Income Populations within the 50-mi (80-km) Radius Surrounding the Proposed Iron Mountain SEZ

Parameter	Arizona	California
Total population	72,101	58,237
White, non-Hispanic	58,957	30,643
Hispanic or Latino	8,621	17,536
Non-Hispanic or Latino minorities	4,523	10,058
One race	3,617	8,535
Black or African American	314	5,935
American Indian or Alaskan Native	2,853	956
Asian	363	1,176
Native Hawaiian or Other Pacific Islander	48	255
Some other race	39	213
Two or more races	906	1,523
Total minority	13,144	27,594
Low-income	8,973	8,213
Percentage minority	18.2	47.4
State percentage minority	24.5	40.5
Percentage low-income	12.6	20.7
State percentage low-income	13.9	14.2

Source: U.S Bureau of the Census (2009k,l).

not exceed 50% of the total population in the area; thus, there are no low-income populations in the SEZ.

Figures 9.2.20.1-1 and 9.2.20.1-2 show the locations of the minority and low-income population groups, respectively, within the 50-mi (80-km) radius around the boundary of the SEZ.

In the California portion of the 50-mi (80-km) radius around the SEZ, more than 50% of the population is classified as minority in block groups located in the city of Blythe itself, to the immediate west and southwest of the city, and in the Fort Mohave Indian Reservation, to the south of Bullhead City. Block groups with a minority population, which is more than 20 percentage points higher than the state average, are located in the city of Blythe, to the immediate west of the city, and in the western and northeastern portions of the 50-mi (80-km) radius. In the Arizona portion of the 50-mi (80-km) radius, more than 50% of the population is

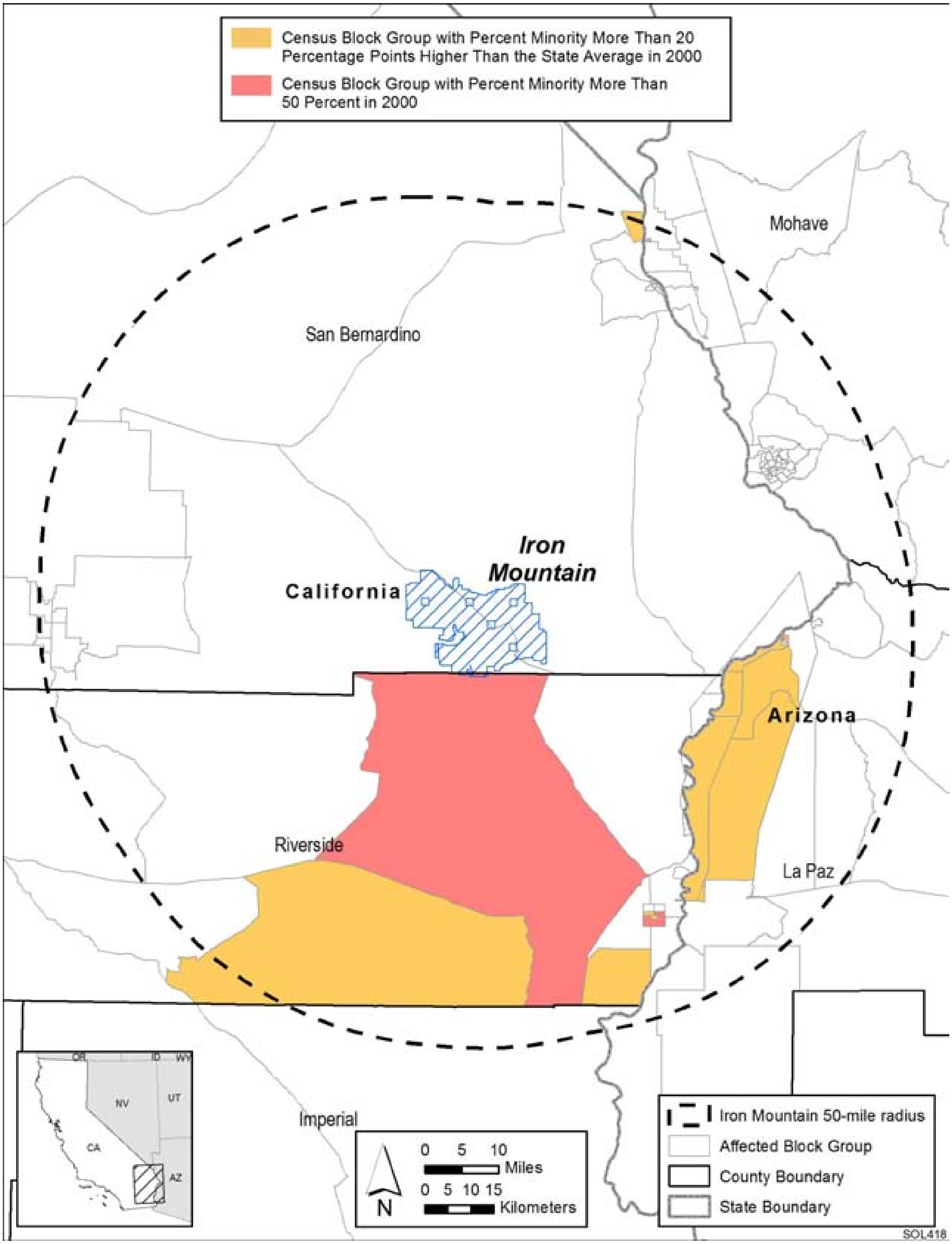

FIGURE 9.2.20.1-1 Minority Population Groups within the 50-mi (80-km) Radius Surrounding the Proposed Iron Mountain SEZ

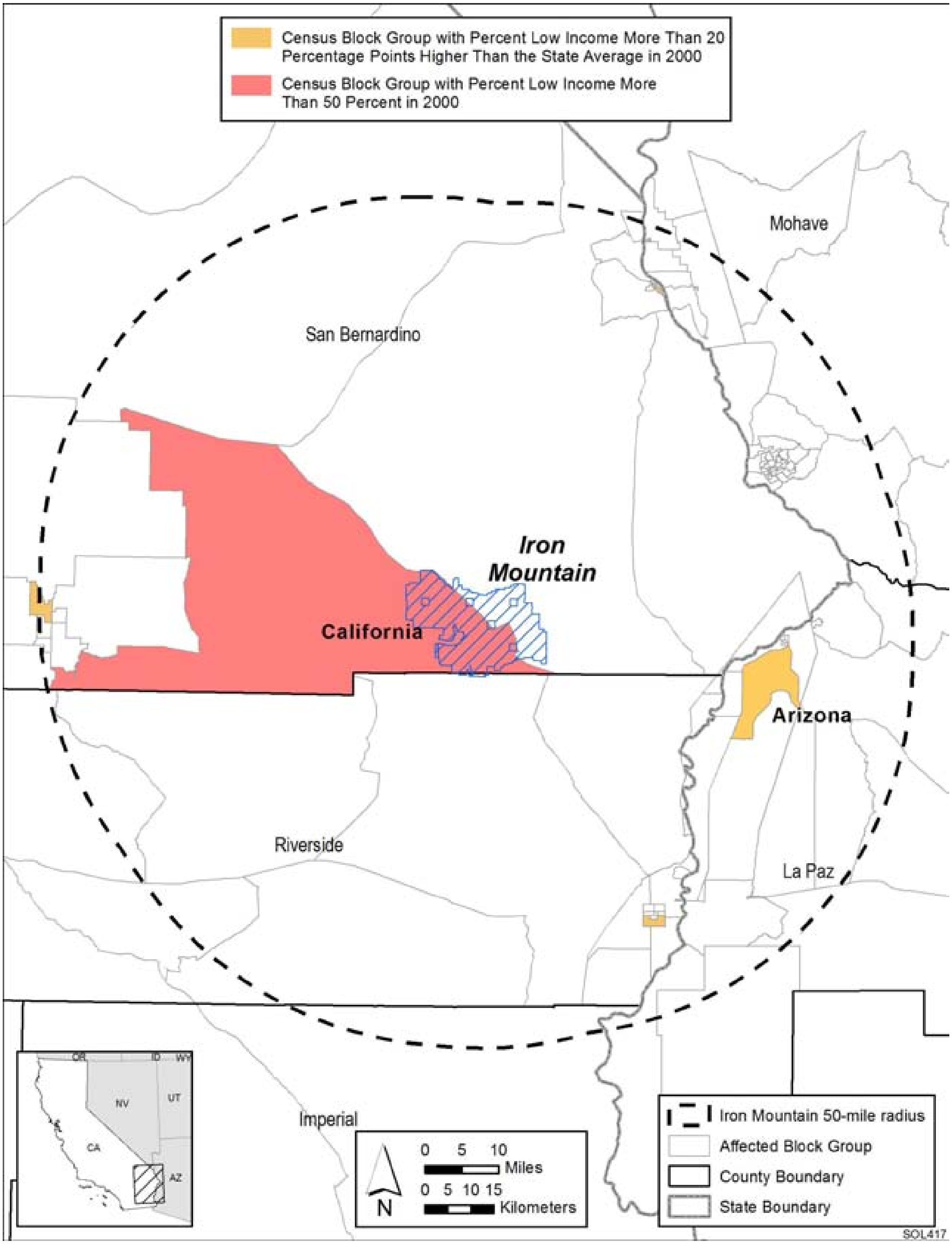

FIGURE 9.2.20.1-2 Low-Income Population Groups within the 50-mi (80-km) Radius Surrounding the Proposed Iron Mountain SEZ

classified as minority in block groups located in the Colorado River Indian Reservation, in the city of Parker, and to the east of the Colorado River, south of Blythe.

Low-income populations in the 50-mi (80-km) radius are limited to two block groups in California, in the city of Blythe and in the city of Twentynine Palms, and one in Arizona, in the Colorado River Indian Reservation. There is one block group in California where the low-income population is more than 20 percentage points higher than the state average, located to the west of the SEZ.

9.2.20.2 Impacts

Environmental justice concerns common to all utility-scale solar energy facilities are described in detail in Section 5.18. These impacts will be minimized through the implementation of the programmatic design features described in Appendix A, Section A.2.2, which address the underlying environmental impacts contributing to the concerns. The potentially relevant environmental impacts associated with solar facilities within the proposed Iron Mountain SEZ include noise and dust during the construction; noise and EMF effects associated with operations; visual impacts of solar generation and auxiliary facilities, including transmission lines; access to land used for economic, cultural, or religious purposes; and effects on property values as areas of concern that might potentially affect minority and low-income populations. Minority populations have been identified within 50 mi (80 km) of the proposed Iron Mountain SEZ; no low-income populations are present (Section 9.2.20.1).

Potential impacts on low-income and minority populations could be incurred as a result of the construction and operation of solar facilities involving each of the four technologies. Although impacts are likely to be small, there are minority populations defined by CEQ guidelines (Section 9.2.20.1) within the 50-mi (80-km) radius around the boundary of the SEZ; this means that any adverse impacts of solar projects could disproportionately affect minority populations. Because there are also low-income populations within the 50-mi (80-km) radius, there could also be impacts on low-income populations.

9.2.20.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features addressing environmental justice impacts have been identified for the proposed Iron Mountain SEZ. Implementing the programmatic design features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would reduce the potential for environmental justice impacts during all project phases.

9.2.21 Transportation

The proposed Iron Mountain SEZ is accessible by road and rail. One state highway and one railroad pass through the SEZ. A small municipal airport is located 55 mi (88 km) west of the SEZ. General transportation considerations and impacts are discussed in Sections 3.4 and 5.19, respectively.

9.2.21.1 Affected Environment

State Route 62, a two-lane highway, passes through the southern edge of the Iron Mountain SEZ, as shown in Figure 9.2.21.1-1. The town of Twentynine Palms is located about 60 mi (97 km) to the west of the SEZ along State Route 62. Parker, Arizona, is 40 mi (65 km) to the east along State Route 62. Major cities such as Los Angeles to the west and Phoenix to the southeast are about a 355-km (220-mi) drive via I-10, which runs east–west approximately 31 mi (50 km) south of the Iron Mountain SEZ. Several local dirt roads cross the SEZ. Annual average traffic volumes along State Route 62 for 2008 are provided in Table 9.2.21.1-1. Figure 9.2.21-1 also shows the designated open OHV routes in the proposed Iron Mountain SEZ; these routes were designated under the CDCA Plan (BLM 1999).

The ARZC Railroad serves the area (RailAmerica 2008). This regional railroad originates in Cadiz, approximately 25 mi (40 km) to the northwest, where it has an interchange with the Burlington Northern Santa Fe (BNSF) Railroad. As shown in Figure 9.2.21.1-1, the ARZC railroad traverses the Iron Mountain SEZ from the northwest to the southeast. A dirt road, Cadiz Road, runs along parallel to the railroad from Cadiz to State Route 62. The railroad continues on for about 150 mi (240 km), passing through Parker, Arizona, eventually joining with the BNSF Railroad again in Matthie, Arizona, northwest of Phoenix. The ARZC railroad has local stops in Milligan, Sablon, and Freda, which are located at the northwest edge, near the center, and at the southeast edge, respectively, of the SEZ.

Five small public airports are within a driving distance of approximately 85 mi (137 km) of the Iron Mountain SEZ as listed in Table 9.2.21.1-1. The nearest public airport, which is suitable only for light aircraft, is the Twentynine Palms Airport, approximately 55 mi (88 km) to the west of the SEZ along State Route 62 in the town of Twentynine Palms. None of the five airports nearest has scheduled passenger service. The only commercial freight service occurs at Lake Havasu City Municipal Airport in Arizona. In 2009, the amount of commercial freight shipped from and received at the Lake Havasu Airport was 798,744 lb (362,200 kg) and 884,488 lb (401,100 kg), respectively (BTS 2009).

9.2.21.2 Impacts

As discussed in Section 5.19, the primary transportation impacts are anticipated to be from commuting worker traffic. State Route 62 provides a regional traffic corridor that could experience moderate impacts for single projects that may have up to 1,000 daily workers, with an additional 2,000 vehicle trips per day (maximum). This would represent up to approximately

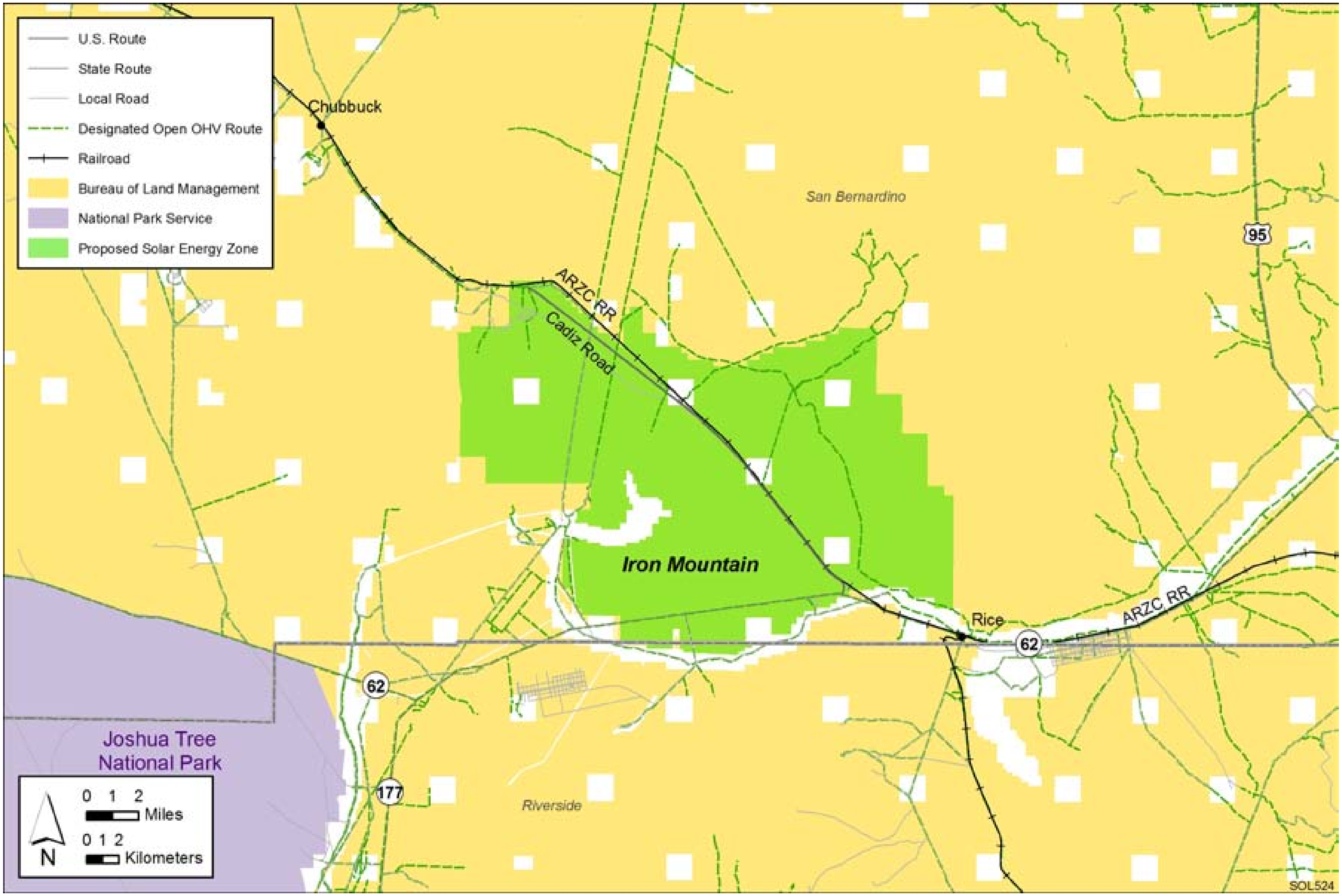

FIGURE 9.2.21.1-1 Local Transportation Network Serving the Proposed Iron Mountain SEZ

TABLE 9.2.21.1-1 AADT on Major Roads near the Proposed Iron Mountain SEZ, 2008

Road	General Direction	Location	AADT (Vehicles)
State Route 62	East–west	Junction I-10	19,000
		Junction State Route 247	28,500
		Park Boulevard (in Joshua Tree)	18,000
		Utah Trail (in Twentynine Palms)	2,700
		San Bernardino/Riverside County Line	500
		Junction State Route 177	2,200
		Cadiz Road	2,000
		Blythe Rice Road	2,000
		Junction U.S. 95	2,700
U.S. 95	North–south	Junction State Route 62	3,000

Source: Caltrans (2009).

two times the AADT values summarized in Table 9.2.21.1-2 for State Route 62 in the vicinity of the SEZ. Local road improvements would be necessary in any portion of the SEZ along State Route 62 that might be developed in order not to overwhelm the local roads near any site access point(s).

Solar development within the SEZ would affect public access along OHV routes designated open and available for public use. Although few routes within the proposed SEZ are designated as open, open routes crossing areas granted ROWs for solar facilities would be redesignated as closed (see Section 5.5.1 for more details on how routes coinciding with proposed solar facilities would be treated).

Should up to three large projects with approximately 1,000 daily workers each be under development simultaneously, an additional 6,000 vehicle trips per day could be added to State Route 62 in the vicinity of the SEZ, assuming ride-sharing was not implemented. This increase in traffic would quadruple the current average daily traffic level on State Route 62 and could have serious impacts on traffic flow during peak commute times. The extent of the problem would depend on the relative locations of the projects within the SEZ, where the worker populations originate, and the work schedules. Road improvements in the vicinity of any project within the SEZ could include deceleration and acceleration lanes on State Route 62 at project access points to help maintain flow along the highway as well as other design features listed in the following for individual projects.

TABLE 9.2.21.1-2 Airports Open to the Public in the Vicinity of the Iron Mountain SEZ

			Runway 1[a]			Runway 2[a]		
Airport	Location	Owner/Operator	Length [ft (m)]	Type	Condition	Length [ft (m)]	Type	Condition
Avi Suquilla	Just across the border in Parker, AZ, approximately 40 mi (64 km) east of the SEZ	Colorado River Indian Tribes	6,250 (1,905)	Asphalt	Good	–[b]	–	–
Blythe Municipal	Off I-10, about 75 mi (120 km) south of the SEZ	County of Riverside/ City of Blythe	5,800 (1,768)	Asphalt	Good	6,543 (1,994)	Asphalt	Good
Lake Havasu City Municipal	Off AZ State Route 95, about 85 mi (137 km) from the SEZ to the northeast	Lake Havasu City	8,001 (2,439)	Asphalt	Good	–	–	–
Needles	About 68 mi (109 km) to the north-northeast of the SEZ on U.S. 95	County of San Bernardino	4,235 (1,291)	Asphalt	Fair	5,005 (1,526)	Asphalt	Good
Twentynine Palms	Approximately 55 mi (88 km) to the west of the SEZ along State Route 62	County of San Bernardino	3,797 (1,157)	Asphalt	Good	5,531 (1,686)	Asphalt	Good

[a] Source: FAA (2009).

[b] A dash indicates not applicable.

9.2.21.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features have been identified related to impacts on transportation systems around the Iron Mountain SEZ. The programmatic design features discussed in Appendix A, Section A.2.2, including local road improvements, multiple site access locations, staggered work schedules, and ride-sharing, would all provide some relief to traffic congestion on local roads leading to any project site. Depending on the location of a proposed solar facility within the SEZ, more specific access locations and local road improvements would be implemented.

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9.2.22 Cumulative Impacts

The analysis presented in this section addresses the potential cumulative impacts in the vicinity of the proposed Iron Mountain SEZ in San Bernardino County, California. The CEQ guidelines for implementing NEPA define cumulative impacts as environmental impacts resulting from the incremental impacts of an action when added to other past, present, and reasonably foreseeable future actions (40 CFR 1508.7). The impacts of other actions are considered without regard to the agency (federal or nonfederal), organization, or person that undertakes them. The time frame of this cumulative impacts assessment could appropriately include activities that would occur up to 20 years in the future (the general time frame for PEIS analyses), but little or no information is available for projects that could occur further than 5 to 10 years in the future.

The nearest population center is the small community of Rice, located near the southeast boundary of the SEZ. The proposed Iron Mountain SEZ is in the center of an area of high wilderness and scenic value. Within 25 mi (40 km) of the area, 11 WAs, including 1 within a national park, are visible from the SEZ. The Turtle Mountain ACEC, which was designated for its outstanding scenic resources, is included within the boundary of the Turtle Mountains Wilderness. In addition, the Iron Mountain SEZ is close to the Riverside East SEZ, and in some areas, impacts from the two SEZs overlap. The geographic extent of the cumulative impacts analysis for potentially affected resources near the Iron Mountain SEZ is identified in Section 9.2.22.1. An overview of ongoing and reasonably foreseeable future actions is presented in Section 9.2.22.2. General trends in population growth, energy demand, water availability, and climate change are discussed in Section 9.2.22.3. Cumulative impacts for each resource area are discussed in Section 9.2.22.4.

9.2.22.1 Geographic Extent of the Cumulative Impacts Analysis

The geographic extent of the cumulative impacts analysis for potentially affected resources evaluated near the Iron Mountain SEZ is provided in Table 9.2.22.1-1. These geographic areas define the boundaries encompassing potentially affected resources. Their extent varies on the basis of the nature of the resource being evaluated and the distance at which an impact may occur (thus, for example, the evaluation of air quality may have a greater regional extent of impact than that of visual resources). Most of the lands around the SEZ are administered by the BLM, the NPS, or the DoD; there are also some Tribal Lands about 20 mi (30 km) east and southeast of the SEZ. The BLM administers approximately 72% of the lands within a 50-mi (80-km) radius of the SEZ.

9.2.22.2 Overview of Ongoing and Reasonably Foreseeable Future Actions

The future actions described below are those that are “reasonably foreseeable”; that is, they have already occurred, are ongoing, are funded for future implementation, or are included in firm near-term plans. Types of proposals with firm near-term plans are as follows:

TABLE 9.2.22.1-1 Geographic Extent of the Cumulative Impacts Analysis by Resource Area: Proposed Iron Mountain SEZ

Resource Area	Geographic Extent
Lands and Realty	Eastern San Bernardino County—Ward Valley
Specially Designated Areas and Lands with Wilderness Characteristics	Within a 25-mi (40-km) radius of the Iron Mountain SEZ
Rangeland Resources	Eastern San Bernardino and Riverside Counties
Recreation	All of San Bernardino and Riverside Counties
Military and Civilian Aviation	For Military Aviation, southeastern California and western Arizona. For Civilian Aviation, eastern San Bernardino and Riverside Counties
Soil Resources	Areas within and adjacent to the Iron Mountain SEZ
Minerals	Eastern San Bernardino and Riverside Counties
Water Resources	
Surface Water	CRA, Danby Lake, Homer Wash
Groundwater	Ward Valley and Rice Valley Basins
Air Quality and Climate	A 31-mi (50-km) radius from the center of the Iron Mountain SEZ within the Mojave Desert Air Basin
Vegetation, Wildlife and Aquatic Biota, Special Status Species	A 50-mi (80-km) radius from the center of the Iron Mountain SEZ, including portions of San Bernardino, Riverside, and Imperial Counties in California, and La Paz and Mohave Counties in Arizona
Visual Resources	Viewshed within a 25-mi (40-km) radius of the Iron Mountain SEZ
Acoustic Environment (noise)	Areas adjacent to the Iron Mountain SEZ
Paleontological Resources	Areas within and adjacent to the Iron Mountain SEZ
Cultural Resources	Areas within and adjacent to the Iron Mountain SEZ for archaeological sites; viewshed within a 25-mi (40-km) radius of the SEZ for other properties, such as traditional cultural properties.
Native American Concerns	Ward Valley and surrounding mountains; viewshed within a 25-mi (40-km) radius of the Iron Mountain SEZ
Socioeconomics	A 50-mi (80-km) radius from the center of the Iron Mountain SEZ
Environmental Justice	A 50-mi (80-km) radius from the center of the Iron Mountain SEZ
Transportation	U.S. Highway 95; State Routes 62, 177

- Proposals for which NEPA documents are in preparation or finalized;

- Proposals in a detailed design phase;

- Proposals listed in formal NOIs published in the *Federal Register* or state publications;

- Proposals for which enabling legislations has been passed; and

- Proposals that have been submitted to federal, state, or county regulators to begin a permitting process.

Projects in the bidding or research phase or that have been put on hold were not included in the cumulative impact analysis.

The ongoing and reasonably foreseeable future actions described below are grouped into two categories: (1) actions that relate to energy production and distribution, including potential solar energy projects under the proposed action (Section 9.2.22.2.1), and (2) other ongoing and reasonably foreseeable actions, including those related to mining and mineral processing, grazing management, transportation, recreation, water management, and conservation (Section 9.2.22.2.2). (Table 9.2.22.2-1 lists reasonably foreseeable future actions related to the "energy" and "other major actions" categories within a 50-mi [80-km] radius from the center of the Iron Mountain SEZ.) Together, these actions have the potential to affect human and environmental receptors within the geographic range of potential impacts over the next 20 years.

9.2.22.2.1 Energy Production and Distribution

Reasonably foreseeable future actions related to energy production and distribution within 50 mi (80 km) of the center of the Iron Mountain SEZ are described in the following sections. That area includes portions of San Bernardino, Riverside, and Imperial Counties in California, and La Paz and Mohave Counties in Arizona. Future renewable energy facilities are expected to be the main contributors to potential future impacts in this area, because of favorable conditions in the area for their development, large acreages required, and potentially large quantities of water used. The area is otherwise largely undeveloped and would be expected to remain so in the absence of renewable energy development. Thus, this analysis focuses on renewable energy facilities and any other foreseeable large energy projects nominally covering 500 acres (2 km^2) or more or requiring amounts of water on the scale of utility-scale CSP. Figure 9.2.22.2-1 shows the approximate locations of the key projects.

Renewable Energy Development

Several recent executive and legislative actions in California have addressed renewable energy development within the state. In November 2008, Governor Schwarzenegger signed

TABLE 9.2.22.2-1 Reasonably Foreseeable Future Actions Related to Energy Development and Distribution and Other Major Actions near the Proposed Iron Mountain SEZ[a]

Description	Status	Resources Affected	Primary Impact Location
Renewable Energy Project on Private Land			
Rice Solar Energy, 150-MW power tower facility; 2,560 total acres	In review; AFC[b] filed with CEC Oct. 21, 2009; CEC comments on AFC sent Nov. 23, 2009.	Land use, visual, terrestrial habitats, wildlife, groundwater	Southeast of Iron Mountain SEZ adjacent to and south of State Route 62
Fast-Track Solar Energy Projects on BLM-Administered Land			
First Solar Desert Sunlight (CACA-48649), 550-MW PV facility; 4,410 disturbed acres	NOI to prepare an EIS issued Jan 13, 2010	Land use, visual, terrestrial habitats, wildlife, groundwater	Western part of Riverside East SEZ
Solar Millennium Palen Solar Project (CACA 48810), 484-MW solar trough; 5,200 total acres	NOI to prepare an EIS issued Nov. 23, 2009	Land use, visual, terrestrial habitats, wildlife, groundwater	West-central part of Riverside East SEZ
Solar Millennium Blythe Solar Project (CACA 48811), 986-MW trough facility; 9,480 total acres[c]	NOI to prepare an EIS issued Nov. 23, 2009	Land use, visual, terrestrial habitats, wildlife, groundwater	Eastern part of Riverside East SEZ
NextEra Genesis Ford Dry Lake Solar Project (CACA-4880); 250 MW trough facility; 4,640 total acres[c]	NOI to prepare an EIS issued Nov. 23, 2009	Land use, visual, terrestrial habitats, wildlife, groundwater	Central part of Riverside East SEZ
Other Projects			
Cadiz Valley Dry Year Supply Project	Under review	Disturbed areas, terrestrial habitats along railroad ROW	Areas adjacent to ARZC Railroad ROW in southern portion of the Iron Mountain SEZ
Proposed West Chocolate Mountains Renewable Energy Evaluation Area	NOI to prepare an EIS issued Feb. 10, 2010	Land use, visual, terrestrial habitats, wildlife, groundwater	About 40 mi south of the Iron Mountain SEZ

[a] Projects in later stages of agency environmental review and project development.

[b] AFC = application for certification.

[c] Project approved. Updated information will be included in the Final EIS. See http://www.blm.gov/wo/st/en/prog/energy/renewable_energy/fast-track_renewable.html for details

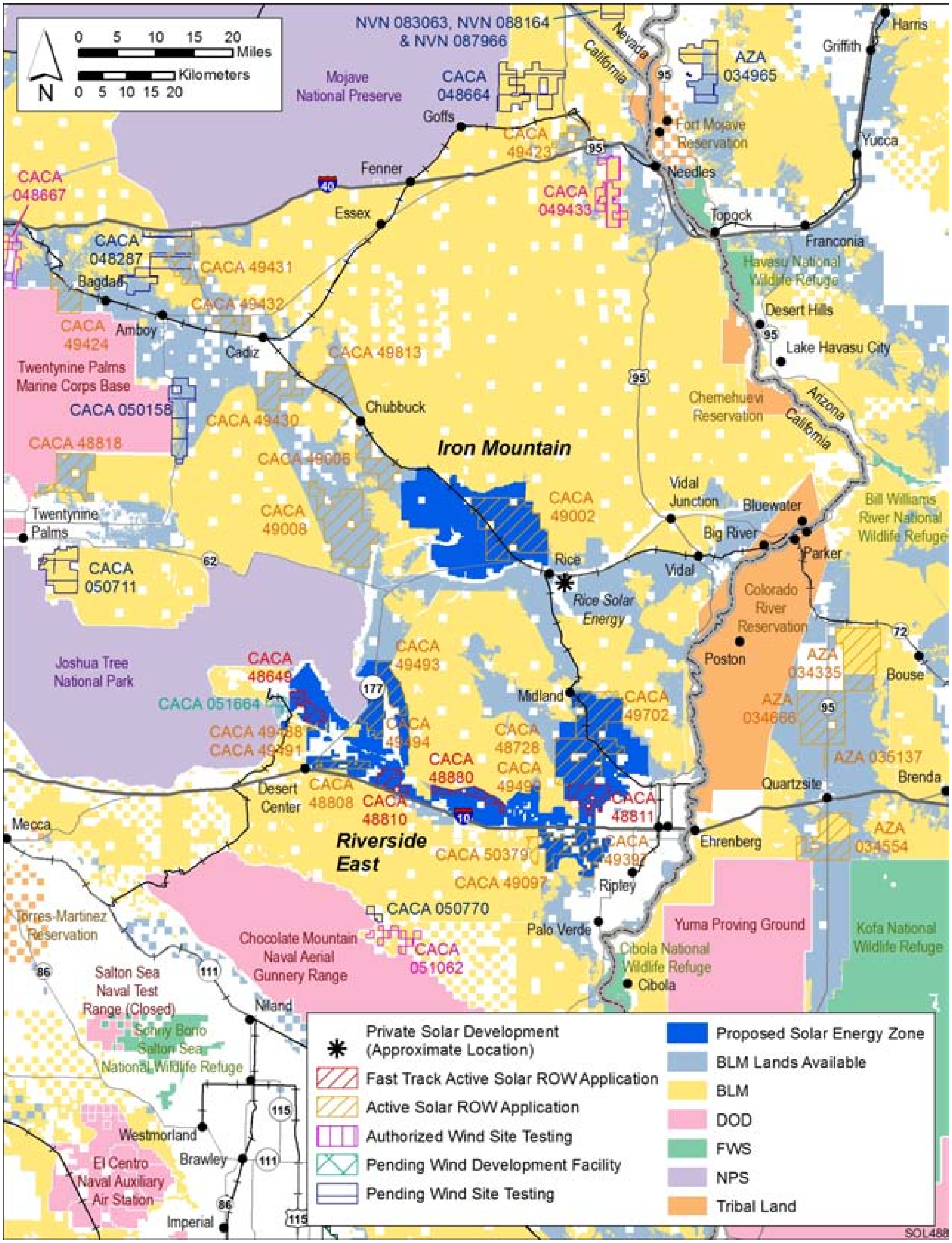

FIGURE 9.2.22.2-1 Locations of Renewable Energy Proposals on Public Land within a 50-mi (80-km) Radius of the Proposed Iron Mountain SEZ

E.O. S-14-08 to streamline California's renewable energy project approval process and increase the state's RPS to the most aggressive in the nation—at 33% renewable power by 2020. On September 15, 2009, the governor issued a second E.O., now requiring that 33% of all electrical energy produced in the state be from renewable energy sources by the year 2020. The E.O. directed the CARB to adopt regulations increasing California's RPS to 33% by 2020.

In 2009, the California Legislature drafted bills requiring that electrical energy production meet a standard of 33% from renewable sources. On October 12, 2009, Governor Schwarzenegger vetoed two bills from the California Legislature on electrical energy generated by renewable sources in favor of an alternative plan that would remove limits on the amount of renewable power utilities could buy from other states (African American Environmentalist Association 2009).

Solar Energy. Table 9.2.22.2-1 lists one project on private land, Rice Solar Energy, and four foreseeable solar energy projects on public land, the so-called fast-track projects. Fast-track projects are those on public lands for which the environmental review and public participation process is under way and the ROW applications could be approved by December 2010 (BLM 2010a). The listed Rice and fast-track projects are considered foreseeable because the permitting and environmental review processes are under way. The locations of these five projects are shown on Figure 9.2.22.2-1. Other, more numerous, pending regular-track ROW applications shown in the figure are discussed collectively at the end of this section.

- *Rice Solar Energy.* The proposed Rice Solar Energy Project would be a power tower facility with an output of 150 MW constructed on 1,410 acres (6 km^2) of a 2,560-acre (10-km^2) parcel on privately owned land in unincorporated eastern Riverside County, California (CEC 2009). Access to the site would be from State Route 62 just north of the site. The Iron Mountain SEZ is less than 5 mi (8 km) northwest of the site, and the eastern portion of the Riverside East SEZ is about 15 mi (24 km) south. Land surrounding the project site consists mostly of undeveloped open desert owned by the Federal Government and managed by the BLM.

  The facility would employ a liquid salt heat transfer and storage medium and a conventional steam turbine. Propane would be used for auxiliary heating, and no natural gas pipeline to the facility would be needed. The facility would use an air-cooled condenser (dry cooling). Water use during the proposed 2011 to 2013 (30-month) construction period would be 780 ac-ft/yr (0.96 million m^3/yr). Process water requirements for facility operations, commencing by the end of 2013, are estimated to be up to 180 ac-ft/yr (0.22 million m^3/yr), assuming an operating capacity factor of 37%. A mostly local construction workforce (averaging 280 workers) would be used. Operations and maintenance of the facility would employ an estimated 47 workers (CEC 2009).

Surveys found seven desert tortoises, along with shell-skeletal remains, burrows, egg shell fragments, and scat present on the project site, along the generator tie-line route, and within the 1-mi (1.6-km) wide zone surrounding the project site. In addition, western burrowing owl, Mojave fringe-toed lizard, and loggerhead shrike were found to be present in or near the project area. Several California-listed sensitive plant species were found on the project site or along the proposed transmission line ROW (CEC 2009).

- *First Solar Desert Sunlight (CACA 48649).* This proposed fast-track project would use a thin-film PV technology in a facility with an output of 550 MW. The proposed project site is located on approximately 9,480 acres (38.4 km^2) and would disturb up to 4,400 acres (17.8 km^2) of public land in Riverside County, California, approximately 6 mi (10 km) north of the community of Desert Center, California, and about 7 mi (11 km) north of the I-10 transmission corridor (BLM 2010b). The facility and most of the corridor for the project's 230-kV generation interconnection transmission line would be located in the western portion of the proposed Riverside East SEZ, about 25 mi (40 km) from the Iron Mountain SEZ. The project would include the solar facility, an on-site substation, a 230-kV generation interconnection line within the transmission corridor, and a planned 230- to 500-kV Red Bluff substation. The Red Bluff substation would connect the project to the Southern California Edison (SCE) regional transmission grid.

  The proposed PV facility would have an estimated water requirement of 27 ac-ft/yr (33,000 m^3/yr) during its 2011 to 2013 construction period and only 4 ac-ft/yr (5,000 m^3/yr) thereafter for operation (BLM and CEC 2010a). On the basis of estimated employment levels for PV facilities (Section 9.2.19.2.2), construction of the facility would employ about 220 people, while operations would require an estimated 11 full-time employees.

- *Solar Millennium Palen Solar Project (CACA 48810).* This proposed fast-track project is a parabolic trough facility with an output of 484 MW. The project site would be on public land within the western portion of the proposed Riverside East SEZ, approximately 10 mi (16 km) east of Desert Center, California, adjacent to the I-10 transmission corridor. The proposed facility would occupy approximately 3,800 acres (15.4 km^2) within a proposed 5,200-acre (20.9-km^2) ROW. The facility would employ two adjacent and independent solar troughs with nominal output of 250 MW each. It would employ dry cooling and would require about 300 ac-ft/yr (0.37 million m^3/yr) of groundwater drawn from two on-site wells for mirror washing and other uses. Water requirements during the proposed construction period of 2011 to 2013 are estimated to be 480 ac-ft/yr (0.59 million m^3/yr). The project would disturb about 3,000 acres (12 km^2). The facility would connect to the planned Red Bluff substation, to be built approximately 10 mi (16 km) west of the project location. An auxiliary boiler would be fired with propane. An average of 566 workers would be employed during construction, and 134 full-time employees would be required for operations (BLM and CEC 2010a).

Special status species of concern include desert tortoise and burrowing owl. No desert tortoises and only low-quality tortoise habitat were observed during spring 2009 surveys. Cultural surveys have identified both prehistoric and historic cultural resources (BLM and CEC 2010a).

- *Solar Millennium Blythe Solar Project (CACA 48811).* This proposed fast-track project would be a parabolic trough facility with an output of 986 MW. The project would be on public land within the eastern portion of the proposed Riverside East SEZ, approximately 8 mi (13 km) west of Blythe, California, adjacent to the I-10 transmission corridor. The proposed facility would occupy approximately 9,480 acres (38.4 km^2) and disturb about 7,030 acres (28.5 km^2). The facility would employ four adjacent and independent solar troughs with nominal output of 250 MW each. It would employ dry cooling and would require about 600 ac-ft/yr (0.74 million m^3/yr) of groundwater drawn from two on-site wells for mirror washing and other uses. Water requirements during the proposed construction period of 2011 to 2015 are estimated to be 620 ac-ft/yr (0.77 million m^3/yr). The facility would connect to a planned new substation, the Colorado River substation, to be built approximately 5 mi (8 km) southwest of the project location. To supply auxiliary boilers, a 9.8-mi (15.7-km) long natural gas pipeline would be built to connect to an existing pipeline south of I-10; about 8 mi (13 km) of the line would be on the project ROW. An average of 604 workers would be employed during construction of the facility, and 221 full-time employees would be required for operations (BLM and CEC 2010b).

  Project construction would result in a direct loss of low- to moderate-quality habitat for desert tortoise over the project site and would fragment and degrade adjacent native plant and wildlife communities. The project could also promote the spread of invasive non-native plants and desert tortoise predators such as ravens. Five species of California-listed sensitive plant species are present. Habitat for western burrowing owl, loggerhead shrike, Le Conte's thrasher, black-tailed gnatcatcher, and California horned lark is also present (BLM and CEC 2010b).

- *NextEra Genesis Ford Dry Lake Solar Project (CACA 4880).* This proposed fast-track project consists of two independent solar trough facilities using wet cooling with a total output of 250 MW. The project would be located on public land within the central portion of the proposed Riverside East SEZ, approximately 20 mi (32 km) west of Blythe, California, north of I-10 and near Dry Lake, California. The proposed facility would occupy 4,640 acres (18.8 km^2) and directly affect 1,800 acres (7.3 km^2). The proposed facility would employ wet cooling and would require about 1,640 ac-ft/yr

(2.0 million m^3/yr) of cooling water from on-site wells. Water requirements during the proposed construction period of 2011 to 2013 are estimated to be 870 ac-ft/yr (1.1 million m^3/yr). The facility would connect to the proposed Colorado River substation via a 230-kV on-site switchyard and a new transmission line that would tie into the existing Blythe Energy Project transmission line. The new transmission line, natural gas line, and access road would be built in the same corridor that would exit the southern site boundary and extend about 6.5 mi (10.5 km) south. An average of 646 workers would be employed during construction of the facility, and 40 to 50 full-time employees would be required for operations (BLM and CEC 2010c).

Biological surveys have identified a number of special status species, including Mojave and Colorado fringe-toed lizards, loggerhead shrike, Western burrowing owl, short-eared owl, prairie falcon, and northern harrier. While no live desert tortoise were found, burrows and bones were present on the site and tracks and carcasses in the surrounding area. As many as 15 cultural resource sites would be directly affected by construction of the proposed Genesis Solar Energy Project (BLM and CEC 2010c).

- *Pending Solar ROW Applications on BLM-Administered Lands.* In addition to the four fast-track solar projects described above, a number of regular-track ROW applications for solar projects have been submitted to the BLM that would be located either within the Iron Mountain SEZ or within 50 mi (80 km) of the SEZ (BLM and USFS 2010b). Table 9.2.22.2-2 lists all solar projects that had pending applications submitted to the BLM as of March 2010. Figure 9.2.22.2-1 shows the locations of these applications.

  Of the 25 active solar applications listed in Table 9.2.22.2-2, one application is within the Iron Mountain SEZ, CACA 49002, on the eastern half of the SEZ. Two applications are within 5 mi (8 km) of the boundary—CACA 49006, 1 mi (1.6 km) west and extending to about 6 mi (9.6 km) north of the SEZ, and CACA 49008, 4 mi (6.5 km) west of the west-central portion of the SEZ. All these applications, which are administered through the Needles Field Office, are listed in Table 9.2.22.2-2 and shown in Figure 9.2.22.2-1.

  The likelihood of any of the regular-track ROW application projects actually being developed is uncertain, but is generally assumed to be less than that for fast-track applications. The projects are all listed for completeness and as an indication of the level of interest in development of solar energy in the region. Some number of these applications would be expected to result in actual projects. Thus, the cumulative impacts of these potential projects are analyzed in their aggregate effects.

Wind Energy. Table 9.2.22.2-2 lists ROW grant applications for five pending wind site testing, three authorized for wind site testing, and one pending wind development facility within

TABLE 9.2.22.2-2 Pending Renewable Energy Project ROW Applications on BLM-Administered Land within 50 mi (80 km) of the Proposed Iron Mountain SEZ[a]

Serial No.	Project Name	Application Received	Size (acres[b])	MW	Technology	Field Office
Solar Applications						
AZA 034335	Boulevand Associates, LLC	June 8, 2007	24,221	500	CSP/Trough	Lake Havasu: Yuma
AZA 034554	Nextlight Renewable Power, LLC	March 26, 2008	20,699	500	CSP/Trough	Yuma
AZA 034666	SolarReserve, LLC (Quartzsite)	May 27, 2008	25,204	100	CSP/Tower	Yuma
AZA 035137	E-on Climate & Renewables (Castle Dome)	July 2, 2009	590	100	PV	Yuma
CACA 48728	FPL Energy	Jan. 31, 2007	20,608	250	CSP	Palm Springs-Southcoast
CACA 48808	Chuckwalla Solar, LLC	Sept. 15, 2006	4,099	200	PV	Palm Springs-Southcoast
CACA 48818	First Solar (Desert Opal)	Feb. 26, 2007	15,824	1,205	PV	Barstow
CACA 49002	Leopold Company, LLC	Apr. 2, 2007	35,466	4,100	CSP	Needles
CACA 49006	Boulevard Associates, LLC	May 14, 2007	12,046	1,000	CSP	Needles
CACA 49008	Boulevard Associates, LLC	May 14, 2007	35,639	1,000	CSP	Needles
CACA 49097	Bull Frog Green Energy, LLC	Oct. 1, 2008	6,634	2,500	PV	Palm Springs-Southcoast
CACA 49397	First Solar (Desert Quartzite)	Oct. 28, 2007	7,548	600	PV	Palm Springs-Southcoast
CACA 49423	Solel, Inc.	July 23, 2007	6,614	0		Needles
CACA 49424	Solel, Inc.	July 23, 2007	7,453	600	CSP	Needles
CACA 49430	Iberdrola Renewables, Inc.	Dec. 8, 2008	13,373	N/A	CSP	Needles
CACA 49431	Boulevard Associates, LLC	Sept. 21, 2007	10,199	1,000	CSP	Needles
CACA 49432	PG&E	Sept. 24, 2007	5,315	800	Undecided	Needles
CACA 49488	Enxco, Inc.	Nov. 13, 2007	1,327	300	CSP	Palm Springs-Southcoast
CACA 49490	Enxco, Inc.	Nov. 13, 2007	20,608	300	CSP	Palm Springs-Southcoast
CACA 49491	Enxco, Inc.	Nov. 13, 2007	1,327	300	CSP	Palm Springs-Southcoast
CACA 49493	Solel, Inc.	March 27, 2008	8,750	500	CSP	Palm Springs-Southcoast
CACA 49494	Solel, Inc.	Nov. 6, 2007	7,317	500	CSP	Palm Springs-Southcoast
CACA 49702	Bull Frog Green Energy, LLC	June 1, 2008	22,717	2,500	PV	Palm Springs-Southcoast
CACA 49813	Iberdrola Renewables, Inc.	April 1, 2008	12,833	1,000	CSP	Needles
CACA 50379	Lightsource Renewables, LLC	Aug. 8, 2008	2,446	550	CSP	Palm Springs-Southcoast

TABLE 9.2.22.2-2 (Cont.)

Serial No.	Project Name	Application Received	Size (acres[c])	MW	Technology	Field Office
Wind Applications Pending Wind Site Testing						
AZA 34965	Oak Creek Energy Systems, Inc.	–[c]	16,258	–	Wind	Lake Havasu: Kingman
CACA 48287	Renewergy, LLC	July 26, 2006	7,760	–	Wind	Needles
CACA 48664	Renewergy, LLC	Aug. 7, 2006	37,219	–	Wind	Needles
CACA 50711	Padoma Wind Power, LLC	March 17, 2009	23,829	–	Wind	Barstow
CACA 50770	–	–	–	–	Wind	–
Authorized Wind Site Testing		Application Last Authorized				
CACA 48667	Oak Creek Energy	June 16, 2010	23,691	–	Wind	Needles
CACA 49433	Padoma Wind Power, LLC	June 16, 2010	25,832	–	Wind	Needles
CACA 51062	John Deere Renewables, LLC	April 29, 2009	6,256		Wind	El Centro
Pending Wind Development Facility						
CACA 51664	LH Renewable, LLC	Dec. 8, 2009	3,500	–	Wind	Palm Springs

[a] Information taken from pending and authorized wind energy projects listed on BLM California Desert District Web site (BLM 2010e) and downloaded from GeoCommunicator (BLM and USFS 2010b). Total solar acres = 126,168, total solar MW =20,387; total wind acres and MW not available.

[b] To convert acres to km^2, multiply by 0.004047.

[c] A dash indicates data not available.

a 50-mi (80-km) radius of the proposed Iron Mountain SEZ. The actual development of all nine proposals is considered pending, however, since they await authorization of development of wind facilities. As shown in Figure 9.2.22.2-1, the locations of the applications lie generally on an arc running from north to west to south of the SEZ at a distance of approximately 30 mi (48 km).

The likelihood of any of the regular-track wind projects actually being developed is uncertain; the projects are listed to give an indication of the level of interest in development of wind energy in the region. Most are in the wind testing stage, and EAs necessary for project approval are being prepared.

Geothermal Energy. No geothermal applications are located within 50 mi (80 km) of the Iron Mountain SEZ.

9.2.22.2.2 Other Actions

Other Foreseeable Actions

Cadiz Valley Dry-Year Supply Project. The Cadiz Valley Dry-Year Supply Project is a water storage and supply program that will provide southern California with as much as 150,000 ac-ft/yr (185 million m^3/yr) of water during years of droughts, emergencies, or other periods of urgent need by utilizing the aquifer system that underlies Cadiz's 35,000 acres (142 km^2) of land holdings in the Cadiz and Fenner Valleys of eastern San Bernardino County (Cadiz, Inc. 2008). Historically, such dry periods occur about 3 out of every 10 years. In any given dry year, this water would be enough to serve more than 1.2 million people. The project would involve taking water from the CRA during high rainfall years and storing it in aquifer systems to supply southern California's water needs during periods of severe drought.

The project was the subject of congressional hearings in August 2009 regarding Cadiz, Inc.'s controversial proposal to use a 42-mi (68-km) long stretch of a Mojave railway line ROW for the water pipeline (Chance of Rain 2009). A portion of the water pipeline would cross the extreme southern part of the Iron Mountain SEZ.

Proposed West Chocolate Mountains Renewable Energy Evaluation Area. In a February 10, 2010, NOI in the *Federal Register*, the BLM El Centro Field Office announced its intent to prepare an EIS to consider an amendment to the CDCA Plan to identify whether 21,300 acres (86.2 km^2) of BLM-administered lands within the West Chocolate Mountains area should be made available for geothermal, solar, or wind energy development (BLM 2010a). The Evaluation Area lies about 40 mi (64.3 km) south of the proposed Iron Mountain SEZ in Riverside County, east of Niland and northeast of El Centro, California. Cumulative impacts at this distance would affect mainly ecological and socioeconomic resources.

Other Ongoing Actions

Mining. The BLM GeoCommunicator Database (BLM and USFS 2010b) shows there are no mining claims for locatable minerals within the proposed Iron Mountain SEZ. About 23,000 acres (93 km^2) of the SEZ is classified as a KSLA, and there are currently three active leases in the area. Sodium is being produced from the area, and production is expected to continue.

Grazing. One grazing allotment exists in the immediate vicinity of the Iron Mountain SEZ (BLM and USFS 2010b). The Keoughs allotment (serial no. CACA 06001) is located mostly in northern Riverside County and adjacent to the southeastern portion of the SEZ. The next nearest grazing allotment (Lazy Daisy allotment, serial no. CACA 09076) is located about 25 to 30 mi (40 to 48 km) north of the SEZ. There is no grazing within the Iron Mountain SEZ, therefore there would be no cumulative effect on the grazing industry.

Communication Sites. One communication tower (serial no. CACA 014137) is located in the western portion of the Iron Mountain SEZ.

Gas Pipeline. Two natural gas pipelines cross the Iron Mountain SEZ paralleling the Atchison Topeka and Santa Fe Railroad, which runs diagonally through the SEZ from southeast to northwest. Major pipeline corridors parallel I-40 and I-10 north and south of the SEZ, respectively.

9.2.22.3 General Trends

9.2.22.3.1 Population Growth

Table 9.2.22.3-1 presents recent and projected population numbers for the 50-mi (80-km) radius two-county ROI and in California as a whole. Population in the ROI stood at 4,189,515 in 2008, having grown at an average annual rate of 3.1% since 2000. Growth rates for the two counties in the ROI were higher than those for California as a whole (1.4%) over the same period.

Both counties in the ROI have experienced growth in population since 2000. Between 2000 and 2008, population grew at an annual rate of 3.8% in Riverside County and 2.4% in San Bernardino County. The ROI population is expected to increase to 5,584,241 by 2021 and to 5,780,284 by 2023 (California Department of Finance 2010).

TABLE 9.2.22.3-1 ROI Population for the Proposed Iron Mountain SEZ

Location	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	2021	2023
Riverside County	1,559,039	2,103,050	3.8	2,965,113	3,085,643
San Bernardino County	1,721,942	2,086,465	2.4	2,619,128	2,694,641
ROI	3,280,981	4,189,515	3.1	5,584,241	5,780,284
California	34,105,437	38,129,628	1.4	44,646,420	45,667,413

Sources: U.S. Bureau of the Census (2009f); California Department of Finance (2010).

9.2.22.3.2 Energy Demand

The growth in energy demand is related to population growth through increases in housing, commercial floor space, transportation, manufacturing, and services. With population growth expected in Imperial, Riverside, and San Bernardino Counties between 2006 and 2016, an increase in energy demand also is expected. However, the EIA projects a decline in per-capita energy use through 2030, mainly because of improvements in energy efficiency and the high cost of oil throughout the projection period. Primary energy consumption in the United States between 2007 and 2030 is expected to grow by about 0.5% each year; the fastest growth is projected for the residential, commercial and industrial sectors, which are expected to grow by about 0.5%, 0.4%, and 0.1%, respectively, (industrial) each year (EIA 2009).

9.2.22.3.3 Water Availability

Because of its remote location and lack of agricultural and residential users, the Iron Mountain SEZ is not in an area of extensive water use. The majority (98%) of the proposed Iron Mountain SEZ is located within the Ward Valley groundwater basin, and the southeastern corner (2%) is located in the Rice Valley groundwater basin. From a regional perspective, groundwater recharge in the eastern Mojave Desert is largely supplied by rainfall and snowmelt runoff at higher elevations, and groundwater discharge is primarily through interbasin flows and evaporation from low-elevation playas (MWD 2001). Information on the groundwater aquifers in the Ward Valley is limited because of the historically low level of development in this region. The groundwater storage capacity for the Ward Valley groundwater basin is estimated to be 8.7 million ac-ft (11 billion m^3), on the basis of basin size and estimates of alluvium depths. The natural groundwater recharge is estimated to be 2,700 ac-ft/yr (3.3 million m^3/yr), and the groundwater discharge at Danby Lake is estimated to range from 11,000 to 22,000 ac-ft/yr (13.6 million to 27.2 million m^3/yr) (CDWR 2003).

Historically, groundwater withdrawals have been used to support small farms and vineyards, railroads, and salt-mining industries (MWD 2001). Between 1901 and 1947, groundwater withdrawals averaged 50 ac-ft/yr (61,700 m^3/yr), but have dropped off because of railroads switching from steam to diesel engines. Withdrawals currently range from 2 to 8 ac-ft/yr (2,500 to 9,900 m^3/yr) (MWD 2001; CDWR 2003). Groundwater levels range from near surface at Danby Dry Lake to 700 ft (229 m) below the surface (CDWR 2003). A USGS monitoring well located on the northwestern corner of the proposed SEZ showed steady groundwater levels at 93 ft (28 m) below the surface from 1964 to 1984 (USGS 2009, well number 341627115102901). Other USGS wells within the adjacent Cadiz Valley and Rice Valley groundwater basins have also shown steady groundwater levels (USGS 2009, well numbers 340500114505801, 340424114484801, 340300114473301, 342513115220001). Well yields within the Ward Valley groundwater basin have been reported between 10 and 260 gpm (38 and 984 L/min) (CDWR 2003). Cadiz, Inc. reported total groundwater yields of up to 3,700 gpm (14,000 L/min) for its agricultural production wells, which are 25 mi (40 km) northwest of the proposed SEZ in the Cadiz Valley groundwater basin (MWD 2001).

The most extensive water use in the region is in western San Bernardino County. In 2005, water withdrawals from surface waters and groundwater in San Bernardino County were 656,900 ac-ft/yr (860 million m^3/yr), 57% of which came from surface waters and 43% from groundwater. The largest water use category was municipal and domestic supply, at 427,100 ac-ft/yr (527 million m^3/yr). However, the majority of this water was used in the larger cities in the southwestern portion of San Bernardino County. Agricultural water uses accounted for 167,000 ac-ft/yr (206 million m^3/yr), while industrial and thermoelectric water uses accounted for 29,150 and 33,630 ac-ft/yr (36 million and 41 million m^3/yr), respectively (Kenny et al. 2009). Water uses in western San Bernardino County, however, may be too far away to affect water resources at the proposed Iron Mountain SEZ.

9.2.22.3.4 Climate Change

Global warming has continued to affect many desert areas in the southwestern United States with increased temperatures and prolonged drought during the past 20 to 30 years. A report on global climate change in the United States prepared on behalf of the National Science and Technology Council by the U.S. Global Research Program documents current temperature and precipitation conditions and historic trends, and projects impacts during the remainder of the 21st century through modeling using low and high scenarios of global GHG emissions. The report summarizes the science of climate change and the recent and future impacts of climate change on the United States (Global Climate Research Program 2009). The following excerpts from that report indicate that there has been a trend for increased global temperature and decreased annual precipitation in desert regions:

- Average temperatures in the United States increased more than 2ºF (1.1ºC) over the period 1957 to 2007.

- Southern areas, particularly desert regions of southern Arizona and southeastern California, have experienced longer droughts and are projected to have more severe periods of drought during the remainder of the 21st century. Much of the Southwest has experienced drought conditions since 1999. This period represents the most severe drought in 110 years.

- The incidence of wildfires in the western United States has increased in recent decades, partly because of increased drought.

- Temperature increases in the next 20 to 30 years are expected to be strongly correlated with past emissions of heat-trapping gases, such as CO_2 and CH_4.

- Many extreme weather events have increased both in frequency and intensity during the last 40 to 50 years. Precipitation and runoff are expected to decrease in the Southwest in spring and summer based on current data and anticipated temperature increases. Water use will increase over the next several decades as the population of southern California grows, resulting in trade-offs among competing uses.

- Climate project models also show a 10 to 20% decline in runoff in California and Nevada for the period 2041 to 2060, compared with data from 1901 to 1970 used as a baseline.

- In the Southwest, average temperatures increased about 1.5ºF (0.8ºC) in 2000 compared to a baseline period of 1960 to 1979. By the year 2020, temperatures are projected to rise 2 to 3ºF (1.1 to 1.7ºC) above the 1960 to 1979 baseline.

Increased global temperatures from GHG emissions will likely continue to exacerbate drought in the southern California deserts. The State of California has prepared several reports of climate change impact predictions through the remainder of the 21st century that address such topics as economics, ecosystems, water use/availability, impacts on Santa Ana winds, agriculture, timber production, and snowpack. The California climate change portal Web site (http://www.climatechange.ca.gov/publications/cat/index.html) lists the Climate Action Team reports that are submitted to the Governor and state legislature. These reports are included as final papers of the CEC's Public Interest Energy Research Program.

9.2.22.4 Cumulative Impacts on Resources

This section addresses potential cumulative impacts in the proposed Iron Mountain SEZ on the basis of the following assumptions: (1) because of the relatively large size of the proposed SEZ (more than 30,000 acres [121 km^2]), as many as three projects could be constructed at a time, and (2) maximum total disturbance over 20 years would be about 85,217 acres (345 km^2) (80% of the entire proposed SEZ). For analysis, it is also assumed that no more than 3,000 acres (12.1 km^2) would be disturbed per project annually and 250 acres (1.01 km^2) monthly on the basis of construction schedules planned in current applications. For this analysis, the impacts of construction and operation of transmission lines outside of the SEZ were not assessed, assuming that the existing 230-kV transmission line might be used to connect some new solar facilities to load centers and that additional project-specific analysis would be performed for new transmission construction or line upgrades. Regarding site access, because State Route 62, a two-lane highway, passes through the southern edge the SEZ, no major road construction activities outside of the SEZ would be needed for development to occur in the SEZ.

Cumulative impacts in each resource area that would result from the construction, operation, and decommissioning of solar energy development projects within the proposed SEZ when added to other past, present, and reasonably foreseeable future actions described in the previous section are discussed below. At this stage of development, because of the uncertainties of the future projects in terms of location within the proposed SEZ, size, number, and the types of technology that would be employed, the impacts are discussed qualitatively or semi-quantitatively, with ranges given as appropriate. More detailed analyses of cumulative impacts would be performed in the environmental reviews for the specific projects in relation to all other existing and proposed projects in the geographic areas.

9.2.22.4.1 Lands and Realty

The area covered by the proposed Iron Mountain SEZ is in a remote, rural, and largely undeveloped portion of the eastern Mojave Desert. While the SEZ comprises only BLM-administered lands, about 2,560 acres (10.4 km^2) of private lands and about 640 acres (2.5 km^2) of state lands are included within the external boundary of the SEZ. Another 560 acres (2.3 km^2) of state land is located adjacent to the southern boundary of the SEZ.

Development of the SEZ would introduce a highly contrasting industrialized land use into an area that is largely rural. In addition, numerous renewable energy projects are proposed within a 50-mi (80-km) radius of the Iron Mountain SEZ. As shown in Table 9.2.22.2-2 and Figure 9.2.22-2, as many as 29 solar projects and 9 wind projects have pending applications within this distance, with ROW applications totaling over 290,000 acres (1,170 km^2), including over 20,000 acres (81 km^2) for five advanced solar proposals (Section 9.2.22.2.1). As a result of the potential and likely development of other renewable energy projects and accompanying transmission lines, roads, and other infrastructure within the geographic extent of effects, the character of a large portion of the California Desert could be dramatically changed. The contribution to cumulative impacts of utility-scale solar projects on public lands on and around the Iron Mountain SEZ could be significant, particularly if the SEZ is fully developed with solar projects. Development of the public lands for solar energy production may also result in similar development on the state and private lands in the immediate vicinity of the SEZ.

Construction of utility-scale solar energy facilities within the SEZ would preclude use of those areas occupied by the solar energy facilities for other purposes. The areas that would be occupied by the solar facilities would be fenced, and access to those areas by both the general public and wildlife would be eliminated.

9.2.22.4.2 Specially Designated Areas and Lands with Wilderness Characteristics

The Iron Mountain SEZ is surrounded by areas of high wilderness and scenic value, including 11 wilderness areas with a potential view of the SEZ within 25 mi (40 km). The Turtle Mountain ACEC, the Chemehuevi DWMA, and the Patton Iron Mountain Divisional Camp ACEC are located nearby. Construction of utility-scale solar energy facilities within the SEZ in combination with potential development of other renewable energy projects and associated infrastructure would have the potential for contributing to the adverse visual impacts on these specially designated areas. Development of the SEZ, especially full development, would be a dominant factor in the viewshed from large portions of these specially designated areas.

Solar development of the Iron Mountain and Riverside East SEZs, together with the Rice Solar Development on private land, would combine to adversely affect wilderness values in the Rice Valley and Palen-McCoy WAs. Development within Iron Mountain and Riverside East SEZs would also combine to affect Joshua Tree National Park and wilderness within the park. The Cadiz Valley to the northwest of Iron Mountain SEZ, in particular, has a large number of pending wind and solar applications that may result in cumulative effects on sensitive areas.

9.2.22.4.3 Rangeland Resources

The SEZ is not included within a grazing allotment, and, therefore, solar development of the area would not contribute to any cumulative effects on livestock grazing. Likewise, since SEZ is not located within either an HA or HMA, there would be no contribution to any adverse effects on wild horses or burros.

9.2.22.4.4 Recreation

The Iron Mountain SEZ is flat and is of a type and quality that generally does not attract recreational users. However, access into the area is easy, and low levels of recreational use do occur, including backcountry driving, visiting of historical sites, hiking, recreational shooting, hunting, and wildlife and wildflower viewing. It is anticipated there would not be a significant loss of recreational use caused by development of the Iron Mountain SEZ, although some users would be displaced. Cadiz Road that passes through the area is an important travel route for people accessing areas adjacent to the SEZ. Access to public lands to the east of the SEZ could be adversely affected by solar energy development if provision is not made to maintain public road access around or through any solar development areas.

When SEZ development is considered in combination with other potential renewable energy development within the region, a potential would exist for cumulative visual impacts on recreational users of the specially designated areas surrounding the SEZ (Section 9.2.22.4.2) and for users who enjoy backcountry driving. There is substantial potential for loss of wilderness and scenic values throughout the California Desert wherever solar and wind energy development encroaches on wilderness or on other currently undeveloped areas. The overall cumulative impacts on recreational use associated with the loss of wilderness values and general open desert scenery also could be large. While the effects cannot be quantified, desert users might avoid areas dominated by industrial-type solar facilities. This could result a fundamental change in the way the California Desert has been traditionally used.

9.2.22.4.5 Military and Civilian Aviation

The proposed Iron Mountain SEZ is located under five MTRs which are part of a very large, interconnected system of training routes throughout the southwest. The development of any solar energy or transmission facilities that encroach into the airspace of MTRs could create safety issues and could conflict with military training activities. While the military has indicated that solar development on portions of the Iron Mountain SEZ is compatible with its existing uses, it has also commented that other portions should have height limits for facilities, and some areas may be incompatible with existing military use. Potential solar development occurring throughout the region, which is currently undeveloped, could result in small cumulative effects on the system of MTRs. Such effects would be limited by mitigations developed in consultation with the military.

There are no civilian aviation facilities in the vicinity of the SEZ and therefore there would be no potential for cumulative effects.

9.2.22.4.6 Soil Resources

Ground-disturbing activities (e.g., grading, excavating, and drilling) during the construction phase of a solar project, including any associated transmission lines, would contribute to the soil loss due to erosion. Construction of new roads within the SEZ or improvements to existing roads would also contribute to soil erosion. During construction, operations, and decommissioning of the solar facilities, worker travel and other road use would also contribute to soil loss. These losses would be in addition to losses occurring as a result of disturbance caused by other users in the area, including from potential construction of several other renewable energy facilities, and recreational users, such as off-road vehicle enthusiasts. As discussed in Section 9.2.7.3, programmatic design features would be employed to minimize erosion and loss of soil during the construction, operation, and decommissioning phases of the solar facilities and any associated transmission lines. Landscaping of solar energy facility areas could alter drainage patterns and lead to increased siltation of surface water streambeds, in addition to that caused by other development activities. Even with the expected design features in place, cumulative impacts from the disturbance of several large sites and connecting linear facilities in the vicinity could be significant.

9.2.22.4.7 Minerals (Fluids, Solids, and Geothermal Resources)

No locatable mining claims, oil and gas leases, or geothermal leases occur within the proposed Iron Mountain SEZ, and for that reason it is assumed there would be no cumulative effect on these mineral resources. The SEZ is still open for discretionary mineral leasing, including leasing for oil and gas and other leasable minerals.

The SEZ currently includes about 23,000 acres (93 km^2) of the Danby Lake KSLA, an area that has been determined by the BLM to contain valuable sodium mineral deposits. Within the KSLA, multiple use-management may allow for uses other than sodium mineral development, but only if those other uses do not interfere with or restrict the production of sodium minerals. Solar energy development within the KSLA, while generally unsuitable due to soil conditions, would be secondary to the production of sodium, and there would be no impact on the sodium resource.

9.2.22.4.8 Water Resources

The water requirements for development and operation of various utility-scale solar energy technologies on the proposed SEZ are described in Section 9.2.9.2. If the SEZ was fully developed over 80% of its available land area, the amount of water needed during the peak construction year for the various solar technologies evaluated would be 4,541 to 6,732 ac-ft (5,600 to 8,300 thousand m^3). The amount of water needed during decommissioning would be similar to or less than the amount used during construction. During operations, the amount of water needed for all solar technologies evaluated would range from 479 to 255,900 ac-ft/yr (0.59 to 316 million m^3 /yr), with PV representing the lower end of this range. Since the availability of groundwater (the primary water resource available to solar energy facilities in the SEZ) is limited, it would not be feasible to obtain the upper end of the water requirements range. A sustainable water use rate might be assumed to equal the estimated recharge rate for the Ward Valley of 2,700 ac-ft/yr (3.3 million m^3/yr), which would severely limit the amount of wet-cooled trough or tower technology that could be built.

The levels of water use needed for build-out with wet cooling are clearly not feasible with the water resources available to the region, and estimated recharge rates would support only on the order of 500 MW of wet-cooled solar trough or power tower output. Conversely, PV development would have minimal impacts on groundwater sources. Full-build out of the proposed Iron Mountain SEZ with dry-cooling trough or tower facilities and/or dish engine facilities would also not be possible without exceeding recharge rates under the water use assumptions used in the PEIS. Implementation of water conservation measures (e.g., for mirror washing) might allow increased development of these types of facilities without exceeding recharge rates.

Currently one application (dated April 2, 2007) for development of a solar energy project within the Iron Mountain SEZ is pending: application CACA 49002 from Leopold Company LLC for a 4,100-MW CSP facility (Table 9.2.22.2-2). With technology-specific water use rates (Section 9.2.9) and solar trough technology, such a facility could require up to 60,000 ac-ft/yr (74 million m^3/yr) if wet cooled, or 6,000 ac-ft/yr (7.4 million m^3/yr) if dry cooled, assuming 60% operating time in each case. Impacts on the Ward Valley aquifer would be large under the wet-cooling scenario, but might be sustainable under the dry-cooling scenario, assuming the application of water conservation measures.

The development of the five advanced solar proposals identified within the geographic extent of effects (Section 9.2.22.2.1) could draw up to 8,000 ac-ft (9.9 million m^3/yr) of water to support construction during the period 2011–2013, and up to 2,700 ac-ft/yr (3.3 million m^3/yr) during the following operational period of approximately 30 years. However, four of these projects would be about 25 mi (40 km) south of the proposed SEZ and would not draw from the Ward Valley or Rice Valley groundwater basins. Only the Rice Solar Energy Project, with construction water use of 780 ac-ft/yr (0.96 million m^3/yr) and operational water use of 180 ac-ft/yr (0.22 million m^3/yr), would cumulatively affect the Iron Mountain SEZ. However, only 2% of the SEZ lies over the Rice Valley basin; 98% of the SEZ lies over the Ward Valley basin (Section 9.2.9.1.2). Likewise, the several pending solar energy project proposals for locations west and northwest of the SEZ (Figure 9.2.22.2-1), if approved, would likely draw from the Cadiz Valley groundwater basin and thus not contribute significantly to cumulative impacts within the SEZ. Therefore, cumulative impacts on groundwater basins underlying the Iron Mountain SEZ from currently foreseeable projects would be minimally greater than the impacts from solar energy development within the SEZ.

Similarly, with respect to wastewaters, the small quantities of sanitary wastewater that would be generated during the construction and operation of utility-scale solar energy facilities within the Iron Mountain SEZ in combination with similarly small volumes from other foreseeable projects would not be expected to strain available sanitary wastewater treatment facilities in the general area of the SEZ. Blowdown water from cooling towers for wet-cooled technologies would be treated within a project site (e.g., in settling ponds) and injected into the ground, released to surface water bodies, or reused, and thus would not contribute cumulative impacts on any nearby treatment systems.

9.2.22.4.9 Vegetation

The proposed Iron Mountain SEZ is located within the Sonoran Basin and Range ecoregion, which supports creosote bush (*Larrea tridentata)* and white bursage (*Ambrosia* sp.) plant communities with large areas of palo verde (*Parkinsonia* sp.) cactus shrub and saguaro cactus (*Carnegiea gigantea*) communities. No wetlands occur within the SEZ or within the 5-mi (8-km) area of indirect effects. Riparian communities occur along larger washes and include tamarisk, mesquite, and ironwood. Danby Lake is a dry lakebed most of the year; it is primarily classified as North American Warm Desert Playa. The occurrences of the Sonora-Mojave Mixed Salt Desert Scrub, North American Warm Desert Active and Stabilized Dune, and North American Warm Desert Volcanic Rockland cover types in the SEZ are within Danby Lake. If utility-scale solar energy projects were to be constructed within the SEZ, all vegetation within the footprints of the facilities would likely be removed during land-clearing and land-grading operations. Primarily affected would be communities of the Sonora–Mojave Creosotebush–White Bursage Desert Scrub, North American Warm Desert Playa, North American Warm Desert Wash, North American Warm Desert Bedrock Cliff and Outcrop cover types. Solar development could result in large impacts on North American Warm Desert Playa associated with Danby Lake (however, solar project development in that area is unlikely), moderate impacts on Sonora-Mojave Creosotebush-White Bursage Desert Scrub, North American Warm Desert

Wash, Sonora-Mojave Mixed Salt Desert Scrub, North American Warm Desert Pavement, and Developed, Open Space—Low Intensity, and small impacts on the remaining cover types.

Numerous other renewable energy projects are proposed within a 50-mi (80-km) radius of the Iron Mountain SEZ. As many as 29 other solar projects and 9 wind projects have pending applications within this distance, with ROW applications totaling more than 500,000 acres (2,000 km^2), including about 20,000 acres (81 km^2) for five advanced solar proposals (Section 9.2.22.2.1). Depending on the actual development of renewable energy projects within and outside the SEZ and accompanying transmission lines, roads, and other infrastructure within the geographic extent of effects, cumulative impacts on certain cover types could be significant, particularly those that favor the basin flats, which are suitable for solar facilities.

In addition, the cumulative effects of fugitive dust generated during the construction of solar facilities along with other activities in the area, such as transportation and recreation, could increase the dust loading in habitats outside a solar project area, which could result in reduced productivity or changes in plant community composition. Programmatic design features would be implemented to reduce the impacts from solar energy projects and thus reduce the overall cumulative impacts on plant communities and habitats.

9.2.22.4.10 Wildlife and Aquatic Biota

As many as 167 species of amphibians (1 species), reptiles (31 species), birds (100 species), and mammals (35 species) occur in and around the proposed Iron Mountain SEZ (Section 9.2.11). The construction of utility-scale solar energy projects in the SEZ and of any associated transmission lines and roads in or near the SEZ would have impacts on wildlife through habitat disturbance (i.e., habitat reduction, fragmentation, and alteration), wildlife disturbance, loss of connectivity between natural areas (e.g., habitat fragmentation and blockage of dispersal corridors for bighorn sheep and desert tortoise), and wildlife injury or mortality. In general, affected species with broad distributions and occurring in a variety of habitats would be less affected than species with a narrowly defined habitat within a restricted area. Programmatic design features include pre-disturbance biological surveys to identify key habitat areas used by wildlife, followed by avoidance or minimization of disturbance to those habitats (e.g., avoiding development in Homer Wash).

Up to 29 other solar projects and 9 wind projects have pending applications within 50 mi (80 km) of the SEZ, including several within the proposed Riverside East SEZ about 25 mi (40 km) to the south. These ROW applications total more than 500,000 acres (2,000 km^2), including about 20,000 acres (81 km^2) for five advanced solar proposals (Section 9.2.22.2.1). Depending on the actual development of renewable energy projects within and outside the SEZ and of accompanying transmission lines, roads, and other infrastructure within the geographic extent of effects, cumulative impacts on some wildlife species could be significant, particularly those with habitats or migratory routes in the basin flats, which are suitable for solar facilities.

While many of the wildlife species have extensive habitat available within the affected counties, where projects are closely spaced, the cumulative impact on a particular species could be moderate to large. Programmatic design features would be used to reduce the impacts from solar energy projects and thus reduce the overall cumulative impacts on wildlife. However, even with mitigations in place, cumulative impacts could be moderate within the geographic extent of effects.

No wetlands are present within the proposed SEZ. However, Danby Lake, while normally dry, supports high densities of aquatic invertebrates such as brine shrimp; which provide important seasonal feeding resources for shorebirds and other wildlife. There would be no cumulative impacts on aquatic biota and habitats resulting from solar development within the SEZ as long as development in Danby Lake is avoided. Increased future demand on groundwater for multiple uses, including solar power development within the SEZ, could affect surface water levels outside of the SEZ, and, as a consequence, could affect aquatic organisms in those water bodies.

9.2.22.4.11 Special Status Species (Threatened, Endangered, Sensitive, and Rare Species)

Five special status species are known to occur within the affected area of the Iron Mountain SEZ: Harwood's eriastrum, Mojave fringe-toed lizard, Bendire's thrasher, hepatic tanager, and Nelson's bighorn sheep. In addition, designated critical habitat for the desert tortoise and ESA species listed as threatened in California occurs within the affected area adjacent to the SEZ boundary. Numerous additional species occurring on or in the vicinity of the SEZ are listed as threatened or endangered by the states of California or Arizona or are listed as a sensitive species by the BLM. Programmatic design features that could be used to reduce or eliminate the potential for cumulative effects on these species from the construction and operation of utility-scale solar energy projects within the geographic extent of effects include avoidance of habitat and minimization of erosion, sedimentation, and dust deposition. In addition, translocation could be used to minimize take of individuals.

Numerous reasonably foreseeable future actions could occur within the geographic extent of effects of the proposed Iron Mountain SEZ, including 29 solar and 9 wind applications for projects that would cover up to 500,000 acres (2,023.4 km^2). A number of sensitive species have been identified within the boundaries of the five advanced solar proposals covering 20,000 acres (80.9 km^2) discussed in Section 9.2.22.2. These species include the federally or state-listed desert tortoise, Mojave fringe-toed lizard, Colorado fringe-toed lizard, Western burrowing owl, short-eared owl, prairie falcon, northern harrier, loggerhead shrike, California horned lark, desert kit fox, and several California-listed sensitive plant species.

The four fast-track solar energy proposals would occur within the proposed Riverside East SEZ, about 25 mi (40 km) south of the Iron Mountain SEZ. Many special status species with potential habitat impacts from solar development are common to both the Riverside East and Iron Mountain SEZs, including the desert tortoise and Mojave fringe-toed lizard. However, projects in these and other areas would employ design features to reduce or eliminate the impacts on protected species as required by the ESA and other applicable federal and state laws and regulations.

Depending on the number and size of other projects that will actually be built within the next 20 to 30 years within the geographic extent of effects, there could be cumulative impacts on protected species due to habitat destruction and overall development and fragmentation of the area. Habitats that are particularly at risk are those in basin flats suited for solar development. In particular, the functioning of the Chemehuevi DWMA could be cumulatively affected with respect to connectivity, control of desert tortoise disease, and predation. Together, several new solar facilities and the other associated actions would have a cumulative impact on wildlife. Where projects are closely spaced, the cumulative impact on a particular species could be moderate to large.

9.2.22.4.12 Air Quality and Climate

While solar energy generates minimal emissions compared with fossil fuel–generated energy, the site preparation and construction activities associated with solar energy facilities would produce some emissions, mainly particulate matter (fugitive dust) and emissions from vehicles and construction equipment. When these emissions are combined with those from other projects near solar energy facilities or when they are added to natural dust generated by winds and windstorms, the air quality in the general vicinity of the projects could be temporarily degraded. For example, particulate matter (dust) concentration at or near the SEZ boundaries could at times exceed state or federal ambient air quality standards. Generation of dust from construction activities can be partially controlled by implementing aggressive dust control measures, such as increased watering frequency or road paving or treatment.

Several other renewable energy projects are proposed or planned within the air basin shared by Iron Mountain (Section 9.2.22.2.1 and Figure 9.2.22.2-1), while the Riverside East SEZ lies about 25 mi (40 km) south. Concurrent construction of solar facilities at the two SEZs could have cumulative impacts. Four fast-track proposed projects lie in the Riverside East SEZ, while a total of 29 solar and 9 wind proposals are pending within 50 mi (80 km) of the Iron Mountain SEZ. The fast-track projects have overlapping construction schedules for the period 2011 to 2013. These projects in combination with others with pending applications could produce periods of elevated particulate emissions in the affected area.

Over the long term and across the region, the development of solar energy may have beneficial cumulative impacts on the air quality and atmospheric values in southern California by offsetting the need for energy production with fossil fuels, which result in higher levels of emissions. As discussed in Section 9.2.13, air emissions from operating solar energy facilities are relatively minor, while the displacement of criteria air pollutants, VOCs, TAPs, and GHG emissions currently produced from fossil fuels could be relative large. For example, if the Iron Mountain SEZ was fully developed (80% of its acreage) with solar facilities, the quantity of pollutants avoided could be as large as 28% of all emissions from the current electric power systems in California.

9.2.22.4.13 Visual Resources

The Ward Valley in the Mohave Desert is flat and is characterized by wide open views. Generally good air quality and a lack of obstructions allow visibility for 50 mi (80 km) or more under favorable atmospheric conditions. The proposed SEZ site is a generally flat to gently rolling, largely treeless plain; the strong horizon line is the dominant visual feature. The VRI values for the SEZ and immediate surroundings are VRI Class II, indicating high relative visual values, Class III, indicating moderate relative visual values, and Class IV, indicating low relative visual values..The inventory indicates relatively low levels of use and public interest; however, the site is within the viewshed of 11 congressionally designated wilderness areas, a National Natural Landmark, a scenic ACEC, and is within the California Desert Conservation Area, indicating high visual sensitivity. The site is also visible from several other ACECs and in general is close to other specially designated areas, indicating moderate visual sensitivity.

Development of utility-scale solar energy projects within the SEZ would contribute to the cumulative visual impacts in the general vicinity of the SEZ and in the Ward Valley. However, the exact nature of the visual impacts and the design features that would be appropriate would depend on the specific project locations within the SEZ and on the solar technologies used. Such impacts and potential design features would be considered in visual analyses conducted for specific future projects. In general, large visual impacts on the SEZ would be expected to occur as a result of the construction, operation, and decommissioning of utility-scale solar energy projects. These impacts would be expected to involve major modification of the existing character of the landscape and would likely dominate the views for some nearby viewers. Additional impacts would occur as a result of the construction, operation, and decommissioning of related facilities, such as access roads and electric transmission lines.

Because of the large size of utility-scale solar energy facilities, the large number of pending applications on public lands in the area, and the generally flat, open nature of the proposed SEZ, some lands outside the SEZ would also be subjected to visual impacts related to the construction, operation, and decommissioning of utility-scale solar energy development. Potential impacts would include night sky pollution, including increased skyglow, light spillage, and glare. Some of the affected lands outside the SEZ would include potentially sensitive scenic resource areas, including the 11 wilderness areas, the scenic ACEC, the National Natural Landmark; and the CDCA. These sensitive visual resource areas would be subject to major to minimal visual impacts. Visual impacts resulting from solar energy development within the SEZ would be in addition to impacts caused by other potential projects in the area, such as other solar facilities on private lands, transmission lines, and other renewable energy facilities, including windmills. The presence of new facilities would normally be accompanied by increased numbers of workers in the area, traffic on local roadways, and support facilities, all of which would add to cumulative visual impacts.

As many as 29 other solar projects and 9 wind projects have pending applications on public lands within 50 mi (80 km) of the SEZ, including several within the proposed Riverside East SEZ about 25 mi (40 km) to the south. While the overall extent of cumulative effects of renewable energy development in the area would depend on the number of projects that are actually are built, it may be concluded that the general visual character of the landscape could be transformed from primarily rural desert to more commercial-industrial in nature as a consequence of these projects. Because of the topography of the region, solar facilities, located in flat basins, would be visible at great distances from sensitive viewing locations in the surrounding mountains. Also, the facilities would be located near major roads, thus the facilities would be viewable by motorists. However, some portions of major roads where solar energy facilities would be located are currently visually affected by transmission line corridors, towns, and other infrastructure, as well as the road system itself.

In addition to cumulative visual impacts associated with views of particular future facilities, as additional facilities are added, several projects might become visible from one location or in succession as viewers move through the landscape, such as driving on local roads. In general, the new facilities would likely vary in appearance, and depending on the number and type of facilities, the resulting visual disharmony could exceed the visual absorption capability of the landscape and add significantly to the cumulative visual impact. Thus, the overall cumulative visual impacts in the region from solar and wind energy development would be significant.

9.2.22.4.14 Acoustic Environment

The areas around the proposed Iron Mountain SEZ and in Bernardino County, in general, are relatively quiet. The existing noise sources include road traffic, infrequent railroad traffic, aircraft flyovers, industrial activities including sodium mining and pumping activities, and activities and events at nearby IMPS residences. During construction of solar energy facilities, construction equipment could increase the noise levels over short durations during the day. After the facilities are constructed and begin operating, there would be little or minor noise impacts for any of the technologies, except from solar dish engine facilities and from parabolic trough or power tower facilities using TES. It is possible that residents could be cumulatively affected by more than one solar or other development built in close proximity to the SEZ, particularly at night when the noise is more discernable due to relatively low background levels. However, such cumulative impacts are unlikely due the expected wide separation of facilities and the sparse population of the region.

9.2.22.4.15 Paleontological Resources

The potential for impacts on significant paleontological resources at the Iron Mountain SEZ in Ward Valley is unknown. The area around Danby Lake has a high potential to contain paleontological deposits and would require a paleontological survey. Further, the specific sites selected for future projects would be surveyed if determined to be necessary by the BLM, and any paleontological resources would be avoided or mitigated to the extent possible. A similar process would be employed at other facilities constructed in the area, and no significant cumulative impacts on paleontological resources are expected.

9.2.22.4.16 Cultural Resources

Ward Valley as a whole, and Danby Lake in particular were important areas for gathering both salt and food resources for both the Mohave and Chemehuevi. The remains of campsites are scattered throughout the valley, and there are panels of rock art in the adjacent mountains. Direct impacts on significant cultural resources during site preparation and construction activities could occur in the proposed Iron Mountain SEZ. However, further investigation would be needed, including a cultural resource survey of the entire area of potential effects to identify historic properties. It is possible that the development of utility-scale solar energy projects in the Iron Mountain SEZ and of other projects likely to occur in the area could contribute cumulatively to cultural resource impacts. However, historic properties would be avoided or mitigated to the extent possible in accordance with state and federal regulations. Similarly, through ongoing consultation with the California SHPO and appropriate Native American governments, it is likely that many adverse effects on significant resources in the Ward Valley could be mitigated to some extent. Some visual and landscape scale impacts may not be mitigatable to the satisfaction of all interested parties. The increment of adverse effects from solar energy development on the overall cumulative effect on cultural resources would depend on the nature of the resources affected and could be significant.

9.2.22.4.17 Native American Concerns

Government-to-government consultation is under way with Native American governments with possible traditional ties to the Ward Valley. In the past, the Chemehuevi have expressed concerns over the Salt Song Trail, which passes just west of the SEZ, and the Quechan Indian Tribe of the Fort Yuma Reservation stressed the importance of evaluating impacts on landscapes as a whole within their Tribal Traditional Use Area. Solar development within the SEZ could have negative effects on the trail. It is possible that the development of utility-scale solar energy projects in the SEZ, when added to other potential projects likely to occur in the area, including renewable energy projects outside the SEZ, could contribute cumulatively to visual impacts and other Native American concerns in the valley. Continued discussions with the area Tribes through government-to-government consultation is necessary to effectively consider and address the Tribes' concerns related to solar energy development in the Ward Valley.

9.2.22.4.18 Socioeconomics

Solar energy development projects in the proposed Iron Mountain SEZ could cumulatively contribute to socioeconomic effects in the immediate vicinity of the SEZs and in the surrounding multicounty ROI. The effects could be positive (e.g., creation of jobs and generation of extra income, increased revenues to local governmental organizations through additional taxes paid by the developers and workers) or negative (e.g., added strain on social institutions such as schools, law enforcement agencies, and health care facilities). Impacts from solar development would be most intense during facility construction, but of greatest duration during operations. Construction in the Iron Mountain SEZ and at other new projects in the area, including other renewable energy development, would temporarily increase the number of workers in the area needing housing and services. The number of workers involved in the construction of solar projects in the proposed Iron Mountain SEZ alone could range from about 400 to 5,200 in the peak construction year, depending on the technology being employed, with solar PV facilities at the low end and solar trough facilities at the high end. The total number of jobs created in the area could range from approximately 1,200 (solar PV) to as high as 16,000 (solar trough).

Cumulative socioeconomic effects in the ROI from construction of solar facilities would occur to the extent that multiple construction projects of any type were ongoing simultaneously. It is a reasonable expectation that this condition would occur within a 50-mi (80 km) radius of the SEZ occasionally over the 20 or more year solar development period. Five anticipated projects with advanced proposals, including four fast-track projects located within the Riverside East SEZ, would employ up to 2,300 construction workers during the period 2011 to 2013 (Section 9.2.22.2.1). This number of workers could place a modest short-term strain on local resources in this sparsely populated area.

Annual impacts during the operation of solar facilities would be less, but could last 20 to 30 years, and could combine with those from other new projects in the area. The number of workers needed at the solar facilities within the SEZ would be in the range of 190 to 3,700, with approximately 260 to 6,100 total jobs created in the region. In addition, approximately 460 operation workers area estimated for the five projects with advanced proposals in the area (Section 9.2.22.2.1). Population increases resulting from renewable energy development within 50 mi (80 km) of the Iron Mountain SEZ would contribute to general population growth experienced in the region in recent years. The overall socioeconomic impacts would be positive, through the creation of additional jobs and income. The negative impacts, including some short-term disruption of rural community quality of life, would not likely be considered large enough to require specific mitigation measures.

9.2.22.4.19 Environmental Justice

No minority or low-income populations have been identified within 50 mi (80 km) of the proposed Iron Mountain SEZ in either California or Arizona, as defined under CEQ guidelines. Thus, solar development within the proposed Iron Mountain SEZ would not be expected to contribute to cumulative impacts on minority and low-income populations.

9.2.22.4.20 Transportation

During construction activities, there could be up to 1,000 workers commuting to a single construction site at the SEZ, which could double the daily traffic load on State Route 62 near the SEZ and have moderate cumulative impacts in combination with existing traffic levels and increases from additional future projects in the area. Should up to three large projects with approximately 1,000 daily workers each be under development simultaneously, an additional 6,000 vehicle trips per day could be added to State Route 62 in the vicinity of the SEZ, assuming ride-sharing was not implemented. This increase in traffic would quadruple the current average daily traffic level on State Route 62 and could have serious impacts on traffic flow during peak commute times.

Further, if construction occurred concurrently in the proposed Iron Mountain and Riverside East SEZs, which are about 20 mi (32 km) apart and both served by State Route 177/62, the increase in traffic during shift changes could be significant. Local road improvements may be necessary near site access points. Any impacts during construction activities would be temporary. The impacts could be mitigated to some degree by having different work hours within an SEZ or between the two SEZs. Traffic increases during operation would be reduced because of the lower number of workers needed to operate solar facilities and would have a smaller contribution to cumulative impacts.

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9.2.23 References

Note to Reader: This list of references identifies Web pages and associated URLs where reference data were obtained for the analyses presented in this PEIS. It is likely that at the time of publication of this PEIS, some of these Web pages may no longer be available or their URL addresses may have changed. The original information has been retained and is available through the Public Information Docket for this PEIS.

AECOM (Architectural Engineering, Consulting, Operations and Maintenance), 2009, *Project Design Refinements*. Available at http://energy.ca.gov/sitingcases/beacon/documents/applicant/refinements/002_WEST1011185v2_Project_Design_Refinements.pdf. Accessed Sept. 2009.

African American Environmentalist Association, 2009, *Governor Schwarzenegger Vetoes AB 1404*. Available at http://aaenvironment.blogspot.com/2009/10/governor-schwarzenegger-vetoes-ab-1404.html. Accessed Nov. 16, 2009.

AMA (American Medical Association), 2009*, Physician Characteristics and Distribution in the U.S.*, Chicago, Ill. Available at http://www.ama-assn.org/ama/pub/category/2676.html.

Bare, L., et al., 2009, *Cumulative Impacts of Large-Scale Renewable Energy Development in the West Mojave. Effects on Habitat Quality, Physical Movement of Species, and Gene Flow*, Group Project Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Environmental Science and Management, University of California, Donald Bren School of Environmental Science and Management, Santa Barbara, Calif., May 8. Available at http://www.bren.ucsb.edu/research/documents/WestMojave_Brief. pdf. Accessed March 3, 2010.

Bassett, A.M., et al., 1959, *Core Logs from Bristol, Cadiz, and Danby Dry Lakes, San Bernardino County, California—Geologic Investigations in the Mojave Desert and Adjacent Region, California*, Bulletin 1045-D, U.S. Geological Survey.

Bassett, A.M., and D.H. Kupfer, 1964, *A Geologic Reconnaissance in the Southeastern Mojave Desert, California*, Special Report 83, California Division of Mines and Geology.

Beacon Solar, LLC, 2008, *Application for Certification for the Beacon Solar Energy Project*, submitted to the California Energy Commission, March. Available at http://www.energy.ca.gov/sitingcases/beacon/index.html.

Bean, L.J., and C.R. Smith, 1978, "Serrano," pp. 570–575 in *Handbook of North American Indians, Vol. 8, California,* R.F. Heizer (editor), Smithsonian Institution, Washington, D.C.

Bean, L.J., et al., 1978, *Persistence and Power: A Study of Native American Peoples in the Sonoran Desert and the Devers-Palo Verde High Voltage Transmission Line*, prepared by Cultural Systems Research, Incorporated, Menlo Park, Calif., for Southern California Edison Company.

Beranek, L.L., 1988, *Noise and Vibration Control*, rev. ed., Institute of Noise Control Engineering, Washington, D.C.

Bischoff, M.C., 2000, *The Desert Training Center/California–Arizona Maneuver Area, 1942–1944: Historic and Archaeological Contexts*, Technical Series 75, prepared by Statistical Research, Inc., Tucson, Ariz., for Bureau of Land Management, California Desert District.

BLM (Bureau of Land Management), 1980, *Green River——Hams Fork Draft Environmental Impact Statement: Coal*, Denver, Colo.

BLM, 1983, *Final Supplemental Environmental Impact Statement for the Prototype Oil Shale Leasing Program,* Colorado State Office, Denver, Colo., Jan.

BLM, 1984, *Iron Mountain Divisional Camp Resource Management Plan*, CA-06-ACEC-52, California Desert District, Needles, Resource Area, Needles, Calif.

BLM, 1986a, *Visual Resource Inventory*, BLM Manual Handbook 8410-1, Release 8-28, U.S. Department of the Interior, Jan.

BLM, 1986b, *Visual Resource Contrast Rating*, BLM Manual Handbook 8431-1, Release 8-30, U.S. Department of the Interior, Jan.

BLM, 1996, *White River Resource Area Proposed Resource Management Plan and Final Environmental Impact Statement*, Colorado State Office, White River Resource Area, Craig District, Colo., June.

BLM, 1999, *The California Desert Conservation Area Plan 1980, as Amended*, California Desert District Office, Riverside, Calif., Aug. 17.

BLM, 2001, *California Water Rights Fact Sheet.* Available at http://www.blm.gov/nstc/WaterLaws/california.html.

BLM, 2007a, *Potential Fossil Yield Classification (PFYC) System for Paleontological Resources on Public Lands*, Instruction Memorandum No. 2008-009, with attachments, Washington, D.C., Oct. 15.

BLM, 2007b*, Proposed Oil Shale and Tar Sands Resource Management Plan Amendments to Address Land Use Allocations in Colorado, Utah, and Wyoming and Programmatic Environmental Impact Statement,* FES 08-2, Sept.

BLM, 2008a, *Special Status Species Management*, BLM Manual 6840, Release 6-125, U.S. Department of the Interior, Washington, D.C., Dec. 12.

BLM, 2008b*, Assessment and Mitigation of Potential Impacts to Paleontological Resources*, Instruction Memorandum No. 2009-011, with attachments, Washington, D.C., Oct. 10.

BLM, 2009a, *First In Line Solar Energy Projects*, BLM California Desert District Web site. Available at http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/pa/energy/solar.Par.45875.File.dat/Renew_Energy_2_09_solar.pdf. Accessed Feb. 14, 2010.

BLM, 2009b, *Needles Field Office, California Desert Conservation Area Plan–Northern and Eastern Mojave Route Designation RMP Amendment, 2004, Designated Open Routes Map*, Nov. 10.

BLM, 2009c, *Fast-Track Renewable Energy Projects*, California Desert District Web site. Available at http://www.blm.gov/ca/st/en/fo/cdd/alternative_energy/fast-trackfastfacts.html. Accessed Feb. 10, 2010.

BLM, 2009d, *Herd Management Areas California*, Washington, D.C. Available at http://www.blm.gov/pgdata/etc/medialib/blm/wo/Planning_and_Renewable_Resources/wild_horses_and_burros/statistics_and_maps/new_hma_state_maps.Par.22729.File.dat/HMA_California.pdf. Accessed Oct. 20, 2009.

BLM, 2009e, *HA and HMA Data through Fiscal Years 2005–2009*, Washington, D.C. Available at http://www.blm.gov/wo/st/en/prog/wild_horse_and_burro/wh_b_information_center/statistics_and_maps/ha_and_hma_data.html. Accessed Oct. 19, 2009.

BLM, 2010a, *BLM Land and Mineral Legacy Rehost System—LR2000*, U.S. Department of the Interior, March 5. Available at http://www.blm/gov/lr2000.

BLM, 2010b, “Notice of Intent to Prepare an Environmental Impact Statement for the Proposed First Solar Desert Sunlight Solar Farm Project, Riverside County, CA and Possible Land Use Plan Amendment,” *Federal Register*, Jan. 13, 2010.

BLM, 2010c, *Solar Energy Interim Rental Policy*, U.S. Department of the Interior. Available at http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos and Bulletins/national instruction/2010/IM_2010-141.html.

BLM, 2010d, *Visual Resource Inventory*, prepared for U.S. Department of the Interior Bureau of Land Management, Needles Field Office, Needles, Calif., Sept.

BLM, 2010e, *Wind Applications & Authorizations*, BLM California Desert District Web site. Available at http://www.blm.gov/ca/st/en/prog/energy/wind.html. Accessed Nov. 5, 2010.

BLM and CEC (California Energy Commission), 2010a, *Staff Assessment and Environmental Impact Statement, Blythe Solar Power Project Application for Certification (09-AFC-6)*. Available at http://www.energy.ca.gov/sitingcases/solar_millennium_blythe/index.html. Accessed April 11, 2010.

BLM and CEC, 2010b, *Staff Assessment and Environmental Impact Statement, Palen Solar Energy Project Application for Certification (09-AFC-7)*. Available at http://www.energy.ca.gov/sitingcases/solar_millennium_palen/index.html. Accessed April 11, 2010.

BLM and CEC, 2010c, *Staff Assessment and Environmental Impact Statement, GENESIS Solar Energy Project Application for Certification (09-AFC-8)*. Available at http://www.energy.ca.gov/sitingcases/genesis_solar/documents. Accessed April 11, 2010.

BLM and USFS (U.S. Forest Service), 2010a, *GeoCommunicator—Public Lands Survey System*. Available at http://geocommunicator.gov/GeoComm/index shtm. Accessed May 27, 2010.

BLM and USFS, 2010b, *GeoCommunicator—NILS National Integrated Land System Interactive Maps*. Available at http://www.geocommunicator.gov/GeoComm/index.shtm. Accessed April 11, 2010.

BLM and USFS, 2010b, *Geocommunicator—Energy Map*. Available at http://www.geocommunicator.gov/GeoComm/index.shtm. Accessed Nov. 3, 2010.

Bryant, W.A. (compiler), 2003, "Fault Number 123, Mesquite Lake Fault," in *Quaternary Fault and Fold Database of the United States*, U.S. Geological Survey. Available at http://earthquakes.usgs.gov/regional/qfaults. Accessed March 21, 2010.

Bryant, W.A., and E.W. Hart, 2007, *Fault-Rupture Hazard Zones in California—Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Maps, Interim Revision*, California Geological Survey, California Department of Conservation.

Bryant, W.A., and M.M. Lundberg (compilers), 2002a, "Fault Number 1j, San Andreas Fault Zone, Coachella Section," in *Quaternary Fault and Fold Database of the United States*, U.S. Geological Survey. Available at http://earthquakes.usgs.gov/regional/qfaults. Accessed March 11, 2010.

Bryant, W.A., and M.M. Lundberg (compilers), 2002b, "Fault Number 1i, San Andreas Fault Zone, San Bernardino Mountains Section," in *Quaternary Fault and Fold Database of the United States*, U.S. Geological Survey. Available at http://earthquakes.usgs.gov/regional/qfaults. Accessed March 11, 2010.

BTS (Bureau of Transportation Statistics), 2009, *Air Carriers: T-100 Domestic Segment (All Carriers)*, Research and Innovative Technology Administration, U.S. Department of Transportation, Dec. Available at http://www.transtats.bts.gov/Fields.asp?Table_ID=311. Accessed Feb. 28, 2010.

Cadiz, Inc., 2008, *Cadiz Announces Agreement with Arizona & California Railroad Company for New Water Pipeline*. Available at http://www.cadizinc.com/blog/2009/press-release-cadiz-announces-agreement-arizona-california-railroad-company-new-water-pipe. Accessed Feb. 8, 2010.

California Department of Finance, 2010, *Population Projections by Race and Ethnicity for California and Its Counties, 2000–2050*. Available at http://www.dof.ca.gov/research/demographic/reports/projections/p-1/documents/P-1%20Report%20Tables.xls.

CalPIF (California Partners in Flight), 2009, *The Desert Bird Conservation Plan: A Strategy for Protecting and Managing Desert Habitats and Associated Birds in California, Version 1.0.* Available at http://www.prbo.org/calpif/plans.html. Accessed March 3, 2010.

Caltrans (California Department of Transportation), 2009, *Traffic Counts*, Traffic Data Branch. Available at http://traffic-counts.dot.ca.gov/2008all/2008AADT.xls. Accessed Feb. 20, 2010.

CARB (California Air Resources Board), 2009, *Recommended Area Designations for the 2008 Federal 8-Hour Ozone Standard, Staff Report*, State of California, Feb. 13. Available at http://www.arb.ca.gov/desig/8-houroz/8-houroz.htm. Accessed March 16, 2010.

CARB, 2010a, *Greenhouse Gas Inventory Data—2000 to 2006*. Available at http://www.arb.ca.gov/cc/inventory/data/data.htm. Accessed March 15, 2010.

CARB, 2010b, *California Ambient Air Quality Standards (CAAQS).* Available at http://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm. Accessed March 15, 2010.

CARB, 2010c, *Area Designations 2010, Attachment C: Maps and Tables of Area Designations for State and National Ambient Air Quality Standards*. Available at http://www.arb.ca.gov/regact/2010/area10/area10.htm. Accessed March 16, 2010.

CASQA (California Stormwater Quality Association), 2003, *Stormwater Best Management Practice Handbook: Industrial and Commercial*, Menlo Park, Calif.

CDC (Centers for Disease Control and Prevention), 2009, *Divorce Rates by State: 1990, 1995, 1999–2007*. Available at http://www.cdc.gov/nchs/data/nvss/Divorce%20Rates%2090%2095%20and%2099-07.pdf.

CDFG (California Department Fish and Game), 2008, *Life History Accounts and Range Maps–California Wildlife Habitat Relationships System*, Sacramento, Calif. Available at http://dfg.ca.gov/biogeodata/cwhr/cawildlife.aspx. Accessed Feb. 19, 2010.

CDFG, 2010a, *California Wildlife Habitat Relationships System (CWHRS)*. Available at http://www.dfg.ca.gov/biogeodata/cwhr. Accessed March 4, 2010.

CDFG, 2010b, *California Natural Diversity Database—Plants and Animal Information*. Available at http://www.dfg.ca.gov/biogeodata/cnddb/plants_and_animals.asp. Accessed March 4, 2010.

CDFG, 2010c, *Lake and Streambed Alteration Program*. Available at http://www.dfg.ca.gov/habcon/1600. Accessed Sept. 27, 2010.

CDFG, 2010d, *Deer Hunting Zone General Information*, Wildlife Branch, Sacramento, Calif. Available at http://www.dfg.ca.gov/wildlife/hunting/deer/zoneinfo.html. Accessed Oct. 19, 2010.

CDWR (California Department of Water Resources), 1991, *California Well Standards*, *Bulletin 74-90*. Supplement to CDWR, 1981, *Water Well Standards: State of California*, *Bulletin 74-81*.

CDWR, 2003, *California's Groundwater Bulletin 118*, Update 2003. Available at http://www.water.ca.gov/groundwater/bulletin118/update2003.cfm.

CDWR, 2009, *California Water Plan 2009*. Available at http://www.waterplan.water.ca.gov/ cwpu2009/index.cfm.

CEC (California Energy Commission), 2009, *Rice Solar Energy Project*. Available at http://www.energy.ca.gov/sitingcases/ricesolar/documents/applicant/afc. Accessed Nov. 16, 2009.

CEQ (Council on Environmental Quality), 1997, *Environmental Justice: Guidance under the National Environmental Policy Act*, Executive Office of the President, Dec. Available at http://ceq.hss.doe.gov/nepa/regs/ej/justice.pdf.

Chance of Rain, 2009, *Interior Appropriations Chair Questions Legality of Cadiz Pipeline Right-of-Way*. Available at http://chanceofrain.com/2009/08/interior-appropriations-chair-questions-legality-of-cadiz-pipeline-right-of-way. Accessed Feb. 8, 2010.

Chase, M.K., and G.R. Geupel, 2005, "The Use of Avian Focal Species for Conservation Planning in California," pp. 130–142 in *Bird Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight Conference, March 20–24, 2002, Asilomar, Calif.*, Vol. 1, Gen. Tech. Rep. PSW-GTR-191.

Corwin, E.J., et al., 1991, "Earth Fissures, Urbanization and Litigation: A Case Study from the Temecula Area, Southwestern Riverside County, California," in *Land Subsidence*, Proceedings for the Fourth International Symposium on Land Subsidence, IAHS Publication No. 200, May.

County of San Bernardino, 2009, *County of San Bernardino 2007 Development Guide*, Aug. 20. Available at http://www.co.san-bernardino.ca.us/landuseservices/DevCode/ 2007_Development_ Code_08-20-09.pdf. Accessed April 8, 2010.

Cowherd, C., et al., 1988, *Control of Open Fugitive Dust Sources*, EPA 450/3-88-008, U.S. Environmental Protection Agency, Research Triangle Park, N.C.

CSC (Coastal Services Center), 2010, *Historical Hurricane Tracks*, National Oceanic and Atmospheric Administration (NOAA). Available at http//csc-s-maps-q.csc.noaa.gov/hurricanes. Accessed March 13, 2010.

CSRI (Cultural Systems Research, Incorporated), 1987, *California Low-Level Radioactive Waste Disposal Project: Cultural Resources Surveying Ethnographic Resources Candidate Site Selection*, prepared by CSRI, Menlo Park, Calif., for US Ecology, Inc., Newport Beach, Calif.

CSRI, 2002, *The Native Americans of Joshua Tree National Park: An Ethnograhic Overview and Assessment Study*, prepared by CSRI, Menlo Park, Calif., for National Park Service.

Davis, F.W., et al., 1998, *The California Gap Analysis Project – Final Report*, University of California, Santa Barbara, Calif.

Desert Tortoise Council, 1994 (revised 1999), *Guidelines for Handling Desert Tortoises during Construction Projects*, E.L. LaRue, Jr. (editor), Wrightwood, Calif.

Diefenbach, A.K., et al., 2009, *Chronology and References of Volcanic Eruptions and Selected Unrest in the United States, 1980–2008*, U.S. Geological Survey Open File Report 2009-1118.

DOE (U.S. Department of Energy), 2009, *Report to Congress, Concentrating Solar Power Commercial Application Study: Reducing Water Consumption of Concentrating Solar Power Electricity Generation*, Jan. 13.

Dohrenwend, J.S. et al., 1984, "K-Ar Dating of the Cima Volcanic Field, Eastern Mojave Desert, California—Late Cenozoic Volcanic History and Landscape Evolution," *Geology* 12(3):163–167.

DOI (U.S. Department of the Interior), 2005, *Camp Ibis Engineering Evaluation/Cost Analysis Environmental Assessment*, CA-690-EA02-05, Bureau of Land Management, Needles Field Office. Available at http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/pdfs/ needles_pdfs/ ibis.Par.d094c8a3.File.pdf/Proposed Action.pdf. Accessed May 11, 2010.

EIA (Energy Information Administration), 2009, *Annual Energy Outlook 2009 with Projections to 2030*, DOE/EIA-0383, March.

Eldred, K.M., 1982, "Standards and Criteria for Noise Control—An Overview," *Noise Control Engineering* 18(1):6–23.

EPA (U.S. Environmental Protection Agency), 1974, *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, EPA-550/9-74-004, Washington, D.C., March. Available at http://www.nonoise.org/library/ levels74/levels74.htm. Accessed Nov. 17, 2008.

EPA, 2002, *Primary Distinguishing Characteristics of Level III Ecoregions of the Continental United States, Draft*. Available at http://www.epa.gov/wed/ecoregions/us/useco_desc.doc. Accessed Oct. 2, 2008.

EPA, 2007, *Level III Ecoregions*, Western Ecology Division, Corvalis, Ore. Available at http://www.epa.gov/wed/pages/ecoregions/level_iii.htm. Accessed Oct. 2, 2008.

EPA, 2009a, *Energy CO_2 Emissions by State*. Available at http://www.epa.gov/climatechange/ emissions/state_energyco2inv.html, last updated June 12, 2009. Accessed June 23, 2008.

EPA, 2009b, *Preferred/Recommended Models—AERMOD Modeling System.* Available at http://www.epa.gov/scram001/dispersion_prefrec.htm. Accessed Nov. 8, 2009.

EPA, 2009c, *eGRID.* Available at http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html, last updated Oct. 16, 2008. Accessed Jan. 12, 2009.

EPA, 2010a, *National Ambient Air Quality Standards (NAAQS)*. Available at http://www.epa.gov/air/criteria.html, last updated June 3, 2010. Accessed June 4, 2010.

EPA, 2010b, *AirData: Access to Air Pollution Data.* Available at http://www.epa.gov/oar/data/. Accessed March 14, 2010.

Epps, C.W., et al., 2007, "Optimizing Dispersal and Corridor Models Using Landscape Genetics," *Journal of Applied Ecology* 44:714–724.

FAA (Federal Aviation Administration), 2009, *Airport Data (5010) & Contact Information, Information Current as of July 2, 2009*. Available at http://www.faa.gov/airports/airport_safety/airportdata_5010. Accessed Aug. 13, 2009.

Farmer, R., et al., 2009, *Revised Draft, Class II and Class III Cultural Resources Inventories for the Proposed Genesis Solar Energy Project, Riverside County, California,* prepared by Tetra Tech, Rancho Cordova, Calif., for Bureau of Land Management, Palm Springs–South Coast Field Office, Calif.

FEMA (Federal Emergency Management Agency), 2009, *FEMA Map Service Center*. Available at http://msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?storeId=10001&catalogId=10001&langId=-1. Accessed Nov. 20, 2009.

Field, K.J., et al., 2007, "Return to the Wild: Translocation as a Tool in Conservation of the Desert Tortoise (*Gopherus agassizii*)," *Biological Conservation* 136: 232–245.

Fire Departments Network, 2009, *Fire Departments by State*. Available at http://www.firedepartments.net/.

Fowler, C.S., 1986, "Subsistence," pp. 64–97 in *Handbook of North American Indians, Vol. 11, Great Basin*, W.L. D'Azevedo (editor), Smithsonian Institution, Washington, D.C.

Gale, H.S., 1951, *Geology of the Saline Deposits, Bristol Dry Lake, San Bernardino County, California*, Special Report 13, California Division of Mines and Geology.

Galloway, D. et al., 1999, *Land Subsidence in the United States*, U.S. Geological Survey, Circular 1182.

Giffen, R., 2009, "Rangeland Management Web Mail," personal communication from Giffen (USDA Forest Service, Rangelands Management, Washington, D.C.) to W. Vinikour (Argonne National Laboratory, Argonne, Illinois), Sept. 22.

Global Change Research Program, 2009, *Global Climate Change Impacts in the United States*, T.R. Karl, et al. (editors), Cambridge University Press, New York, N.Y. Available at www.globalchange.gov/usimpacts. Accessed Jan. 25, 2010.

Graham, T.B., 2001, *Survey of Ephemeral Pool Invertebrates at Wupatki NM: An Evaluation of the Significance of Constructed Impoundments as Habitat*, WUPA-310, final report for Wupatki National Monument and Southwest Parks and Monuments Association, Sept.

Gutierrez, C., et al., 2010, *2010 State Geologic Map of California (Scale 1:750,000)*, California Geological Survey Geologic Data Map 2. Available at http://www.consrv.ca.gov/cgs_history/Pages/2010_geologicmap.aspx. Accessed Oct. 4, 2010.

Halmo, D.B., 2003, *Blythe Energy Projects American Indian Ethnographic Assessment Study,* prepared by Halmo, Lake Havasu, Ariz., for Greystone Environmental Consultants, Inc, Sacramento, Calif.

Hanson, C.E., et al., 2006, *Transit Noise and Vibration Impact Assessment*, FTA-VA-90-1003-06, prepared by Harris Miller Miller & Hanson, Inc., Burlington, Mass., for U.S. Department of Transportation, Federal Transit Administration, Washington, D.C., May. Available at http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf.

Harter, T., 2003, *Water Well Design and Construction*, Publication 8086, FWQP Reference Sheet 11.3, University of California Division of Agriculture and Natural Resources.

Harwell, H.O., and M.C.S. Kelly, 1983, "Maricopa," pp. 71–85 in *Handbook of North American Indians, Vol. 10, Southwest,* A. Ortiz (editor), Smithsonian Institution, Washington, D.C.

Hill, D.P., et al., 1998, *Future Eruptions in California's Long Valley Area—What's Likely?* Fact Sheet 073-97, U.S. Geological Survey, Nov.

Hill, D.P., et al., 2000, *Living with a Restless Caldera—Long Valley California*, Fact Sheet 108-96, Version 2.1, U.S. Geological Survey, May.

Indian Claims Commission, 1958, "Opinions of Commissioners: Separate Opinion of Chief Commissioner Witt, Jan. 28," *Decisions of the Indian Claims Commission, Vol. 6,* Oklahoma State University. Available at http://digital.library.okstate.edu/icc/index.html.

Jackson, M., Sr., 2009, "Quechan Indian Tribe's Comments on Programmatic Environmental Impact Statement for Solar Energy Development," letter from Jackson (President, Quechan Indian Tribe, Fort Yuma, Ariz.) to Argonne National Laboratory (Argonne, Ill.), Sept. 3.

Johnson, B., 2003, "Geoglyphs Associated with the Xam Kwatcan Trail in the Palo Verde Point Area, South of Blythe, California," Chapter 11, *A View across the Cultural Landscape of the Lower Colorado Desert, Cultural Resource Investigations for the North Baja Pipeline Project,* J.H. Cleland and R.M. Apple, prepared by EDAW, Inc., San Diego, Calif. for Tetra Tech FW, Inc., Santa Ana, Calif., and North Baja Pipeline LLC, Portland, Ore.

Jones, T.L., and K.A. Klar (editors), 2007, *California Prehistory: Colonization, Culture, and Complexity*, AltaMira Press, Lanham, Md.

Kelly, I.T., and C.S. Fowler, 1986, "Southern Paiute," pp 368–397 in *Handbook of North American Indians, Vol. 11*, *Great Basin,* Smithsonian Institution, Washington, D.C.

Kenny, J.F., et al., 2009, *Estimated Use of Water in the United States in 2005*, Circular 1344, U.S. Geological Survey. Available at http://pubs.usgs.gov/circ/1344. Accessed Jan. 4, 2010.

Kovach, R.L., 1974, *Source Mechanisms for Wilmington Oil Field, California, Subsidence Earthquakes*, Bulletin of the Seismological Society of America, Vol. 64, No. 3-1.

Kroeber, A.L., 1925, *Handbook of the Indians of California*, *Bureau of American Ethnology*, *Bulletin 78*, Smithsonian Institution, Washington, D.C.

Lee, J.M., et al., 1996, *Electrical and Biological Effects of Transmission Lines: A Review*, Bonneville Power Administration, Portland, Ore., Dec.

Lightfoot, K.G., and O. Parish, 2009, *California Indians and Their Environment: An Introduction, California Natural History Guides No. 96,* University of California Press, Berkeley, Calif.

Lovich, J., and D. Bainbridge, 1999, "Anthropogenic Degradation of the Southern California Desert Ecosystem and Prospects for Natural Recovery and Restoration," *Environmental Management* 24(3):309–326.

Ludington, S., et al., 2007, *Preliminary Integrated Geologic Map Databases for the United States – Western States: California, Nevada, Arizona, Washington, Oregon, Idaho, and Utah*, U.S. Geological Survey Open File Report 2005-1305, Version 1.3, original file updated in Dec. 2007. Available at http://pubs.usgs.gov/of/2005/1305/index.htm.

Manci, K.M., et al., 1988, *Effects of Aircraft Noise and Sonic Booms on Domestic Animals and Wildlife: A Literature Synthesis*, NERC-88/29, U.S. Fish and Wildlife Service National Ecology Research Center, Ft. Collins, Colo.

Matti, J.C., and S.E. Carson, 1991, *Liquefaction Susceptibility in the San Bernardino Valley and Vicinity, Southern California—A Regional Evaluation*, Bulletin 1898, U.S. Geological Survey.

Matti, J.C., et al., 1992, *The San Andreas Fault System in the Vicinity of the Central Transverse Ranges Province, Southern California*, Open-File Report 92-354, U.S. Geological Survey.

MIG (Minnesota IMPLAN Group) Inc., 2010, State Data Files, Stillwater, Minn.

Miller, C.D., 1989, *Potential Hazards from Future Volcanic Eruptions in California*, Bulletin 1847, U.S. Geological Survey.

Miller, N.P., 2002, "Transportation Noise and Recreational Lands," in *Proceedings of Inter-Noise 2002*, Dearborn, Mich., Aug. 19–21. Available at http://www.hmmh.com/cmsdocuments/N011.pdf. Accessed Aug. 30, 2007.

Moyle, W.R., 1967, *Water Wells and Springs in Bristol, Broadwell, Cadiz, Danby, and Lavic Valleys and Vicinity, San Bernardino and Riverside Counties, California*, Bulletin 91-14, California Department of Water Resources, Aug.

Murray, S., 2009, verbal communication during site visit between Murray (Archaeologist, Bureau of Land Management, Needles Field Office, Needles, Calif.) and K. Wescott (Archaeologist, Argonne National Laboratory, Argonne, Ill.), Aug. 25.

MWD (Metropolitan Water District of Southern California), 2001, *Final Environmental Impact Statement: Cadiz Groundwater Storage and Dry-Year Supply Program, San Bernardino County, California*, Metropolitan Water District and Bureau of Land Management. Available at http://www.pacinst.org/reports/cadiz/feir/index.htm.

MWD, 2008, *The Metropolitan Water District of Southern California Annual Report 2008.* Available at http://www.mwdh2o.com/mwdh2o/pages/about/AR/AR08.html.

MWD, 2009, *The Metropolitan Water District Administrative Code*. Available at http://www.mwdh2o.com/rsap/adminCode.pdf.

MWMA (Mojave Weed Management Area), 2002, *Mojave Weed Management Area Memorandum of Understanding*. Available at http://www.mojavewma.org/documents.php. Accessed March 13, 2010.

MWMA, 2008, *Mojave Weed Management Area Long Range Plan*, June 10. Available at http://www.mojavewma.org/documents.php. Accessed March 13, 2010.

National Research Council, 1995, *Ward Valley: An Examination of Seven Issues in Earth Sciences and Ecology*, Committee to Review Specific Scientific and Technical Safety Issues Related to the Ward Valley, California, Low-Level Radioactive Waste Site, Commission on Geosciences, Environment, and Resources, National Academy Press, Washington, D.C.

National Research Council, 1996, *Alluvial Fan Flooding*, Committee on Alluvial Fan Flooding, Water Science and Technology Boar, and Commission on Geosciences, Environment, and Resources, National Academy Press, Washington, D.C.

NatureServe, 2008, *International Ecological Classification Standard: Terrestrial Ecological Classifications*, NatureServe Central Databases, Arlington, Va., data current as of Dec. 18, 2008.

NatureServe, 2009, *International Ecological Classification Standard: Terrestrial Ecological Classifications,* NatureServe Central Databases, Arlington, Va., data current as of July 17, 2009.

NatureServe, 2010, *NatureServe Explorer: An Online Encyclopedia of Life*. Available at http://www.natureserve.org/explorer. Accessed March 4, 2010.

NCDC (National Climatic Data Center), 2010a, *Integrated Surface Data (ISD), DS3505 Format*, database, Asheville, N.C. Available at ftp://ftp3.ncdc.noaa.gov/pub/data/noaa. Accessed Feb. 19, 2010.

NCDC, 2010b, *Climates of the States (CLIM60): Climate of California*, National Oceanic and Atmospheric Administration, Satellite and Information Service. Available at http://cdo.ncdc.noaa.gov/cgi-bin/climatenormals/climatenormals.pl. Accessed March 18, 2010.

NCDC, 2010c, *Storm Events*, National Oceanic and Atmospheric Administration, Satellite and Information Service. Available at http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms. Accessed Oct. 16, 2010.

NCES (National Center for Education Statistics), 2009, Search for Public School Districts. U.S. Department of Education. Available at http://www.nces.ed.gov/ccd/districtsearch/.

NRCS (Natural Resources Conservation Service), 2006, *Official Soil Series Descriptions*. Available at http://www2.ftw.nrcs.usda.gov/. Accessed March 15, 2010.

NRCS, 2008, *Soil Survey Geographic (SSURGO) Database for San Bernardino County, California*. Available at: http://SoilDataMart.nrcs.usds.gov.

NRCS, 2010, *Custom Soil Resource Report for San Bernardino County (covering the proposed Iron Mountain SEZ), California*, U.S. Department of Agriculture, Washington, D.C., Oct. 7.

Nussear, K.E., et al., 2009, *Modeling Habitat for the Desert Tortoise (*Gopherus agassizii*) in the Mojave and Parts of the Sonoran Deserts of California, Nevada, Utah, and Arizona*, Open-File Report 2009-1102, U.S. Geological Survey.

Parker, R.B., 1963, *Recent Volcanism at Amboy Crater, San Bernardino County, California*, Special Report 76, California Division of Mines and Geology, San Francisco, Calif.

Planert, M., and J.S. Williams, 1995, *Ground Water Atlas of the United States: California, Nevada*, HA 730-B, U.S. Geological Survey. Available at http://pubs.usgs.gov/ha/ha730/ch_b/index.html.

RailAmerica, 2008, *Arizona and California Railroad.* Available at http://www.railamerica.com/RailServices/ARZC.aspx. Accessed Feb. 26, 2010.

Ralph, C.J., and T.D. Rich (editors), U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, Albany, Calif.

Reynolds, R.E., 1988, *Paleontologic Monitoring and Salvage for Federal Lands along the All American and Celeron Pipeline Project*, San Bernardino County Museum.

Ridder, C., 1998, *Sacred or Profane? Standoff in Ward Valley Escalates as Protesters Are Asked to Relocate.* Available at http://cridder.com/morgue/freelance/ward.html.

Royster, J., 2008, "Indian Land Claims," pp. 28–37 in *Handbook of North American Indians, Vol. 2, Indians in Contemporary Society,* G.A. Bailey (editor), Smithsonian Institution, Washington, D.C.

Russo, K., 2009, "Re: Solar Energy Study Area," letter from Russo (Native American Land Conservancy, Indio, Calif.) to Solar Energy PEIS (Argonne National Laboratory, Argonne, Ill.), Sept. 11.

SAMHSA (Substance Abuse and Mental Health Services Administration), 2009, *National Survey on Drug Use and Health, 2004, 2005 and 2006*, Office of Applied Studies, U.S. Department of Health and Human Services. Available at http://oas.samhsa.gov/substate2k8/StateFiles/TOC.htm#TopOfPage.

Sanborn Mapping, 2008, *GAP Ecological Systems*, *USGS Mapping Zones 12 and 13*, Portland, Ore., for the USGS GAP Program, Dec. Available at http://gapanalysis.nbii.gov/portal/community/GAP_Analysis_Program/Communities/Maps,_Data,_&_Reports/Find_Updated_GAP_Regional_Data.

SES (Stirling Energy Systems), 2008, *Solar Two, LLC*, *Application for Certification*, submitted to the Bureau of Land Management, El Centro, Calif., and the California Energy Commission, Sacramento, Calif., June. Available at http://www.energy.ca.gov/sitingcases/solartwo/documents/applicant/afc/index.php. Accessed Oct. 1, 2008.

Shlemon, R.J., 1995, "Groundwater Rise and Hydrocollapse: Technical and Political Implications of 'Special Geologic Report Zones' in Riverside County, California, USA," in *Land Subsidence*, Proceedings for the Fifth International Symposium on Land Subsidence, IAHS Publication No. 234, Oct.

Singleton, D., 2010, "Request for a Sacred Lands File Search and Native American Contacts List for the 'Four Solar Study Areas (SESA)'; located in San Bernardino, Riverside and Imperial Counties," personal communication from Singleton (Native American Heritage Commission, Sacramento, Calif.) to (B. Verhaaren, Argonne National Laboratory, Argonne, Ill.), April 12.

Smith, M., et al., 2001, "Growth, Decline, Stability and Disruption: A Longitudinal Analysis of Social Well-Being in Four Western Communities," *Rural Sociology* 66:425–450.

Smithsonian, 2010, *Global Volcanism Program—Lavic Lake Summary*, Smithsonian National Museum of Natural History. Available at http://www.volcano.si.edu/world/volcano.cfm?vnum=1203-19-. Accessed April 14, 2010.

Stewart, K.M., 1983, "Mohave," pp. 55–70 in *Handbook of North American Indians, Vol. 10, Southwest,* A. Ortiz (editor), Smithsonian Institution, Washington, D.C.

Stoffle, R.W., et al., 1990, *Native American Cultural Resource Studies at Yucca Mountain, Nevada,* University of Michigan, Ann Arbor, Mich.

Stout, D., 2009, personal communication from Stout (Acting Assistant Director for Fisheries and Habitat Conservation, U.S. Fish and Wildlife Service, Washington, D.C.) to L. Jorgensen (Bureau of Land Management, Washington, D.C.), and L. Resseguie (Bureau of Land Management, Washington, D.C.), Sept. 14.

Treiman, J.J. (compiler), 2003, "Fault Number 122c, Pisgah-Bullion Fault Zone, East Bullion Section," in *Quaternary Fault and Fold Database of the United States*, U.S. Geological Survey. Available at http://earthquakes.usgs.gov/regional/qfaults. Accessed March 18, 2010.

Turner, R.M., and D.E. Brown, 1994, "Sonoran Desertscrub," in *Biotic Communities: Southwestern United States and Northwestern Mexico*, D.E. Brown (editor), University of Utah Press, Salt Lake City, Utah.

USACE (U.S. Army, Corps of Engineers), 1956, *BLM Master Title Plats for Iron Mountain SEZ Area identifying Presence of Contaminated Mil Area Surface Use Only* (Original source: USACE correspondence with CASO, 1956).

USACE, 2007, *Final Site Inspection Report, Camp Iron Mountain*, Rice, Calif., Aug. 2007.

U.S. Bureau of the Census, 2009a, *County Business Patterns*, 2006. Washington, D.C. Available at http://www.census.gov/ftp/pub/epcd/cbp/view/cbpview.html.

U.S. Bureau of the Census, 2009b, *GCT-T1, Population Estimates*. Available at http://factfinder.census.gov/.

U.S. Bureau of the Census, 2009c, *QT-P32, Income Distribution in 1999 of Households and Families: 2000. Census 2000 Summary File (SF 3) – Sample Data*. Available at http://factfinder.census.gov/.

U.S. Bureau of the Census, 2009d, *S1901, Income in the Past 12 Months, 2006–2008 American Community Survey 3-Year Estimates*. Available at http://factfinder.census.gov/.

U.S. Bureau of the Census, 2009e, *GCT-PH1, GCT-PH1, Population, Housing Units, Area, and Density: 2000*, Census 2000 Summary File (SF 1) – 100-Percent Data. Available at http://factfinder.census.gov/.

U.S. Bureau of the Census, 2009f, T1, *Population Estimates*. Available at http://factfinder.census.gov/.

U.S. Bureau of the Census, 2009g, *GCT2510, Median Housing Value of Owner-Occupied Housing Units (Dollars). 2006-2008 American Community Survey 3-Year Estimates*. Available at http://factfinder.census.gov/.

U.S. Bureau of the Census, 2009h, *QT-H1, General Housing Characteristics, 2000. Census 2000 Summary File 1 (SF 1) 100-Percent Data*. Available at http://factfinder.census.gov/.

U.S. Bureau of the Census, 2009i, *GCT-T9-R, Housing Units, 2008. Population Estimates*. Available at http://factfinder.census.gov/.

U.S. Bureau of the Census, 2009j, *S2504, Physical Housing Characteristics for Occupied Housing Units 2006–2008 American Community Survey 3-Year Estimates*. Available at http://factfinder.census.gov/.

U.S. Bureau of the Census, 2009k, Census *2000 Summary File 1 (SF 1) 100-Percent Data*. Available at http://factfinder.census.gov/.

U.S. Bureau of the Census, 2009l, *Census 2000 Summary File 3 (SF 3) - Sample Data*. Available at http://factfinder.census.gov/.

U.S. Department of Agriculture, 2009, 2007 Census of Agriculture: California State and County Data, Volume 1, Geographic Area Series, National Agricultural Statistics Service, Washington, D.C. Available at http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_2_County_Level/California/index.asp.

U.S. Department of Commerce, 2009, *Local Area Personal Income*, Bureau of Economic Analysis. Available at http://www.bea.doc.gov/bea/regional/reis/.

U.S. Department of the Interior, 2010, Native American Consultation Database. National NAGPRA Online Databases. National Park Service. Available at http://grants.cr.nps.gov/nacd/index.cfm.

U.S. Department of Justice, 2008, *Crime in the United States: 2007*, Federal Bureau of Investigation. Available at http://www.fbi.gov/ucr/cius2006/about/table_title.html.

U.S. Department of Justice, 2009a, *2008 Crime in the United States*, "Table 8: Offences Known to Law Enforcement, by State and City," Federal Bureau of Investigation, Criminal Justice Information Services Division. Available at http://www.fbi.gov/ucr/cius2008/data/table_08.html.

U.S. Department of Justice, 2009b, *2008 Crime in the United States*, "Table 10: Offences Known to Law Enforcement, by State and by Metropolitan and Non-metropolitan Counties," Federal Bureau of Investigation, Criminal Justice Information Services Division. Available at http://www.fbi.gov/ucr/cius2008/data/table_10.html.

U.S. Department of Labor, 2009a, *Local Area Unemployment Statistics: States and Selected Areas: Employment Status of the Civilian Noninstitutional Population, 1976 to 2007, Annual Averages*, Bureau of Labor Statistics. Available at http://www.bls.gov/lau/staadata.txt.

U.S. Department of Labor, 2009b, *Local Area Unemployment Statistics: Unemployment Rates by State,* Bureau of Labor Statistics. Available at http://www.bls.gov/web/laumstrk.htm.

U.S. Department of Labor, 2009c, *Local Area Unemployment Statistics: County Data,* Bureau of Labor Statistics. Available at http://www.bls.gov/lau.

USFS (U.S. Forest Service), 1997, *Ecological Subregions of California: Section and Subsection Descriptions*, S.R. Miles and C.B. Goudy, compilers, USDA Forest Service Pacific Southwest Region, San Francisco, Calif., Publication R5-EM-TP-005. Available at http://www.r5.fs.fed.us/ecoregions. Accessed April 11, 2010.

USFS, 2007, *Rangelands: Wild Horse and Burro Territories,* Rangelands, Washington, D.C. Available at http://www.fs.fed.us/rangelands/ecology/wildhorseburro//territories/index.shtml. Accessed Oct. 20, 2009.

USFWS (U.S. Fish and Wildlife Service), 1994, *Desert Tortoise (Mojave Population) Recovery Plan*, Portland, Ore.

USFWS, 2009, *National Wetlands Inventory*, Washington, D.C. Available at http://www.fws.gov/wetlands.

USGS (U.S. Geological Survey), 1988, *Probabilities of Large Earthquakes Occurring in California on the San Andreas Fault*, prepared by the Working Group on California Earthquake Probabilities, Open-File Report 88-398, U.S. Geological Survey.

USGS, 2004, *National Gap Analysis Program, Provisional Digital Land Cover Map for the Southwestern United States,* Version 1.0, RS/GIS Laboratory, College of Natural Resources, Utah State University. Available at http://earth.gis.usu.edu/swgap/landcover.html. Accessed March 15, 2010.

USGS, 2005, *National Gap Analysis Program, Southwest Regional GAP Analysis Project—Land Cover Descriptions*, RS/GIS Laboratory, College of Natural Resources, Utah State University. Available at http://earth.gis.usu.edu/swgap/legend_desc.html. Accessed March 15, 2010.

USGS, 2007, *National Gap Analysis Program, Digital Animal-Habitat Models for the Southwestern United States*, Version 1.0, Center for Applied Spatial Ecology, New Mexico Cooperative Fish and Wildlife Research Unit, New Mexico State University. Available at http://fws-nmcfwru.nmsu.edu/swregap/HabitatModels/default.htm. Accessed March 15, 2010.

USGS, 2008a, *Quagga and Zebra Mussel Sightings Distribution in the Western United States*, map produced by the U.S. Geological Survey, Nov. 20. Available at http://Nas.Er. Usgs.Gov/Taxgroup/Mollusks/Zebramussel/Maps/Southwest_Quagga.Pdf. Accessed March 12, 2009.

USGS, 2008b, *National Seismic Hazard Maps – Peak Horizontal Acceleration (%g) with 10% Probability of Exceedance in 50 Years (Interactive Map)*. Available at http://gldims.cr.usgs.gov/nshmp2008/viewer.htm. Accessed Aug. 4, 2010.

USGS, 2009, *National Water Information System*: *Mapper*. Available at http://wdr.water.usgs.gov/nwisgmap. Accessed Nov. 20, 2009.

USGS, 2010a, *National Biological Informatics Infrastructure (NBII)*, *California Regional Gap Analysis Project (CAReGAP)*. Available at http://gapanalysis.nbii.gov/portal/community/GAP_Analysis_Program/Communities/Maps,_Data,_&_Reports/Find_Updated_GAP_Regional_Data/. Accessed March 4, 2010.

USGS, 2010b, *Water Resources of the United States—Hydrologic Unit Maps*. Available at http://water.usgs.gov/GIS/huc.html. Accessed April 12, 2010.

USGS, 2010c, *National Earthquake Information Center (NEIC) – Circular Area Database Search (within 100-km of the center of the proposed Iron Mountain SEZ)*. Available at: http://earthquake.usgs.gov/earthquakes/eqarchives/epic/epic_circ.php. Accessed Aug. 5, 2010.

USGS, 2010d, *Earthquake Hazards Program: Baja California, Mexico, Aftershock Map—Mainshock and 708 Aftershocks, Last Updated: 06 April 2010*. Available at http://earthquake.usgs.gov/earthquakes/aftershocks/?code-ci14607652&title=Baja%20California,%20Mexico. Accessed Oct. 7, 2010.

USGS and CGS (California Geological Survey), 2009, *Quaternary Fault and Fold Database for the United States*. Available at: http://earthquake.usgs.gov/regional/qfaults/. Accessed Sept. 11, 2009.

WRAP (Western Regional Air Partnership), 2009, *Emissions Data Management System (EDMS)*. Available at http://www.wrapedms.org/default.aspx. Accessed June 4, 2009.

WRCC (Western Regional Climate Center), 2010a, *Average Pan Evaporation Data by State*. Available at http://www.wrcc.dri.edu/htmlfiles/westevap.final.html. Accessed Jan. 19, 2010.

WRCC, 2010b, *Western U.S. Climate Historical Summaries.* Available at http://www.wrcc.dri.edu/Climsum.html. Accessed Jan. 31, 2010.

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