11.3 DRY LAKE

11.3.1 Background and Summary of Impacts

11.3.1.1 General Information

The proposed Dry Lake SEZ is located in Clark County in southern Nevada (Figure 11.3.1.1-1). The SEZ has a total area of 15,649 acres (63 km^2). In 2008, the county population was 1,879,093. The towns of Moapa Town and Overton are as close as 18 mi (29 km) northeast and 23 mi (37 km) east of the SEZ, respectively. The Nellis Air Force Base is located approximately 13 mi (21 km) southwest of the SEZ.

The nearest major roads accessing the proposed Dry Lake SEZ are I-15, which passes through the southeastern portion of the SEZ, and U.S. 93, which runs from northwest to southeast along part of the southwest border of the SEZ. The UP Railroad runs north to south along a portion of the eastern SEZ boundary, with the nearest stop in Las Vegas. The nearest public airport is the North Las Vegas Airport, a regional airport about 21 mi (34 km) to the southwest of the SEZ that does not have scheduled commercial passenger service. McCarran International Airport is farther south, in Las Vegas, and is served by all major U.S. airlines.

Three designated transmission corridors that are heavily developed with numerous natural gas, petroleum product, and electric transmission lines (including a 500-kV transmission line) pass through the proposed SEZ. It is assumed that the existing 500-kV transmission line, or any of the other existing transmission lines, could potentially provide access from the SEZ to the transmission grid (see Section 11.3.1.2).

There are four foreseeable and 16 pending solar development applications and one foreseeable and nine pending wind site testing applications within a 50-mi (80-km) radius of the proposed Dry Lake SEZ. Five of the 16 pending solar applications are either within or adjacent to the SEZ, as is one of the wind site testing applications. These applications are discussed in Section 11.3.22.2.1.

The proposed Dry Lake SEZ is in an undeveloped rural area. The SEZ is located in Dry Lake Valley and is bounded on the west by the Arrow Canyon Range and on the southeast by the Dry Lake Range. Land within the SEZ is undeveloped scrubland, characteristic of a semiarid basin.

The proposed Dry Lake SEZ and other relevant information are shown in Figure 11.3.1.1-1. The criteria used to identify the SEZ as an appropriate location for solar energy 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).

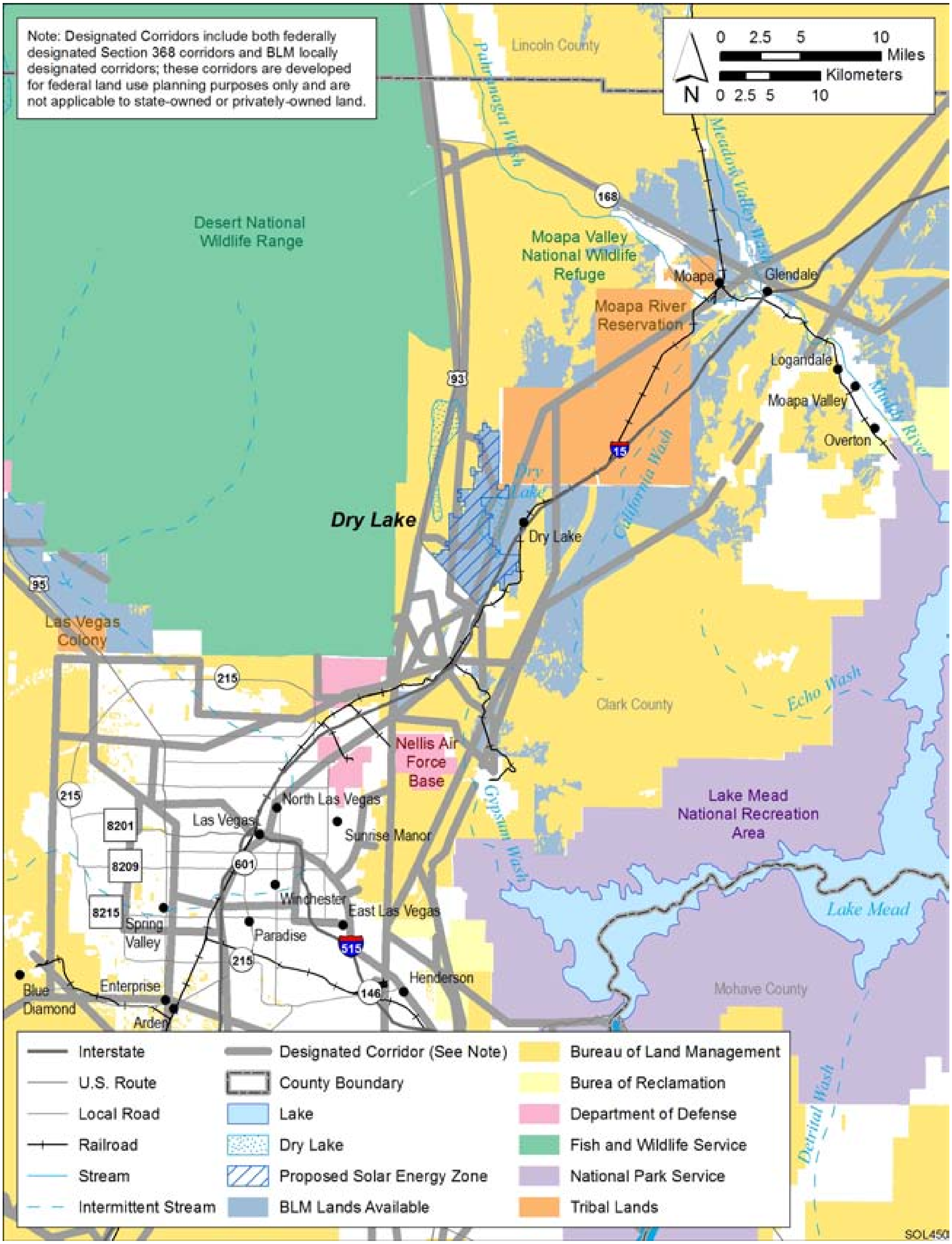

FIGURE 11.3.1.1-1 Proposed Dry Lake SEZ

Although these classes of restricted lands were excluded from the proposed Dry Lake SEZ, other restrictions might be appropriate. The analyses in the following sections evaluate 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 Dry Lake SEZ encompassed 16,516 acres (67 km^2). Subsequent to the study area scoping period, the boundaries of the proposed Dry Lake SEZ were altered somewhat to facilitate the 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 2010c).The revised SEZ is approximately 867 acres (3.5 km^2) smaller than the original SEZ area as published in June 2009.

11.3.1.2 Development Assumptions for the Impact Analysis

Maximum solar development of the Dry Lake SEZ is assumed to be 80% of the SEZ area over a period of 20 years; a maximum of 12,519 acres (51 km^2). These values are shown in Table 11.3.1.2-1, along with other development assumptions. Full development of the Dry Lake SEZ would allow development of facilities with an estimated total of 1,391 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 2,504 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. Several existing transmission lines, including a 500-kV line, run through the SEZ. It is possible that an existing line could be used to provide access from the SEZ to the transmission grid, but a 500-kV capacity line would be inadequate for 1,391 to 2,504 MW of new capacity (note: a 500-kV line can accommodate approximately the load of one 700-MW facility). At full build-out capacity, new transmission and/or upgrades of existing transmission lines may be required to bring electricity from the proposed Dry Lake 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 purposes of analysis in the PEIS, it was assumed that the existing 500-kV transmission line which runs through the proposed SEZ could provide initial access to the transmission grid, and thus, no additional acreage for transmission line access was assessed. Access to the existing 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.

TABLE 11.3.1.2-1 Proposed Dry Lake SEZ—Assumed Development Acreages, Solar MW Output, Access Roads, and Transmission Line ROWs

Total Acreage and Assumed Developed Acreage (80% of Total)	Assumed Maximum SEZ 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 and Road ROWs	Distance to Nearest Designated Corridor[d]
15,649 acres and 12,519 acres[a]	1,391 MW[b] and 2,504 MW[c]	I-15 0 mi[d]	0 mi and 500 kV	0 acres and 0 acres	0 mi

[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.

Existing road access to the proposed Dry Lake SEZ should be adequate to support construction and operation of solar facilities, because a portion of I-15 runs through the SEZ and because U.S. 93 is adjacent to the SEZ. Thus, no additional road construction outside of the SEZ was assumed to be required to support solar development.

11.3.1.3 Summary of Major Impacts and SEZ-Specific Design Features

In this section, the impacts and SEZ-specific design features assessed in Sections 11.3.2 through 11.3.21 for the proposed Dry Lake SEZ are summarized in tabular form. Table 11.3.1.3-1 is a comprehensive list of impacts discussed in these sections; the reader may reference the applicable sections for detailed support of the impact assessment. Section 11.3.22 discusses potential cumulative impacts from solar energy development in the proposed SEZ.

Only those design features specific to the proposed Dry Lake SEZ are included in Sections 11.3.2 through 11.3.21 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 11.3.1.3-1 Summary of Impacts of Solar Energy Development within the Proposed Dry Lake SEZ and SEZ-Specific Design Features[a]

Resource Area	Environmental Impacts—Proposed Dry Lake SEZ	SEZ-Specific Design Features
Lands and Realty	Full development of the proposed Dry Lake SEZ could disturb up to 12,519 acres (51 km^2). Development of the SEZ for utility-scale solar energy production would establish a large industrial area that would exclude many existing and potential uses of the land, perhaps in perpetuity.	None.
	The three designated transmission corridors located within the SEZ could limit future solar development within the corridor. Alternatively, solar development could also constrain future development within these corridors.	None.
	Solar development could sever existing roads that cross the SEZ, making it difficult to access public lands within the SEZ that are not developed or those that are outside of the SEZ.	None.
Specially Designated Areas and Lands with Wilderness Characteristics	Wilderness characteristics in up to 3% of the Arrow Canyon and 13% of the Muddy Mountains WAs could be adversely affected.	Design features for visual resources should be applied to minimize adverse visual impacts.
Rangeland Resources: Livestock Grazing	The grazing allotments within the SEZ have been closed, therefore there are no impacts to grazing.	None.
Rangeland Resources: Wild Horses and Burros	None.	None.
Recreation	Recreational use would be eliminated from portions of the SEZ that would be developed for solar energy production.	None.

TABLE 11.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake SEZ	SEZ-Specific Design Features
Recreation *(Cont.)*	Because the SEZ sits astride numerous roads and trails, construction of solar energy facilities could sever access to undeveloped public lands.	None.
Military and Civilian Aviation	Nellis Air Force Base has expressed concern for solar energy facilities that might affect approach and departure from runways on the base. The military is also concerned with the potential impact on the test and training mission at the NTTR.	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), especially during the construction phase. Impacts would 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).	None.
Minerals (fluids, solids, and geothermal resources)	None.	None.
Water Resources	Ground-disturbance activities (affecting 38% 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 3,480 ac-ft (4.3 million m^3) of water during the peak construction year. Construction activities would generate as high as 148 ac-ft (180,000 m^3) of sanitary wastewater.	Wet-cooling and dry-cooling options would not be feasible unless further hydrologic study of the basin reveals that more water is available; other technologies should incorporate water conservation measures. Land-disturbance activities should avoid impacts to the extent possible in the vicinity of the ephemeral washes and the dry lake present on the site.

TABLE 11.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake SEZ	SEZ-Specific Design Features
Water Resources *(Cont.)*	Assuming full development of the SEZ, operations would use the following amounts of water: • For parabolic trough facilities (2,504-MW capacity), 1,788 to 3,791 ac-ft/yr (2.2 million to 4.7 million m^3/yr) for dry-cooled systems; 12,554 to 37,593 ac-ft/yr (15 million to 46 million m^3/yr) for wet-cooled systems. • For power tower facilities (1,391-MW capacity), 989 to 2,102 ac-ft/yr (1.2 million to 2.6 million m^3/yr) for dry-cooled systems; 6,971 to 20,881 ac-ft/yr (8.6 million to 26 million m^3/yr) for wet-cooled systems. • For dish engine facilities (1,391-MW capacity), 711 ac-ft/yr (880,000 m^3/yr). • For PV facilities (1,391-MW capacity), 71 ac-ft/yr (86,000 m^3/yr). • Assuming full development of the SEZ, operations would generate up to 35 ac-ft/yr (43,000 m^3/yr) of sanitary wastewater and up to 711 ac-ft/yr (877,000 m3/yr) of blowdown water.	Siting of solar facilities and construction activities should avoid areas identified as being within a 100-year floodplain, which totals 1,569 acres [6.3 km^2] of the proposed SEZ. Groundwater rights must be obtained from the NDWR. Stormwater management plans and BMPs should comply with standards developed by the Nevada Division of Environmental Protection. Groundwater monitoring and production wells should be constructed in accordance with state standards. Water for potable uses would have to meet or be treated to meet water quality standards in accordance with the *Nevada Administrative Code* (445A.453-445A.455).
Vegetation[b]	Up to 80% (12,519 acres [50.7 km^2]) of the SEZ would be cleared of vegetation; re-establishment of shrub communities in temporarily disturbed areas would likely be very difficult because of the arid conditions and might require extended periods of time. Noxious weeds could become established in disturbed areas and colonize adjacent undisturbed habitats, thus reducing restoration success and potentially resulting in widespread habitat degradation.	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 desert scrub and other affected habitats, and to minimize the potential for the spread of invasive species such as salt cedar or

TABLE 11.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake SEZ	SEZ-Specific Design Features
Vegetation[b] *(Cont.)*	The deposition of fugitive dust from large areas of disturbed soil onto habitats outside a solar project area could result in reduced productivity or changes in plant community composition. Vegetation communities associated with Dry Lake playa habitats or other intermittently flooded areas within or downgradient from solar projects could be affected by ground-disturbing activities. The use of groundwater within the proposed Dry Lake SEZ for technologies with high water requirements, such as wet-cooling systems, could disrupt the groundwater flow pattern and adversely affect mesquite communities on or near the SEZ or springs in the vicinity of the SEZ.	Mediterranean grass. Invasive species control should focus on biological and mechanical methods where possible to reduce the use of herbicides. All dry wash, dry wash woodland, chenopod scrub, and playa communities within the SEZ should be avoided to the extent practicable, and any impacts minimized and mitigated. Any yucca, cacti, or succulent plant species that cannot be avoided should be salvaged. A buffer area should be maintained around dry wash, dry wash woodland, playa, and wetland habitats to reduce the potential for impacts. Appropriate engineering controls should be used to minimize impacts on dry wash, dry wash woodland, wetland, and playa habitats, including downstream occurrences, resulting from surface water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition. Appropriate buffers and engineering controls would be determined through agency consultation. Groundwater withdrawals should be limited to reduce the potential for indirect impacts on groundwater-dependent communities, such as mesquite communities. Potential impacts on springs should be determined through hydrological studies.
Wildlife: Amphibians and Reptiles[b]	Direct impacts on representative amphibian and reptile species from SEZ development would be small (i.e., loss of ≤1% of potentially suitable habitats). With implementation of proposed design features, indirect impacts would be expected to be negligible.	Dry Lake and wash habitats should be avoided.

TABLE 11.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake SEZ	SEZ-Specific Design Features
Wildlife: Birds[b]	Direct impacts on all representative bird species from SEZ development would be small (i.e., loss of ≤1% of potentially suitable habitats). Other impacts on birds could result from collision with vehicles and infrastructure (e.g., buildings 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. These indirect impacts are expected to be negligible with implementation of design features.	The requirements contained within the 2010 Memorandum of Understanding between the BLM and USFWS to promote the conservation of migratory birds will be followed. Take of golden eagles and other raptors should be avoided. Mitigation regarding the golden eagle should be developed in consultation with the USFWS and the NDOW. A permit may be required under the Bald and Golden Eagle Protection Act. Dry lake and wash habitats should be avoided.
Wildlife: Mammals[b]	Direct impacts on all representative mammal species would be small (i.e., loss of ≤1% of potentially suitable habitats). In addition to habitat loss, other direct impacts on mammals could result from collision with vehicles and infrastructure (e.g., fences). Indirect impacts on mammals 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 the implementation of design features.	The fencing around the solar energy development should not block the free movement of mammals, particularly big game species. Dry Lake and wash habitats should be avoided.
Wildlife: Aquatic Biota[b]	The dry lake and the washes and wetlands present in the SEZ are typically dry and are not connected to any permanent surface water features; therefore, impacts on aquatic habitat and communities are not likely. California Wash and Gypsum Wash are intermittent streams in the area of indirect effects that flow into perennial surface waters. Thus fugitive dust entering these streams could potentially affect aquatic habitat and biota.	Appropriate engineering controls should be implemented to minimize the amount of runoff and fugitive dust that reaches California Wash and Gypsum Wash.

TABLE 11.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake SEZ	SEZ-Specific Design Features
Wildlife: Aquatic Biota[b] *(Cont.)*	Groundwater withdrawals for solar energy needs could affect surface water levels, habitat conditions, and aquatic biota in the Colorado River and the springs located in the vicinity of the SEZ. Contaminants are not likely to affect aquatic habitat and biota given the relatively large distance and lack of hydrologic connection of the SEZ to any perennial surface water.	Minimize or eliminate the impact of groundwater withdrawals on streams near the SEZ such as the Muddy River, and springs such as those along the north shore of Lake Meade and within Desert NWR and Moapa NWR
Special Status Species[b]	Potentially suitable habitat for 62 special status species occurs in the affected area of the Dry Lake SEZ. For all of these special status species, less than 1% of the potentially suitable habitat in the region occurs in the area of direct effects. There are 13 groundwater dependent species that occur outside of the areas of direct and indirect effects. Potential impacts on these species could range from small to large depending on the solar energy technology deployed, the scale of development within the SEZ, and the cumulative rate of groundwater withdrawals.	Pre-disturbance surveys should be conducted within the area of direct effects 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 to occupied habitats is not possible for some species, 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 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. Consultation with the USFWS and NDOW should be conducted to address the potential for impacts on the following four species currently listed as threatened or endangered under the ESA: Moapa dace, Pahrump poolfish, desert tortoise, and southwestern willow flycatcher. Consultation would identify an appropriate survey protocol, avoidance and minimization measures, and, if appropriate,

TABLE 11.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake SEZ	SEZ-Specific Design Features
Special Status Species[b] *(Cont.)*		reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions for incidental take statements. Coordination with the USFWS and NDOW should be conducted to address the potential for impacts on the following seven species under review for listing under the ESA that may be affected by solar energy development on the SEZ: Las Vegas buckwheat, grated tryonia, Moapa pebblesnail, Moapa Valley pebblesnail, Moapa Warm Spring riffle beetle, Moapa speckled dace, and Moapa White River springfish. Coordination would identify an appropriate survey protocol, and mitigation requirements, which may include avoidance, minimization, translocation, or compensation. Avoiding or minimizing disturbance to desert wash, playa, and desert pavement habitats on the SEZ could reduce or eliminate impacts on 14 special status species. Avoidance or minimization of groundwater withdrawals to serve solar energy development on the SEZ could reduce or eliminate impacts on 13 special status species. In particular, impacts on aquatic and riparian habitat in the Corn Creek Spring, Moapa Warm Springs and Muddy River should be avoided.

TABLE 11.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake SEZ	SEZ-Specific Design Features
Special Status Species[b] *(Cont.)*		Harassment or disturbance of special status species and their habitats in the affected area should be avoided or minimized. This can be accomplished by identifying any additional sensitive areas and implementing necessary protection measures based upon consultation with the USFWS and NDOW.
Air Quality and Climate	*Construction*: Temporary exceedances of AAQS for 24-hour and annual PM_{10} and 24-hour $PM_{2.5}$ concentration levels at the SEZ boundaries and in the immediate surrounding areas during the construction of solar facilities. These concentrations would decrease quickly with distance. Modeling indicates that emissions from construction activities are anticipated to be somewhat higher than Class I PSD PM_{10} increments at the nearest federal Class I area (Grand Canyon NP, Arizona). In addition, construction emissions from the engine exhaust of heavy equipment and vehicles could affect AQRVs (e.g., visibility and acid deposition) at nearby federal Class I areas. *Operations*: Positive impact due to avoided emissions of air pollutants from combustion-related power generation: 6.4 to 12% of total emissions of SO_2, NO_x, Hg, and CO_2 from electric power systems in the state of Nevada avoided (up to 6,189 tons/yr SO_2, 5,308 tons/yr NO_x, 0.035 ton/yr Hg, and 3,407,000 tons/yr CO_2).	None.
Visual Resources	The SEZ is in an area of low scenic quality, and major cultural disturbances are already present in SEZ and surrounding areas. Residents, workers, 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) as they travel area roads.	None.

TABLE 11.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake SEZ	SEZ-Specific Design Features
Visual Resources *(Cont.)*	Large visual impacts on the SEZ and surrounding lands within the SEZ viewshed due to major modification of the character of the existing landscape. The SEZ is located 2.3 mi (3.7 km) from Desert National Wildlife Range. Because of the close proximity of the NWR to the SEZ, and the elevated viewpoints in the NWR, strong visual contrasts could be observed by NWR visitors. The SEZ is located 2.4 mi (3.9 km) from a high-potential segment of the Old Spanish National Historic Trail. Because of the close proximity of the NHT to the SEZ, and the elevated viewpoints in the WA, strong visual contrasts could be observed by NHT users. The SEZ is located 2.5 mi (4.0 km) from Arrow Canyon WA. Because of the close proximity of the WA to the SEZ, and the elevated viewpoints in the WA, strong visual contrasts could be observed by WA visitors. The SEZ is located 6.6 mi (10.6 km) from Muddy Mountains WA. Because of the elevated viewpoints in the WA, moderate visual contrasts could be observed by WA visitors. The SEZ is located 4.5 mi (7.2 km) from Muddy Mountains SRMA. Because of the elevated viewpoints in the SRMA, moderate visual contrasts could be observed by SRMA visitors. The SEZ is located 4.3 mi (6.9 km) from Nellis Dunes SRMA. Because of the elevated viewpoints in the SRMA, moderate visual contrasts could be observed by SRMA visitors.	

TABLE 11.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake SEZ	SEZ-Specific Design Features
Visual Resources *(Cont.)*	Almost 38 mi (61.2 km) of I-15 are within the Dry Lake SEZ viewshed, and almost 4 mi (6.4 km) of I-15 pass along and through the SEZ's southeasternmost portion. Because of the close proximity of the I-15 to the SEZ, strong visual contrasts could be observed by travelers on I-15. Almost 13 mi (21 km) of U.S. 93 are within the SEZ viewshed, and about 4.5 mi (7.2 km) of U.S. 93 pass along the SEZ's southwestern boundary. Because of the close proximity of the U.S. 93 to the SEZ, strong visual contrasts could be observed by travelers on U.S. 93.	
Acoustic Environment	*Construction:* For construction of a solar facility located near the southern SEZ boundary, estimated noise levels at the nearest residences located about 12 mi (19 km) from the SEZ boundary would be about 14 dBA, which is well below the typical daytime mean rural background level of 40 dBA. In addition, an estimated 40 dBA L_{dn} at these residences (i.e., no contribution from construction activities) is well below the EPA guidance of 55 dBA L_{dn} for residential areas. *Operations:* For operation of a parabolic trough or power tower facility located near the southern SEZ boundary, the predicted noise level would be about 20 dBA at the nearest residences, which is well below the typical daytime mean rural background level of 40 dBA. If the operation were limited to daytime, 12 hours only, a noise level of about 40 dBA L_{dn} (i.e., no contribution from facility operation) would be estimated for the nearest residences, which is well below the EPA guideline of 55 dBA L_{dn} for residential areas. However, in the case of 6-hour TES, the estimated noise level at the nearest residences would be 30 dBA, which is equivalent to the typical nighttime mean rural background level of 30 dBA. The day-night average noise level is estimated to be about 41 dBA L_{dn}, which is still well below the EPA guideline of 55 dBA L_{dn} for residential areas.	None.

TABLE 11.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake SEZ	SEZ-Specific Design Features
Acoustic Environment *(Cont.)*	If 80% of the SEZ were developed with dish engine facilities, the estimated noise level at the nearest residences would be about 32 dBA, which is below the typical daytime mean rural background level of 40 dBA. On the basis of 12-hour daytime operation, the estimated 40 dBA L_{dn} at these residences (i.e., no contributions from dish engines) would be well below the EPA guideline of 55 dBA L_{dn} for residential areas.	
Paleontological Resources	Few, if any, impacts on significant paleontological resources are likely to occur in 90% of the proposed Dry Lake SEZ. However, a more detailed look at the geological deposits of the SEZ is needed to determine whether a paleontological survey is warranted. The potential for impacts on significant paleontological resources in the remaining 10% of the SEZ is unknown. A paleontological survey will likely be needed.	The need for and the nature of any SEZ-specific design features would depend on the results of future paleontological investigations.
Cultural Resources	Direct impacts on significant cultural resources could occur in the proposed Dry Lake SEZ; however, further investigation is needed. Consistent with findings at other SEZs, dune areas continue to have potential to contain significant sites within the valley floors suitable for solar development. A cultural resource survey of the entire area of potential effects, including consultation with affected Native American Tribes, would need to be conducted first to identify archaeological sites, historic structures and features, and traditional cultural properties, and then an evaluation would follow to determine whether any are eligible for listing in the NRHP as historic properties. Direct impacts are possible to the Old Spanish Trail/Mormon Road site within the SEZ, which is listed in the NRHP as a district. Visual impacts are also possible to a high-potential segment of the congressionally designated Old Spanish National Historic Trail located near the SEZ to the east.	Coordination with the Trail Administration for the Old Spanish Trail and Old Spanish Trail Association is recommended for identifying potential mitigation strategies for avoiding or minimizing potential impacts on the congressionally designated Old Spanish National Historic Trail, and also to any remnants of the NRHP-listed site associated with the Old Spanish Trail/Mormon Road that may be located within the SEZ. Avoidance of the Old Spanish Trail NRHP-listed site within the southeastern portion of the proposed SEZ is recommended. Other SEZ-specific design features would be determined through consultation with the Nevada SHPO and affected Tribes and would depend on the results of future investigations.

TABLE 11.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake SEZ	SEZ-Specific Design Features
Native American Concerns	The proposed Dry Lake SEZ is directly adjacent to Moapa Valley, a traditional center of Southern Paiute culture. It is likely that plant and animal species of cultural importance to the Southern Paiute are present within the proposed SEZ. With 80% of the SEZ developed, it is likely that important traditional plants and animal habitat will be destroyed. The cultural importance of this loss must be determined through consultation with the Tribes. The culturally important Salt Song Trail approaches or passes through the SEZ and could experience visual and noise impacts by the development of utility-scale solar energy facilities within the proposed SEZ.	The need for and nature of SEZ-specific design features would be determined during government-to-government consultation with the affected Tribes.
Socioeconomics	*Construction:* A total of 441 to 5,842 jobs would be added; ROI income would increase by $27.3 million to $361.5 million. *Operations:* A total of 36 to 822 annual jobs would be added; ROI income would increase by $1.3 million to $31.1 million.	None.
Environmental Justice	There are both minority and low income populations, as defined by CEQ guidelines, within the 50-mi (80-km) radius around the boundary of the SEZ. Therefore, any adverse impacts of solar projects, although likely to be small, could disproportionately affect both minority and low-income populations.	None.

TABLE 11.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake SEZ	SEZ-Specific Design Features
Transportation	The primary transportation impacts are anticipated to be from commuting worker traffic. I-15 provides a regional traffic corridor that would experience small impacts for single projects that may have up to 1,000 workers each day, with an additional 2,000 vehicle trips per day (maximum), or possibly 4,000 vehicle trips per day if two larger projects were to be developed at the same time. Such an increase would range from 10 to 20% of the current traffic volume. If all project traffic were routed through U.S. 93, the traffic levels would represent a 100 to 200% increase of the traffic level experienced on U.S. 93 north of its junction with I-15.	

Abbreviations: AAQS = ambient air quality standards; AQRV = air quality–related value; BLM = Bureau of Land Management; BMP = best management practice; CEQ = Council on Environmental Quality; CO_2 = carbon dioxide; dBA = A-weighted decibel; DoD = U.S. Department of Defense; EPA = U.S. Environmental Protection Agency; ESA = Endangered Species Act; Hg = mercury; L_{dn} = day-night average sound level; MTR = military training route; NDOW = Nevada Department of Wildlife; NDWR = Nevada Division of Water Resources; NNHP = Nevada Natural Heritage Program; NO_x = nitrogen oxides; NP = National Park; NRHP = *National Register of Historic Places*; NTTR = Nevada Test and Training Range; PEIS = programmatic environmental impact statement; $PM_{2.5}$ = 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; ROW = right-of-way; SEZ = solar energy zone; SHPO = State Historic Preservation Office; SO_2 = sulfur dioxide; SRMA = Special Recreation Management Area; TES = thermal energy storage; USFWS = U.S. Fish and Wildlife Service.

[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 Dry Lake SEZ.

[b] The scientific names of all plants, wildlife, aquatic biota, and special status species are provided in Sections 11.3.10 through 11.3.12.

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11.3.2 Lands and Realty

11.3.2.1 Affected Environment

The proposed Dry Lake SEZ is a moderately sized and well-blocked area of BLM-administered land. The character of much the land in the SEZ, especially the southern portion, is highly developed with many types of energy, water, and transportation infrastructure facilities present. Three designated transmission corridors pass through the area, including a 368 corridor (of the Energy Policy Act of 2005), that contain numerous electric transmission lines, natural gas and refined petroleum product lines, and water lines (see Figure 11.3.1.1-1). A new power generating station is being constructed within the area of the SEZ, and two existing natural gas power plants are located just southwest of the SEZ on private land. A minerals processing plant is located in the southeastern corner of the area.

The area is bordered on the southwest by U.S. 93, and I-15 passes through the southeastern portion of the SEZ. A railroad closely follows the southeastern border of the SEZ, and there is an undeveloped railroad ROW located in the portion of the SEZ east of I-15. With the exception of the 368 corridor, the area in the northern portion of the SEZ is relatively undeveloped. Several informal dirt roads provide access into the area, in addition to roads that provide access to along the various transmission lines.

As of February 2010, there were five ROW applications for solar energy facilities either within or adjacent to the SEZ.

11.3.2.2 Impacts

11.3.2.2.1 Construction and Operations

Full development of the proposed Dry Lake SEZ could disturb up to 12,519 acres (51 km^2) (Table 11.3.1.2-1). Development of the SEZ for utility-scale solar energy production would establish a large industrial area that would exclude other potential uses of the land, perhaps in perpetuity. Numerous energy-related activities occur within the SEZ; solar energy development, however, with its high density of visible facilities, would become a dominating visual presence in the area.

Existing ROW authorizations on the SEZ would not be affected by solar energy development since they are prior rights. Should the proposed SEZ be identified as an SEZ in the ROD for this PEIS, 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.

The existing electrical transmission and pipelines in the three designated transmission corridors, and the existing pipeline pumping, mineral processing, and power plant construction sites, occupy a large area within the SEZ that would not be available for solar energy development. The railroad ROW may also not be available. To avoid technical or operational interference between transmission and pipeline facilities and solar energy facilities, solar facilities cannot be constructed under transmission lines or over pipelines. A consideration that could affect future solar development is the need for future corridor capacity within the three designated corridors. As presently proposed, capacity for future electrical transmission lines or pipelines would be restricted by solar energy development. This is an administrative conflict that can be addressed by the BLM through its planning process, but there would be implications either for the amount of potential solar energy development that could be accommodated within the SEZ, or the amount of additional corridor capacity available for future development.

Existing dirt roads located in the SEZ would be closed wherever solar development facilities are developed, and access to public lands not developed for solar energy could be affected. This could adversely affect public land users wishing to access any areas isolated by solar development unless provision of alternate access is retained or provided.

11.3.2.2.2 Transmission Facilities and Other Off-Site Infrastructure

An existing 500-kV transmission line runs through 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. If a connecting transmission line were constructed in a different location outside of the SEZ in the future, 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.

Road access to the SEZ is readily available from U.S. 93 and I-15, so it is anticipated there would be no additional land disturbance outside the SEZ associated with road construction to provide access to the SEZ.

Roads and power lines would be constructed within the SEZ as part of the development of solar energy facilities.

11.3.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

There are no SEZ specific design features proposed to protect lands and realty resources. Implementing the programmatic design features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program would provide some mitigation for some identified impacts. The exceptions may be the development of the SEZ would establish a large industrial area that would exclude many existing and potential uses of the land, perhaps in perpetuity.

11.3.3 Specially Designated Areas and Lands with Wilderness Characteristics

11.3.3.1 Affected Environment

There are 9 specially designated areas within 25 mi (40 km) of the proposed Dry Lake SEZ that potentially could be affected by solar energy development within the SEZ, principally from impacts on scenic, recreation, and/or wilderness resources. It is not anticipated that any of these areas would experience increased visitation impacts associated with SEZ development. The Meadow Valley Range and Mormon Mountains WAs and the Lake Mead NRA are not considered further because of the small amount of acreage with visibility of the SEZ, the long distance from the SEZ, and the percentage of the total acreage of the areas with visibility of the SEZ is less than 1%. The ACECs included in the list below have scenic values as one of the components supporting the designation. The Hidden Valley, Coyote Springs, Arrow Canyon, Mormon Mesa, and Kane Springs ACECs that are within 25 mi (40 km) of the SEZ are not being analyzed because they were designated to protect either critical desert tortoise habitat, or paleontological, cultural, or geologic resources that would not be affected by solar development within the SEZ. The specially designated areas that could be affected from solar development within the SEZ include the following (see Figure 11.3.3.1-1):

- Wilderness Areas
  - Arrow Canyon
  - Muddy Mountains

- Areas of Critical Environmental Concern
  - Rainbow Gardens
  - River Mountains

- National Wildlife Refuges
  - Desert National Wildlife Range
  - Moapa Valley

- National Trail
  - Old Spanish Trail

- Scenic Byway
  - Bitter Springs Backcountry Byway

- State Park
  - Valley of Fire

No lands within 25 mi (40 km) of the SEZ and outside of designated wilderness areas have been identified by the BLM to be managed to protect wilderness characteristics.

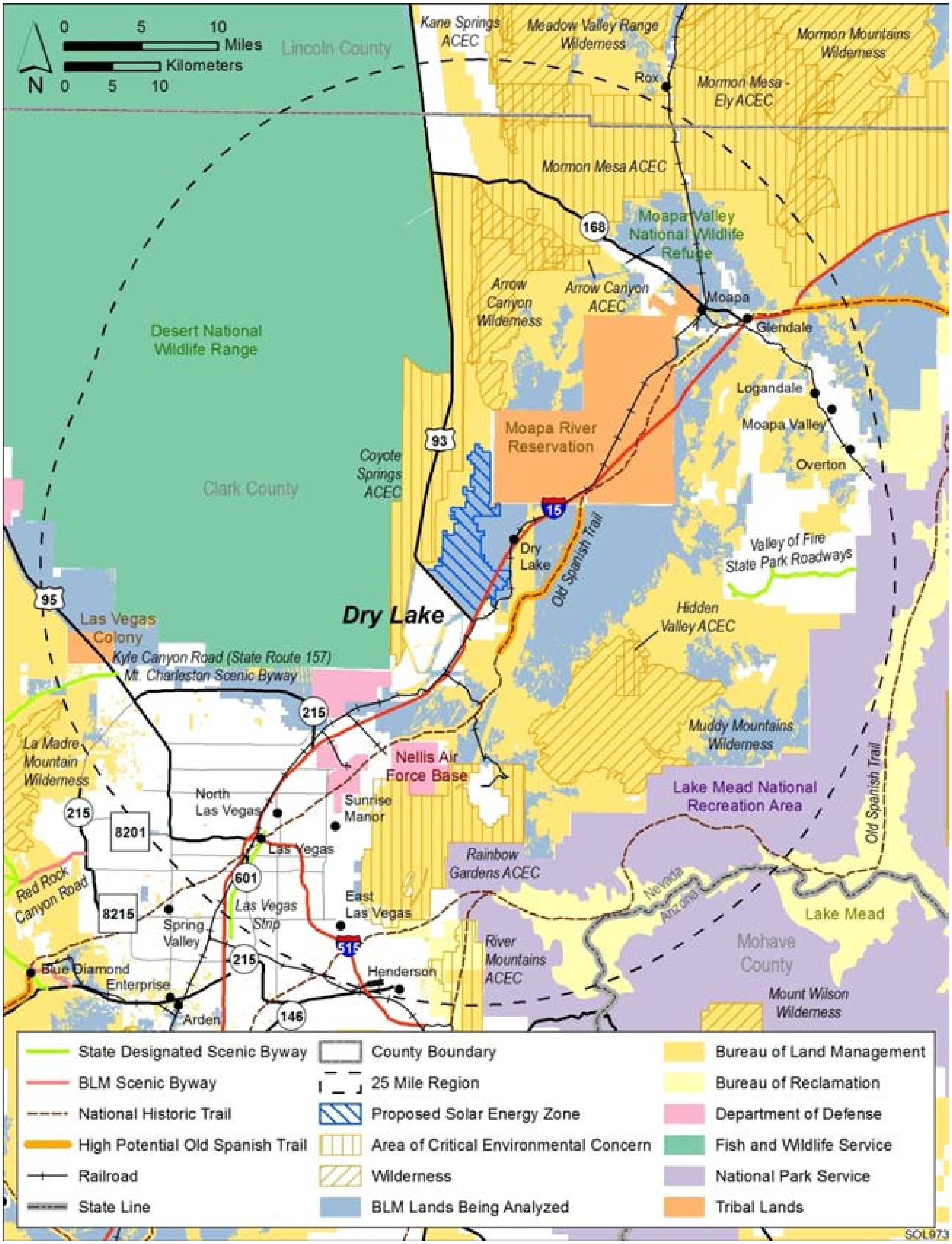

FIGURE 11.3.3.1-1 Specially Designated Areas in the Vicinity of the Proposed Dry Lake SEZ

11.3.3.2 Impacts

11.3.3.2.1 Construction and Operations

The primary potential impact on the remaining specially designated areas near the SEZ would be from visual impacts of solar energy development that could affect scenic, recreational, or wilderness characteristics of the areas. The visual impact on specially designated areas 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 factor in the viewshed from portions of these specially designated areas, as summarized in Table 11.3.3.2-1. The data provided in the table assume the use of 198-m (650-ft) 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. Viewshed analysis for this SEZ has shown that the visual impacts of shorter solar energy facilities would be slightly less than for power tower technology that is used for the analysis (see Section 11.3.14 for more detail on all viewshed analysis discussed in this section). Assessment of the visual impact of solar energy projects must be conducted on a site-specific and technology-specific basis to accurately identify impacts.

In general, the closer a viewer is to solar development, the greater the impact on an individual's perception. From a visual analysis perspective, the most sensitive viewing distances generally are from 0 to 5 mi (0 to 8 km). 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 or scenic experience within these areas could be expected to be more adversely affected than those simply traveling along a highway with another destination in mind. In the case of the Dry Lake SEZ, the low-lying location of the SEZ in relation to some of the surrounding specially designated areas, especially the Muddy Mountains and Arrow Canyon WAs, would highlight the industrial-like development in the SEZ.

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 that were used 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.

Wilderness Areas

Arrow Canyon. The southernmost portion of the Arrow Canyon WA is less than 2.5 mi (4 km) north of the northernmost portion of the SEZ. About 1,500 acres (6.1 km^2), or about 5%, of the WA within about 9 mi (14 km) are within the SEZ viewshed. Mountains of the Arrow Canyon Range just south of the WA screen views of the SEZ from all but the highest elevations of the southern peaks in the WA. From a few of these peaks, nearly open views of the SEZ exist,

TABLE 11.3.3.2-1 Potentially Affected Specially Designated Areas within a 25-mi (40-km) Viewshed of the Proposed Dry Lake SEZ, Assuming Power Tower Solar Technology and a Target Height of 650 ft (198.1 ha)

		Feature Area or Highway Length		
			Visible within	
Feature Type	Feature Name (Total Acreage/Linear Distance)[a]	Visible within 5 mi	5 mi and 15 mi	15 mi and 25 mi
WAs	Arrow Canyon (27,521 acres)	764 acres (2.8%)[b]	1,485 acres (5.4%)	1,485 acres (5.4%)
	Muddy Mountains (44,522 acres)	0 acres	5,764 acres (13%)	5,764 acres (13%)
ACECs	Rainbow Gardens (38,777 acres)	0 acres	680 acres (1.8%)	844 acres (2.2%)
	River Mountains (10,950 acres)	0 acres	0 acres	1,962 acres (18%)
Wildlife Refuges	Desert (1,626,903 acres)	12,098 acres (0.7%)	45,730 acres (2.8%)	51,276 acres (3.2%)
	Moapa Valley (117 acres)	0 acres	0 acres	0 acres
National Trail	Old Spanish Trail (high-potential segment)	11 mi	0 mi	1 mi
Scenic Highway	Bitter Springs (28 mi)	0 mi	9.5 mi	0 mi
State Park	Valley of Fire (36,000 acres)	0 acres	727 acres (2%)	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 acreage or road length viewable.

looking down the narrow north–south axis of the SEZ; from those viewpoints, solar facilities would cause moderate to strong contrast levels with the surrounding terrain. It is anticipated that in the portions of the WA with views of the SEZ within 5 mi (8 km) of the SEZ, wilderness characteristics would likely be adversely affected. These effects would be restricted to less than 3% of the WA. It is possible that areas visible out to 9 mi (14 km) could be adversely affected, but because of the visual orientation along the narrow axis of the SEZ, it is not clear this would be the case.

Muddy Mountains. The Muddy Mountains WA is located about 7 mi (11 km) southeast of the SEZ at the point of closest approach. Within the WA, solar facilities within the SEZ could be visible from an area of about 5,800 acres (23.5 km^2) scattered throughout the peaks of much of the western half of the WA out to a distance of about 12 mi (19 km) from the SEZ. The Dry Valley Range provides at least partial screening of the SEZ for views within the WA. However, for some of the higher peaks closer to the SEZ, a substantial portion of the SEZ would be in view over the mountains of the Dry Lake Range, and for some viewpoints within the WA, the SEZ would stretch across most of the horizontal field of view, and strong visual contrast would be expected as a result. Because of the anticipated strong contrast and a clear view into the largest portion of the SEZ, it is anticipated that wilderness characteristics in the portions of the WA closest to the SEZ would be adversely affected. The presence of existing development within the SEZ, especially the new power plant under construction, and the presence of the freeway and existing power line development within the SEZ that are visible from the WA may moderate the impact of solar development.

Areas of Critical Environmental Concern

Rainbow Gardens. The Rainbow Gardens ACEC, which was designated to protect geological, scientific, cultural, sensitive plants, and scenic resources is located 9 mi (24.5 km) south of the SEZ. Within the ACEC, solar facilities within the SEZ could be visible from about 2.2% of the area, and this visibility is scattered through several areas of the northwestern portion of the area, generally at the summits and on north-facing slopes of Sunrise and Frenchman Mountains, and neighboring peaks and ridges. From these high-elevation viewpoints, views of the SEZ are over the tops of mountains in the Dry Lake Range and hills more directly south of the SEZ. Although the viewpoints are 1,000 to 2,000 ft (305 to 610 m) above the elevation of the SEZ, the vertical angle of view is low, and the SEZ is partially screened by intervening topography. In addition, the views are along the SEZs' relatively narrow north–south axis, so that the SEZ occupies only a small portion of the horizontal field of view; consequently, only weak visual contrast is expected from solar facilities within the SEZ. On the basis of this assessment, it is anticipated that there would be no effect on this ACEC from solar construction within the SEZ.

River Mountains. The River Mountains ACEC is located about 20 mi (32 km) south of the SEZ. The ACEC was designated to protect the scenic viewshed for Henderson and Boulder City located south of the ACEC and to protect bighorn sheep habitat. From within the ACEC, solar facilities within the SEZ could be distantly visible from an area of about 2,000 acres (8.1 km^2) scattered among the peaks and ridge tops within the area. Because of the long distance to the SEZ and screening of much of the SEZ by intervening topography, minimal levels of visual contrast would be expected for viewpoints in the ACEC, and it is anticipated that there would be no effect within the ACEC from construction within the SEZ; the reasons for which the area was designated would also not be affected.

Wildlife Refuges

Desert Wildlife Refuge. The refuge was established to protect and perpetuate the desert bighorn sheep and its habitat. The refuge contains habitat for many species, and there also are many recreational opportunities available. The refuge is located a little more than 2 mi (3 km) west of the SEZ at the point of closest approach, beyond the Arrow Canyon Range, and extends beyond the 25-mi (40-km) viewshed of the SEZ. Within the refuge, areas with visibility of solar facilities within the SEZ would include the eastern slopes of mountains and ridges of the Las Vegas Range on the east side of the refuge, primarily within 10 mi (16 km) of the SEZ, but extending in a few areas to beyond 20 mi (32 km) into the refuge. Public access to the refuge is restricted to the eastern third of the area, and strong visual contrast would be expected for some viewpoints that look into the SEZ. Lower elevation viewpoints would be more subject to screening by the mountains of the Arrow Canyon Range, and lower contrast levels would therefore be expected. While the major purpose of the refuge would not be disrupted by the presence of solar facilities in the SEZ, it is possible that some of the areas closest to the SEZ could become less attractive to recreational visitors who currently access these areas. It is not anticipated that this would result in a significant impact on recreational use of the refuge nor would there be any effect on the major purpose of the refuge.

Moapa Valley. This is a very small refuge that was established for the protection of the Moapa dace, a small endangered fish. The refuge is located about 15 mi (24 km) northeast of the SEZ. The principle concern for the refuge is the maintenance of adequate water flows to sustain the dace and to protect its habitat. Groundwater withdrawals within the SEZ to support solar operations could create concern over the long-term impacts on maintenance of the refuge. Water withdrawals in the basin are currently controlled and monitored by the Nevada State Engineer. See Section 11.3.12 for more detailed information on ecological issues associated with the maintenance of adequate groundwater flows within the region surrounding the SEZ. The implementation of design features and complete avoidance or limitations of groundwater withdrawals from the regional groundwater system would reduce impacts on the Moapa dace and other special status species residing in thermal springs of the Moapa Valley.

National Trail

Old Spanish National Historic Trail. About 30 mi (48 km) of the Old Spanish National Historic Trail are within the SEZ viewshed to the east and northeast of the SEZ. Much of this segment of the trail has been identified as having high potential for future management for protection and interpretation of the trail. For all but 5 mi (8 km), visibility of solar facilities within the SEZ would be limited to the upper portions of power towers, and expected visual contrast levels in these portions of the trail would likely be minimal or very weak. The SEZ would be visible from the trail in a number of places, but the segment with full visibility of solar facilities within the SEZ is a 5-mi (8 km) stretch roughly paralleling the SEZ's eastern boundary, and 3 to 5 mi (5 to 8 km) east of the SEZ. For much of this segment, views of the SEZ would be partially screened by the Dry Lake Range, but some portions of the SEZ would be visible through gaps in the range and beyond the northern end of the range. Visual contrast levels are expected to be minimal to weak, but a site-specific analysis would be required prior to any solar project construction. Potential impacts on the historical setting of the trail and future management of the trail are unknown at this time.

Scenic Byway

Bitter Springs Backcountry Byway. This BLM 28-mi (45-km) designated byway is located about 7 mi (11 km) east from the nearest boundary of the SEZ. About 9.5 mi (15.3 km) of the byway is within the viewshed of the SEZ before it enters the Muddy Mountains. Views of solar development within the SEZ from the byway would be generally very low angle. No impact on the use of the byway from construction of solar facilities within the SEZ is anticipated.

Nevada State Park

Valley of Fire. This is Nevada's oldest and largest state park and it includes about 36,000 acres (146 km^2). The western boundary of the park is about 14 mi (23 km) from the SEZ. Visual analysis indicates that the southwestern corner of the state park could have some limited visibility of taller solar power towers constructed in the SEZ on about 727 acres (3 km^2), or 2% of the park. Overall contrast levels associated with solar facilities would be low, and it is not anticipated that there would be an adverse impact on the use of the park.

11.3.3.2.2 Transmission Facilities and Other Off-Site Infrastructure

Because of the availability of an existing transmission line and road access to the SEZ, no additional construction of transmission or road facilities was assessed. Should additional transmission lines be required outside of the SEZ, there may be additional impacts to specially designated areas. See Section 11.3.1.2 for the development assumptions underlying this analysis.

11.3.3.3 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 mitigation for some identified impacts. The exceptions may be the adverse impacts on wilderness characteristics in up to 3% of the Arrow Canyon and 13% of the Muddy Mountains WAs that would not be completely mitigated.

A proposed design feature specific to the Dry Lake SEZ is as follows:

- Design features for visual resources as described in Section 11.3.14 should be applied to minimize adverse visual impacts.

11.3.4 Rangeland Resources

Rangeland resources managed by the BLM on BLM-administered lands include livestock grazing and habitat for wild horses and burros. These resources and possible impacts on them from solar development within the proposed Dry Lake SEZ are discussed in Sections 11.3.4.1 and 11.3.4.2.

11.3.4.1 Livestock and Grazing

11.3.4.1.1 Affected Environment

Three grazing allotments overlapped the proposed SEZ, but they were closed to grazing in the 1998 ROD for the Las Vegas Resource Management Plan (BLM 1998).

11.3.4.1.2 Impacts

Because the Dry Lake SEZ does not contain any active grazing allotments, solar energy development within the SEZ would have no impact on livestock and grazing.

11.3.4.1.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

11.3.4.2 Wild Horses and Burros

11.3.4.2.1 Affected Environment

Section 4.4.2 discusses wild horses (*Equus caballus*) and burros (*E. asinus*) that occur within the six-state study area. Nearly 100 wild horse and burro herd management areas (HMAs) occur within Nevada (BLM 2009f). Five HMAs in Nevada are located wholly or partially within the 50-mi (80-km) SEZ region for the proposed Dry Lake SEZ; while one HMA in Arizona also occurs partially within the SEZ region (BLM 2010a) (Figure 11.3.4.2-1). None of the HMAs occur within the SEZ or within the area of indirect effects. The Muddy Mountains HMA is the closest HMA. It occurs about 8 mi (13 km) east of the Dry Lake SEZ (Figure 11.3.4.2-1).

In addition to the HMAs managed by the BLM, the USFS has 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 Dry Lake SEZ is the Spring Mountain Territory, located within a portion of the

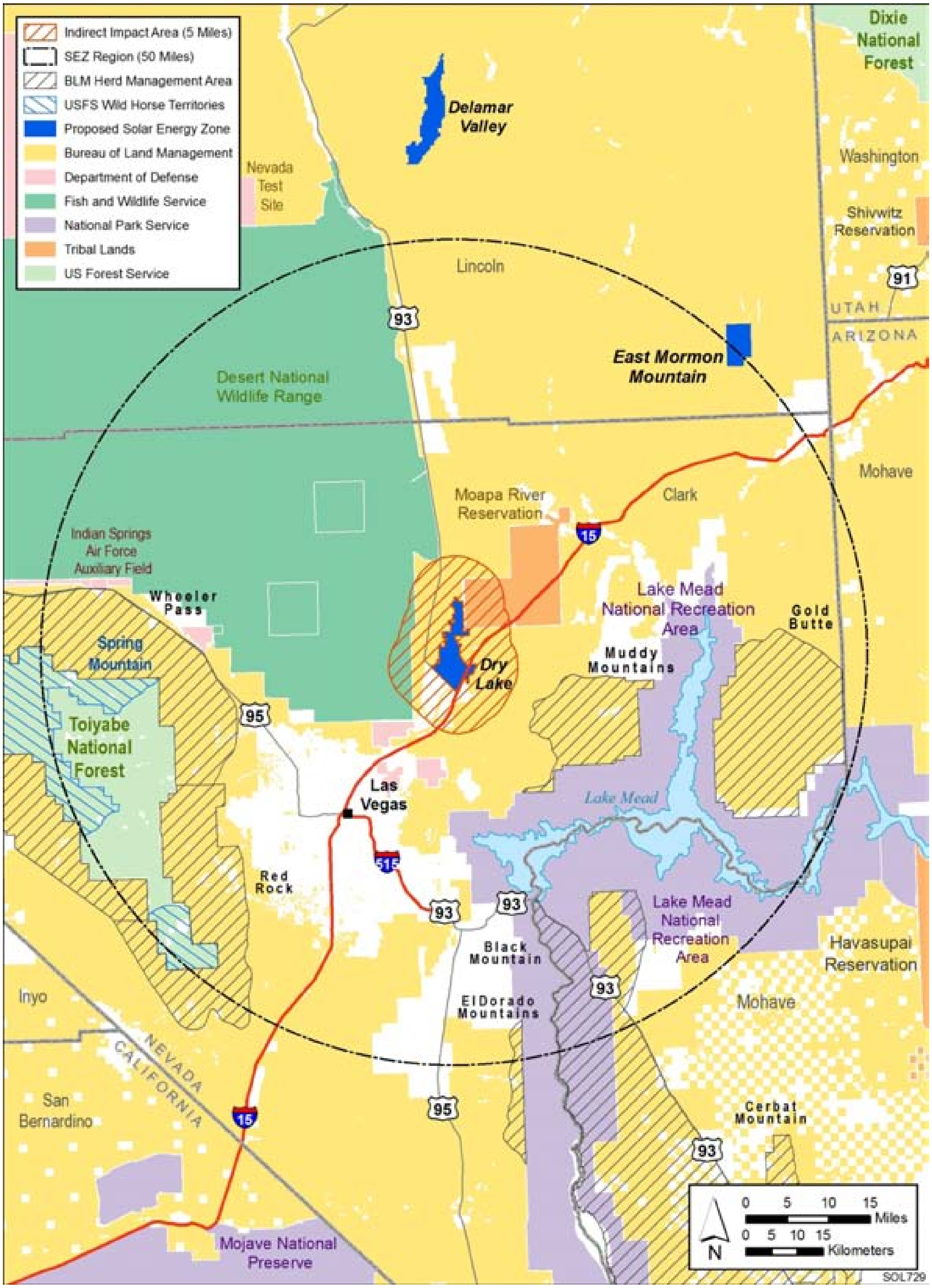

FIGURE 11.3.4.2-1 Wild Horse and Burro Herd Management Areas and Territories within the Analysis Area for the Proposed Dry Lake SEZ (Sources: BLM 2009f; USFS 2007)

Toiyabe National Forest. The closest portion of this territory is located about 33 mi (53 km) west of the proposed Dry Lake SEZ (Figure 11.3.4.2-1).

11.3.4.2.2 Impacts

Because the proposed Dry Lake SEZ is about 8 mi (13 km) or more from any wild horse and burro HMA managed by the BLM and more than about 33 mi (53 km) from any wild horse and burro territory administered by the USFS, solar energy development within the SEZ would not directly or indirectly affect wild horses and burros that are managed by these agencies.

11.3.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features for solar development within the proposed Dry Lake SEZ would be necessary to protect or minimize impacts on wild horses and burros.

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11.3.5 Recreation

11.3.5.1 Affected Environment

The site of the proposed Dry Lake SEZ is an easily accessible area, close to Las Vegas, that is flat with numerous roads and trails that provide access into the area. Although there are no recreation data available, the area appears to offer limited opportunities for recreation, although backcountry driving, OHV use of the roads and trails, and recreational shooting are evident in the area. The area may also support some limited camping and hunting opportunities. OHV use in the SEZ and surrounding area has been designated as "Limited to existing roads, trails, and dry washes" (BLM 2010b).

11.3.5.2 Impacts

Construction and Operations

Recreational use would be eliminated from portions of the SEZ developed for solar energy production, and existing recreational users would be displaced. Although there are no recreational use figures for the area, the area is not a major recreation destination, and it is not anticipated that the loss of recreational opportunities would be significant. The area contains numerous roads and trails that access areas in and around the SEZ, and the potential exists for many of these roads and trails to be closed. This could adversely affect access to undeveloped areas within the SEZ and areas outside the SEZ. Whether recreational visitors would continue to use any remaining undeveloped portions of the SEZ, or how the use of areas surrounding the SEZ would change, is unknown.

Because of the presence of solar development within the SEZ, it is possible that some of the specially designated areas closest to the SEZ could become less attractive to recreational visitors who currently access these areas. It is not anticipated that this would result in a significant impact on recreational use.

Solar development within the SEZ would affect public access along OHV routes designated open and available for public use. If open OHV routes within the SEZ were identified during project-specific analyses, they would be re-designated as closed (see Section 5.5.1 for more details on how routes coinciding with proposed solar facilities would be treated).

Transmission Facilities and Other Off-Site Infrastructure

Because of the availability of an existing transmission line and road access to the SEZ, no additional construction of transmission or road facilities was assessed. Should additional transmission lines be required outside of the SEZ, there may be additional impacts to specially designated areas. See Section 11.3.1.2 for the development assumptions underlying this analysis.

11.3.5.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ specific design features to protect recreation resources would be required. 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 that recreational use of the area developed for solar energy production would be lost and would not be mitigated.

11.3.6 Military and Civilian Aviation

11.3.6.1 Affected Environment

The proposed Dry Lake SEZ is not located under any military airspace, nor is it identified as a DoD Consultation Area in BLM land records. It is located about 13.5 mi (22 km) northeast of Nellis Air Force Base, which is one of the largest fighter bases in the world. While not located under designated military airspace, the area is close to airspace that is used for military aircraft approaches and departures from Nellis.

The nearest public airport is the North Las Vegas Airport, a regional airport about a 21-mi (34-km) drive to the southwest of the SEZ. The airport does not have scheduled commercial passenger service but caters to smaller private and business aircraft (Clark County Department of Aviation 2010a). Farther to the south in Las Vegas, McCarran International Airport is served by all major U.S. airlines and is the major airport in the area.

11.3.6.2 Impacts

The Command at Nellis Air Force Base has commented that approaches/departures from runways at Nellis may be affected by solar towers or other tall structures that could be located in the SEZ. In addition, because of the nature of testing at the NTTR located to the west and north of the SEZ, the military has indicated that solar technologies requiring structures higher than 50 ft (15 m) AGL may present unacceptable electromagnetic compatibility concerns for its test mission. The NTTR has commented that a pristine testing environment is required for the unique national security missions conducted on the NTTR.

The North Las Vegas and McCarran International airports are located far enough away from the facility that there would be no effect on their operations.

11.3.6.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ specific design features are required to protect either military airspace or civilian aviation operations. The programmatic design features described in Appendix A, Section A.2.2, would require early coordination with the DoD to identify and mitigate, if possible, potential impacts on the use of MTRs.

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11.3.7 Geologic Setting and Soil Resources

11.3.7.1 Affected Environment

11.3.7.1.1 Geologic Setting

Regional Setting

The proposed Dry Lake SEZ is located in Dry Lake Valley, a northeast-trending closed basin within the Basin and Range physiographic province in southern Nevada. The valley is bounded on the west by the Arrow Canyon Range and on the southeast by the Dry Lake Range (Figure 11.3.7.1-1). Dry Lake Valley is one of many structural basins (grabens) typical of the Basin and Range province.

Exposed sediments in Dry Lake Valley consist mainly of modern alluvial and eolian deposits (Qa) (Figure 11.3.7.1-2). Playa lake sediments at Dry Lake (Qp) occur in the valley's center. The surrounding mountains are composed predominantly of Paleozoic carbonates (limestone and dolomite) and Tertiary volcaniclastic sedimentary rocks. The oldest rocks in the region are the Late Proterozoic to Cambrian metamorphic rocks (CZq) exposed along ridges within the Las Vegas Range to the west (Longwell et al. 1965).

Topography

Dry Lake Valley is an elongated basin covering an area of about 102,400 ac (414 km^2). Elevations along the valley axis range from about 2,200 ft (670 m) at its northern end and along the range fronts to about 1,970 ft (600 m) at its southern end near Dry Lake. Alluvial fan deposits occur along the valley margins and coalesce toward the valley center. The valley is drained by several unnamed ephemeral streams that terminate at the Alkali Flat and Dry Lake, a playa in the southern part of the valley.

The proposed Dry Lake SEZ is located in the southern part of Dry Lake Valley, between the Arrow Canyon Range to the west and the Dry Lake Range to the east (Figure 11.3.7.1-1). The terrain of the proposed SEZ site is relatively flat. Elevations range from about 2,556 ft (779 m) along the northwest-facing boundary to 1,985 ft (600 m) along the western edge of Dry Lake near the center of the SEZ (Figure 11.3.7.1-3).

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 Dry Lake SEZ. Solar project developers

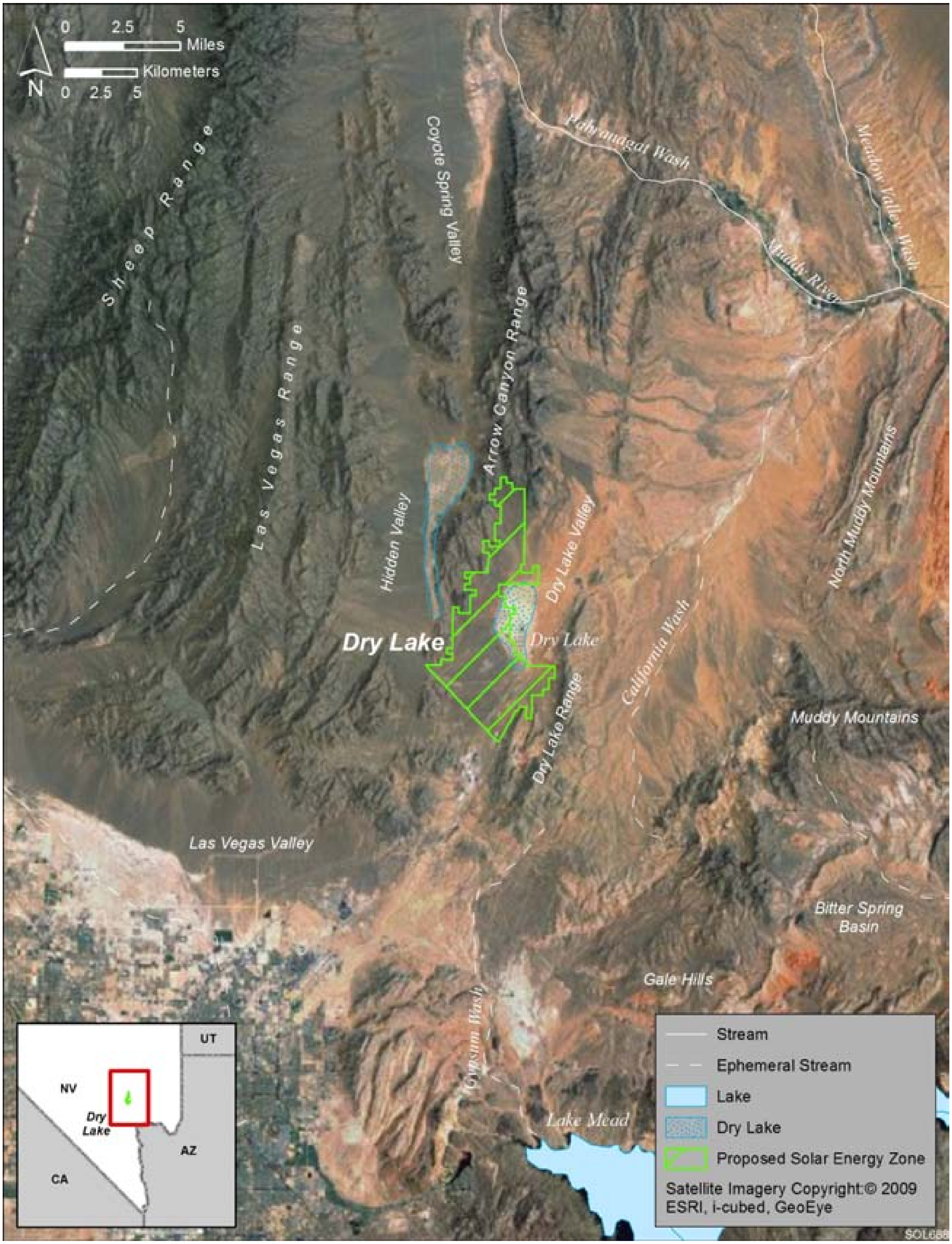

FIGURE 11.3.7.1-1 Physiographic Features of the Dry Lake Valley Region

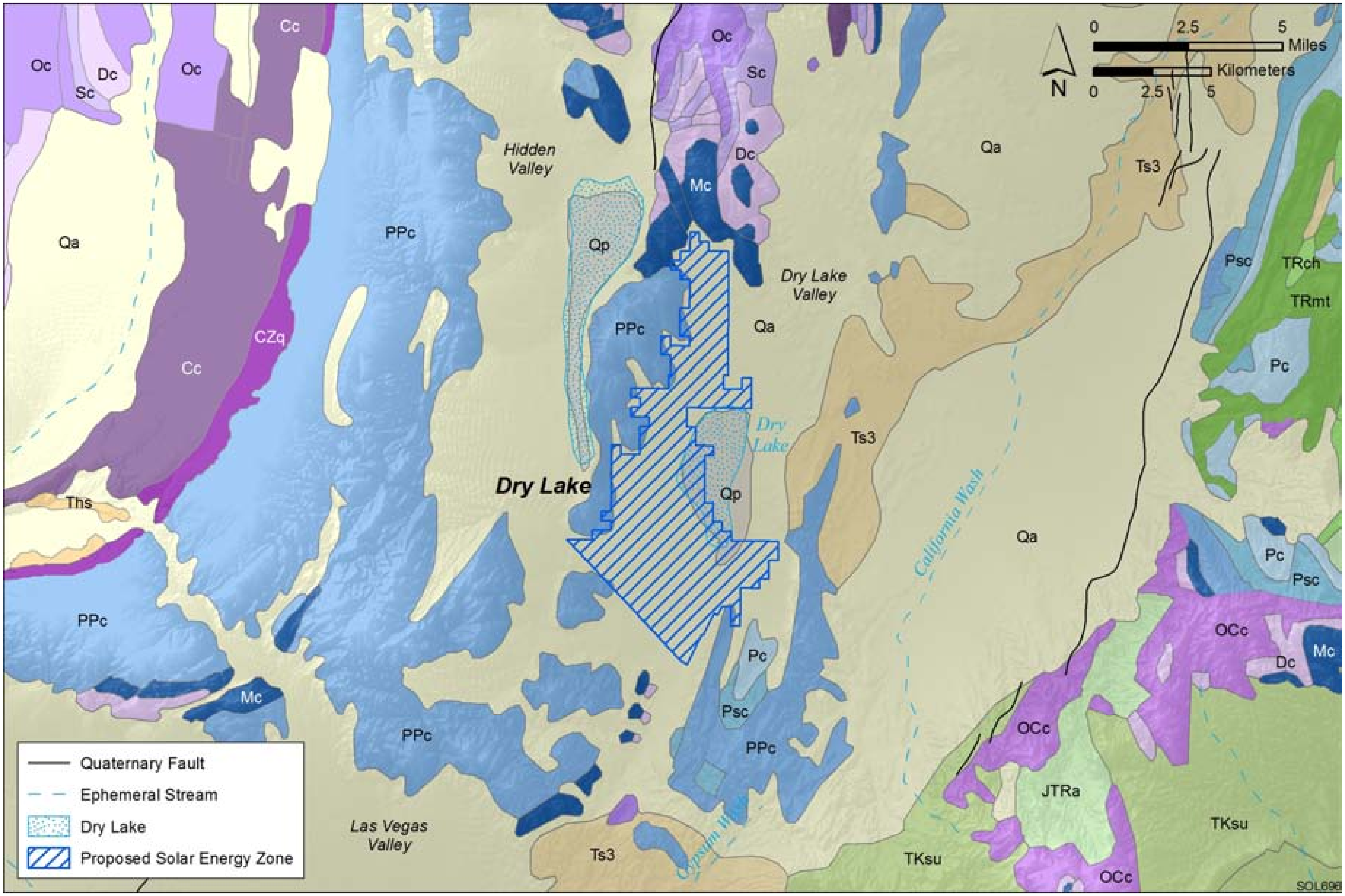

FIGURE 11.3.7.1-2 Geologic Map of the Dry Lake Valley Region (Sources: Ludington et al. 2007; Stewart and Carlson 1978)

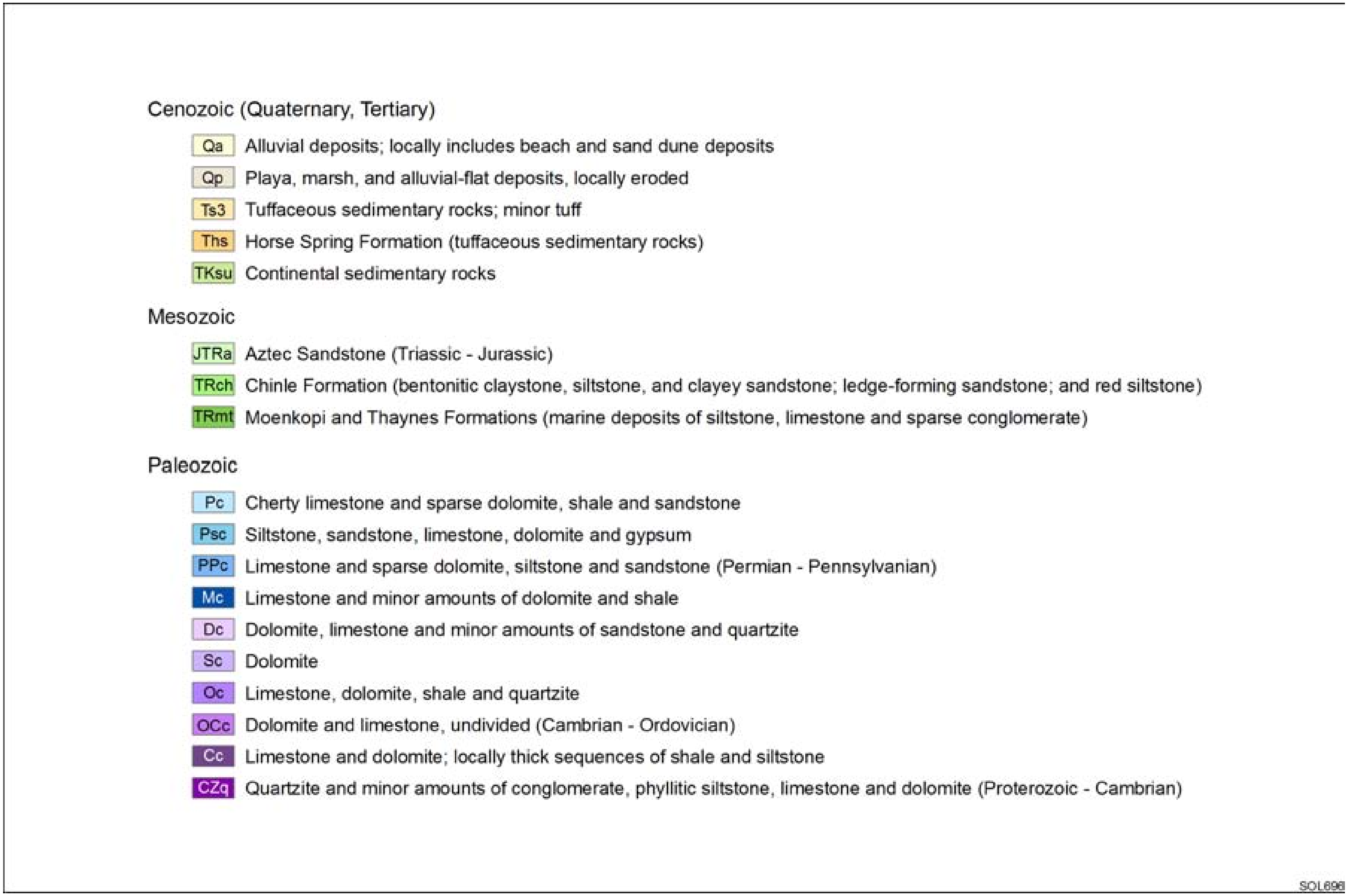

FIGURE 11.3.7.1-2 (Cont.)

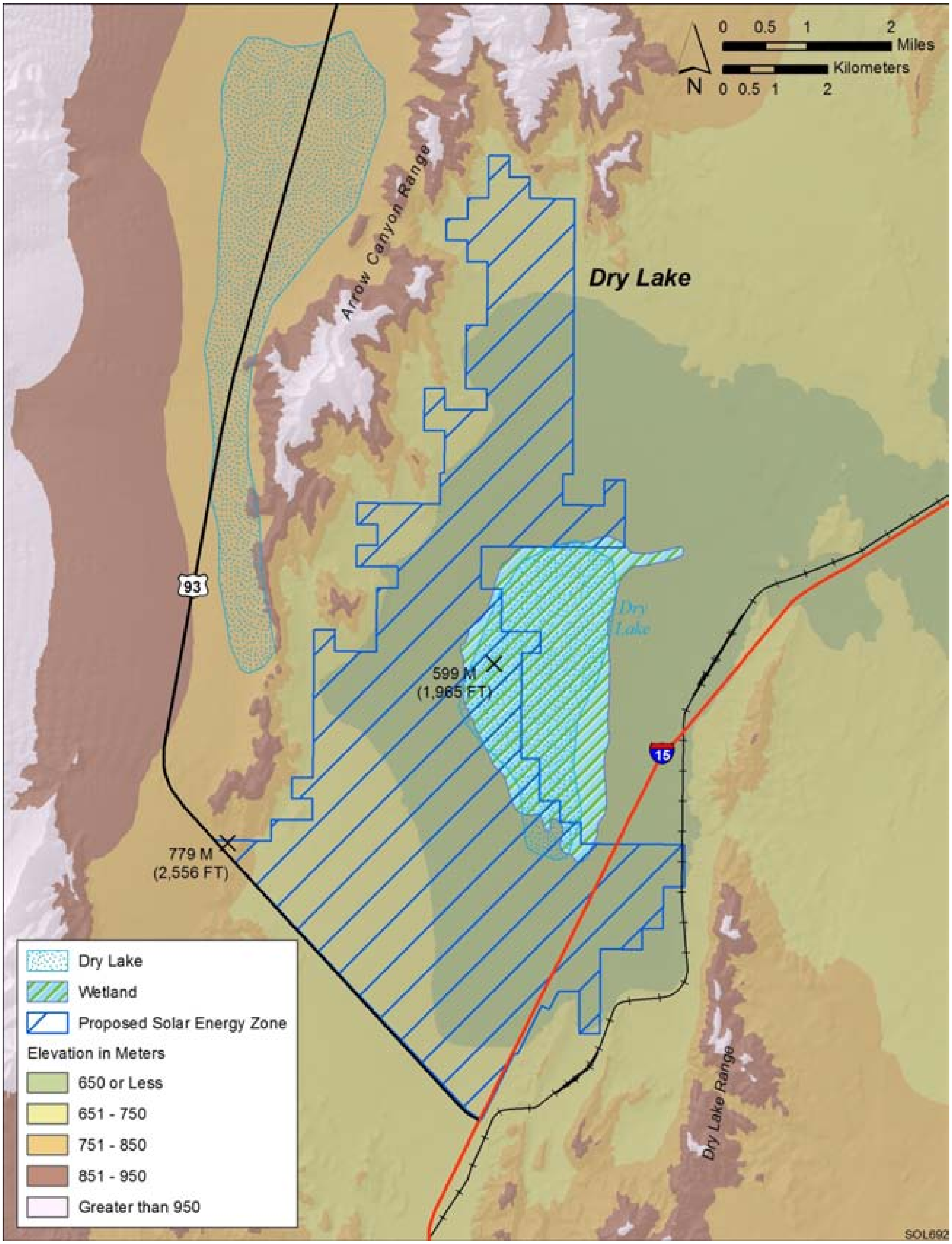

FIGURE 11.3.7.1-3 General Terrain of the Proposed Dry Lake SEZ

may need to conduct a geotechnical investigation to identify and assess geologic hazards locally to better identify facility design criteria and site-specific design features to minimize their risk.

Seismicity. Clark County is south of the Southern Nevada Seismic Belt (also called the Pahranagat Shear Zone), a south-southwest trending zone of seismic activity characterized mainly by background earthquakes (i.e., earthquakes not associated with surface expression) (DePolo and DePolo 1999). Although the region is seismically active, no Quaternary faults occur within or immediately adjacent to the proposed Dry Lake SEZ. The nearest Quaternary fault is the Arrow Canyon Range fault, a north-striking fault along the western edge of the Arrow Canyon Range a few miles north of the SEZ (Figure 11.3.7.1-4).

The Arrow Canyon Range fault is a major basin and range normal fault that forms an abrupt boundary between the down-dropped block (Hidden Valley) to the west and the east-tilting block of the Arrow Canyon Range to the east. Its trace is well defined, and fault-line scarps have been mapped at the 1:100,000 scale. The northern part of the fault cuts older alluvium of middle to early Pleistocene age and is covered by alluvial fan deposits of middle to late Pleistocene age, placing the age of most recent movement at less than 1.6 million years. Slip rates along the fault are estimated to be less than 0.2 mm/yr (Anderson 1998).

From June 1, 2000, to May 31, 2010, 51 earthquakes were recorded within a 61-mi (100-km) radius from the proposed Dry Lake SEZ (USGS 2010a). The largest earthquake during that period occurred on May 16, 2004. It was located about 50 mi (80 km) north of the SEZ in the Gregerson Basin (near the Delamar Mountains) and registered a Richter magnitude[1] (ML) of 4.5 (Figure 11.3.7.1-4). During this period, 24 (47%) of the recorded earthquakes within a 61-mi (100-km) radius of the SEZ had magnitudes greater than 3.0; none were greater than 4.5 (USGS 2010a).

Liquefaction. The proposed Dry Lake SEZ is within an area where the peak horizontal acceleration with a 10% probability of exceedance in 50 years is between 0.09 and 0.10 g. Shaking associated with this level of acceleration is generally perceived as moderate to strong; however, the potential damage to structures is very light to light (USGS 2008).Given the very low intensity of ground shaking estimated for the area and the low incidence of historical seismicity in the region, the potential for liquefaction in sediments within and around the SEZ is also likely to be low.

Volcanic Hazards. Dry Lake Valley is located about 60 mi (100 km) southeast of the southwestern Nevada volcanic field, which consists of volcanic rocks (tuffs and lavas) of the Timber Mountain-Oasis Valley caldera complex and Silent Canyon and Black Mountain calderas

[1] Richter scale magnitude (ML) was the original magnitude defined by Richter and Gutenberg for local earthquakes in 1935. It was based on the maximum amplitude recorded on a Wood-Anderson torsion seismograph but is currently calculated for earthquakes with magnitudes ranging from 2 to 6, using modern instruments with adjustments (USGS 2010b).

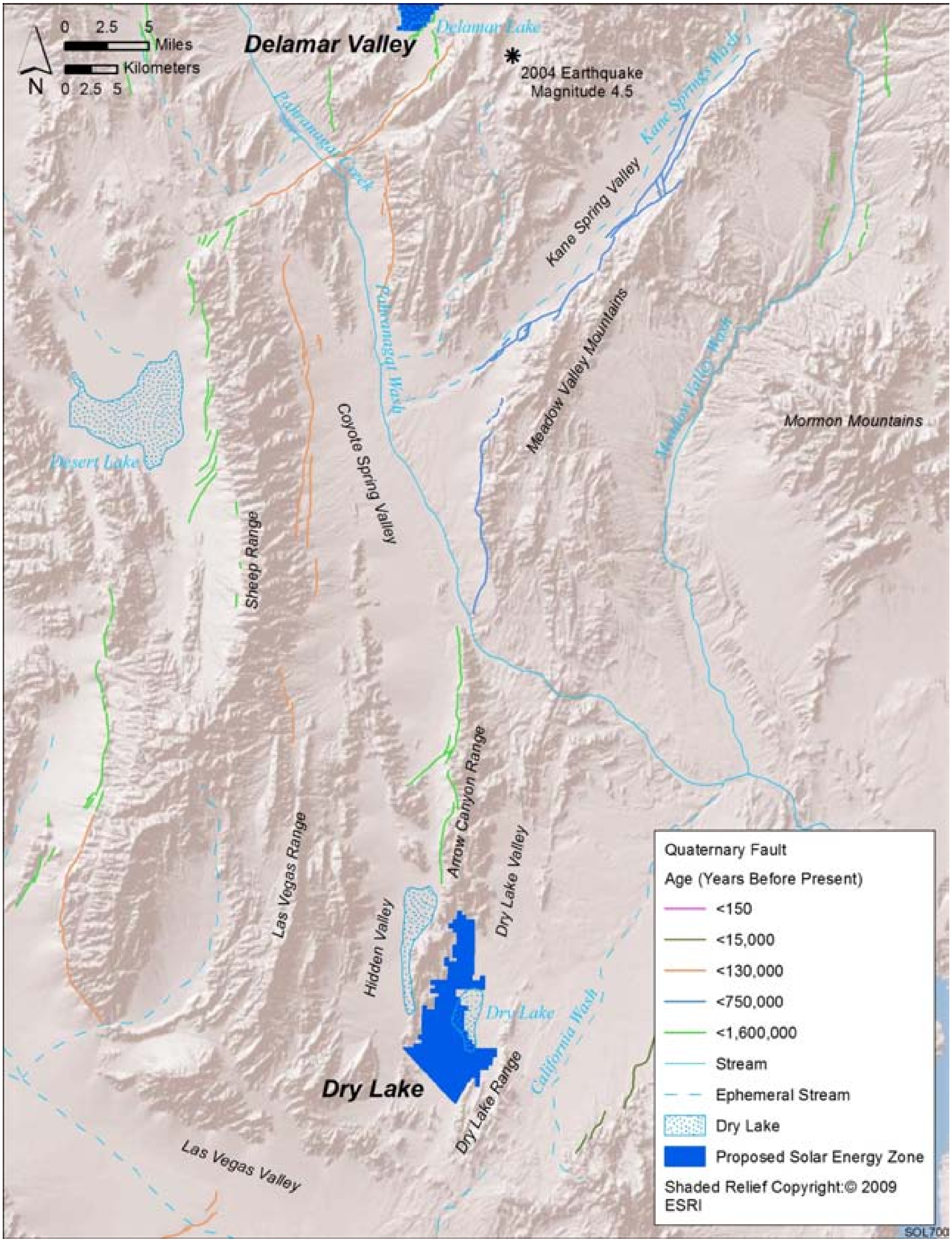

FIGURE 11.3.7.1-4 Quaternary Faults in the Dry Lake Valley Region (USGS and NBMG 2010; USGS 2010a)

(Figure 11.3.7.1-4). The area has been studied extensively because of its proximity to the NTS and Yucca Mountain repository. Two types of fields are present in the region: (1) large-volume, long-lived fields with a range of basalt types associated with more silicic volcanic rocks produced by melting of the lower crust, and (2) small-volume fields formed by scattered basaltic scoria cones during brief cycles of activity, called rift basalts because of their association with extensional structural features. The basalts of the region typically belong to the second group; examples include the basalts of Silent Canyon and Sleeping Butte (Byers et al. 1989; Crowe et al. 1983).

The oldest basalts in the region were erupted during the waning stages of silicic volcanism in the southern Great Basin in the Late Miocene and are associated with silicic volcanic centers like Dome Mountain (the first group). Rates of basaltic volcanic activity in the region have been relatively constant but generally low. Basaltic eruptions occurred from 1.7 million to 700,000 years ago, creating the cinder cones within Crater Flat (Stuckless and O'Leary 2007). The most recent episode of basaltic eruptions occurred at the Lathrop Wells Cone complex about 80,000 years ago, a few miles east of the proposed Amargosa SEZ (Stuckless and O'Leary 2007). There has been no silicic volcanism in the region in the past 5 million years. Current silicic volcanic activity occurs entirely along the margins of the Great Basin (Crowe et al. 1983).

Crowe et al. (1983) determined that the annual probability of a volcanic event for the region is very low (3.3×10^{-10} to 4.7×10^{-8}), similar to the probability of 1.7×10^{-8} calculated for the proposed Yucca Mountain repository (Cline et al. 2005). The volcanic risk in the region is associated only with basaltic eruptions; the risk of more explosive silicic volcanism is negligible. Perry (2002) cites new hypotheses and geologic data that point to a possible increase in the recurrence rate (and thus the probability of disruption) of volcanism in the region. These include hypotheses of anomalously high strain rate episodes in the region and the presence of a regional mantle hot spot; and new aeromagnetic data that suggest as many as twelve previously unrecognized volcanoes may be buried in the alluvial-filled basins in the region.

Slope Stability and Land Subsidence. The incidence of rock falls and slope failures can be moderate to high along mountain fronts. Such events can present a hazard to facilities on the relatively flat terrain of valley floors, such as Dry Lake 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 taken place in Dry Lake Valley to date; however, earth fissures have been documented in the Las Vegas Valley around Las Vegas, about17 mi (27 km) southwest of the proposed Dry Lake SEZ. The fissures are likely the result of land subsidence caused by compaction of unconsolidated alluvial sediments due to groundwater withdrawal. Spatial distribution of fissures in the valley suggests that fissures are preferentially located near and along Quaternary faults, with 80% of fissures within 1,150 ft (350 m) of a known fault. The maximum subsidence measured for the period between 1963 and 1987 was about 5 ft (1.5 m). Since then, subsidence rates have declined by as much as 50 to 80%. The reduction in subsidence rates has been attributed to the effects of the artificial recharge program

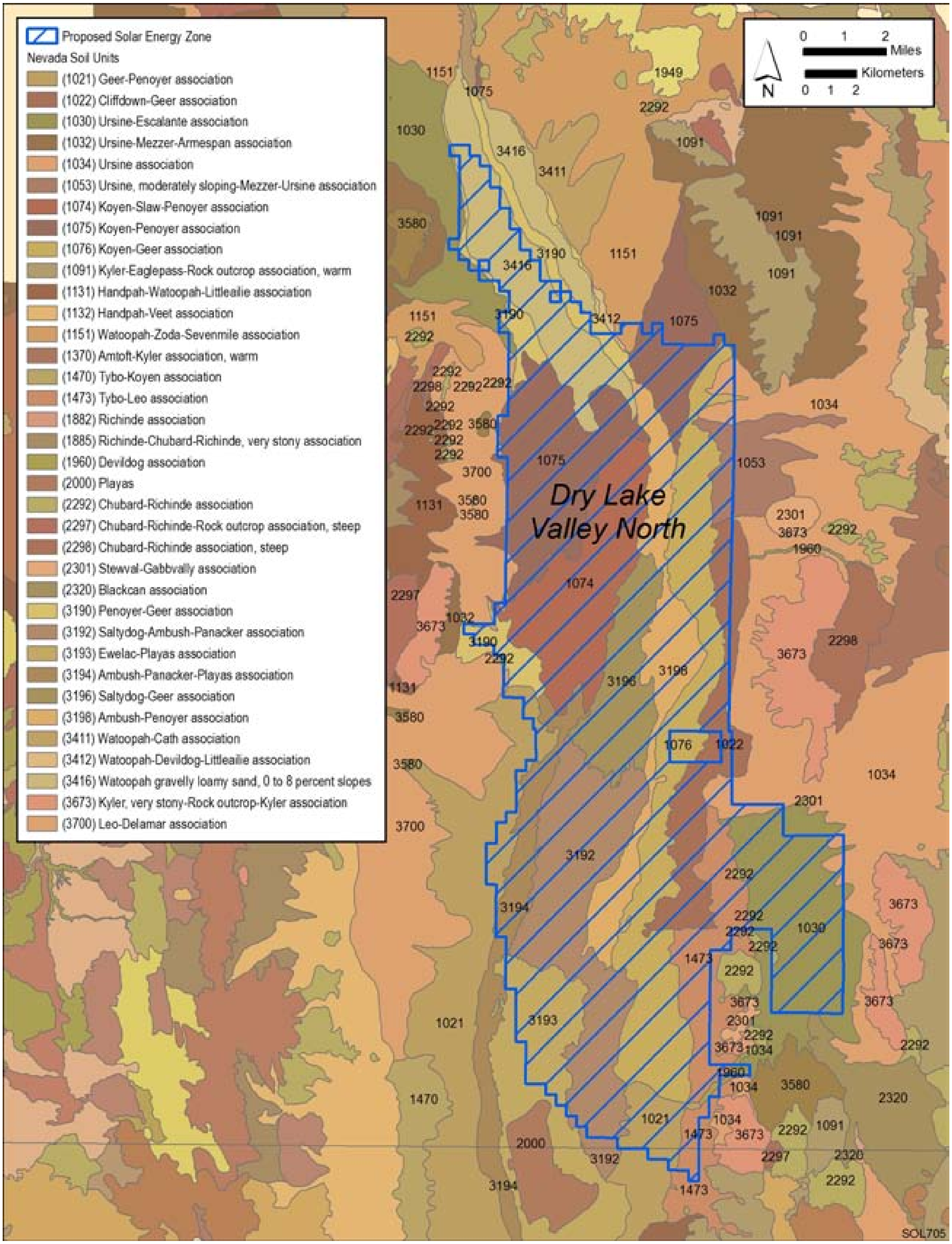

FIGURE 11.3.7.1-5 Soil Map for the Proposed Dry Lake SEZ (NRCS 2008)

(using water from Lake Mead) started in the 1990s, which has generally increased water levels in the region (Bell et al. 2002; Burbey 2002; Galloway et al. 1999).

Other Hazards. Other potential hazards at the proposed Dry Lake 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 pavement on soil surfaces may increase the likelihood of soil erosion by wind.

Alluvial fan surfaces, such as those found in Dry Lake 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., stream flow versus debris flow fans) will depend on the specific morphology of the fan (NRC 1996). Section 11.3.9.1.1 provides further discussion of flood risks within the proposed Dry Lake SEZ.

11.3.7.1.2 Soil Resources

Soils within the proposed Dry Lake SEZ are predominantly very gravelly and stony loams of the Colorock-Tonopah and Bard-Tonopah associations, which together make up about 68% of the soil coverage at the site (Figure 11.3.7.1-5). Soil map units within the proposed Dry Lake SEZ are described in Table 11.3.7.1-1. These gently to moderately sloping soils are derived alluvium from sedimentary rocks (mainly carbonates); some soils (particularly those of the Colorock series) have well developed pavements. They are characterized as deep and well to excessively drained. Most of the soils on the site have a high surface runoff potential and moderate permeability. The water erosion potential is low for all soils at the site except those within the playa (covering about 1% of the site). The susceptibility to wind erosion is moderate for most soils, with as much as 86 tons (78 metric tons) of soil eroded by wind per acre each year (NRCS 2010). Biological soil crusts and desert pavement have not been documented in the SEZ, but may be present.

None of the soils within the proposed Dry Lake SEZ is rated as hydric.[2] Except for the Ireteba loam, which covers about 851 acres (3.4 km^2) and has a frequent flooding rating (with a 50% chance in any year), flooding is rare for soils at the site but possible under unusual weather conditions (with a 1 to 5% chance in any year). None of the soils is classified as prime or unique farmland (NRCS 2010).

11.3.7.2 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 include soil compaction, soil horizon mixing, soil erosion and deposition by wind,

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2 A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding (NRCS 2010).

TABLE 11.3.7.1-1 Summary of Soil Map Units within the Proposed Dry Lake SEZ

Map Unit Symbol	Map Unit Name	Water Erosion Potential[a]	Wind Erosion Potential[b]	Description	Area, in Acres[c] (percent of SEZ)
469360	Colorock-Tonopah association, moderately sloping (2 to 8% slopes)	Low (0.24)	Moderate (WEG 6)[d]	Consists of about 55% Colorock very gravelly clay loam and 40% Tonopah gravelly sandy loam. Nearly level to gently sloping soils on fan remnants. Parent material is calcareous alluvium derived from sedimentary rock. Deep and well to excessively drained, with high surface runoff potential (very slow infiltration rate) and moderate permeability. Available water capacity is low. Moderate rutting hazard. Colorock soils have well developed pavements. Used mainly as rangeland, forestland, or wildlife habitat; unsuitable for cultivation.	8,777 (56)
469349	Bard-Tonopah association, gently sloping	Low (0.28)	Moderate (WEG 5)	Consists of about 60% Bard gravelly fine sandy loam and 30% Tonopah gravelly sandy loam. Gently sloping soils on fan remnants. Parent material is alluvium derived from limestone and dolomite. Shallow and deep, well to excessively drained, with high surface runoff potential (very slow infiltration rate) and moderate permeability. Available water capacity is very low. Moderate rutting hazard. Used mainly as rangeland, forestland, or wildlife habitat; unsuitable for cultivation.	1,814 (12)
469355	Bard very stony loam (2 to 4% slopes)	Low (0.28)	Moderate (WEG 5)	Nearly level to gently sloping soils on fan remnants. Parent material consists of alluvium derived from limestone and dolomite. Moderately deep and well drained, with high surface runoff potential (very slow infiltration rate) and high permeability. Available water capacity is very low. Moderate rutting hazard. Used mainly as rangeland, forestland, or wildlife habitat; unsuitable for cultivation.	1,546 (10)
469353	Bard gravelly fine sandy loam (2 to 8% slopes)	Low (0.20)	Moderate (WEG 4)	Nearly level to gently sloping soils on fan remnants. Parent material consists of alluvium derived from limestone and dolomite. Moderately deep and well drained, with high surface runoff potential (very slow infiltration rate) and high permeability. Available water capacity is very low. Moderate rutting hazard. Used mainly as rangeland, forestland, or wildlife habitat; unsuitable for cultivation.	1,189 (8)

TABLE 11.3.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential[a]	Wind Erosion Potential[b]	Description	Area, in Acres[c] (% of SEZ)
369381	Ireteba loam, overflow	Low (0.28)	Moderate (WEG 4)	Nearly level soils formed on floodplains. Parent material consists of alluvium derived from mixed sources. Moderately deep and well drained, with moderate surface runoff potential and moderate permeability Low resistance to compaction. Available water capacity is high. Severe rutting hazard. Used mainly as rangeland, forestland, or wildlife habitat; unsuitable for cultivation.	851 (5)
369380	Ireteba loam	Low (0.28)	Moderate (WEG 4)	Nearly level soils on fan remnants. Parent material consists of alluvium from mixed sources. Moderately deep and well drained, with moderate surface runoff potential and moderate permeability. Available water capacity is high. Used mainly as rangeland, forestland, or wildlife habitat; unsuitable for cultivation.	516 (3)
369379	Grapevine loam	Moderate (0.43)	Moderate (WEG 4)	Level to nearly level soils on fan piedmonts and alluvial flats. Very deep and well drained, with moderate surface runoff potential and moderate permeability. Parent material consists of mixed alluvium with some gypsum. Available water capacity is moderate. Used mainly as wildlife habitat and rangeland; unsuitable for cultivation.	415 (1)
369399	Rock land-St. Thomas association, very steep	Not rated	Not rated	Consists of about 60% rockland and 30% St. Thomas. Steeply sloping soils on mountain slopes. Parent material is colluvium derived from limestone and dolomite over residuum weathered from limestone and dolomite. Shrink-swell potential is low. Available water capacity is very low. Used mainly as rangeland, forestland, or wildlife habitat; unsuitable for cultivation.	226 (1)
369395	Playas	Moderate (0.37)	Moderate (WEG 4)	Moderately to strongly saline, very poorly drained silty clay loam (0 to 6 in.[e]) to silty clay (6 to 60 in.) formed on playas. Used mainly for wildlife habitat, watershed, and recreational and esthetic purposes.	195 (1)

TABLE 11.3.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential[a]	Wind Erosion Potential[b]	Description	Area, in Acres[c] (% of SEZ)
369354	Bard very gravelly fine sandy loam (2 to 15% slopes)	Low (0.10)	Moderate (WEG 6)	Moderately sloping soils formed on fan remnants. Parent material consists of alluvium derived from limestone and dolomite. Shallow to moderately deep and well drained, with high surface runoff potential (very slow infiltration rate) and high permeability. Available water capacity is very low. Slight rutting hazard. Used mainly as rangeland, forestland, or wildlife habitat; unsuitable for cultivation.	116 (<1)

[a] Water erosion potential rates based on soil erosion factor K, which indicates the susceptibility of soil to sheet and rill erosion by water. Values range from 0.02 to 0.69 and are provided in parentheses under the general rating; a higher value indicates a higher susceptibility to erosion. Estimates based on the percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity.

[b] Wind erosion potential here is based on the wind erodibility group (WEG) designation: groups 1 and 2, high; groups 3 through 6, moderate; and groups 7 and 8 low (see footnote d for further explanation).

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

[d] WEG = wind erodibility group. WEGs are based on soil texture, content of organic matter, effervescence of carbonates, content of rock fragments, and mineralogy, and also take into account soil moisture, surface cover, soil surface roughness, wind velocity and direction, and the length of unsheltered distance (USDA 2004). Groups range in value from 1 (most susceptible to wind erosion) to 8 (least susceptible to wind erosion). The NRCS provides a wind erodibility index, expressed as an erosion rate in tons per acre per year, for each of the wind erodibility groups: WEG 4, 86 tons (78 metric tons) per acre (4,000 m^2) per year; WEG 5, 56 tons (51 metric tons) per acre (4,000 m^2) per year; and WEG 6, 48 tons (44 metric tons) per acre (4,000 m^2) per year.

[e] To convert from in. to cm, multiply by 2.54.

Source: NRCS (2010).

soil erosion by water and surface runoff, sedimentation, and soil contamination. Such impacts are common to all utility-scale solar energy developments 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 since some components would involve greater disturbance and would take place over a longer timeframe.

11.3.7.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features were identified for soil resources at the proposed Dry Lake 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.

11.3.8 Minerals (Fluids, Solids, and Geothermal Resources)

11.3.8.1 Affected Environment

As of September 17, 2010, there were a number of active mining claims, both lode and placer located, in Sections 13 and 14, Township 18S, Range 63E, in the very southern tip of the proposed Dry Lake SEZ (BLM and USFS 2010a). There also is a mineral processing plant located in Section 13. The public land within the SEZ was closed to additional locatable mineral entry in June 2009, pending the outcome of this solar energy PEIS. There are no active oil and gas leases in the area, but all but a small portion of the area has been leased in the past (BLM and USFS 2010b). The area remains open for discretionary mineral leasing for oil and gas and other leasable minerals, and for disposal of salable minerals. There is no active or historical geothermal leasing or development in or near the SEZ (BLM and USFS 2010b).

11.3.8.2 Impacts

The existing mining claims in the southern portion of the SEZ represent prior existing rights and would likely make development of the encumbered parcels within the two sections unlikely. In addition, this same area already has numerous existing ROWs present, so it is not likely to be utilized for solar development.

If the area were identified as a solar energy zone, it would continue to be closed to all incompatible forms of mineral development. For the purpose of this analysis, it is assumed that future development of oil and gas resources would continue to be possible, since such development could occur with directional drilling from outside the SEZ. Since the remainder of the SEZ does not contain existing mining claims, it is also assumed that there would be no future loss of locatable mineral production. The production of common minerals, such as sand and gravel and mineral materials used for road construction or other purposes, might take place in areas not directly developed for solar energy production.

Since the SEZ has no history of leasing or development of geothermal resources, it is not anticipated that solar development would adversely affect development of geothermal resources.

11.3.8.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features are required to protect mineral resources. Implementing the programmatic design features described in Appendix A, Section A.2.2, as required under BLM’s Solar Energy Program would provide adequate protection mineral resources.

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11.3.9 Water Resources

11.3.9.1 Affected Environment

The proposed Dry Lake SEZ is located within the Lower Colorado-Lake Mead subbasin of the Lower Colorado River Basin hydrologic region (USGS 2010c) and the Basin and Range physiographic province, which is characterized by intermittent mountain ranges and desert valleys (Planert and Williams 1995). The proposed SEZ has surface elevations ranging between 1,970 and 2,560 ft (600 and 780 m). The Dry Lake SEZ is located within Garnet Valley Hydrographic Area (also referred to as Dry Lake Valley), a closed basin that is internally drained and underlain by alluvial deposits that fill the valley (Figure 11.3.9.1-1). The climate of Garnet Valley is arid; average annual precipitation is about 5 in. (13 cm) in the basin (WRCC 2010a). Evaporation rates are estimated to be 99 in. (251 cm) in the basin (Cowherd et al. 1988; WRCC 2010b).

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

The Dry Lake SEZ is located within the Garnet Valley Hydrographic Area, a closed basin that has an area of approximately 99,800 acres (404 km^2) and is not hydraulically connected to the Colorado River Basin (NDWR 1972). Surface water features within the proposed Dry Lake SEZ include three unnamed washes that lead to the remnants of a Pleistocene era dry lake (Figure 11.3.9.1-1) (NDWR 1972). Annual runoff from the mountains within the Garnet Valley is estimated to be 300 ac-ft/yr (370,000 m^3/yr) (Rush 1968). The basin is closed, so any water that runs off the mountains of the Garnet Valley Basin evaporates or infiltrates into the ground. The area of the dry lake is approximately 2,700 acres (11 km^2). To the east, in the adjacent California Wash Basin, the California Wash drains east to Muddy River, a tributary to the Colorado River.

Flood hazards within the SEZ include areas within the 100-year floodplain (Zone A) and areas outside the 500-year floodplain (Zone X) (FEMA 2009). Areas of the SEZ within the 100-year floodplain total 1,569 acres (6.3 km^2) and include the Pleistocene era dry lake and two washes that extend southwest from the dry lake. Flooding in parts of these areas occurs with an annual probability greater than or equal to 1%. In these areas, intermittent flooding may occur with temporary ponding and erosion. The rest of the proposed SEZ is estimated to be outside the 500-year floodplain, and has an annual probability of flooding of less than 0.2%.

A 3,310-acre (13-km^2) wetland area has been identified by the NWI in the vicinity of the dry lake, and approximately 1,022 acres (4.1 km^2) of the SEZ are part of the wetland area (USFWS 2009a). Further information regarding the wetlands near the SEZ is described in Section 11.3.10.1.

11.3.9.1.2 Groundwater

The proposed Dry Lake SEZ is located within the Garnet Valley groundwater basin (NDWR 2010a). The basin-fill aquifer in Garnet Valley consists of unconfined Quaternary-age

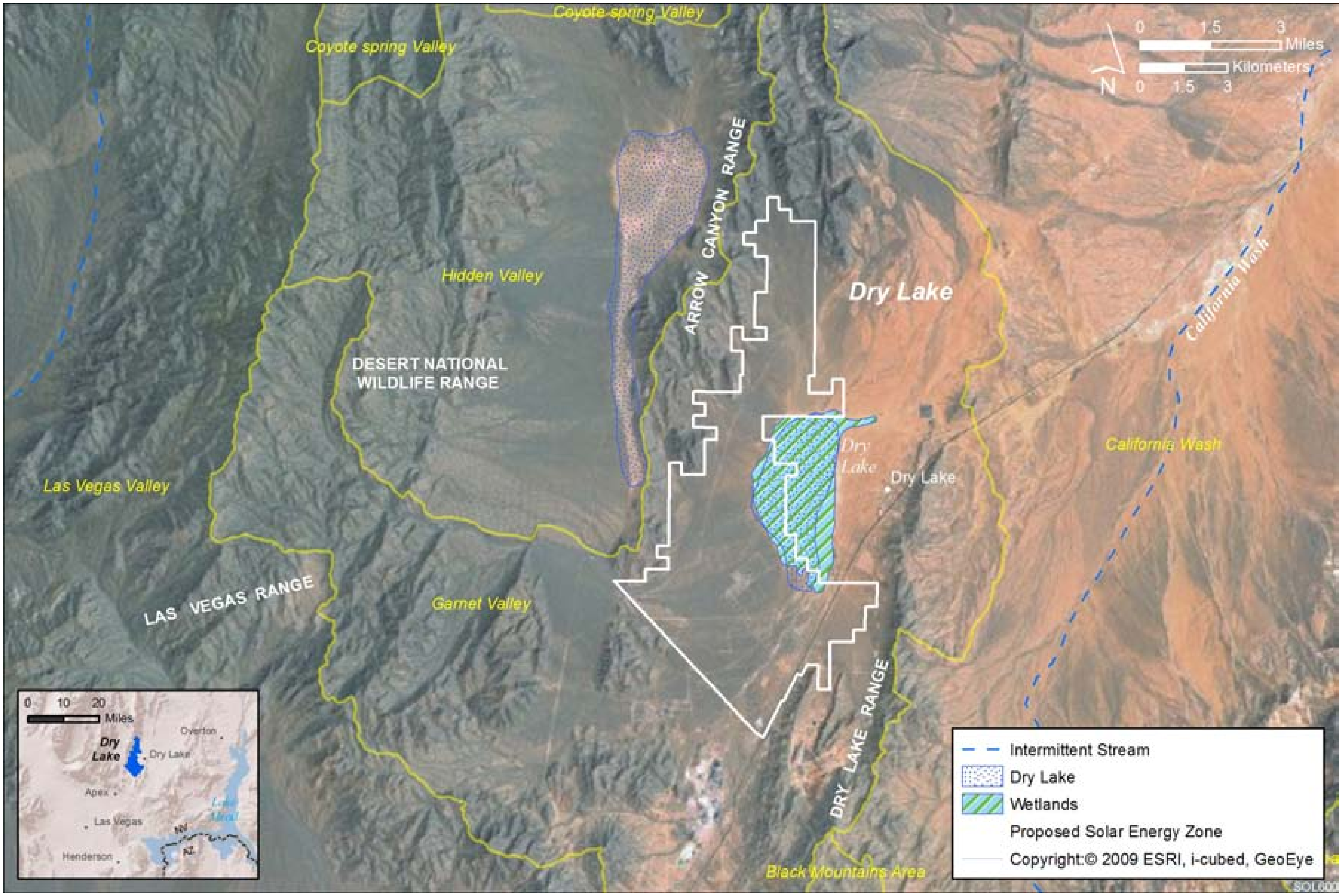

FIGURE 11.3.9.1-1 Surface Water Features near the Proposed Dry Lake SEZ

alluvium and lacustrine deposits of moderately well-sorted sand, silt, and clay. The younger alluvium is underlain by the Muddy Creek Formation consisting of gypsum and Pleistocene-age poorly sorted, semi-consolidated alluvium (Rush 1968). Alluvium thickness has been found to be between 900 and 1,500 ft (274 and 457 m) in the center of the basin, but likely averages around 600 ft (183 m) (Rush 1968). Thickness of suitable aquifer basin-fill materials was found to be between 50 and 200 ft (15 and 61 m) in the basin (Rush 1968). Transmissivity values have not been reported for the alluvium in the basin, but are estimated to be low, in general, with areas of coarser and more well-sorted materials being more conductive (Rush 1968).

Paleozoic carbonate rocks underlie the alluvium in the Garnet Valley basin and are present in the mountain ranges on the basin margins (Rush 1968; Burbey 1997). The Paleozoic carbonate rocks that underlay Garnet Valley basin are thought to be a part of the White River Groundwater Flow System, a regional-scale carbonate-rock aquifer that flows generally toward the south and terminates at Muddy River Springs and the Virgin River. The White River Groundwater Flow System is a part of a large carbonate-rock province that occurs within approximately one-third of Nevada, a large portion of Utah, and parts of Arizona and California (Harrill and Prudic 1998). Connectivity of the carbonate-rock aquifer system in Nevada is difficult to assess, due to the complex geologic history of compression and extensional forces that the rocks were subjected to long after they were deposited (Burbey 1997). Garnet Valley and the Hidden Valley basin to the north are studied together because of their similar properties and connectivity. Approximately 17,000 ft (5,200 m) of carbonate rocks were measured during exploratory drilling of the Arrow Canyon mountain range, which is thought to be one of the thickest sequences of carbonate rocks in southern Nevada (Burbey 1997). Connectivity of the carbonate rock systems in the Garnet Valley (and the adjacent Hidden Valley) basin with the rest of White River Groundwater Flow System is unclear. Fault systems to the east and west may impede groundwater flow between Garnet Valley and Las Vegas Valley to the west and California Wash basin to the east. However, the Garnet Valley/Hidden Valley groundwater system is thought to be connected to the Coyote Spring Valley basin to the north, as the isotopic characteristics of the water in Garnet Valley are similar to those of the White River Groundwater Flow System (Burbey 1997).

Groundwater discharge through evapotranspiration was estimated to be nonexistent in the Garnet Valley aquifer system (DeMeo et al. 2008). Groundwater recharge from precipitation on the valley floor and the surrounding mountains was estimated to be 400 ac-ft/yr (490,000 m^3/yr) (Rush 1968). Groundwater inflows from neighboring basins were estimated at 400 ac-ft/yr (490,000 m^3/yr) from the Hidden Valley groundwater basin, adjacent to the north/west (Rush 1968). Groundwater is estimated to discharge from the basin to the west into the California Wash groundwater basin at a rate of 800 ac-ft/yr (990,000 m^3/yr) (Rush 1968). Estimates of interbasin flows were estimated based on the amount of recharge received in the upstream basin, Hidden Valley, and in Garnet Valley to formulate the numbers presented in the report by Rush (1968).

Groundwater flows through the basin from the west to the east, through fractured carbonate rocks; however, the groundwater gradient is very flat (Rush 1968; Burbey 1997). Groundwater elevations were approximately 1,810 to 1,815 ft (552 to 553 m) in the year 2000, and were recorded at between 230 and 760 ft (70 and 230 m) below ground surface

(USGS 2010d). Water depths in some areas of the basin declined approximately 20 ft (6 m) between the 1950s and 1980s.

Groundwater quality in the Garnet Valley basin has been measured (one sample in each of four wells) and reported to the NWIS database (USGS 2010d). Concentrations of total dissolved solids (TDS) have been measured at between 950 and 1,010 mg/L, which is above the secondary MCL of 500 mg/L recommended by the EPA (2009d). Sulfate concentrations have been measured at between 330 to 370 mg/L, which is higher than secondary MCL. Iron, fluoride, and manganese concentrations also exceeded secondary MCLs in one well. The only well sampled for Radon-222 had a concentration of 530 pCi/L, which exceeds the primary MCL for alpha-emitting radioactive constituents of 15 pCi/L.

11.3.9.1.3 Water Use and Water Rights Management

In 2005, water withdrawals from surface waters and groundwater in Clark County were 680,000 ac-ft/yr (839 million m^3/yr), of which 83% came from surface waters and 17% came from groundwater. The largest water use category was public supply, at 526,000 ac-ft/yr (649 million m^3/yr). Thermoelectric water use accounted for 28,000 ac-ft/yr (34 million m^3/yr), with irrigation water use on the order of 17,000 ac-ft/yr (21 million m^3/yr) (Kenny et al. 2009). Municipal water use for the Las Vegas Valley Water District is listed as the primary water use (64%); other uses include industrial (20%), mining and milling (8%), quasi-municipal (5%), domestic (1%), and commercial (<1%) (NDWR 2010a; SNWA 2009).

All waters in Nevada are the property of the public in the State of Nevada and subject to the laws described in Nevada Revised Statutes, Chapters 532 through 538 (available at http://leg.state.nv.us/nrs). The NDWR, led by the State Engineer, is the agency responsible for managing both surface water and groundwater resources, which includes overseeing water right applications, appropriations, and interbasin transfers (NDWR 2010c). The two principle ideas behind water rights in Nevada are the prior appropriations doctrine and the concept of beneficial use. A water right establishes an appropriation amount and date such that more senior water rights have priority over newer water rights. In addition, water rights are treated as both real and personal property, such that water rights can be transferred without affecting the land ownership (NDWR 2010c). Water rights applications (new or transfer of existing) are approved if the water is available to be appropriated, if existing water rights will not be affected, and if the proposed use is not deemed to be harmful to the public interest. If these conditions are satisfied according to the State Engineer, proof of beneficial use of the approved water must be provided within a certain time period, and following that a certificate of appropriation is issued (BLM 2001).

The NDWR has the authority to designate preferred uses of groundwater in a basin, overriding the prior appropriation doctrine (BLM 2001). The NDWR generally does not grant water rights in a basin that is over-appropriated. However, in basins that may have alternative sources of water, groundwater rights can be temporarily granted in excess of the estimated recharge of the basin. For example, basins that may have access to Colorado River water in the future may be temporarily granted use of groundwater. Those permits may then be revoked at a later date when water becomes available from the Colorado River (BLM 2001). Interbasin transfers of water are possible within Nevada and are regulated by the NDWR (NDWR 2010c).

The proposed Dry Lake SEZ is located in the Garnett Valley groundwater basin (NDWR 2010a). The NDWR estimates the perennial yield for each groundwater basin as the amount of water that can be economically withdrawn for an indefinite period without depleting the source (NDWR 1999). The perennial yield for Garnett Valley was estimated to be 400 ac-ft/yr (490,000 m^3/yr) according to the study by Rush (1968) (NDWR 2010a). The Garnett Valley groundwater basin is over-appropriated with up to approximately 3,400 ac-ft/yr (4.2 million m^3/yr) committed for beneficial uses in Garnet Valley. However, groundwater withdrawals ranged from 797 to 1,558 ac-ft/yr (980,000 to 1.9 million m^3/yr) between 2001 and 2009, primarily for mining and industrial uses (NDWR 2010a,b). The Southern Nevada Water Authority (SNWA 2009) stated that the Las Vegas Valley Water District has leased the majority of their 2,200 ac-ft/yr (2.7 million m^3/yr) of groundwater rights in Garnet Valley to dry-cooled power plants in the area.

In 1990, Garnet Valley was designated as a groundwater basin by the State Engineer, and the preferred uses of groundwater were specified to exclude irrigation and to include the following uses: municipal, quasi-municipal, industrial, commercial, mining, stockwater, and wildlife purposes (NDWR 1990). In 2002, the State Engineer issued Order 1169 stating that new applications for water in the carbonate-rock aquifer systems within Garnet Valley would be suspended to allow further study of the system (NDWR 2002). An additional 44,500 ac-ft/yr (55 million m^3/yr) of water rights have been applied for within the basin and are under consideration by the NDWR (NDWR 2010b). These water rights applications are currently being held in abeyance per NDWR Order 1169 (NDWR 2002).

11.3.9.2 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, and 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 can also be degraded through the generation of wastewater, chemical spills, increased erosion and sedimentation, and increased salinity (e.g., by the excessive withdrawal from aquifers).

11.3.9.2.1 Land Disturbance Impacts on Water Resources

Impacts related to land disturbance activities are common to all utility-scale solar energy developments, 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 programmatic design features described in Appendix A, Section A.2.2. Land disturbance activities should be avoided to the extent possible in the vicinity of the dry lake, 100-year flood plain, and ephemeral wash areas within the SEZ. The area of the 100-year floodplain totals 1,569 acres (6.3 km^2) of the proposed Dry Lake SEZ. Alterations to these systems could enhance erosion processes, disrupt groundwater recharge, and negatively affect plant and animal habitats associated with the ephemeral channels and the dry lake.

11.3.9.2.2 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 Dry Lake SEZ include the following:

- On the basis of a total area of 15,649 acres (63 km^2), it is assumed that two 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 disturbance for an individual solar facility during the peak construction year is 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, result in the potential to disturb up to 38% of the SEZ total area during the peak construction year; and

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

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 Dry Lake 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 11.3.9.2-1 and could be as high as 3,480 ac-ft (4.3 million m^3) in the peak construction year. The assumptions underlying these estimates for each solar energy technology are described in Appendix M. Groundwater wells would have to yield up to an estimated 2,160 gpm (8,200 L/min) to meet the estimated construction water requirements. These yields are on the order of a large-scale municipal or agricultural well, so multiple wells may be needed in order to obtain the water requirements (Harter 2003). In addition, up to 148 ac-ft (180,000 m^3) of sanitary wastewater generated on-site would need to be either treated on-site or sent to an off-site facility. The availability of groundwater, groundwater rights, and the impacts of groundwater withdrawal would need to be assessed during the site characterization phase of a solar development project. Obtaining water from an offsite source could be necessary for solar development projects.

Groundwater quality in the vicinity of the SEZ is known to have elevated concentrations of TDS and other constituents. If groundwater were to be used for potable supply during construction, it would need to be tested to verify the quality would comply with drinking water standards.

TABLE 11.3.9.2-1 Estimated Water Requirements during the Peak Construction Year for the Proposed Dry Lake SEZ

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Water use requirements[a]				
Fugitive dust control (ac-ft)[b,c]	2,260	3,390	3,390	3,390
Potable supply for workforce (ac-ft)	148	90	37	19
Total water use requirements (ac-ft)	2,408	3,480	3,428	3,409
Wastewater generated				
Sanitary wastewater (ac-ft)	148	90	37	19

[a] Assumptions of water use for fugitive dust control, potable supply for workforce, and wastewater generation are presented in Table M.9-1 (Appendix M).

[b] Fugitive dust control estimation assumes a local pan evaporation rate of 99 in./yr (251 cm/yr) (Cowherd et al. 1988; WRCC 2010a).

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

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 11.3.9.2-2). Water needs for cooling are a function of the type of cooling used (dry, hybrid, wet). Further refinements to water requirements for cooling would result from the percentage of time the option was employed (30 to 60% range assumed) and the power of the system. The differences between the water requirements reported in Table 11.3.9.2-2 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.

TABLE 11.3.9.2-2 Estimated Water Requirements during Operations at the Proposed Dry Lake SEZ

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Full build-out capacity (MW)[a,b]	2,504	1,391	1,391	1,391
Water use requirements				
Mirror/panel washing (ac-ft/yr)[c,d]	1,252	696	697	70
Potable supply for workforce (ac-ft/yr)	35	16	16	1.6
Dry cooling (ac-ft/yr)[e]	501–2,504	278–1,391	NA[f]	NA
Wet cooling (ac-ft/yr)[e]	11,267–36,306	6,260–20,170	NA	NA
Total water use requirements				
Non-cooled technologies (ac-ft/yr)	NA	NA	711	71
Dry-cooled technologies (ac-ft/yr)	1,788–3,791	989–2,102	NA	NA
Wet-cooled technologies (ac-ft/yr)	12,554–37,593	6,971–20,881	NA	NA
Wastewater generated				
Blowdown (ac-ft/yr)[g]	711	395	NA	NA
Sanitary wastewater (ac-ft/yr)	35	16	16	1.6

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 Table M.9-2 (Appendix M).

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 2009).

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.

At full build-out capacity, water needs for mirror/panel washing are estimated to range from 70 to 1,252 ac-ft/yr (86,000 to 1.5 million m^3/yr) and the workforce potable water supply from 1.6 to 35 ac-ft/yr (2,000 to 43,000 m^3/yr). The maximum total water usage during normal operation at full build-out capacity would be greatest for those technologies using the wet-cooling option and is estimated to be as high as 37,593 ac-ft/yr (46 million m^3/yr). Water usage for dry-cooling systems would be as high as 3,791 ac-ft/yr (4.7 million m^3/yr), approximately a factor of 10 times less than the wet-cooling option. Non-cooled technologies, dish engine and PV systems, require substantially less water at full build-out capacity, up to 711 ac-ft/yr (880,000 m^3/yr) for dish engine systems and 71 ac-ft/yr (86,000 m^3/yr) for PV systems (Table 11.3.9.2-2). Operations would produce up to 35 ac-ft/yr (43,000 m^3/yr) of sanitary wastewater; in addition, for wet-cooled technologies, 395 to 711 ac-ft/yr (490,000 to 880,000 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 were effectively lined in order to prevent any groundwater contamination.

Groundwater is the primary water resource available for solar energy development at the proposed Dry Lake SEZ. However, obtaining water from an off-site source could be necessary for solar development projects. At the level of full build-out, parabolic trough technologies that use wet cooling would use 32 to 94 times the amount of water of the estimated perennial yield of the Garnett Valley groundwater basin. Water use for technologies that use dry cooling would also exceed the perennial yield of the basin. If groundwater withdrawals exceeded the sustainable yield of the basin, then groundwater levels would decline in the basin, potentially leading to permanent loss of groundwater storage, land surface subsidence, and reduced inflows to the California Wash basin, which is within the Colorado River Basin watershed. Groundwater level declines could also affect flow in the White River Groundwater Flow System and impact groundwater discharge to the Muddy River Springs or the Virgin River. Groundwater may be available within the carbonate aquifer, but further study is needed to determine the connectivity of the system within Nevada and the potential impacts from large-scale groundwater withdrawals. Further, both new and current applications for groundwater rights are being held in abeyance per NDWR Order 1169. Also, 44,500 ac-ft/yr (55 million m^3/yr) of water rights that have been applied for within the basin and would be considered by the NDWR first before any applications for new water rights or transfer of existing water rights would be considered. Based on the information presented here, wet cooling and dry cooling for the full build-out scenario is not deemed feasible for the Dry Lake SEZ. To the extent possible, solar development projects should implement water conservation practices to limit water needs.

Groundwater quality in the vicinity of the SEZ is known to have elevated concentrations of TDS and other constituents. If groundwater were to be used for potable supply during construction, it would need to be tested to verify the quality would comply with drinking water standards.

Decommissioning/Reclamation

During decommissioning/reclamation, all surface structures associated with the solar project would be dismantled, and the site reclaimed to its pre-construction 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.

11.3.9.2.3 Off-Site Impacts: 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. The extent of the impacts on water resources would be proportional to the amount and location of land disturbance needed to connect the proposed SEZ to major roads and existing transmission lines. The proposed Dry Lake SEZ is located adjacent to existing roads and transmission lines as described in Section 11.3.1.2, so it is assumed that impacts would be negligible.

11.3.9.2.4 Summary of Impacts on Water Resources

The impacts on water resources associated with developing solar energy at the proposed Dry Lake SEZ are associated with land disturbance effects on the natural hydrology, water quality concerns, and water use requirements for the various solar energy technologies. Land disturbance activities can cause localized erosion and sedimentation issues, as well as altering groundwater recharge and discharge processes. Land disturbance activities should be avoided to the extent possible in the vicinity of the dry lake, 100-year flood plain, and ephemeral wash areas within the SEZ. Alterations to these systems could enhance erosion processes, disrupt groundwater recharge, and negatively affect plant and animal habitats associated with the ephemeral channels and the dry lake.

Impacts relating to 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) used. Groundwater is the primary water resource available to solar energy facilities in the proposed Dry Lake SEZ; however, aquifer characteristics and the basin's sustainable yield are not fully quantified. The estimates of groundwater recharge, discharge, underflow from adjacent basins, and historical data on groundwater extractions and groundwater surface elevations suggest that there may not be groundwater available to support the water-intensive technologies, such as those using wet or dry cooling. The basin's perennial yield is listed as 400 ac-ft/yr (490,000 m^3/yr), and current withdrawals from the basin are almost four times that estimated perennial yield (NDWR 2010a; NDWR 2010b). The estimate of basin's perennial yield for Garnet Valley is based on a report done in 1968, and does not include the yield of the carbonate aquifer beneath the basin fill in Garnet Valley. The quantity of water potentially available within the carbonate-rock aquifer is not well understood, and is currently being studied.

Currently, all applications for new water rights are on hold pending studies on the carbonate-rock aquifer system, per NDWR Order 1169. Water rights currently allocated by the

NDWR within the basin are over 8 times the estimated perennial yield of the basin-fill aquifer (NDWR 2010a). In addition, water rights applications are pending for another 44,500 ac-ft/yr (55 million m^3/yr) in water allocations from the basin. Obtaining new water rights or transfer of existing water rights within the Garnet Valley basin could present challenges for solar development. Given the information presented here, wet cooling and dry cooling for the full build-out scenario is not deemed feasible for the Dry Lake SEZ. To the extent possible, solar development projects should implement water conservation practices to limit water needs.

Groundwater quality in the vicinity of the SEZ is known to have elevated concentrations of TDS and other constituents. If groundwater were to be used for potable supply during construction, it would need to be tested to verify the quality would comply with drinking water standards.

11.3.9.3 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, will mitigate some impacts on water resources. Programmatic design features would focus on coordinating 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 conducting 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 Dry Lake SEZ include the following:

- Wet-cooling and dry-cooling options would not be feasible unless further hydrologic study of the basin reveals that more water is available, and other technologies should incorporate water conservation measures;

- Land-disturbance activities should avoid impacts to the extent possible in the vicinity of the ephemeral washes and the dry lake present on the site;

- Siting of solar facilities and construction activities should avoid areas identified as being within a 100-year floodplain, which totals 1,569 acres (6.3 km^2) of the proposed SEZ.

- Groundwater rights must be obtained from the NDWR;

- Stormwater management plans and BMPs should comply with standards developed by the Nevada Division of Environmental Protection (NDEP 2010);

- Groundwater monitoring and production wells should be constructed in accordance with state standards (NDWR 2006); and

- Water for potable uses would have to meet or be treated to meet water quality standards in accordance with the *Nevada Administrative Code* (445A.453-445A.455).

11.3.10 Vegetation

This section addresses vegetation that could occur or is known to occur within the potentially affected area of the proposed Dry Lake SEZ. The affected area considered in this assessment includes 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 includes 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 effects.

Indirect effects considered in the assessment include 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 from the SEZ. This area of indirect effects 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.

11.3.10.1 Affected Environment

The proposed Dry Lake SEZ is located primarily within the Creosotebush–Dominated Basins Level IV ecoregion (EPA 2007), which includes stream terraces, floodplains, alluvial fans, and eroded washes, as well as isolated hills, mesas, and buttes (Bryce et al. 2003). Plant communities are characterized by sparse creosotebush (*Larrea tridentata*), white bursage (*Ambrosia dumosa*), and big galleta grass (*Pleuraphis rigida*); cacti, yucca (*Yucca* sp.), ephedra (*Ephedra* sp.), and Indian ricegrass (*Achnatherum hymenoides*) are also common, although barren areas occur. In addition, mesquite (*Prosopis* sp.) and acacia (*Acacia* sp.) are present, and blackbrush (*Coleogyne ramosissima*) is common in areas near the Arid Footslopes ecoregion. Riparian habitats include desert willow (*Chilopsis linearis*), coyote willow (*Salix exigua*), and mesquite, with salt cedar (*Tamarix* sp.), a non-native shrub/tree invading riparian areas. Small areas of the northwestern margin of the SEZ are located in the Arid Footslopes Level IV ecoregion. This ecoregion supports a diverse but sparse mixture of Mojave desert forbs, succulents and shrubs, such as creosotebush, white bursage, *Yucca* species, including Joshua tree (*Yucca brevifolia*), winterfat (*Krascheninnikovia lanata*), spiny menodora (*Menodora spinescens*), Nevada ephedra (*Ephedra nevadensis*), big galleta, Indian ricegrass, and annual fescue (*Vulpia myuros*) on alluvial fans, basalt flows, hills, and low mountains (Bryce et al. 2003). Cacti, such as silver cholla (*Cylindropuntia echinocarpa*) and beavertail (*Opuntia basilaris*), occur in rocky areas. Annual plants are abundant with sufficient winter precipitation. The east-central portion of the SEZ is located within the Mojave Playas Level IV ecoregion, which includes broad, nearly level alluvial flats, muddy lake plains, low terraces, sand sheets, and sand dunes (Bryce et al. 2003). These playas are intermittently flooded and mostly barren, with sparse, scattered, highly salt-tolerant vegetation on the margins. Velvet ash (*Fraxinus velutina*), mesquite or other trees may occur on some playas with sufficient moisture. Scattered creosotebush occurs in some locations. Areas surrounding the SEZ include the Creosotebush–Dominated Basins and Arid Footslopes ecoregions.

These ecoregions are located within the Mojave Basin and Range Level III ecoregion (see Appendix I). This ecoregion is characterized by broad basins and scattered mountains. Communities of sparse, scattered shrubs and grasses including creosotebush, white bursage, and big galleta grass occur in basins; Joshua tree, other *Yucca* species, and cacti occur on arid footslopes; woodland and shrubland communities occur on mountain slopes, ridges, and hills (Bryce et al. 2003). Creosotebush, all-scale (*Atriplex polycarpa*), brittlebush (*Encelia farinosa*), desert holly (*Atriplex hymenelytra*), white burrobrush (*Hymenoclea salsola*), shadscale (*Atriplex confertifolia*), blackbrush, and Joshua tree are dominant species within the Mojave desertscrub biome (Turner 1994). Precipitation in the Mojave Desert occurs primarily in winter. Many ephemeral species (winter annuals) germinate in response to winter rains (Turner 1994). Annual precipitation in the vicinity of the SEZ is low, averaging about 6.5 in. (16.4 cm) at Valley of Fire State Park (see Section 11.3.13).

Land cover types described and mapped under the SWReGAP (USGS 2005a) 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 Dry Lake SEZ are shown in Figure 11.3.10.1-1. Table 11.3.10.1-1 lists the surface area of each cover type within the potentially affected area.

Sonora-Mojave Creosote-White Bursage Desert Scrub is the predominant cover type within the proposed Dry Lake SEZ. Additional cover types within the SEZ are given in Table 11.3.10.1-1. During an August 2009 visit to the site, creosotebush and white bursage were the dominant species observed in the desert scrub communities throughout most of the SEZ, with scattered Mojave yucca (*Yucca schidigera*) in some areas. A large dry lake playa in the central area of the SEZ was mostly barren, with saltbush (*Atriplex* sp.) along the perimeter. Thickets of honey mesquite (*Prosopis glandulosa*) occurred in swales near the playa. Cacti observed on the SEZ included teddybear cholla (*Cylindropuntia bigelovii*) and beavertail. Sensitive habitats on the SEZ include desert chenopod scrub/mixed salt desert scrub, desert dry washes, dry wash woodland, wetland, and playa. The area has a history of livestock grazing, and the plant communities on the SEZ have likely been affected by grazing.

The area of indirect effects, including the area within 5 mi (8 km) around the SEZ, includes 12 cover types, which are listed in Table 11.3.10.1-1. The predominant cover type in the area of indirect effects is Sonora-Mojave Creosote-White Bursage Desert Scrub.

One wetland mapped by the NWI is located within the central portion of the SEZ (USFWS 2009a) (Figure 11.3.10.1-2). NWI maps are produced from high-altitude imagery and are subject to uncertainties inherent in image interpretation (USFWS 2009a). This large sparsely vegetated lacustrine wetland, Dry Lake, is mapped primarily as North American Warm Desert Pavement, with small areas of Sonora-Mojave Creosote-White Bursage Desert Scrub, Sonora-Mojave Mixed Salt Desert Scrub, North American Warm Desert Playa, and North American Warm Desert Wash. Approximately 1,022 acres (4.1 km^2) of this 3,310.5-acre (13.4-km^2) wetland is located within the SEZ. The remaining portion is located entirely within the area of indirect effects. Numerous dry washes occur within the SEZ, terminating in the large playa. These washes do not support wetland habitats, but many support communities of mesquite and

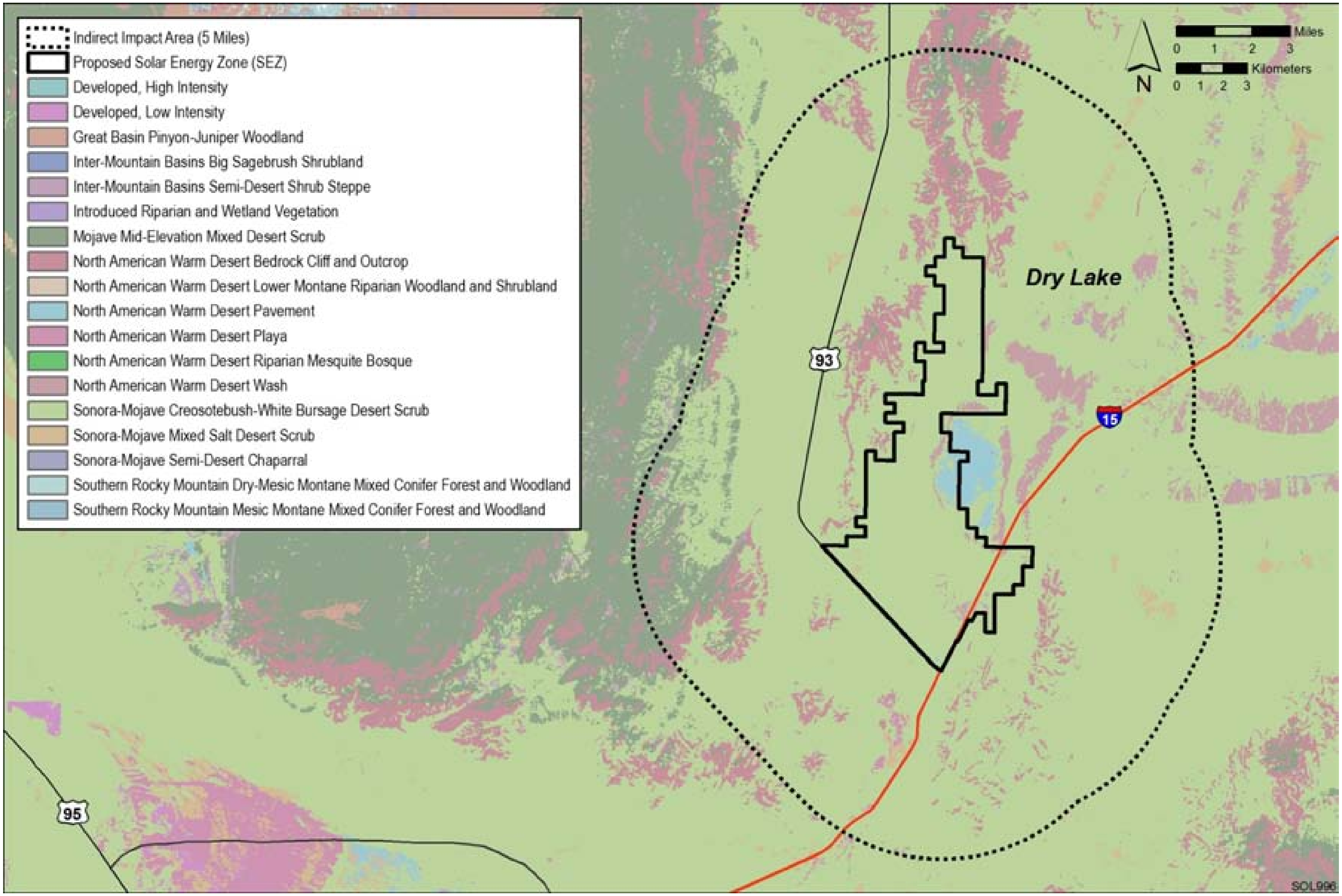

FIGURE 11.3.10.1-1 Land Cover Types within the Proposed Dry Lake SEZ (Source: USGS 2004)

TABLE 11.3.10.1-1 Land Cover Types within the Potentially Affected Area of the Proposed Dry Lake SEZ and Potential Impacts

Land Cover Type[a]	Area of Cover Type Affected (acres)[b] Within SEZ (Direct Effects)[c]	Area of Cover Type Affected (acres)[b] Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e]
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.	14,613 acres[f] (0.5%, 1.0%)	118,001 acres (4.1%)	Small
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.	430 acres (1.1%, 3.8%)	1,271 acres (3.1%)	Moderate
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.	429 acres (0.7%, 1.0%)	3,419 acres (5.4%)	Small
Developed, Medium-High Intensity: Includes housing and commercial/industrial development. Impervious surfaces compose 50 to 100% of the total land cover.	128 acres (0.7%, 4.3%)	441 acres (2.3%)	Small
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 co-dominant. Grasses occur at varying densities.	54 acres (0.1%, 0.3%)	1,064 acres (1.4%)	Small

TABLE 11.3.10.1-1 (Cont.)

	Area of Cover Type Affected (acres)[b]		
Land Cover Type[a]	Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e]
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.	2 acres (<0.1%, <0.1%)	295 acres (0.5%)	Small
North American Warm Desert Bedrock Cliff and Outcrop: Occurs on subalpine to foothill steep cliff faces, narrow canyons, rock outcrops, and 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.	0 acres	11,639 acres (3.5%)	Small
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	6,309 acres (0.7%)	Small
Inter-Mountain Basins Semi-Desert Shrub Steppe: Generally consists of perennial grasses with an open shrub and dwarf shrub layer.	0 acres	239 acres (0.5%)	Small
Introduced Riparian and Wetland Vegetation: Dominated by non-native riparian and wetland plant species.	0 acres	71 acres (0.5%)	Small
North American Warm Desert Riparian Mesquite Bosque: Occurs along perennial and intermittent streams as relatively dense riparian corridors composed of trees and shrubs. Honey mesquite (*Prosopis glandulosa*) and velvet mesquite (*P. velutina*) are the dominant trees. Vegetation is supported by groundwater when surface water is absent.	0 acres	7 acres (0.2%)	Small
Open Water: Plant or soil cover is generally less than 25%.	0 acres	1 acre (<0.1%)	Small

Footnotes on next page.

TABLE 11.3.10.1-1 (Cont.)

[a] Land cover descriptions are from USGS (2005a). Full descriptions of land cover types, including plant species, can be found in Appendix I.

[b] Area in acres, determined from USGS (2004).

[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 Nevada and Arizona. However, the SEZ and area of indirect effects occur only in Nevada.

[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 area of indirect effects 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 ($\leq$1%) of the cover type within the SEZ region would be lost; (2) *moderate*: an intermediate proportion (>1 but $\leq$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.

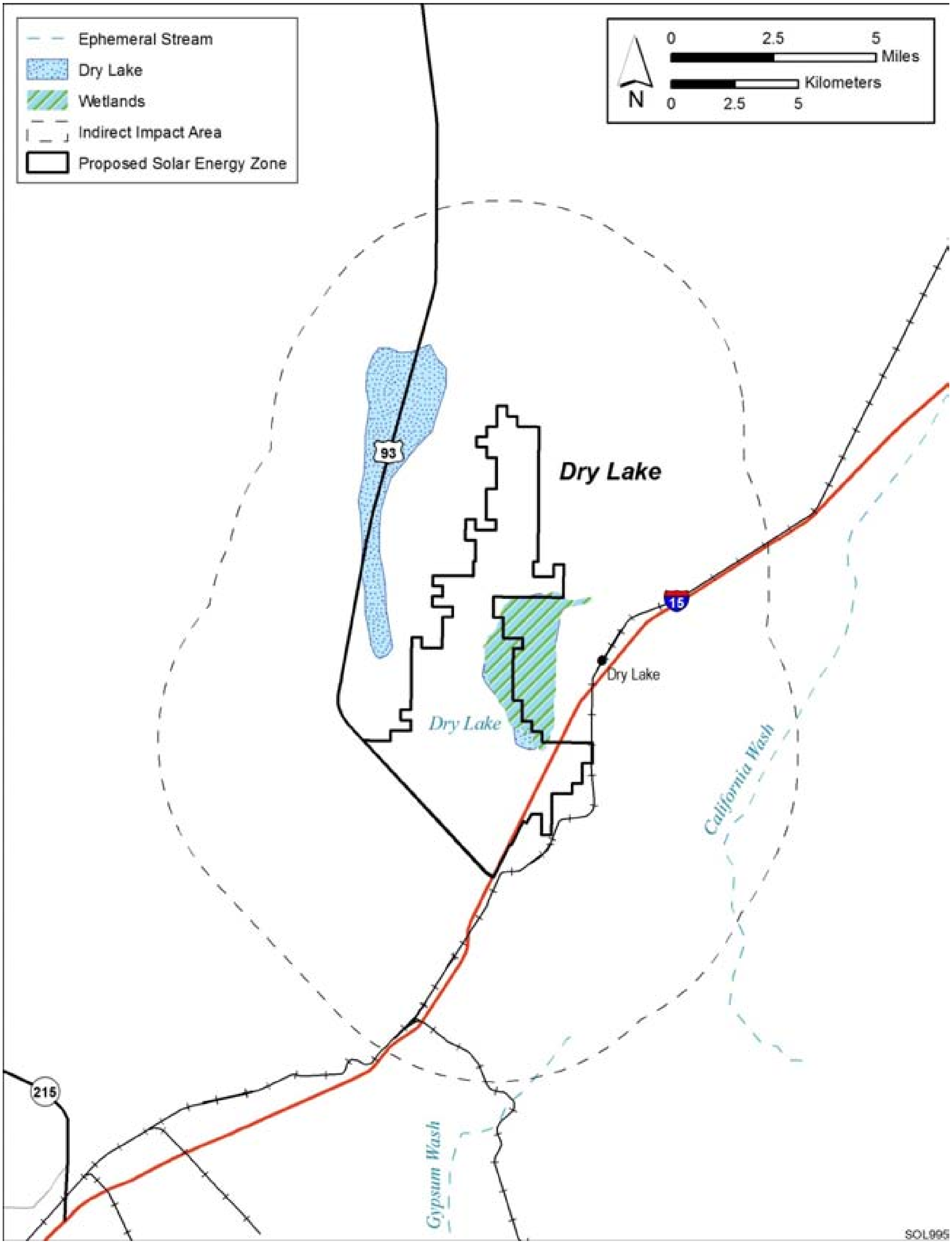

FIGURE 11.3.10.1-2 Wetlands within the Proposed Dry Lake SEZ (Source: USFWS 2009a)

other shrubs. The dry washes and playa typically contain water for short periods during or following precipitation events.

Springs occur in the vicinity of the SEZ, including Moapa Warm Springs, northeast of the SEZ, and Corn Creek Spring, west of the SEZ (see Section 11.3.9). A large playa is located west of the SEZ in Hidden Valley, entirely within the area of indirect effects; this playa is separated from the SEZ by the Arrow Canyon Range.

The State of Nevada maintains an official list of weed species designated as noxious. Table 11.3.10.1-2 provides a summary of the noxious weed species regulated in Nevada that are known to occur in Clark County (USDA 2010; Creech et al. 2010), which includes the proposed Dry Lake SEZ. Salt cedar (*Tamarix* sp.), included in Table 11.3.10.1-2, was observed on the SEZ in August 2009 near the edge of the playa. Mediterranean grass (*Schismus barbatus*), an invasive species observed to occur within much of the SEZ, is not included in this table.

TABLE 11.3.10.1-2 Designated Noxious Weeds of Nevada Occurring in Clark County

Common Name	Scientific Name	Category
African/Sahara mustard[a,b]	*Brassica tournefortii*	B
African rue[a,b]	*Peganum harmala*	A
Camelthorn[a]	*Alhagi maurorum*	A
Canada thistle	*Cirsium arvense*	C
Crimson/Green fountaingrass[a]	*Pennisetum setaceum*	A
Diffuse knapweed[a]	*Centaurea diffusa*	B
Giant reed[a,b]	*Arundo donax*	A
Hoary cress[a]	*Cardaria draba*	C
Johnsongrass[a,b]	*Sorghum halepense*	C
Malta star thistle[a,b]	*Centaurea melitensis*	A
Mediterranean sage[a]	*Salvia aethiopis*	A
Musk thistle	*Carduus nutans*	B
Perennial pepperweed[a]	*Lepidium latifolium*	C
Puncture vine[a,b]	*Tribulus terrestris*	C
Purple loosestrife[a]	*Lythrum salicaria*	A
Russian knapweed[a,b]	*Acroptilon repens*	B
Saltcedar[a,b]	*Tamarix* spp.	C
Scotch thistle[a,b]	*Onopordium acanthium*	B
Spotted knapweed[a]	*Centaurea maculosa/biebersteinii*	A
White horse-nettle/Silverleaf nightshade[a,b]	*Solanum elaeagnifolium*	B

[a] Creech et al. (2010).

[b] USDA (2010).

Source: NDA (2005).

The Nevada Department of Agriculture classifies noxious weeds into one of three categories (NDA 2005):

- "Category A: Weeds not found or limited in distribution throughout the state; actively excluded from the state and actively eradicated wherever found; actively eradicated from nursery stock dealer premises; control required by the state in all infestations."

- "Category B: Weeds established in scattered populations in some counties of the state; actively excluded where possible, actively eradicated from nursery stock dealer premises; control required by the state in areas where populations are not well established or previously unknown to occur."

- "Category C: Weeds currently established and generally widespread in many counties of the state; actively eradicated from nursery stock dealer premises; abatement at the discretion of the state quarantine officer."

11.3.10.2 Impacts

The construction of solar energy facilities within the proposed Dry Lake SEZ would result in direct impacts on plant communities due to the removal of vegetation within the facility footprint during land-clearing and land-grading operations. Approximately 80% of the SEZ (12,519 acres [50.7 km^2]) 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 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 (e.g., caused 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 by 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 within the SEZ are described in more detail in Section 5.10.1. Any such impacts would be minimized through the implementation of required design features described in Section A.2.2 of Appendix and from any additional mitigation applied. Section 11.3.10.2.3, below, identifies design features of particular relevance to the proposed Dry Lake SEZ.

11.3.10.2.1 Impacts on Native Species

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

Solar facility construction and operation in the proposed Dry Lake SEZ would primarily affect communities of the Sonora-Mojave Creosote-White Bursage Desert Scrub cover type. Additional cover types that would be affected within the SEZ include North American Warm Desert Pavement, North American Warm Desert Wash, Sonora-Mojave Mixed Salt Desert Scrub, and North American Warm Desert Playa. Although the Developed, Medium-High Intensity cover type occurs within the SEZ, these areas likely support few native plant communities. Table 11.3.10.1-1 summarizes the potential impacts on land cover types resulting from solar energy facilities in the proposed Dry Lake SEZ. Many of these cover types are relatively common in the SEZ region; however, North American Warm Desert Pavement is relatively uncommon, representing 0.8% of the land area within the SEZ region. Desert chenopod scrub/mixed salt desert scrub, desert dry washes, dry wash woodland, wetland, and playa are important sensitive habitats on the SEZ.

The construction, operation, and decommissioning of solar projects within the proposed Dry Lake SEZ would result in moderate impacts on the North American Warm Desert Pavement cover type. Solar energy development would result in small impacts on all other cover types in the affected area.

Because of the arid conditions, re-establishment of desert scrub 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).

The deposition of fugitive dust from large areas of disturbed soil onto 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 11.3.10.1-1.

Communities associated with Dry Lake playa habitats or other intermittently flooded areas within or downgradient from solar projects could be affected by ground-disturbing activities. Surface drainage throughout the SEZ is directed toward Dry Lake playa. Site-clearing and site-grading could disrupt surface water flow patterns, resulting in changes in the frequency, duration, depth, or extent of inundation or soil saturation; could potentially alter playa 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 desert dry wash habitats within the SEZ. Some desert dry washes in the SEZ support communities of mesquite or other shrubs. Alteration of surface drainage patterns or hydrology could adversely affect dry wash communities outside the SEZ. Vegetation within these communities could be lost by erosion or desiccation.

Potential impacts on wetlands as a result of solar energy facility development are described in Section 5.6.1. Approximately 1,022 acres (4.1 km^2) of wetland habitat that has been identified within the SEZ, associated with the Dry Lake playa, could be affected by project development. Direct impacts on the wetland would occur if fill material were placed within the playa for solar facility construction. Indirect impacts, as described above, could occur with project construction near or upgradient from Dry Lake playa.

Although the use of groundwater within the Dry Lake SEZ for technologies with high water requirements, such as wet-cooling systems, may be unlikely, groundwater withdrawals for such systems could reduce groundwater elevations. Communities that depend on accessible groundwater, such as mesquite communities, could become degraded or lost as a result of lowered groundwater levels. The potential for impacts on springs in the vicinity of the SEZ, such as Moapa Warm Springs or Corn Creek Springs, would need to be evaluated by project-specific hydrological studies.

11.3.10.2.2 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 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 Dry Lake SEZ, such that weeds could be transported into areas that were previously relatively weed-free, which could result in reduced restoration success and possible widespread habitat degradation. Invasive species, including salt cedar and Mediterranean grass, occur within the SEZ. Additional species designated as noxious weeds in Nevada and known to occur in Clark County are given in Table 11.3.10.1-2. Approximately 71 acres (0.3 km^2) of Introduced Riparian and Wetland Vegetation occurs within the area of indirect effects.

Past or present land uses may affect the susceptibility of plant communities to the establishment of noxious weeds and invasive species. Existing roads, transmission lines, and recreational OHV use within the SEZ area of potential impact would also likely contribute to the susceptibility of plant communities to the establishment and spread of noxious weeds and invasive species. Disturbed areas occur within the SEZ and may contribute to the establishment of noxious weeds and invasive species. Approximately 128 acres (0.5 km^2) of Developed, Medium-High Intensity occurs within the SEZ and 441 acres (1.8 km^2) in the area of indirect effects.

11.3.10.3 SEZ-Specific Design Features and Design Feature Effectiveness

In addition to programmatic design features, SEZ-specific design features would reduce the potential for impacts on plant communities. While specific practices are best established when project details are considered, some SEZ-specific design features can be identified at this time, as follows:

- 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 desert scrub and other affected habitats, and minimize the potential for the spread of invasive species such as salt cedar or Mediterranean grass. Invasive species control should focus on biological and mechanical methods where possible to reduce the use of herbicides.

- All dry wash, dry wash woodland, chenopod scrub, and playa communities within the SEZ should be avoided to the extent practicable, and any impacts minimized and mitigated. Any yucca, cacti, or succulent plant species that cannot be avoided should be salvaged. A buffer area should be maintained around dry wash, dry wash woodland, playa, and wetland habitats to reduce the potential for impacts.

- Appropriate engineering controls should be used to minimize impacts on dry wash, dry wash woodland, wetland, and playa habitats, including downstream occurrences, resulting from surface water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition. Appropriate buffers and engineering controls would be determined through agency consultation.

- Groundwater withdrawals should be limited to reduce the potential for indirect impacts on groundwater-dependent communities, such as mesquite communities. Potential impacts on springs should be determined through hydrological studies.

If these SEZ-specific design features are implemented in addition to other programmatic design features, it is anticipated that a high potential for impacts from invasive species and potential impacts on dry wash, dry wash woodland, chenopod scrub, mesquite bosque, riparian, wetland, and playa, communities and springs would be reduced to a minimal potential for impact.

11.3.11 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 Dry Lake SEZ. Wildlife known to occur within 50 mi (80 km) of the SEZ (i.e., the SEZ region) were determined from SWReGAP (USGS 2007). Land cover types suitable for each species were also determined from SWReGAP (USGS 2004, 2005a, 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 maximum developed area within the SEZ would be 12,519 acres (50.7 km^2). No areas of direct effect would occur for either a new transmission line or a new access road because existing transmission line and road corridors are adjacent to or run through 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 in the SEZ). Areas of potentially suitable habitat within the SEZ that are greater than the maximum of 12,519 acres (50.7 km^2) of direct effect were also included as part of the area of indirect effects. The potential degree of indirect effects would decrease with increasing distance away from the SEZ. The 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. Areas of direct and indirect effect are defined and the impact assessment approach is described in Appendix M.

The primary land cover habitat type within the affected area is Sonora–Mojave creosotebush–white bursage desert scrub (see Section 11.3.10). Potentially unique habitats in the affected area include washes, playas, and bedrock cliff and rock outcrops (the bedrock and cliff outcrops only occur within the area of indirect effects). A portion of Dry Lake occurs within the SEZ, while the remainder of Dry Lake and an unnamed dry lake occur within the area of indirect effects. Three ephemeral washes also occur within the SEZ (Section 11.3.9.1) Portions of California Wash and Gypsum Wash occur within the area of indirect effects (see Figure 11.3.10.1-2).

11.3.11.1 Amphibians and Reptiles

11.3.11.1.1 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 Dry Lake SEZ. The list of amphibian and reptile species potentially present in the SEZ area was determined from species lists available from the Nevada Natural Heritage Program (NDCNR 2002) and range maps and habitat information available from the California Wildlife Habitat Relationships System (CDFG 2008) and SWReGAP (USGS 2007). Land cover types suitable for each species were determined from SWReGAP (USGS 2004, 2005a, 2007). See Appendix M for additional information on the approach used.

Based on species distributions within the area of the SEZ and habitat preferences of the amphibian species, the Great Plains toad (*Bufo cognatus*) and red-spotted toad (*Bufo punctatus*) would be expected to occur within the SEZ (USGS 2007; Stebbins 2003). Both toad species would most likely occur in or near the dry lakes within the SEZ.

More than 25 reptile species occur within the area that encompasses the proposed Dry Lake SEZ (USGS 2007; Stebbins 2003). The desert tortoise (*Gopherus agassizii*) is a federal and state listed threatened species. This species is discussed in Section 11.3.12. Lizard species expected to occur within the SEZ include the desert horned lizard (*Phrynosoma platyrhinos*), Great Basin collared lizard (*Crotaphytus bicinctores*), long-nosed leopard lizard (*Gambelia wislizenii*), side-blotched lizard (*Uta stansburiana*), western fence lizard (Sceloporus occidentalis), western whiptail (*Cnemidophorus tigris*), and zebra-tailed lizard (*Callisaurus draconoides*). Snake species expected to occur within the SEZ are the coachwhip (*Masticophis flagellum*), common kingsnake (*Lampropeltis getula*), glossy snake (*Arizona elegans*), gophersnake (*Pituophis catenifer*), groundsnake (*Sonora semiannulata*), long-nosed snake (*Rhinocheilus lecontei*), and nightsnake (*Hypsiglena torquata*). The Mojave rattlesnake (*Crotalus scutulatus*) and sidewinder (*Crotalus cerastes*) would be the most common poisonous snake species expected to occur on the SEZ.

Table 11.3.11.1-1 provides habitat information for representative amphibian and reptile species that could occur within the proposed Dry Lake SEZ. Special status amphibian and reptile species are addressed in Section 11.3.12.

11.3.11.1.2 Impacts

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 through any additional mitigation applied. Section 11.3.11.1.3, below, identifies SEZ-specific design features of particular relevance to the proposed Dry Lake SEZ.

The assessment of impacts on amphibian and reptile species is based on available information on the presence of species in the affected area, as presented in Section 11.3.11.1.1 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

TABLE 11.3.11.1-1 Habitats, Potential Impacts, and Potential Mitigation for Representative Amphibian and Reptile Species That Could Occur on or in the Affected Area of the Proposed Dry Lake SEZ

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Amphibians				
Great Plains toad (*Bufo cognatus*)	Prairies and deserts. Often breeds in shallow temporary pools or quiet waters of streams, marshes, irrigation ditches, and flooded fields. About 4,005,500 acres[g] of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	127,529 acres of potentially suitable habitat (3.2% of available suitable habitat)	Small overall impact. Avoid wash and playa habitats; otherwise no species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Red-spotted toad (*Bufo punctatus*)	Dry, rocky areas at lower elevations near desert springs and persistent pools along rocky arroyos, desert streams and oases, open grassland, scrubland oaks, and dry woodlands. About 4,116,000 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	127,529 acres of potentially suitable habitat (3.1% of available suitable habitat)	Small overall impact. Avoid wash and playa habitats; otherwise no species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.3.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]		Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
		Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	
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. About 4,453,000 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	144,976 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	Small overall impact. Avoid wash habitats; otherwise no species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Great Basin collared lizard (*Crotaphytus bicinctores*)	Usually inhabits alluvia, lava flows, mountain slopes, canyons, buttes, rock outcrops, washes, and rocky plains. Limiting factors are presence of large boulders and open/sparse vegetation. About 4,300,700 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	142,979 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	Small overall impact. Avoid wash habitats; otherwise no species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Long-nosed leopard lizard (*Gambelia wislizenii*)	Desert and semi-desert areas with scattered shrubs. Prefers sandy or gravelly flats and plains. Also prefers areas with abundant rodent burrows that they occupy when inactive. About 3,834,500 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	127,283 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.3.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Lizards (Cont.)				
Side-blotched lizard (*Uta stansburiana*)	Low to moderate elevations in washes, arroyos, boulder-strewn ravines, rocky cliff bases, and flat shrubby areas in canyon bottoms. Often along sandy washes. Usually in areas with a lot of bare ground. About 4,393,100 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	141,624 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Small overall impact. Avoid wash habitats; otherwise no species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Western fence lizard (*Sceloporus occidentalis*)	Disturbed areas, roadsides, gravel beds, rock quarries, lava flows, outcrops, talus slopes, shrublands, riparian areas, and coniferous woodlands. About 3,641,700 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	132,914 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Western whiptail (*Cnemidophorus tigris*)	Arid and semi-arid habitats with sparse plant cover. About 4,112,700 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	130,252 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.3.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Lizards (Cont.)				
Zebra-tailed lizard (*Callisaurus draconoides*)	Open, warm-desert habitats, especially dry washes and canyons with fine gravel and sand. About 4,004,800 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	133,119 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	Small overall impact. Avoid wash habitats; otherwise no species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Snakes				
Coachwhip (*Masticophis flagellum*)	Creosotebush desert, shortgrass prairie, shrub-covered flats and hills. Sandy to rocky substrates. Avoids dense vegetation. About 3,478,600 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	131,727 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Common kingsnake (*Lampropeltis getula*)	Coniferous forests, woodlands, swampland, coastal marshes, river bottoms, farmlands, prairies, chaparral, and deserts. Uses rock outcrops and rodent burrows for cover. About 4,681,211 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	144,976 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.3.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Snakes (Cont.)				
Glossy snake (*Arizona elegans*)	Light shrubby to barren deserts, sagebrush flats, grasslands, and chaparral-covered slopes and woodlands. Prefers sandy grasslands, shrublands and woodlands. About 2,981,800 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	123,955 acres of potentially suitable habitat (4.2% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Gophersnake (*Pituophis catenifer*)	Plains grasslands, sandhills, riparian areas, marshes, edges of ponds and lakes, rocky canyons, semi-desert and mountain shrublands, montane woodlands, rural and suburban areas, and agricultural areas. Likely inhabits pocket gopher burrows in winter. About 4,335,500 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	131,994 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Groundsnake (*Sonora semiannulata*)	Arid and semi-arid regions with rocky to sandy soils. River bottoms, desert flats, sand hummocks, and rocky hillsides. About 4,031,800 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	126,413 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.3.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Snakes (Cont.)				
Mojave rattlesnake (*Crotalus scutulatus*)	Mostly upland desert and lower mountain slopes. Barren desert, grassland, open juniper woodland, and scrubland; especially common in areas of scattered scrubby growth such as creosote and mesquite. About 5,017,600 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	145,616 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Nightsnake *(Hypsiglena torquata)*	Arid and semi-arid desert flats, plains, and woodlands; areas with rocky and sandy soils are preferred. During cold periods of the year, seeks refuge underground, in crevices, or under rocks. About 3,471,000 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	131,727 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Sidewinder (*Crotalus cerastes*)	Windblown sand habitats near rodent burrows. Most common in areas of sand hummocks topped with creosote, mesquite, or other desert plants. About 3,749,600 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	126,167 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

[a] Potentially suitable habitat was determined using SWReGAP habitat suitability and land cover models. Area of potentially suitable habitat for each species is presented for the SEZ region, which is defined as the area within 50 mi (80 km) of the SEZ center.

Footnotes continued on next page.

TABLE 11.3.11.1-1 (Cont.)

[b] 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 using SWReGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area. A maximum of 12,519 acres of direct effect within the SEZ was assumed.

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

[d] Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Potentially suitable habitat within the SEZ greater than the maximum of 12,519 acres of direct effect was also added to the area of indirect effect. 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.

[e] 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.

[f] 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.

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

Sources: CDFG (2008); NatureServe (2010); NDCNR (2002); USGS (2004, 2005a, 2007).

required actions to avoid or mitigate impacts on amphibians and reptiles (see Section 11.3.11.1.3).

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 magnitude of impacts on representative amphibians and reptiles summarized in Table 11.3.11.1-1, direct impacts on amphibian and reptile species would be small for all species as 0.2 to 0.4% of potentially suitable habitats identified for the species in the SEZ region would be lost. Larger areas of potentially suitable habitats for the amphibian and reptile species occur within the area of potential indirect effects (e.g., up to 4.2% of available habitat for the glossy snake). 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 after operations cease could result in short-term negative impacts on individuals and habitats within and adjacent to the SEZ. The negative impacts of decommissioning would be reduced or eliminated as reclamation proceeds. Potentially long-term benefits could accrue as habitats are 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.

11.3.11.1.3 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 amphibians and reptiles, especially for those species that utilize habitat types that can be avoided (e.g., washes and playas). 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 design features are best established when considering specific project details, one design feature can be identified at this time:

- Dry lakes and wash habitats should be avoided.

If this SEZ-specific design feature is implemented in addition to the programmatic design features, impacts on amphibian and reptile species could be reduced. However, because potentially suitable habitats for all of the representative amphibian and reptile species occur throughout the SEZ, additional species-specific mitigation of direct effects for those species would be difficult or infeasible.

11.3.11.2 Birds

11.3.11.2.1 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 Dry Lake SEZ. The list of bird species potentially present in the SEZ area was determined from the Nevada Natural Heritage Program (NDCNR 2002) and range maps and habitat information available from the California Wildlife Habitat Relationships System (CDFG 2008) and SWReGAP (USGS 2007). Land cover types suitable for each species were determined from SWReGAP (USGS 2004, 2005a, 2007). See Appendix M for additional information on the approach used.

> **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)

Twelve bird species that could occur on or in the affected area of the SEZ are considered focal species in the *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*), Lucy's warbler (*Vermivora luciae*), phainopepla (*Phainopepla nitens*), and verdin (*Auriparus flaviceps*). Habitats for most of these species are described in Table 11.3.11.2-1. Because of their special species status, the burrowing owl and phainopepla are discussed in Section 11.3.12.1.

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 solar study area. However, within the proposed Dry Lake SEZ, waterfowl, wading birds, and shorebird species would be mostly absent to uncommon. Playa and wash habitats within the SEZ may attract shorebird species, but Lake Mead, Muddy River, and larger named washes and dry lakes within 50 mi (80 km) of the SEZ would provide more viable habitat for this group of birds. The killdeer (*Charadrius vociferus*) is the shorebird species most likely to occur within the SEZ.

Neotropical Migrants

As discussed in Section 4.10.2.2.3, neotropical migrants represent the most diverse category of birds within the six-state solar energy study area. Species expected to occur within

TABLE 11.3.11.2-1 Habitats, Potential Impacts, and Potential Mitigation for Representative Bird Species That Could Occur on or in the Affected Area of the Proposed Dry Lake SEZ

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Shorebirds				
Killdeer (*Charadrius vociferus*)	Open areas such as fields, meadows, lawns, mudflats, and shores. Nests on ground in open dry or gravelly locations. About 302,000 acres[g] of potentially suitable habitat occurs within the SEZ region.	132 acres of potentially suitable habitat lost (0.04% of available potentially suitable habitat) during construction and operations	733 acres of potentially suitable habitat (0.2% of potentially suitable habitat)	Small overall impact. Avoidance of playa and wash habitats. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
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 4,143,200 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	131,129 acres of potentially suitable habitat (3.2% of potentially suitable habitat)	Small overall impact. Avoid wash habitats; otherwise 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 11.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Neotropical Migrants (Cont.)				
Bewick's wren (*Thryomanes bewickii*)	Generally associated with dense, brushy habitats. Breeding occurs in brushy areas of open woodlands and other open habitats. It is a cavity nester with nests constructed in small enclosed areas such as tree cavities, nesting boxes, rock crevices, or the center of a brush pile. About 3,640,500 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	135,644 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. 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.
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 2,937,100 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	123,787 acres of potentially suitable habitat (4.2% of potentially suitable habitat)	Small overall impact. Avoid wash habitats; otherwise 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 11.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Neotropical Migrants (Cont.)				
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 4,075,600 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	127,868 acres of potentially suitable habitat (3.1% of potentially suitable habitat)	Small overall impact. 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.
Brewer's sparrow (*Spizella breweri*)	Prefers to nest in sagebrush, but also nests in other shrubs and cactus. During migration and winter, it occurs in low, arid vegetation, desert scrub, sagebrush, and creosotebush. About 3,805,300 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	127,861 acres of potentially suitable habitat (3.3% of potentially suitable habitat)	Small overall impact. 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 11.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Neotropical Migrants (Cont.)				
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. About 1,311,300 acres of potentially suitable habitat occurs within the SEZ region.	426 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) during construction and operations	21,328 acres of potentially suitable habitat (1.6% of potentially suitable habitat)	Small overall impact. Some measure of mitigation also 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 3,568,200 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	136,443 acres of potentially suitable habitat (3.8% of potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation also provided by the requirements of the Migratory Bird Treaty Act.

TABLE 11.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
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 4,319,400 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	128,098 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small overall impact. 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.
Costa's hummingbird (*Calypte costae*)	Desert and semi-desert 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 are located in trees, shrubs, vines, or cacti. About 3,952,100 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	131,129 acres of potentially suitable habitat (3.3% of potentially suitable habitat)	Small overall impact. Avoid wash habitats; otherwise 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 11.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Neotropical Migrants (Cont.)				
Crissal thrasher (*Toxostoma crissale*)	Riparian woodlands and shrublands; creosotebush, mixed desert and thorn scrub; juniper woodland and savannah; and pinyon-juniper woodlands. About 83,900 acres of potentially suitable habitat occurs within the SEZ region.	426 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat) during construction and operations	3,491 acres of potentially suitable habitat (4.2% of potentially suitable habitat)	Small overall impact. Avoid desert wash habitats. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
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 4,628,000 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	143,043 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact. 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 11.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Neotropical Migrants (Cont.)				
Horned lark (*Eremophila alpestris*)	Common to abundant resident in a variety of open habitats. Breeds in grasslands, sagebrush, semi-desert 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 3,889,300 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	127,522 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	Small overall impact. 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.
Ladder-backed woodpecker (*Picoides scalaris*)	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 4,116,700 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	131,129 acres of potentially suitable habitat (3.2% of potentially suitable habitat)	Small overall impact. 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 11.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b] Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b] Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
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 3,817,300 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	130,013 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	Small overall impact. Avoid wash habitats; otherwise 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.
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 4,345,900 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	144,441 acres of potentially suitable habitat (3.3% of potentially suitable habitat)	Small overall impact. 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 11.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
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 4,281,400 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	131,439 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact. 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.
Lucy's warbler (*Vermivora luciae*)	Breeding habitat includes deserts, mesquite along streams, and riparian woodlands. Nests in tree cavities, behind bark and in abandoned woodpecker holes or verdin nests. During migration and winter, it inhabits dry washes, riparian forests, and thorn forests. About 83,200 acres of potentially suitable habitat occurs in the SEZ region.	426 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat) during construction and operations	3,491 acres of potentially suitable habitat (4.2% of available potentially suitable habitat)	Small overall impact. Avoid wash habitats. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 11.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Neotropical Migrants (Cont.)				
Northern mockingbird (*Mimus polyglottos*)	Parkland, cultivated lands, second-growth habitats, desert scrub, and riparian areas at low elevations. Forages on ground in short, grassy to nearly barren substrates. About 4,621,700 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	143,555 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact. 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.
Rock wren (*Salpinctes obsoletus*)	Arid and semiarid habitats. It breeds in areas with talus slopes, scrublands, or dry washes. Nests, constructed of plant materials, are located in rock crevices and the nest entrance is paved with small rocks and stones. About 4,687,800 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	143,564 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact. 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 11.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Neotropical Migrants (Cont.)				
Sage sparrow (*Amphispiza belli*)	Prefers shrubland, grassland, and desert habitats. The nest, constructed of twigs and grasses, is located either low in a shrub or on the ground. About 486,100 acres of potentially suitable habitat occurs within the SEZ region.	485 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	2,860 acres of potentially suitable habitat (0.6% of available potentially suitable habitat)	Small overall impact. 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 4,274,000 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	138,901 acres of potentially suitable habitat (3.2% of potentially suitable habitat)	Small overall impact. 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 11.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Neotropical Migrants (Cont.)				
Verdin (*Auriparus flaviceps*)	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 3,818,000 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	130,013 acres of potentially suitable habitat (3.4% of potentially suitable habitat)	Small overall impact. Avoid wash habitats; otherwise 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.
Western kingbird (*Tyrannus verticalis*)	Occurs in a variety of habitats including riparian forests and woodlands, savannahs, shrublands, agricultural lands, deserts, and urban areas. Nesting occurs in trees, bushes, and other raised areas, such as buildings. Migrates to Central America or the southeastern United States for the winter. About 3,941,100 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	126,982 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Small overall impact. 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 11.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
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 1,817,700 acres of potentially suitable habitat occurs in the SEZ region.	184 acres of potentially suitable habitat lost (0.01% of available potentially suitable habitat) during construction and operations	19,662 acres of potentially suitable habitat (1.1% of available potentially suitable habitat)	Small overall impact.
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 1,810,800 acres of potentially suitable habitat occurs in the SEZ region.	482 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) during construction and operations	22,930 acres of potentially suitable habitat (1.3% of available potentially suitable habitat)	Small overall impact. Some measure of mitigation provided by the requirements of the Bald and Golden Eagle Protection Act.
Great horned owl (*Bubo virginianus*)	Needs large abandoned bird nest or large cavity for nesting. Usually lives on forest edges and hunts in open areas. In desert areas, requires wooded cliff areas for nesting. About 5,026,500 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat) during construction and operations	145,051 acres of potentially suitable habitat (2.9% of potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Long-eared owl (*Asio otus*)	Nests and roosts in dense vegetation and hunts in open areas (e.g., creosotebush–bursage flats, desert scrub, grasslands, and agricultural fields). About 4,126,200 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	126,494 acres of potentially suitable habitat (3.1% of potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
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 1,161,900 acres of potentially suitable habitat occurs in the SEZ region.	54 acres of potentially suitable habitat lost (<0.01% of available potentially suitable habitat) during construction and operations	7,598 acres of potentially suitable habitat (0.7% of available potentially suitable habitat)	Small overall impact.
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 4,422,800 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	138,979 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Upland Game Birds				
Chukar (*Alectoris chukar*)	Steep, semi-arid slopes with rocky outcrops and shrubs with a grass and forb understory. Sources of water are required during hot, dry periods, with most birds during the brooding period found within 0.25 mi (0.4 km) of water. About 4,129,000 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	127,522 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact. Avoid wash and playa habitats; otherwise no species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Upland Game Birds (Cont.)				
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 4,319,900 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	143,057 acres of potentially suitable habitat (3.3% of potentially suitable habitat)	Small overall impact. Avoid wash and playa habitats; otherwise no species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
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 4,355,000 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	132,304 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
White-winged dove (*Zenaida asiatica*)	Nests in low to medium height trees with dense foliage and fairly open ground cover. Feeds on wild seeds, grains and fruit. About 3,902,100 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	131,200 acres of potentially suitable habitat (3.4% of potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Upland Game Birds (Cont.)				
Wild turkey (*Meleagris gallopavo*)	Lowland riparian forests, foothill shrubs, pinyon-juniper woodlands, foothill riparian forests, and agricultural areas. About 408,900 acres of potentially suitable habitat occurs within the SEZ region.	426 acres of potentially suitable habitat lost (0.01% of available potentially suitable habitat) during construction and operations	3,659 acres of potentially suitable habitat (0.9% of available potentially suitable habitat)	Small overall impact. Avoid development within desert wash habitat to the extent practicable.

[a] Potentially suitable habitat was determined using SWReGAP habitat suitability and land cover models. Area of potentially suitable habitat for each species is presented for the SEZ region, which is defined as the area within 50 mi (80 km) of the SEZ center.

[b] 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 using SWReGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area. A maximum of 12,519 acres of direct effect within the SEZ was assumed.

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

[d] Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Potentially suitable habitat within the SEZ greater than the maximum of 12,519 acres of direct effect was also added to the area of indirect effect. 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.

[e] 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.

[f] 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.

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

Sources: CDFG (2008); NatureServe (2010); NDCNR (2002); USGS (2004, 2005a, 2007).

the proposed Dry Lake SEZ include the ash-throated flycatcher, Bewick's wren (*Thryomanes bewickii*), black-tailed gnatcatcher, black-throated sparrow, Brewer's sparrow (*Spizella breweri*), cactus wren (*Campylorhynchus brunneicapillus*), common poorwill (*Phalaenoptilus nuttallii*), common raven, Costa's hummingbird, crissal thrasher, greater roadrunner (*Geococcyx californianus*), horned lark (*Eremophila alpestris*), ladder-backed woodpecker, Le Conte's thrasher, lesser nighthawk (*Chordeiles acutipennis*), loggerhead shrike (*Lanius ludovicianus*), Lucy's warbler, northern mockingbird (*Mimus polyglottos*), rock wren (*Salpinctes obsoletus*), sage sparrow (*Amphispiza belli*), Say's phoebe (*Sayornis saya*), verdin, and western kingbird (*Tyrannus verticalis*) (CDFG 2008; NDCNR 2002; USGS 2007).

Birds of Prey

Section 4.10.2.2.4 provided an overview of the birds of prey (raptors, owls, and vultures) within the six-state solar study area. Species that could occur within the proposed Dry Lake SEZ include the American kestrel (*Falco sparverius*), golden eagle (*Aquila chrysaetos*), great horned owl (*Bubo virginianus*), long-eared owl (*Asio otus*), red-tailed hawk (*Buteo jamaicensis*), and turkey vulture (*Cathartes aura*) (CDFG 2008; NDCNR 2002; USGS 2007). Several special status birds of prey species are discussed in Section 11.3.12.

Upland Game Birds

Section 4.10.2.2.5 provided an overview of the upland game birds (primarily pheasants, grouse, quail, and doves) that occur within the six-state solar study area. Upland game species that could occur within the proposed Dry Lake SEZ include the chukar (*Alectoris chukar*), Gambel's quail (*Callipepla gambelii*), mourning dove (*Zenaida macroura*), white-winged dove (*Zenaida asiatica*), and wild turkey (*Meleagris gallopavo*) (CDFG 2008; NDCNR 2002; USGS 2007).

Table 11.3.11.2-1 provides habitat information for representative bird species that could occur within the proposed Dry Lake SEZ. Special status bird species are discussed in Section 11.3.12.

11.3.11.2.2 Impacts

The types of impacts 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 11.3.11.2.3, below, identifies design features of particular relevance to the proposed Dry Lake 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 11.3.11.2.1, following the analysis approach described in Appendix M. Additional NEPA assessments and coordination with federal or 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 11.3.11.2.3).

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 11.3.11.2-1 summarizes the magnitude of potential impacts on representative bird species resulting from solar energy development in the proposed Dry Lake SEZ. Direct impacts on representative bird species would be small, since SEZ development could cause the loss of less than 0.01 to 0.5% of their potentially suitable habitat within the SEZ region. Larger areas of potentially suitable habitat for bird species occur within the area of potential indirect effects (e.g., up to 4.2% of potentially suitable habitat for the black-tailed gnatcatcher, crissal thrasher, and Lucy's warbler). Other impacts on birds could result from collision with vehicles and infrastructure (e.g., buildings 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. 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 after operations cease could result in short-term negative impacts on individuals and habitats within and adjacent to the SEZ. The negative impacts of decommissioning would be reduced or eliminated as reclamation proceeds. Potentially long-term benefits could accrue as habitats are 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.

11.3.11.2.3 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, especially for those species that depend on habitat types that can be avoided (e.g., wash and playa habitats). 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 design features important in reducing impacts on birds are best established when considering specific project details, some design features can be identified at this time:

- The requirements contained within the 2010 Memorandum of Understanding between the BLM and USFWS to promote the conservation of migratory birds will be followed.

- Take of golden eagles and other raptors should be avoided. Mitigation regarding the golden eagle should be developed in consultation with the

USFWS and the NDOW. A permit may be required under the Bald and Golden Eagle Protection Act.

- Dry lakes and wash habitats should be avoided.

If these SEZ-specific design features are implemented in addition to the programmatic design features, impacts on bird species could be reduced. However, as potentially suitable habitats for a number of the bird species occur throughout much of the SEZ, additional species-specific mitigation of direct effects for those species would be difficult or infeasible.

11.3.11.3 Mammals

11.3.11.3.1 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 Dry Lake SEZ. The list of mammal species potentially present in the SEZ area was determined from the Nevada Natural Heritage Program (NDCNR 2002) and range maps and habitat information available from the California Wildlife Habitat Relationships System (CDFG 2008) and SWReGAP (USGS 2007). Land cover types suitable for each species were determined from SWReGAP (USGS 2004, 2005a, 2007). See Appendix M for additional information on the approach used.

Over 55 species of mammals have ranges that encompass the area of the proposed Dry Lake SEZ (NDCNR 2002; USGS 2007); however, suitable habitats for a number of these species are limited or nonexistent within the SEZ (USGS 2007). Similarly to the overview of mammals provided for the six-state solar energy study area (Section 4.10.2.3), the following discussion for the SEZ emphasizes big game and other mammal species that (1) have key habitats within or near the 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 important habitats.

Big Game

The big game species that could occur within the vicinity of the proposed Dry Lake SEZ include cougar (*Puma concolor*), mule deer (*Odocoileus hemionus*), and Nelson's bighorn sheep (*Ovis canadensis nelsoni*) (CDFG 2008; NDCNR 2002; USGS 2007). Due to its special species status, Nelson's bighorn sheep is addressed in Section 11.3.12. Potentially suitable habitat for the cougar and mule deer occur throughout most of the SEZ. Figure 11.3.11.3-1 shows the location of the SEZ relative to mapped range of mule deer habitat.

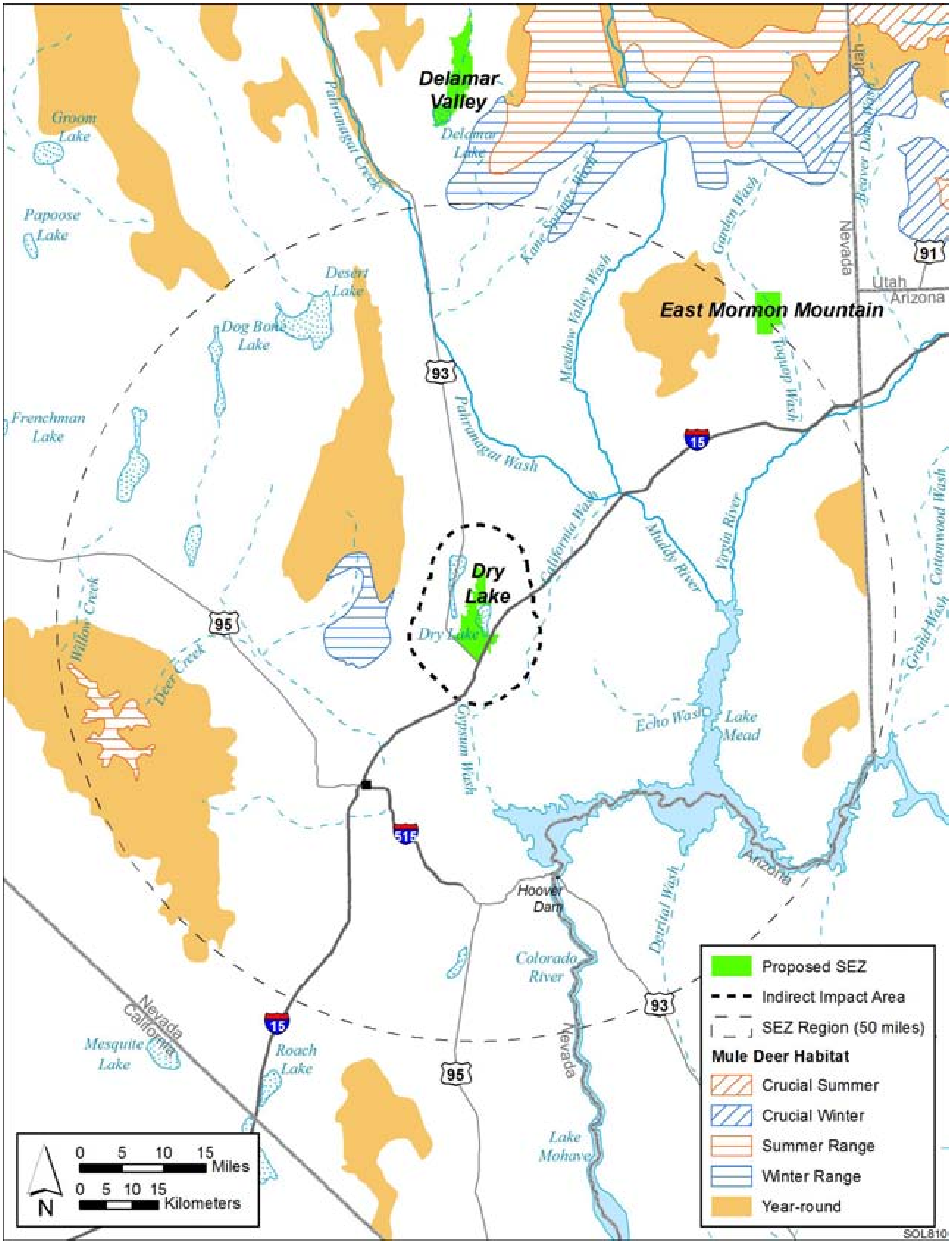

FIGURE 11.3.11.3-1 Location of the Proposed Dry Lake SEZ Relative to the Mapped Range of Mule Deer (Source: NDOW 2010)

Other Mammals

A number of small game and furbearer species occur within the area of the proposed Dry Lake SEZ. Species that could occur within the area of the SEZ would include the American badger (*Taxidea taxus*), black-tailed jackrabbit (*Lepus californicus*), bobcat (*Lynx rufus*), coyote (*Canis latrans*, common), desert cottontail (*Sylvilagus audubonii*), gray fox (*Urocyon cinereoargenteus*), kit fox (*Vulpes macrotis*), and red fox (*Vulpes vulpes*) (CDFG 2008; NDCNR 2002; USGS 2007).

The nongame (small) mammals include rodents, bats, mice, and shrews. Representative species for which potentially suitable habitat occurs within the proposed Dry Lake SEZ include Botta's pocket gopher (*Thomomys bottae*), cactus mouse (*Peromyscus eremicus*), canyon mouse (*P. crinitis*), deer mouse (*P. maniculatus*), 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 pocket mouse (*Dipodomys merriami*), northern grasshopper mouse (*Onychomys leucogaster*), southern grasshopper mouse (*O. torridus*), western harvest mouse (*Reithrodontomys megalotis*), and white-tailed antelope squirrel (*Ammospermophilus leucurus*) (CDFG 2008; NDCNR 2002; USGS 2007). Bat species that may occur within the area of the SEZ include the big brown bat (*Eptesicus fuscus*), Brazilian free-tailed bat (*Tadarida brasiliensis*), California myotis (*Myotis californicus*), hoary bat (*Lasiurus cinereus*), long-legged myotis (*M. volans*), silver-haired bat (*Lasionycteris noctivagans*), and western pipistrelle (*Parastrellus hesperus*) (CDFG 2008; NDCNR 2002; USGS 2007). However, roost sites for the bat species (e.g., caves, hollow trees, rock crevices, or buildings) would be limited to absent within the SEZ. Several other special status bat species that could occur within the SEZ area are addressed in Section 11.3.12.1.

Table 11.3.11.3-1 provides habitat information for representative mammal species that could occur within the proposed Dry Lake SEZ. Special status mammal species are discussed in Section 11.3.12.

11.3.11.3.2 Impacts

The types of impacts 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 through any additional mitigation applied. Section 11.3.11.3.3, below, identifies design features of particular relevance to mammals for the proposed Dry Lake 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 11.3.11.3.1 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.

TABLE 11.3.11.3-1 Habitats, Potential Impacts, and Potential Mitigation for Representative Mammal Species That Could Occur on or in the Affected Area of the Proposed Dry Lake SEZ

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Big Game				
Cougar (*Puma concolor*)	Most common in rough, broken foothills and canyon country, often in association with montane forests, shrublands, and pinyon-juniper woodlands. About 4,545,800 acres[g] of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	139,147 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Mule deer (*Odocoileus hemionus*)	Most habitats, including coniferous forests, desert shrub, chaparral, and grasslands with shrubs. Greatest densities in shrublands on rough, broken terrain that provides abundant browse and cover. About 4,124,500 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	130,619 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
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. About 4,119,100 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	126,413 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Small Game and Furbearers (Cont.)				
Black-tailed jackrabbit (*Lepus californicus*)	Open plains, fields, and deserts with scattered thickets 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 4,530,700 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	141,870 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Bobcat (*Lynx rufus*)	Most habitats other than subalpine coniferous forest and montane meadow grasslands. Most common in rocky country from deserts through ponderosa forests. About 4,284,700 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	130,252 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Coyote (*Canis latrans*)	All habitats at all elevations. 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 4,883,100 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	145,616 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Small Game and Furbearers (Cont.)				
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. Thickets and patches of shrubs, vines, and brush also used as cover. About 3,299,400 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	123,955 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Gray fox (*Urocyon cinereoargenteus*)	Deserts, open forests, and brush. Prefers wooded areas, broken country, brushlands, and rocky areas. Tolerant of low levels of residential development. About 3,679,500 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	135,869 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Kit fox (*Vulpes macrotis*)	Desert and semi-desert areas with relatively open vegetative cover and soft soils. Seeks shelter in underground burrows. About 4,055,200 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	131,657 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Small Game and Furbearers (Cont.)				
Red fox (*Vulpes vulpes*)	Most common in open woodlands, pasturelands, riparian areas, and agricultural lands. About 3,228,100 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	120,116 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Nongame (small) Mammals				
Big brown bat (*Eptesicus fuscus*)	Most habitats from lowland deserts to timberline meadows. Roosts in hollow trees, rock crevices, mines, tunnels, and buildings. About 3,786,300 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	132,296 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Botta's pocket gopher (*Thomomys bottae*)	Variety of habitats including shortgrass plains, oak savanna, agricultural lands, and deserts. Burrows are more common in disturbed areas such as roadways and stream floodplains. About 3,056,900 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	123,948 acres of potentially suitable habitat (4.1% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
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 3,724,300 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	136,135 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Cactus mouse (*Peromyscus eremicus*)	Variety of areas including desert scrub, semi-desert chaparral, desert wash, semi-desert grassland, and cliff and canyon habitats. About 4,194,400 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	131,439 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact. Avoid wash habitats; otherwise no species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
California myotis (*Myotis californicus*)	Desertscrub, semi-desert shrublands, lowland riparian, swamps, riparian suburban areas, plains grasslands, scrub-grasslands, woodlands, and forests. Roosts in caves, mine tunnels, hollow trees, and loose rocks. About 3,370,900 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	135,573 acres of potentially suitable habitat (4.0% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Nongame (small) Mammals (Cont.)				
Canyon mouse (*Peromyscus crinitus*)	Associated with rocky substrates in a variety of habitats including desert scrub, sagebrush shrublands, woodlands, cliffs and canyons, and volcanic rock and cinder lands. Source of free water not required. About 3,889,900 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	127,283 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Deer mouse (*Peromyscus maniculatus*)	Tundra; alpine and subalpine grasslands; plains grasslands; open, sparsely vegetated deserts; warm temperate swamps and riparian forests; and Sonoran desert scrub habitats. About 4,456,300 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	138,024 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Desert kangaroo rat (*Dipodomys deserti*)	Most arid areas with deep sands such as stabilized sand dunes, sandy patches in salt desert scrub, and bottoms of desert washes. About 65,100 acres of potentially suitable habitat occurs in the SEZ region.	426 acres of potentially suitable habitat lost (0.07% of available potentially suitable habitat) during construction and operations	3,413 acres of potentially suitable habitat (5.2% of available potentially suitable habitat)	Small overall impact. Avoid wash habitats.

TABLE 11.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Nongame (small) Mammals (Cont.)				
Desert shrew (*Notiosorex crawfordi*)	Usually in arid areas with adequate cover such as semi-arid grasslands, shortgrass plains, desert scrub, chaparral slopes, shortgrass plains, oak savannas and woodlands, and alluvial fans. About 4,330,300 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	143,057 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
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 4,620,700 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	144,680 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Hoary bat (*Lasiurus cinereus*)	Chaparral, shortgrass plains, scrub-grassland, desertscrub, forests and woodlands. Usually roosts in trees, also in caves, rock crevices, and houses. About 3,659,900 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	132,367 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Nongame (small) Mammals (Cont.)				
Little pocket mouse (*Perognathus longimembris*)	Mostly sandy and gravelly soils, but also stony soils and rarely rocky sites. About 3,962,000 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	131,361 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Long-legged myotis (*Myotis volans*)	Prefers pine forest, desert, and riparian habitats. Old buildings, rock crevices, and hollow trees used for daytime roosting and winter hibernation. It forages in open areas, such as forest clearings. About 3,768,200 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	131,727 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Long-tailed pocket mouse (*Chaetodipus formosus*)	Common in sagebrush, desert scrub, and desert succulent shrub habitats with rocky or stony groundcover. About 4,163,700 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	142,502 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Nongame (small) Mammals (Cont.)				
Merriam's kangaroo rat (*Dipodomys merriami*)	Plains grasslands, scrub-grasslands, desertscrub, shortgrass plains, oak and juniper savannahs, mesquite dunes, and creosote flats. About 3,994,200 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	133,062 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Northern grasshopper mouse (*Onychomys leucogaster*)	Occurs in grasslands, sagebrush deserts, overgrazed pastures, weedy roadside ditches, sand dunes, and other habitats with sandy soil and sparse vegetation. About 4,039,600 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	126,413 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Silver-haired bat (*Lasionycteris noctivagans*)	Urban areas, chaparral, alpine and subalpine grasslands, forests, scrub-grassland, oak savannah and desertscrub habitats. Roosts under bark, in hollow trees, caves and mines. Forages over clearings and open water. About 3,793,100 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	132,296 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Nongame (small) Mammals (Cont.)				
Southern grasshopper mouse (*Onychomys torridus*)	Low, arid, shrub and semiscrub vegetation of deserts. About 3,952,700 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	131,432 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Western harvest mouse (*Reithrodontomys megalotis*)	Various habitats including scrub-grasslands, temperate swamps and riparian forests, salt marshes, shortgrass plains, oak savannah, dry fields, agricultural areas, deserts, and desertscrub. Grasses are the preferred cover. About 2,181,400 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat) during construction and operations	117,980 acres of potentially suitable habitat (5.4% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Western pipistrelle (*Parastrellus hesperus*)	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 3,403,000 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	132,296 acres of potentially suitable habitat (3.9% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b] Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Nongame (small) Mammals (Cont.)				
White-tailed antelope squirrel (*Ammospermophilus leucurus*)	Low deserts, semi-desert and montane shrublands, plateaus, and foothills in areas with sparse vegetation and hard gravelly surfaces. Spends nights and other periods of inactivity in underground burrows. About 4,221,200 acres of potentially suitable habitat occurs within the SEZ region.	12,519 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	141,863 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Yuma myotis (*Myotis yumanensis*)	Riparian areas, grasslands, semi-desert shrubland, mountain brush, woodlands, and deserts. It occurs where there is open water, regardless of the habitat. Roosts in caves, mines, cliffs, crevices, buildings, and swallow nests. About 3,543,600 acres of potentially suitable habitat occurs in the SEZ region.	12,519 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	132,101 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

[a] Potentially suitable habitat was determined using SWReGAP habitat suitability and land cover models. Area of potentially suitable habitat for each species is presented for the SEZ region, which is defined as the area within 50 mi (80 km) of the SEZ center.

[b] 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 using SWReGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area. A maximum of 12,519 acres of direct effect within the SEZ was assumed.

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

[d] Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary. Potentially suitable habitat within the SEZ greater than the maximum of 12,519 acres of direct effect was also added to the area of indirect effect. 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.

Footnotes continued on next page.

TABLE 11.3.11.3-1 (Cont.)

[e] Overall impact magnitude categories were based on professional judgment and are as follows: (1) *small*: $\leq$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 $\leq$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.

[f] 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.

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

Sources: CDFG (2008); NatureServe (2010); NDCNR (2002); USGS (2004, 2005a, 2007).

These assessments and consultations could result in additional required actions to avoid or mitigate impacts on mammals (see Section 11.3.11.3.3).

Table 11.3.11.3-1 summarizes the magnitude of potential impacts on representative mammal species resulting from solar energy development (with the inclusion of programmatic design features) in the proposed Dry Lake SEZ.

Cougar

Up to 12,519 acres (50.7 km^2) of potentially suitable cougar habitat could be lost by solar energy development within the proposed Dry Lake SEZ. This represents about 0.3% of potentially suitable cougar habitat within the SEZ region. About 140,000 acres (567 km^2) of potentially suitable cougar habitat occurs within the area of indirect effect. Overall, impacts on cougar from solar energy development in the SEZ would be small.

Mule Deer

Based on land cover analyses, up to 12,519 acres (50.7 km^2) of potentially suitable mule deer habitat could be lost by solar energy development within the proposed Dry Lake SEZ. This represents about 0.3% of potentially suitable mule deer habitat within the SEZ region. Over 130,000 acres (526 km^2) of potentially suitable mule deer habitat occurs within the area of indirect effect. Based on mapped mule deer ranges, the closest year-round range is about 8 mi (13 km) from the SEZ; the closest winter range is about 7 mi (11 km) from the SEZ; and the closest summer range is about 37 mi (60 km) from the SEZ (Figure 11.3.11.3-1). Therefore, solar energy development within the proposed Dry Lake SEZ would not be expected to have direct or indirect effects on the range of mule deer. Overall, impacts on mule deer from solar energy development in the SEZ would be small.

Other Mammals

Direct impacts on other representative mammal species (i.e., small game, furbearers, and small [nongame] mammals) would be small as 0.07 to 0.6% of their potentially suitable habitat within the SEZ region would be lost. Larger areas of potentially suitable habitat for these species occur within the area of potential indirect effects (i.e., up 5.4% for the western harvest mouse).

Summary

Overall, direct impacts on mammal species would be small, as 0.6% or less of potentially suitable habitats for the representative mammal species would be lost (Table 11.3.11.3-1). Larger areas of potentially suitable habitat for mammal species occur within the area of potential indirect effects (e.g., up to 5.4% of potentially suitable habitat for the western harvest mouse). Other impacts on mammals could result from collision with vehicles and infrastructure (e.g., 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. Indirect impacts on areas outside the SEZ (for example, impacts caused by dust generation, erosion, and sedimentation) would be negligible with implementation of programmatic design features.

Decommissioning after operations cease could result in short-term negative impacts on individuals and habitats within and adjacent to the SEZ. The negative impacts of decommissioning would be reduced or eliminated as reclamation proceeds. Potentially long-term benefits could accrue as habitats are 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.

11.3.11.3.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

- Fencing around the solar energy development should not block the free movement of mammals, particularly big game species.

- Playa and wash habitats should be avoided.

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

11.3.11.4 Aquatic Biota

11.3.11.4.1 Affected Environment

This section addresses aquatic habitats and biota known to occur on the proposed Dry Lake SEZ itself or within an area that could be affected, either directly or indirectly, by activities associated with solar energy development within the SEZ. There are no perennial or intermittent streams within the proposed Dry Lake SEZ. Although ephemeral washes may cross the SEZ, these drainages only contain water following rainfall and typically do not support wetland or riparian habitats. Approximately 981 acres (4 km^2) of Dry Lake are located within the SEZ along the eastern border. Dry Lake is the only water body present in the SEZ. Although it rarely has standing water, temporary ponding may occur, especially after rainfall. Dry lakes and associated wetlands in desert regions typically do not support aquatic habitat, but they may 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 flies, may also occur depending on pool longevity, distance to permanent water features, and the abundance of other invertebrates for prey (Graham 2001). However, more site-specific data is needed to fully evaluate aquatic biota present in Dry Lake.

There are no perennial water bodies or stream features within the area of indirect effects. There are 6,185 acres (25 km^2) of dry lakes present in the area of indirect effects, along with associated wetlands. Portions of two intermittent streams (California Wash and Gypsum Wash) totaling 7 mi (11 km) are present within the area of indirect effects. California Wash carries water into the Muddy River, a perennial stream containing federally endangered fish species such as the Moapa dace (*Moapa coriacea)* and Virgin River chub (*Gile seminuda*). Gypsum Wash drains water from upland areas into Lake Mead. Both streams are typically dry and are not expected to contain permanent aquatic habitat or communities. However, such ephemeral or intermittent stream reaches may contain a diverse seasonal community of fish and invertebrates, with the latter potentially present in a dormant state even in dry periods (Levick et al. 2008). More site-specific data is needed to fully evaluate aquatic biota present in California Wash and Gypsum Wash.

Outside of the potential indirect effects area, but within 50 mi (80 km) of the SEZ, there are 125,352 acres (507 km^2) of permanent lake (Lake Mead), 10,798 acres (44 km^2) of the Colorado River, and 37,244 (151 km^2) of dry lake. There are also several stream features, including 131 mi (211 km) of perennial streams and 276 mi (444 km) of intermittent streams. The nearest perennial stream (Muddy River) and permanent water body (Lake Meade) are both more than 14 mi (24 km) away from the SEZ. Within the SEZ and the area of potential indirect effects, dry lakes are the primary surface water features present; they represent approximately 16% of dry lake habitat available within the overall analysis area. Several springs are located within 50 mi (80 km) of the Dry Lake SEZ, including springs on the north shore of Lake Meade, and springs within the Desert NWR and the Moapa Valley NWR. Historically, some springs on the north shore of Lake Meade contained native fishes like the speckled dace (*Rhinichthys osculus*), but introduced fishes like cichlids have reduced or eliminated native species (Courtenay and Deacon 1983). Springs within the Desert NWR contain a diverse community of spring snails as well as the endangered Pahrump poolfish (*Empetrichthys latos*), which is present in Corn Creek. Non-native fish species such as goldfish and crayfish are also present in the Desert NWR. The Moapa Valley NWR also contains stream and spring systems that support four species of protected native fish: Moapa dace, Virgin River chub (*Gila seminuda*), Moapa White River springfish, and the Moapa speckled dace (*Rhinichthys osculus moapa*). Non-native species of fish exist in the Moapa NWR, primarily in the Muddy River and its tributaries, and include blue tilapia (*Oreochromis aurea*), shortfin molly (*Poecilia mexicana*), and mosquitofish (*Gambusia affinis*). Highly seasonal populations of aquatic gastropod snails exist in the Muddy River and associated warm springs, several of which, such as the Moapa pebblesnail (*Fluminicola avernalis,* the grated tryonia (*Tryonia clathrata*) are species of concern. The Moapa Warm Springs riffle beetle (*Stenelmis moapae*), the Amargosa naucorid (*Pelocoris shoshone shoshone*), and the Moapa naucorid (*Usingerina moapensis*) are aquatic invertebrates found in the Moapa Valley NWR and all are species of concern. Preferred habitat for aquatic invertebrates in Moapa Valley NWR varies from fast moving waters with clean cobble bottom to marshy pool habitats.

11.3.11.4.2 Impacts

The types of impacts that could occur on aquatic habitats and biota due to development of utility-scale solar energy facilities are discussed in detail in Section 5.10.3. Effects particularly relevant to aquatic habitats and communities are water withdrawal and changes in water, sediment, and contaminant inputs associated with runoff.

No permanent water bodies or streams are present within the boundaries of the Dry Lake SEZ, and the nearest perennial surface waters are greater than14 mi (22 km) from the SEZ boundary. Therefore, no direct impacts on these features are expected. Dry Lake and its associated wetlands, as well as several washes, are present within the SEZ, and runoff of water and sediment as well as airborne particulate deposition into these features is possible, especially if ground disturbance occurs near Dry Lake. However, the surface water features in the SEZ are typically dry and are not connected to any permanent surface water. Surveys of ephemeral and intermittent surface water features within the SEZ would be necessary to determine the potential for impacts on aquatic biota. California Wash and Gypsum Wash are intermittent streams located in the area of indirect effects that could receive runoff and fugitive dust from solar development activities within the SEZ. Neither California Wash nor Gypsum Wash is likely to contain aquatic habitat, but both streams flow into perennial surface waters, and soils entering these streams could potentially affect aquatic habitat and biota at downstream locations. The implementation of commonly used engineering practices to control water runoff and sediment deposition into streams and water bodies would help to minimize the potential for impacts on aquatic organisms.

In arid environments, reductions in the quantity of water in aquatic habitats are of particular concern. 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). There are no permanent surface waters in the proposed Dry Lake SEZ or area of indirect effects. 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. Groundwater is generally more than 100 ft (30 m) below ground and does not supply water to any surface water feature except the Colorado River via a subsurface connection to the California Wash Basin. Thus, groundwater withdrawals for solar energy needs could affect surface water levels and aquatic habitat in the Colorado River. In addition, groundwater withdrawals could alter the size and chemical and physical conditions of groundwater-dependent springs (including those on the north shore of Lake Meade and within Desert NWR and Moapa NWR) in the vicinity of the SEZ, and adversely affect associated aquatic communities. Historically, groundwater withdrawals have resulted in the loss or reduction of native species in desert springs. Consequently, the effect of groundwater withdrawals for solar energy development on pool and spring aquatic communities is of particular concern. 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 identified 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. Contaminants could potentially enter Dry Lake and wetlands within the SEZ, especially if heavy machinery is used in or nearby these features. However, these areas are typically dry; therefore no impacts on aquatic communities are expected. The introduction of contaminants can be minimized by avoiding construction near Dry Lake. Contaminants are not likely to affect aquatic habitat and biota, given the distance (14 mi [22 km]) and lack of hydrologic connection of the SEZ to any perennial surface water.

11.3.11.4.3 SEZ-Specific Design Features and Design Feature Effectiveness

The implementation of programmatic design features presented 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 the most SEZ-specific design features are best established when specific project details are being considered, SEZ-specific design features that can be identified at this time are as follows:

- Appropriate engineering controls should be implemented to minimize the amount of surface water runoff and fugitive dust reaching California Wash and Gypsum Wash.

- Minimize or eliminate the impact of groundwater withdrawals on streams near the SEZ such as the Muddy River and springs such as those along the north shore of Lake Meade and within Desert NWR and Moapa NWR.

If these SEZ-specific design features are implemented in addition to programmatic design features and if the utilization of water from groundwater or surface water sources is adequately controlled to maintain sufficient water levels in aquatic habitats, the potential impacts on aquatic biota and habitats from solar energy development at the Dry Lake SEZ would be negligible.

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11.3.12 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 Dry Lake 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 by the BLM as sensitive;
- Species that are listed by the State of Nevada[4]; and
- Species that have been ranked by the State of Nevada as S1 or S2, or species of concern by the State of Nevada or the USFWS; hereafter referred to as "rare" species.

Special status species known to occur within 50 mi (80 km) of the Dry Lake SEZ center (i.e., the SEZ region) were determined from natural heritage records available through NatureServe Explorer (NatureServe 2010), information provided by the NDOW NNHP (Miskow 2009; NDCNR 2004, 2009a, 2009b), SWReGAP (USGS 2004, 2005a, 2007), and the USFWS ECOS (USFWS 2010). Information reviewed consisted of county-level occurrences as determined from NatureServe, element occurrences provided by the NNHP, as well as modeled land cover types and predicted suitable habitats for the species within the 50-mi (80-km) region as determined from the SWReGAP. The 50-mi (80-km) SEZ region intersects Clark and Lincoln Counties, Nevada, as well as Mohave County, Arizona. However, the SEZ and affected area occurs only in Clark County, Nevada. See Appendix M for additional information on the approach used to identify species that could be affected by development within the SEZ.

11.3.12.1 Affected Environment

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). For the Dry Lake SEZ, the area of direct effects included only the SEZ itself. Due to 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 infrastructure might be used to

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[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 2008d). These species are included here to ensure broad consideration of species that may be most vulnerable to impacts.

[4] State-listed species for the state of Nevada are those protected under NRS 501.110 (animals) or NRS 527 (plants).

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 due to the proximity of an existing federal highway (see Section 11.3.1.2 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. Indirect effects considered in the assessment included effects from groundwater withdrawals, surface runoff, dust, noise, lighting, and accidental spills from the SEZ, but did not include ground-disturbing activities. For the most part, the potential magnitude of indirect effects would decrease with increasing distance from the SEZ. This area of indirect effects 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 land cover habitat type within the affected area is Sonora-Mojave creosote desert scrub (see Section 11.3.10). Potentially unique habitats in the affected area in which special status species may reside include cliff and rock outcrops, desert washes, playas, and riparian habitats. There are no permanent aquatic habitats known to occur on the SEZ or within 5 mi (8 km) from the SEZ boundary. However, a portion of one dry lake playa (Dry Lake) occurs on the SEZ; an additional unnamed dry lake playa and an intermittent stream (California Wash) occur within 5 mi (8 km) of the SEZ boundary.

In scoping comments on the proposed Dry Lake SEZ (Stout 2009), the USFWS expressed concern that groundwater withdrawals from the Garnet Valley groundwater basin associated with solar energy development on the SEZ may reduce the regional groundwater supply that supports spring-fed aquatic habitats in the SEZ region, including habitats in the Pahranagat and Moapa Valleys. This includes species that occur in aquatic and riparian habitat associated with the following springs: Moapa Warm Springs (including Big Muddy Spring) and Corn Creek Spring (Figure 11.3.12.1-1). Although these areas are outside of the affected area as defined above, they are included in the evaluation because of the possible effect of groundwater withdrawals.

All special status species known to occur within the Dry Lake 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, 62 could be affected by solar energy development on the SEZ (including those dependent on groundwater discharge in the region), 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 11.3.12.1-1. For many of the species listed in the table (especially plants), their predicted potential occurrence in the affected area is based only on a general correspondence between mapped 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) from the SEZ.

Based on NNHP records and information provided by the USFWS, the following seven special status species are known to occur within the affected area of the Dry Lake SEZ:

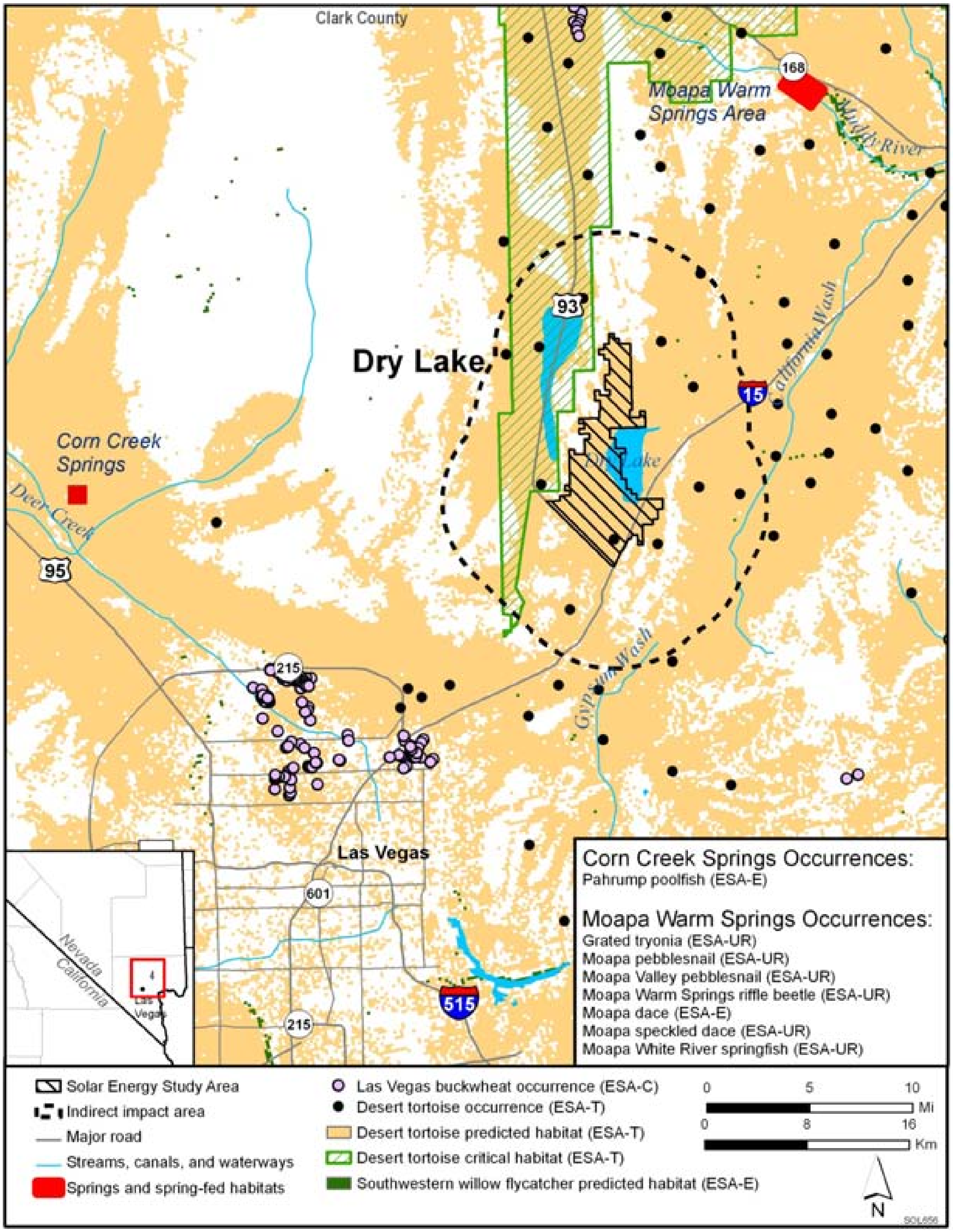

FIGURE 11.3.12.1-1 Known or Potential Occurrences of Species Listed as Endangered or Threatened under the ESA, Candidates for Listing under the ESA, or Species under Review for ESA Listing in the Affected Area of the Proposed Dry Lake SEZ (Sources: Miskow 2009; USGS 2007)

TABLE 11.3.12.1-1 Habitats, Potential Impacts, and Potential Mitigation for Special Status Species That Could Be Affected by Solar Energy Development on the Proposed Dry Lake SEZ

				Maximum Area of Potential Habitat Affected[c]		
Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Within SEZ (Direct Effects)[d]	Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants						
Ackerman milkvetch	*Astragalus ackermanii*	NV-S2	Endemic to the Sheep and Pintwater ranges of southern Nevada in crevices and ledges of carbonate cliffs in mixed shrub, sagebrush, and juniper woodland at elevations between 4,000 and 6,200 ft.[h] Nearest recorded occurrence is 16 mi[i] northwest of the SEZ in the Desert NWR. About 4,304,500 acres[j] of potentially suitable habitat occurs in the SEZ region.	12,500 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	137,800 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the areas of direct effects; 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.
Alkali mariposa lily	*Calochortus striatus*	BLM-S; FWS-SC; NV-S1	Restricted to wetlands in the western Mojave Desert including alkaline seeps, springs, and meadows at elevations between 2,600 and 4,600 ft. Nearest recorded occurrence is 21 mi southwest of the SEZ. About 79,850 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	375 acres of potentially suitable habitat (0.5% of available potentially suitable habitat)	Small overall impact; no direct effects. No species-specific mitigation is warranted.
Antelope Canyon goldenbush	*Ericameria cervina*	NV-S1	Rock crevices and talus in shadscale and Douglas-fir-bristlecone pine woodland on calcareous substrates and ash flow tuff. Elevation ranges between 3,100 and 8,800 ft. Nearest recorded occurrence is 35 mi east of the SEZ. About 556,200 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	11,600 acres of potentially suitable habitat (2.1% of available potentially suitable habitat)	Small overall impact; no direct effects. No species-specific mitigation is warranted.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Bearded screwmoss	*Pseudocrossidium crinitum*	NV-S1	Known from only 12 occurrences in Nevada on or near gypsiferous deposits and outcrops or limestone boulders, especially on east to north facing slopes of loose, uncompacted soil and associated with other mosses and lichens at elevations between 1,300 and 2,300 ft. Nearest recorded occurrence is 18 mi east of the SEZ. About 334,400 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	11,600 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small overall impact; no direct effects. No species-specific mitigation is warranted.
Beaver dam breadroot	*Pediomelum castoreum*	FWS-SC	Dry, sandy desert communities. Nearest recorded occurrence is 19 mi northeast of the SEZ. About 65,000 acres of potentially suitable habitat occurs in the SEZ region.	425 acres of potentially suitable habitat lost (0.7% of available potentially suitable habitat)	3,000 acres of potentially suitable habitat (4.6% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to desert wash habitat on the SEZ could reduce impacts. In addition, see the Ackerman milkvetch for a list of other potential mitigations.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Charleston goldenbush	*Ericameria compacta*	NV-S2	Endemic to the Spring and Sheep ranges southern Nevada, where the species is known from 10 occurrences on forested carbonate slopes, and adjacent ridges and low outcrops, within the subalpine and montane conifer communities at elevations between 2,850 and 11,300 ft. Nearest recorded occurrence is 18 mi northwest of the SEZ in the Desert NWR. About 409,350 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	11,600 acres of potentially suitable habitat (2.8% of available potentially suitable habitat)	Small overall impact; no direct effects. No species-specific mitigation is warranted.
Dune sunflower	*Helianthus deserticola*	NV-S2	Sand dunes on dry, open, deep, loose sandy soils of aeolian deposits, vegetated dunes, and dune skirt areas, on flats and gentle slopes of all aspects, generally in alkaline areas. Elevation ranges between 1,325 and 4,900 ft. Nearest recorded occurrence is 22 mi east of the SEZ along the Muddy River. About 105,700 acres of potentially suitable habitat occurs in the SEZ region.	850 acres of potentially suitable habitat lost (0.8% of available potentially suitable habitat)	4,700 acres of potentially suitable habitat (4.4% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to desert wash and desert pavement habitats on the SEZ could reduce impacts. In addition, see the Ackerman milkvetch for a list of other potential mitigations.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Gold Butte moss	*Didymodon nevadensis*	BLM-S; NV-S1	Gypsiferous deposits and outcrops or limestone boulders, especially on east- to north-facing slopes of loose soil, and associated with other mosses and lichens. Elevation ranges between 1,300 and 2,300 ft. Nearest recorded occurrence is 15 mi southeast of the SEZ in the Lake Mead NRA. About 359,200 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	11,600 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Small overall impact; no direct effects. No species-specific mitigation is warranted.
Halfring milkvetch	*Astragalus mohavensis* var. *hemigyrus*	BLM-S; FWS-SC; NV-S2	Endemic to Nevada on carbonate gravels and derivative soils on terraced hills and ledges, open slopes, and along washes within the creosote-bursage, blackbrush, and mixed-shrub habitat communities. Elevation ranges between 3,000 and 5,600 ft. Nearest recorded occurrence is 15 mi northwest of the SEZ in the Desert N WR. About 422,200 acres of potentially suitable habitat occurs in the SEZ region.	425 acres of potentially suitable habitat lost (0.7% of available potentially suitable habitat)	15,000 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to desert wash habitat on the SEZ could reduce impacts. In addition, see the Ackerman milkvetch for a list of other potential mitigations.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Las Vegas bearpoppy[k]	***Arctomecon californica***	NV-P; FWS-SC	Open, dry, spongy or powdery, often dissected or hummocked soils with high gypsum content, typically with well-developed soil crust, in areas of generally low relief on all aspects and slopes, with a sparse cover of other gypsum-tolerant species. Elevation ranges between 1,050 and 3,650 ft. Nearest recorded occurrence is 5 mi south of the SEZ. About 65,400 acres of potentially suitable habitat occurs in the SEZ region.	425 acres of potentially suitable habitat lost (0.7% of available potentially suitable habitat)	1,250 acres of potentially suitable habitat (1.9% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to desert pavement habitat on the SEZ could reduce impacts. In addition, see the Ackerman milkvetch for a list of other potential mitigations.
Las Vegas buckwheat	*Eriogonum corymbosum* var. *nilesii*	ESA-C; BLM-S; NV-S1	Restricted to southern Nevada in the vicinity of Las Vegas on or near gypsum soils, in washes, drainages, or in areas of generally low relief. Elevation ranges between 1,900 and 3,850 ft. Nearest recorded occurrence is 12 mi southwest of the SEZ. About 63,000 acres of potentially suitable habitat occurs in the SEZ region.	425 acres of potentially suitable habitat lost (0.7% of available potentially suitable habitat)	3,400 acres of potentially suitable habitat (5.4% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to desert wash habitat on the SEZ could reduce impacts. In addition, see the Ackerman milkvetch for a list of other potential mitigations a. The potential for impact and need for mitigation should be developed in coordination with the USFWS and the NDOW.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Littlefield milkvetch	*Astragalus preussii* var. *laxiflorus*	NV-S1	Endemic to the Lake Mead region of Arizona and Nevada and disjunctly in California on alkaline clay flats and gravelly washes within shadscale and chenopod scrub at elevations between 2,300 and 2,450 ft. Nearest recorded occurrence is 13 mi southeast of the SEZ. About 122,200 acres of potentially suitable habitat occurs in the SEZ region.	430 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	3,700 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to desert wash and playa habitats on the SEZ could reduce impacts. In addition, see the Ackerman milkvetch for a list of other potential mitigations.
Meadow Valley sandwort	***Eremogone stenomeres***	NV-S2	Endemic to Clark and Lincoln counties, Nevada on limestone cliffs at elevations between 2,950 and 3,950 ft. Nearest recorded occurrence is 1 mi west of the SEZ. About 334,400 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	11,600 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small overall impact; no direct effects. No species-specific mitigation is warranted.
Mottled milkvetch	*Astragalus lentiginosus* var. *stramineus*	NV-S1	Restricted to the lower Virgin River Valley in Mohave County, Arizona, and Clark County, Nevada, on sandy and gravelly flats and dunes at elevations between 2,000 and 3,000 ft. Nearest recorded occurrence is 40 mi northeast of the SEZ. About 65,400 acres of potentially suitable habitat occurs in the SEZ region.	425 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat)	1,275 acres of potentially suitable habitat (1.9% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to desert pavement habitat on the SEZ could reduce impacts. In addition, see the Ackerman milkvetch for a list of other potential mitigations.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
New York Mountains catseye	*Cryptantha tumulosa*	NV-S2	Gravelly or clay, granitic or carbonate substrates within Mojave desert scrub, creosotebush scrub, and pinyon-juniper woodland at elevation between 4,500 and 9,900 ft. Nearest recorded occurrence is 10 mi northwest of the SEZ in the Desert NWR. About 4,066,100 acres of potentially suitable habitat occurs in the SEZ region.	12,500 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	127,300 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact. See the Ackerman milkvetch for a list of other potential mitigations.
Parish's phacelia	*Phacelia parishii*	BLM-S; FWS-SC; NV-S2	Aquatic habitats and wetlands in moist to superficially dry, open, flat, mostly barren, salt-crusted silty-clay soils on valley bottoms, lake deposits, playa edges in proximity to seepage areas surrounded by saltbush scrub vegetation. Elevation ranges from 2,200 to 5,950 ft. Nearest recorded occurrence is 19 mi southwest of the SEZ. About 81,700 acres of potentially suitable habitat occurs in the SEZ region.	430 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	4,100 acres of potentially suitable habitat (5.0% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to desert wash and playa habitats on the SEZ could reduce impacts. In addition, see the Ackerman milkvetch for a list of other potential mitigations.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Rock phacelia	*Phacelia petrosa*	BLM-S; NV-S2	Dry limestone and volcanic talus slopes of foothills, washes, and gravelly canyon bottoms on substrates derived from calcareous material. Inhabits mixed desert scrub, creosotebush, and blackbrush at elevations between 2,500 and 5,800 ft. Nearest recorded occurrence is 9 mi west of the SEZ in the Desert NWR. About 4,242,700 acres of potentially suitable habitat occurs in the SEZ region.	12,500 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	142,750 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	Small overall impact. See the Ackerman milkvetch for a list of potential mitigations applicable to all special status plant species.
Rosy two-tone beard-tongue	***Penstemon bicolor* ssp. *roseus***	BLM-S; FWS-SC	Calcareous, granitic, or volcanic soils in washes, roadsides, scree at outcrop bases, rock crevices, or similar places receiving runoff, within creosote-bursage, blackbrush, and mixed-shrub. Elevation ranges between 1,800 and 4,850 ft. Known to occur on the SEZ and throughout the affected area. About 524,100 acres of potentially suitable habitat occurs in the SEZ region.	550 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	15,500 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to desert wash habitats on the SEZ could reduce impacts. In addition, see the Ackerman milkvetch for a list of other potential mitigations.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Rough dwarf greasebush	*Glossopetalon pungens* var. *pungens*	BLM-S; NV-S2	Endemic to the Spring and Sheep ranges in southern Nevada, where the species is known from seven occurrences in the crevices of carbonate cliffs and outcrops, generally avoiding southerly exposures, within pinyon-juniper, mountain mahogany, and montane conifer communities. Elevation ranges from 4,400 to 7,800 ft. Nearest recorded occurrence is 17 mi west of the SEZ in the DNWR. About 606,000 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	11,600 acres of potentially suitable habitat (1.9% of available potentially suitable habitat)	Small overall impact; no direct effects. No species-specific mitigation is warranted.
Rough fringemoss	*Crossidium seriatum*	NV-S2	Known from only eight occurrences in Nevada in sandstone and gypsiferous bluffs, outcrops, rock piles, and soils, often protected on the north or east sides of rocks or shrubs, or at bases of bluffs at elevations between 1,300 and 2,450 ft. Nearest recorded occurrence is 15 mi southeast of the SEZ in the Lake Mead NRA. About 399,800 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	12,875 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Small overall impact; no direct effects. No species-specific mitigation is warranted.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Sheep fleabane	*Erigeron ovinus*	BLM-S; FWS-SC; NV-S2	Endemic to Mount Irish and the Sheep and Groom ranges in southern Nevada, where the species is known from fewer than 15 occurrences in crevices of carbonate cliffs and ridgeline outcrops within pinyon-juniper and montane conifer woodland. Elevation ranges from 3,600 to 8,400 ft. Nearest recorded occurrence is 17 mi northwest of the SEZ in the Desert NWR. About 576,650 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	11,600 acres of potentially suitable habitat (2.0% of available potentially suitable habitat)	Small overall impact; no direct effects. No species-specific mitigation is warranted.
Sheep Mountain milkvetch	*Astragalus amphioxys* var. *musimonum*	BLM-S; FWS-SC; NV-S2	Restricted to the foothills of the Sheep Mountains in southern Nevada (historically occurred in Arizona). Occurs in carbonate alluvial gravels, particularly along drainages, roadsides, and in other microsites with enhanced runoff, at elevations between 4,400 and 6,000 ft. Nearest recorded occurrence is 6 mi northwest of the SEZ in the Desert NWR. About 3,884,600 acres of potentially suitable habitat occurs in the SEZ region.	12,500 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	131,100 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	Small overall impact. See the Ackerman milkvetch for a list of other potential mitigations.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Silverleaf sunray	*Enceliopsis argophylla*	BLM-S; NV-S1	Nearly entirely confined to Clark County, Nevada, in dry, open, relatively barren areas on gypsum badlands, volcanic gravels, or loose sands, within creosote-bursage habitat. Elevation ranges from 1,200 to 2,400 ft. Nearest recorded occurrence is 15 mi east of the SEZ. About 89,100 acres of potentially suitable habitat occurs in the SEZ region.	425 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	1,265 acres of potentially suitable habitat (1.4% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to desert pavement habitat on the SEZ could reduce impacts. In addition, see the Ackerman milkvetch for a list of other potential mitigations.
Sticky buckwheat	*Eriogonum viscidulum*	NV-P; FWS-SC; NV-S2	Known only from Clark County, Nevada, and Mohave County, Arizona, on deep, loose sandy soils in washes, flats, roadsides, steep aeolian slopes, and stabilized dunes. Elevation ranges from 1,200 to 2,200 ft. Nearest recorded occurrence is 21 mi northeast of the SEZ. About 65,000 acres of potentially suitable habitat occurs in the SEZ region.	425 acres of potentially suitable habitat lost (0.7% of available potentially suitable habitat)	3,375 acres of potentially suitable habitat (5.2% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to desert wash habitat on the SEZ could reduce impacts. In addition, see the Ackerman milkvetch for a list of other potential mitigations.
Sweet moustache moss	*Trichostomum sweetii*	NV-S1	Known from only two occurrences in Nevada on sandstone bluffs and sandstone-derived soil, often shaded by rocks at elevations between 2,000 and 2,230 ft. Nearest recorded occurrence is 21 mi southeast of the SEZ in the Lake Mead NRA. About 65,400 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	1,265 acres of potentially suitable habitat (1.9% of available potentially suitable habitat)	Small overall impact; no direct effects. No species-specific mitigation is warranted.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Threecorner milkvetch	***Astragalus geyeri* var. *triquetrus***	NV-P; FWS-SC; NV-S2	Known only from Clark County, Nevada, and Mohave County, Arizona on open, deep sandy soils, desert washes, or dunes, generally stabilized by vegetation and/or a gravel veneer. Elevations range from 1,500 to 2,500 ft. Nearest recorded occurrence is about 1 mi east of the SEZ. About 105,700 acres of potentially suitable habitat occurs in the SEZ region.	850 acres of potentially suitable habitat lost (0.8% of available potentially suitable habitat)	4,700 acres of potentially suitable habitat (4.4% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to desert wash and pavement habitats on the SEZ could reduce impacts. In addition, see the Ackerman milkvetch for a list of other potential mitigations.
Virgin River thistle	*Cirsium virginense*	NV-S1	Known from only a few locations in Washington County, Utah, Mohave County, Arizona, and Clark County, Nevada, in open, moist, alkaline clay soils of seep and spring areas or gypsum knolls at elevations between 1,950 and 6,550 ft. Nearest recorded occurrence is 34 mi east of the SEZ. About 60,700 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	300 acres of potentially suitable habitat (0.5% of available potentially suitable habitat)	Small overall impact; no direct effects. No species-specific mitigation is warranted.
White bearpoppy	*Arctomecon merriamii*	BLM-S	Endemic to the Mojave Desert of California and Nevada in barren gravelly areas, rocky slopes, and limestone outcrops at elevations between 2,000 and 5,900 ft. Nearest recorded occurrence is 19 mi southwest of the SEZ. About 358,000 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	11,600 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Small overall impact; no direct effects. No species-specific mitigation is warranted.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Yellow two-tone beard-tongue	***Penstemon bicolor* ssp. *bicolor***	BLM-S; FWS-SC; NV-S2	Endemic to Clark County, Nevada, on mostly BLM lands in the vicinity of Las Vegas on calcareous or carbonate soils in washes, roadsides, rock crevices, or outcrops at elevations between 2,500 and 5,500 ft. Nearest recorded occurrence is from a dry lake approximately 2 mi west of the SEZ. About 524,100 acres of potentially suitable habitat occurs in the SEZ region.	550 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	15,500 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to desert wash habitat on the SEZ could reduce impacts. In addition, see the Ackerman milkvetch for a list of other potential mitigations.
Invertebrates						
Grated tryonia	*Tryonia clathrata*	ESA-UR; BLM-S; NV-S2	Endemic to the Muddy River spring system in southeastern Nevada on algae and detritus substrates of slow moving freshwater spring systems. Nearest recorded occurrence is from Big Muddy Spring, approximately 15 mi north of the SEZ. About 500 acres of potentially suitable habitat associated with the Warm Springs Area occurs in the SEZ region.	0 acres	0 acres within the 5-mi area surrounding the SEZ, but approximately 500 acres of potentially suitable habitat in the Warm Springs Area could be affected by groundwater withdrawals.	Small to large overall impact. The impact of water withdrawal on the Garnet Valley regional groundwater system that supports aquatic and mesic habitat in the SEZ region would depend on the volume of water withdrawn to support solar energy development on the SEZ. Avoiding or limiting withdrawals from this regional groundwater system could reduce impacts on this species to negligible levels. Note that these potential mitigation measures apply to all special status species with habitats dependent upon groundwater that may be affected by development on the SEZ. The potential for impact and need for mitigation should be determined in coordination with the USFWS and the NDOW.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Invertebrates (Cont.)						
Moapa pebblesnail	*Pyrgulopsis avernalis*	ESA-UR; NV-S1	Endemic to Moapa Springs in Clark County, Nevada, in freshwater springs and brooks. Nearest recorded occurrence is from Big Muddy Spring, approximately 15 mi north of the SEZ. About 500 acres of potentially suitable habitat associated with the Warm Springs Area occurs in the SEZ region.	0 acres	0 acres within the 5-mi area surrounding the SEZ, but approximately 500 acres of potentially suitable habitat in the Warm Springs Area could be affected by groundwater withdrawals.	Small to large overall impact. Habitats may be affected by groundwater withdrawal. See grated tryonia for potential mitigation measures applicable to all groundwater-dependent special status species. The potential for impact and need for mitigation should be determined in coordination with the USFWS and the NDOW.
Moapa Valley pebblesnail	*Pyrgulopsis carinifera*	ESA-UR; NV-S1	Endemic to the Moapa Valley in Clark County, Nevada, in freshwater spring-fed habitats. Nearest recorded occurrence is from Big Muddy Spring, approximately 15 mi north of the SEZ. About 28 mi of potentially suitable habitat associated with the Warm Springs Area and Muddy River occurs in the SEZ region.	0 acres	0 acres within the 5-mi area surrounding the SEZ, but approximately 28 mi of potentially suitable habitat in the Muddy River could be affected by groundwater withdrawals.	Small to large overall impact. Habitats may be affected by groundwater withdrawal. See grated tryonia for potential mitigation measures applicable to all groundwater-dependent special status species. The potential for impact and need for mitigation should be determined in coordination with the USFWS and NDOW.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Invertebrates (Cont.)						
Moapa Warm Spring riffle beetle	*Stenelmis moapa*	ESA-UR; BLM-S; NV-S1	Endemic to the Warm Springs Area of Clark County, Nevada, in swift, shallow waters of freshwater warm outlet springs on gravel substrates. Nearest recorded occurrence is from Big Muddy Spring, approximately 15 mi north of the SEZ. About 500 acres of potentially suitable habitat associated with the Warm Springs Area occurs in the SEZ region.	0 acres	0 acres within the 5-mi area surrounding the SEZ, but approximately 500 acres of potentially suitable habitat in the Warm Springs Area could be affected by groundwater withdrawals.	Small to large overall impact. Habitats may be affected by groundwater withdrawal. See grated tryonia for potential mitigation measures applicable to all groundwater-dependent special status species. The potential for impact and need for mitigation should be determined in coordination with the USFWS and the NDOW.
Mojave gypsum bee	*Andrena balsamorhizae*	BLM-S; NV-S2	Endemic to Nevada on gypsum soils associated with habitats of its single larval host plant, silverleaf sunray. Such habitats include warm desert shrub communities on dry slopes and sandy washes. Nearest recorded occurrence is 8 mi south of the SEZ. About 3,819,500 acres of potentially suitable habitat occurs in the SEZ region.	12,500 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	127,300 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats on the SEZ or compensatory mitigation of direct effects on occupied habitats may reduce impacts on this species.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Invertebrates (Cont.)						
Mojave poppy bee	*Perdita meconis*	BLM-S; NV-S2	Known only from Clark County, Nevada where the species is dependent on poppy plants (genus *Arctomecon*). in roadsides, washes, and barren desert areas on gypsum soils. Nearest recorded occurrence is in the vicinity of Lake Mead, approximately 17 mi south of the SEZ. About 418,000 acres of potentially suitable habitat occurs in the SEZ region.	550 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	13,300 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to desert wash habitat on the SEZ could reduce impacts. In addition, pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats on the SEZ or compensatory mitigation of direct effects on occupied habitats may reduce impacts on this species.
Pahranagat naucorid	*Pelocoris shoshone shoshone*	BLM-S; NV-S1	Known only to occur in the Muddy and White River Basins in southern Nevada in quiet waters of warm spring-fed habitats. Nearest recorded occurrence is from Big Muddy Spring, approximately 15 mi north of the SEZ. Approximately 68 mi of potentially suitable habitat in the Muddy and White River Basins occurs in the SEZ region.	0 acres	0 acres within the 5-mi area surrounding the SEZ, but approximately 68 mi of potentially suitable habitat in the Muddy and White River Basins could be affected by groundwater withdrawals.	Small to large overall impact. Habitats may be affected by groundwater withdrawal. See grated tryonia for potential mitigation measures applicable to all groundwater-dependent special status species.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Invertebrates (Cont.)						
Red-tailed blazing star bee	*Megandrena mentzeliae*	NV-S2	Endemic to southern Nevada, where it is known only from Clark County. The species is primarily associated with the host plant *Mentzelia tricuspis*. Such habitats include open, dry, barren areas with gypsum to gravelly soils. Nearest recorded occurrence is 13 mi northwest of the SEZ in the Desert NWR. About 105,700 acres of potentially suitable habitat occurs in the SEZ region.	425 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	1,500 acres of potentially suitable habitat (1.4% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to desert pavement habitat on the SEZ could reduce impacts. Pre-disturbance surveys, avoiding or minimizing disturbance to occupied habitats, or compensatory mitigation of occupied habitats on the SEZ may also reduce impacts on this species.
Spring Mountains springsnail	*Pyrgulopsis deaconi*	BLM-S; NMV-S1	Endemic to freshwater springs of the Spring Mountains in southern Nevada. Known to occur in Clark County, Nevada. The amount of suitable habitat in the SEZ region has not been determined.	0 acres	0 acres within the 5-mi area surrounding the SEZ, but suitable habitat elsewhere in the SEZ region could be affected by groundwater withdrawals.	Small to large overall impact. Habitats may be affected by groundwater withdrawal. See grated tryonia for potential mitigation measures applicable to all groundwater-dependent special status species.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Invertebrates (Cont.)						
Warm Springs naucorid	*Limnocoris moapensis*	NV-S1	Endemic to southern Nevada, where it is restricted to the Warm Springs Area among the pebble beds of quiet waters or stream outlets. Nearest recorded occurrence is from Big Muddy Spring, approximately 15 mi north of the SEZ. Approximately 500 acres of potentially suitable habitat in the Warm Springs Area occurs in the SEZ region.	0 acres	0 acres within the 5-mi area surrounding the SEZ, but approximately 500 acres of potentially suitable habitat in the Warm Springs Area could be affected by groundwater withdrawals.	Small to large overall impact. Habitats may be affected by groundwater withdrawal. See grated tryonia for potential mitigation measures applicable to all groundwater-dependent special status species.
Fish						
Moapa dace	*Moapa coriacea*	ESA-E; NV-P; NV-S1	Endemic to Clark County, Nevada, where the species is restricted to 6 mi of aquatic habitat in the warm spring area at the headwaters of the Muddy River. Preferred habitat includes spring pools, outflows, and the main stem of the Muddy River, where the water is clear and warm. Nearest recorded occurrences are from Moapa and Big Muddy Springs, approximately 15 mi north of the SEZ. Approximately 6 mi of potentially suitable habitat in the Warm Springs Area and Muddy River occurs in the SEZ region.	0 acres	0 acres within the 5-mi area surrounding the SEZ, but approximately 6 mi of potentially suitable habitat in the Warm Springs Area and Muddy River could be affected by groundwater withdrawals.	Small to large overall impact. Habitats may be affected by groundwater withdrawal. See grated tryonia for potential mitigation measures applicable to all groundwater-dependent special status species. The potential for impact and need for mitigation should be determined in consultation with the USFWS and the NDOW.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Fish (Cont.)						
Moapa speckled dace	*Rhinichthys osculus moapae*	ESA-UR; BLM-S; NV-P; NV-S1	Endemic to Clark County, Nevada, where it is restricted to the Muddy River in shallow cobble riffles. Nearest recorded occurrences are from Muddy River, approximately 15 mi northeast of the SEZ. Approximately 28 mi of potentially suitable habitat in the Muddy River occurs in the SEZ region.	0 acres	0 acres within the 5-mi area surrounding the SEZ, but approximately 28 mi of potentially suitable habitat in the Muddy River could be affected by groundwater withdrawals.	Small to large overall impact. Habitats may be affected by groundwater withdrawal. See grated tryonia for potential mitigation measures applicable to all groundwater-dependent special status species. The potential for impact and need for mitigation should be determined in coordination with the USFWS and the NDOW.
Moapa White River springfish	*Crenichthys baileyi moapae*	ESA-UR; NV-P; NV-S2	Endemic to southern Nevada, where it is restricted to five warm-water springs in the upper Muddy River in spring pools and backwaters in spring outflows. More abundant in and near the springs than in the river. Nearest recorded occurrences are from Muddy River, approximately 15 mi northeast of the SEZ. Approximately 500 acres of potentially suitable habitat in the Warm Springs Area occurs in the SEZ region.	0 acres	0 acres within the 5-mi area surrounding the SEZ, but approximately 500 acres of potentially suitable habitat in the Warm Springs Area could be affected by groundwater withdrawals.	Small to large overall impact. Habitats may be affected by groundwater withdrawal. See grated tryonia for potential mitigation measures applicable to all groundwater-dependent special status species. The potential for impact and need for mitigation should be determined in coordination with the USFWS and the NDOW.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Fish (Cont.)						
Pahrump poolfish	*Empetrichthys latos latos*	ESA-E; NV-P; NV-S1	Historically endemic to the Pahrump Valley in southern Nye County, Nevada. It is currently extirpated from its native range. Introduced populations occur in three spring-fed habitats in Clark and White Pine Counties, Nevada: Corn Creek Springs, Shoshone Springs, and an irrigation reservoir fed by Sandstone Spring. Nearest recorded occurrence is from Corn Creek Springs in the Desert NWR, approximately 23 mi west of the SEZ. Approximately 5 acres of potentially suitable habitat in Corn Creek Springs occurs in the SEZ region.	0 acres	0 acres within the 5-mi area surrounding the SEZ, but approximately 5 acres of potentially suitable habitat in Corn Creek Springs could be affected by groundwater withdrawals.	Small to large overall impact. Habitats may be affected by groundwater withdrawal. See grated tryonia for potential mitigation measures applicable to all groundwater-dependent special status species. The potential for impact and need for mitigation should be determined in consultation with the USFWS and the NDOW.
Amphibians						
Southwestern toad	*Bufo microscaphus*	BLM-S; FWS-SC; NV-S2	Woodlands and low-elevation riparian habitats in association with permanent or semipermanent water bodies including streams, ditches, flooded fields, irrigated croplands, and permanent reservoirs. Nearest recorded occurrences are along the Meadow Valley Wash, approximately 50 mi north of the SEZ. About 19,100 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	50 acres of potentially suitable habitat (0.3% of available potentially suitable habitat). Additional potentially suitable riparian habitats in the SEZ region could be affected by groundwater withdrawals.	Small to large overall impact. Habitats may be affected by groundwater withdrawal. See grated tryonia for potential mitigation measures applicable to all groundwater-dependent special status species.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Reptiles						
Desert tortoise	***Gopherus agassizii***	ESA-T; NV-P; NV-S2	Desert creosotebush communities on firm soils for digging burrows along riverbanks, washes, canyon bottoms, creosote flats, and desert oases. Known to occur on the SEZ and throughout the affected area. About 2,762,500 acres of potentially suitable habitat occurs in the SEZ region.	15,000 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	106,250 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to 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 the NDOW.
Gila monster	*Heloderma suspectum*	BLM-S; NV-P; FWS-SC; CA-S1; NV-S2	Rocky, deeply incised areas of desert scrub, thorn scrub, desert riparian, oak woodland, and semidesert grassland. Occurs in lower mountain slopes, rocky bajadas, canyon bottoms, and arroyos at elevations below 3,950 ft. Known to occur in Clark County, Nevada. About 3,175,900 acres of potentially suitable habitat occurs in the SEZ region.	14,700 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	124,100 acres of potentially suitable habitat (3.9% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to 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.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Birds						
American peregrine falcon	*Falco peregrinus*	BLM-S; NV-P; FWS-SC; NV-S2	Year-round resident in SEZ region in open habitats, including deserts, shrublands, and woodlands associated with high, near vertical cliffs and bluffs above 200 ft. When not breeding, activity is concentrated in areas with ample prey, such as farmlands, marshes, lakes, rivers, and urban areas. Nearest recorded occurrences are from the metropolitan area of Las Vegas, Nevada, approximately 22 mi southwest of the SEZ. About 4,171,400 acres of potentially suitable habitat occurs in the SEZ region.	14,900 acres of potentially suitable foraging habitat lost (0.4% of available potentially suitable habitat)	137,700 acres of potentially suitable foraging or nesting habitat (2.8% of available potentially suitable habitat)	Small overall impact. Direct 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 effect.
Crissal thrasher	*Toxostoma crissale*	BLM-S; FWS-SC	Year-round resident in SEZ region. Nests in dense thickets of mesquite or low trees in desert riparian and desert wash habitats. Also occurs in washes within pinyon-juniper habitats. Known to occur in Clark County, Nevada. About 81,000 acres of potentially suitable habitat occurs in the SEZ region.	350 acres of potentially suitable foraging and nesting habitat lost (0.4% of available potentially suitable habitat)	3,440 acres of potentially suitable foraging and nesting habitat (4.2% of available potentially suitable habitat).	Small overall impact. Avoiding or minimizing disturbance to desert wash and riparian habitat on the SEZ could reduce impacts. In addition, pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats (especially nesting habitats) on the SEZ or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Birds (Cont.)						
Ferruginous hawk	*Buteo regalis*	BLM-S; FWS-SC	Winter resident in SEZ region in grasslands, sagebrush, and saltbrush habitats, as well as the periphery of pinyon-juniper woodland. Known to occur in Clark County, Nevada. About 417,500 acres of potentially suitable habitat occurs in the SEZ region.	340 acres of potentially suitable foraging habitat lost (0.1% of available potentially suitable habitat)	15,150 acres of potentially suitable foraging habitat (3.6% of available potentially suitable habitat)	Small overall impact. Direct 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 effect.
LeConte's thrasher	*Toxostoma lecontei*	BLM-S; NV-P; FWS-SC; NV-S2	Year-round resident in SEZ region in saltbush-cholla scrub communities in desert flats, dunes, or alluvial fans. Known to occur in Clark County, Nevada. About 3,817,950 acres of potentially suitable habitat occurs in the SEZ region.	15,000 acres of potentially suitable foraging and nesting habitat lost (0.4% of available potentially suitable habitat)	127,500 acres of potentially suitable foraging and nesting habitat (3.3% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats (especially nesting habitats) on the SEZ or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Birds (Cont.)						
Phainopepla	*Phainopepla nitens*	BLM-S; NV-P; FWS-SC; NV-S2	Year-round resident in project area in desert scrub, mesquite, pinyon-juniper woodland, desert riparian areas and orchards. Nests in trees or shrubs. Nearest recorded occurrences are from the Meadow Valley Wash and Muddy River systems, approximately 20 mi east of the SEZ. About 1,038,500 acres of potentially suitable habitat occurs in the SEZ region.	340 acres of potentially suitable foraging and nesting habitat lost (<0.1% of available potentially suitable habitat)	9,850 acres of potentially suitable foraging and nesting habitat (0.9% of available potentially suitable habitat). Additional potentially suitable riparian habitats in the SEZ region could be affected by groundwater withdrawals.	Small to large overall impact. Potentially suitable nesting habitat in riparian habitats in the Moapa and Pahranagat Valleys may be affected by groundwater withdrawal. See grated tryonia for potential mitigation measures applicable to all groundwater-dependent species. In addition, pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats (especially nesting habitats) on the SEZ or compensatory mitigation of direct effects on occupied habitats on the SEZ could reduce impacts.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Birds (Cont.)						
Southwestern willow flycatcher	*Empidonax traillii extimus*	ESA-E; NV-P; NV-S1	Summer breeding resident in SEZ region in riparian shrublands and woodlands. Nests in thickets, scrubby and brushy areas, open second growth, swamps, and open woodlands. Nearest recorded occurrences are from the Muddy and Virgin River systems, approximately 20 mi east of the SEZ. About 183,400 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	50 acres of potentially suitable foraging and nesting habitat (<0.1% of available potentially suitable habitat). Additional potentially suitable riparian habitats in the SEZ region could be affected by groundwater withdrawals.	Small to large overall impact. No direct impact. Potentially suitable nesting habitat in riparian habitats in the Moapa and Pahranagat Valleys may be affected by groundwater withdrawal. See grated tryonia for potential mitigation measures applicable to all groundwater-dependent species. The potential for impact and need for mitigation should be determined in consultation with the USFWS and the NDOW.
Western burrowing owl	*Athene cunicularia hypugaea*	BLM-S; FWS-SC	Summer breeding resident in SEZ region in open grasslands and prairies, as well as disturbed sites such as golf courses, cemeteries, and airports throughout the SEZ region. Nests in burrows constructed by mammals (prairie dog, badger, and the like). Known to occur in Clark County, Nevada. About 4,034,600 acres of potentially suitable habitat occurs in the SEZ region.	14,750 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	125,500 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact on foraging and nesting habitat. Pre-disturbance surveys and avoiding or minimizing disturbance to occupied burrows and habitats in the area of direct effects or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Mammals						
Big free-tailed bat	*Nyctinomops macrotis*	BLM-S; NV-S1	Year-round resident in SEZ region. Roosts in rock crevices on cliff faces or in buildings. Forages primarily in coniferous forests and arid shrublands to feed on moths. Known to occur in Clark County, Nevada. About 4,048,200 acres of potentially suitable habitat occurs in the SEZ region.	15,600 acres of potentially suitable foraging habitat lost (0.4% of available potentially suitable habitat)	141,575 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small overall impact. Direct 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 effect.
Brazilian free-tailed bat	*Tadarida brasiliensis*	BLM-S; NV-P	Year-round resident in SEZ region. Forages in desert grassland, old field, savanna, shrubland, and woodland habitats as well as urban areas. Roosts in old buildings, caves, mines, and hollow trees. Known to occur in Clark County, Nevada. About 3,722,850 acres of potentially suitable habitat occurs in the SEZ region.	15,200 acres of potentially suitable foraging habitat lost (0.4% of available potentially suitable habitat)	133,500 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small overall impact. Direct 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 effect.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Mammals (Cont.)						
Nelson's bighorn sheep	***Ovis canadensis nelsoni***	BLM-S; FWS-SC	Open, steep rocky terrain in mountainous habitats of the eastern Mojave and Sonoran Deserts in California. Rarely uses desert lowlands, but may use them as corridors for travel between mountain ranges. Known to occur in the Sheep Mountains, approximately 5 mi west of the SEZ, and potentially suitable year-round habitat occurs within the affected area. May utilize portions of the SEZ as migratory corridors. About 593,900 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	8,400 acres of potentially suitable habitat (1.4% of available potentially suitable habitat)	Small overall impact; no direct affect. Impacts could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to important movement corridors within the area of direct effects.
Pallid bat	*Antrozous pallidus*	BLM-S; NV-P; FWS-SC	Year-round resident in SEZ region in low elevation desert communities, including grasslands, shrublands, and woodlands. Roosts in caves, crevices, and mines. Nearest recorded occurrences are from the Desert NWR, approximately 10 mi west of the SEZ. About 3,706,300 acres of potentially suitable habitat occurs in the SEZ region.	15,100 acres of potentially suitable foraging habitat lost (0.4% of available potentially suitable habitat)	134,100 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small overall impact. Direct 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 effect.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Mammals (Cont.)						
Silver-haired bat	*Lasionycteris noctivagans*	BLM-S; FWS-SC	Year-round resident in SEZ region in high-elevation (1,600 to 8,500 ft) forested areas of aspen, cottonwood, white fir, pinyon-juniper, subalpine fir, willow, and spruce. May also forage in arid shrublands. Roosts in tree foliage, cavities, under loose bark, caves, mines, and under rock ledges. Rarely hibernates in caves. Nearest recorded occurrences are from the Muddy River, approximately 15 mi northeast of the SEZ. About 3,586,800 acres of potentially suitable habitat occurs in the SEZ region.	14,800 acres of potentially suitable foraging habitat lost (0.4% of available potentially suitable habitat)	130,100 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small overall impact. Direct 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 effect.
Spotted bat	*Euderma maculatum*	BLM-S; NV-P; FWS-SC; NV-S2	Year-round resident in SEZ region near forests and shrubland habitats throughout the SEZ region. Roosts and hibernates in caves and rock crevices. Nearest recorded occurrences are from the vicinity of Las Vegas, approximately 16 mi southwest of the SEZ. About 4,404,950 acres of potentially suitable habitat occurs in the SEZ region.	15,000 acres of potentially suitable foraging habitat lost (0.3% of available potentially suitable habitat)	139,300 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Small overall impact. Direct 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 effect.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Mammals (Cont.)						
Townsend's big-eared bat	*Corynorhinus townsendii*	BLM-S; NV-P; NV-S2	Year-round resident in SEZ region near forests and shrubland habitats below 9,000 ft elevation throughout the SEZ region. Roosts in caves, mines, and buildings for day roosting. Nearest recorded occurrences are from the Desert NWR, approximately 10 mi west of the SEZ. About 3,861,200 acres of potentially suitable habitat occurs in the SEZ region.	14,900 acres of potentially suitable foraging habitat lost (0.4% of available potentially suitable habitat)	131,100 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	Small overall impact. Direct 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 effect.
Western mastiff bat	*Eumops perotis*	NV-P; FWS-SC; NV-S1	Summer resident in project area 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 occurrences are from the vicinity of Las Vegas, approximately 20 mi southwest of the SEZ. About 97,800 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	200 acres of potentially suitable habitat (0.2% of available potentially suitable habitat)	Small overall impact; no direct effects. No species-specific mitigation is warranted.

TABLE 11.3.12.1-1 (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 Impact Magnitude[f] and Species-Specific Mitigation[g]
Mammals (Cont.)						
Western small-footed myotis	*Myotis ciliolabrum*	BLM-S; FWS-SC	Year-round resident in SEZ region in woodland and riparian habitats at elevations below 9,000 ft. Roosts in caves, buildings, mines, and crevices of cliff faces. Nearest recorded occurrences are from the Desert NWR, approximately 10 mi west of the SEZ. About 4,325,600 acres of potentially suitable habitat occurs in the SEZ region.	14,900 acres of potentially suitable foraging habitat lost (0.3% of available potentially suitable habitat)	137,600 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Small overall impact. Direct 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 effect.

[a] BLM-S = listed as a sensitive species by the BLM; ESA-C = candidate for listing under the ESA; ESA-E = listed as endangered under the ESA; ESA-T = listed as threatened under the ESA; ESA-UR = under review for listing under the ESA; FWS-SC = USFWS species of concern; NV-P = protected in the State of Nevada under NRS 501.110 (animals) or NRS 527 (plants); NV-S1 = ranked as S1 in the State of Nevada; NV-S2 = ranked as S2 in the State of Nevada.

[b] For plant species, potentially suitable habitat was determined by using SWReGAP land cover types. For terrestrial vertebrate species, potentially suitable habitat was determined by using SWReGAP habitat suitability and land cover models. Area of potentially suitable habitat for each species is presented for the SEZ region, which is 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 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 due to the proximity of existing infrastructure to the SEZ.

[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 where ground-disturbing activities would not occur. Indirect effects include effects from groundwater withdrawal, surface runoff, dust, noise, lighting, and so on from project developments. The potential degree of indirect effects would decrease with increasing distance from the SEZ. Indirect effects on groundwater-dependent species were considered outside these defined areas.

Footnotes continued on next page.

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TABLE 11.3.12.1-1 (Cont.)

[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 within 5 mi (8 km) of the SEZ boundary.

Las Vegas bearpoppy, Meadow Valley sandwort, rosy two-tone beardtongue, threecorner milkvetch, yellow two-tone beardtongue, desert tortoise, and Nelson's bighorn sheep. In addition to these species, there are 13 groundwater-dependent species or species with habitats that may be dependent on groundwater discharge from the Garnet Valley groundwater basin. These species include grated tryonia, Moapa pebblesnail, Moapa Valley pebblesnail, Moapa Warm Spring riffle beetle, Pahranagat naucorid, Spring Mountain springsnail, Warm Springs naucorid, Moapa dace, Moapa speckled dace, Moapa White River springfish, Pahrump poolfish, phainopepla, and southwestern willow flycatcher.

11.3.12.1.1 Species Listed under the Endangered Species Act That Could Occur in the Affected Area

In scoping comments on the proposed Dry Lake SEZ (Stout 2009), the USFWS expressed concern for impacts of project development within the SEZ on habitat for the Mojave population of the desert tortoise—a species listed as threatened under the ESA. The USFWS also expressed concern that groundwater withdrawals for development on the SEZ from the Garnet Valley regional groundwater system might also reduce the groundwater supply that supports aquatic and riparian habitats for various ESA-listed species in the SEZ region. The following ESA-listed species that may occur outside the area of indirect effects but that could be affected by groundwater withdrawals within the SEZ are considered: Moapa dace (endangered), Pahrump poolfish (endangered), and southwestern willow flycatcher (endangered). These species are discussed below, and information on their habitats is presented in Table 11.3.12.1-1; additional basic information on life history, habitat needs, and threats to populations of these species is provided in Appendix J.

Desert Tortoise

The Mojave population of the desert tortoise is listed as threatened under the ESA and is known to occur in the SEZ region in desert shrubland habitats. The species is known to occur on the SEZ and within the area of indirect effects; designated critical habitat occurs immediately adjacent to the western boundary of the proposed Dry Lake SEZ in the Mormon Mesa critical habitat unit (Figure 11.3.12.1-1). Desert tortoise surveys in the Mormon Mesa critical habitat unit conducted by the USFWS have indicated a desert tortoise density of about 1.6 to 3.2 individuals per km^2 (Stout 2009). Extrapolated across the size of the Dry Lake SEZ, the USFWS has estimated that the Dry Lake SEZ may support up to 213 desert tortoises.

According to the SWReGAP habitat suitability model, approximately 121,250 acres (491 km^2) of potentially suitable habitat for this species occurs in the affected area; 15,000 acres (61 km^2) occurs within the SEZ and 106,250 acres (430 km^2) occurs in the area of indirect effects. The USGS desert tortoise model (Nussear et al. 2009) identifies the SEZ as having overall high habitat suitability for desert tortoise (suitability score greater than or equal to 0.8 out of 1.0). According to the SWReGAP habitat suitability model, approximately 2,762,500 acres (11,180 km^2) of potentially suitable habitat for this species occurs in the SEZ region (Table 11.3.12.1-1).

Southwestern Willow Flycatcher

The southwestern willow flycatcher is a small neotropical migrant bird listed as endangered under the ESA that inhabits riparian shrublands, woodlands, and thickets in the southwestern United States. The nearest recorded occurrence of this species is from riparian areas along the Muddy River, approximately 20 mi (32 km) east of the SEZ. Potentially suitable breeding and foraging habitats for this species within the Moapa Valley are dependent upon surface discharges from the Garnet Valley regional groundwater system. According to the SWReGAP habitat suitability model, suitable habitat for this species does not occur on the SEZ. However, approximately 50 acres (0.2 km^2) of potentially suitable habitat is expected to occur within the area of indirect effects within 5 mi (8 km) of the SEZ boundary. This potentially suitable riparian habitat and other potentially suitable riparian habitat in the SEZ region, especially along the Muddy River, could be affected by groundwater withdrawals. Approximately 183,400 acres (742 km^2) of potentially suitable habitat occurs throughout the SEZ region (Figure 11.3.12.1-1).

Groundwater-Dependent Species

The USFWS (Stout 2009) identified the potential for impacts on various species that could result from groundwater withdrawals from the Garnet Valley groundwater basin that would serve solar energy development on the Dry Lake SEZ. As discussed previously and on the basis of the analysis presented in Section 11.3.9.2, three ESA-listed species could be affected by groundwater withdrawals on the Dry Lake SEZ: Moapa dace, Pahrump poolfish, and southwestern willow flycatcher. The southwestern willow flycatcher is discussed above.

Moapa Dace. The Moapa dace is a small fish listed as endangered under the ESA. This species is endemic to the Muddy (Moapa) River and associated thermal spring systems within the Warm Springs Area of Clark County, Nevada. Historically, the Moapa dace inhabited 25 springs and approximately 10 mi (16 km) of the upper Muddy River system. Currently, the species is restricted to 3 springs and less than 6 mi (10 km) of the Muddy River system. Preferred habitats include spring pools, outflows, and the main stem of the Muddy River, where water is clear and warm. Habitat use varies with age—juveniles tend to occur in spring pools and outflows, while adults tend to occur in outflows and in the Muddy River. This species is known to occur in spring habitats of the Warm Springs Area, approximately 15 mi (24 km) north of the SEZ (Figure 11.3.12.1-1; Table 11.3.12.1-1). Critical habitat for this species has not been designated.

Pahrump Poolfish. The Pahrump poolfish is a small fish listed as endangered under the ESA. This species is endemic to the Pahrump Valley in southern Nye County, Nevada. Natural populations of this species have been extirpated, but introduced populations exist in three spring-fed habitats in Clark and White Pine Counties, Nevada: Corn Creek Springs (Desert NWR), Shoshone Springs, and an irrigation reservoir fed by Sandstone Spring (Spring Mountain State Park). The introduced population in Corn Creek Springs is located approximately 23 mi (37 km) west of the SEZ (Figure 11.3.12.1-1; Table 11.3.12.1-1). This habitat is about 5 acres (<0.1 km^2) in size and represents the only available potentially suitable habitat for this species in the SEZ region. Critical habitat for this species has not been designated.

11.3.12.1.2 Species That Are Candidates for Listing under the ESA

In scoping comments on the proposed Dry Lake SEZ (Stout 2009), the USFWS did not mention any species that are candidates for listing under the ESA that may be affected by solar energy development on the Dry Lake SEZ. However, there is one ESA candidate species—the Las Vegas buckwheat—that may occur within the affected area of the Dry Lake SEZ. This species is endemic to southern Nevada in the vicinity of Las Vegas. It inhabits areas of gypsum soils, washes, drainages, or areas of low relief at elevations between 1,900 and 3,850 ft (580 and 1,175 m). The nearest recorded occurrence of this species is approximately 12 mi (19 km) southwest of the SEZ (Figure 11.3.12.1-1; Table 11.3.12.1-1). Additional basic information on life history, habitat needs, and threats to populations of this species is provided in Appendix J.

11.3.12.1.3 Species That Are under Review for Listing under the ESA

The USFWS identified three invertebrate species (mollusks) under review for ESA listing that may be indirectly affected by solar energy development within the SEZ (Stout 2009): grated tryonia, Moapa pebblesnail, and Moapa Valley pebblesnail. These species do not occur within 5 mi (8 km) of the SEZ boundary, but they do occur in aquatic habitats dependent on groundwater discharge from the Garnet Valley regional groundwater system in the Warm Springs Area and the Moapa Valley, which could be affected by groundwater withdrawals on the Dry Lake SEZ. In addition to these species, the Moapa Warm Springs riffle beetle, Moapa speckled dace, and Moapa White River springfish are other species under review for ESA listing with habitats dependent upon this same groundwater system (Table 11.3.12.1-1). Appendix J provides basic information on life history, habitat needs, and threats to populations of these species. General information on each species is provided below.

Grated Tryonia

The grated tryonia is an aquatic snail known from the Muddy River system in southern Nevada. The nearest known occurrence of this species is from Big Muddy Spring, approximately 15 mi (24 km) north of the SEZ (Figure 11.3.12.1-1).

Moapa Pebblesnail

The Moapa pebblesnail is an aquatic snail restricted to the Moapa Springs in Clark County, Nevada. The nearest known occurrence of this species is from Big Muddy Spring, approximately 15 mi (24 km) north of the SEZ (Figure 11.3.12.1-1).

Moapa Valley Pebblesnail

The Moapa Valley pebblesnail is a freshwater mollusk restricted to spring-fed habitats in the Moapa Valley of southern Nevada. The nearest known occurrence of this species is from Big Muddy Spring, approximately 15 mi (24 km) north of the SEZ (Figure 11.3.12.1-1).

Moapa Warm Springs Riffle Beetle

The Moapa Warm Springs riffle beetle is an aquatic insect restricted to the Warm Springs Area of Clark County, Nevada. The nearest known occurrence of this species is from Big Muddy Spring, approximately 15 mi (24 km) north of the SEZ (Figure 11.3.12.1-1).

Moapa Speckled Dace

The Moapa speckled dace is a fish restricted to the Muddy River system in Clark County, Nevada. The nearest known occurrence of this species is from the Muddy River, approximately 15 mi (24 km) north of the SEZ (Figure 11.3.12.1-1).

Moapa White River Springfish

The Moapa White River springfish is restricted to warm water springs in the upper Muddy River. The nearest known occurrence of this species is from the Muddy River, approximately 15 mi (24 km) north of the SEZ (Figure 11.3.12.1-1).

11.3.12.1.4 BLM-Designated Sensitive Species

A total of 35 BLM-designated sensitive species may occur in the affected area of the Dry Lake SEZ (Table 11.3.12.1-1), including the following: (1) plants: alkali mariposa lily, Gold Butte moss, halfring milkvetch, Las Vegas buckwheat, Parish's phacelia, rosy two-tone beardtongue, rough dwarf greasebush, sheep fleabane, Sheep Mountain milkvetch, silverleaf sunray, white bearpoppy, and yellow two-tone beardtongue; (2) invertebrates: grated tryonia, Moapa Warm Spring riffle beetle, Mojave gypsum bee, Mojave poppy bee, Pahranagat naucorid, and Spring Mountains springsnail; (3) fish: Moapa speckled dace; (4) amphibian: southwestern toad; (5) reptile: Gila monster; (6) birds: American peregrine falcon, crissal thrasher, ferruginous hawk, LeConte's thrasher, phainopepla, and western burrowing owl; and (7) mammals: big free-tailed bat, Brazilian free-tailed bat, Nelson's bighorn sheep, pallid bat, silver-haired bat, spotted bat, Townsend's big-eared bat, and western small-footed bat. The occurrences of the following 4 BLM-designated sensitive species have been previously discussed because of their known or pending status under the ESA (Sections 11.3.12.1.1, 11.3.12.1.2, and 11.3.12.1.3): Las Vegas buckwheat, grated tryonia, Warm Springs riffle beetle, and Moapa speckled dace. Of the remaining 31 BLM-designated sensitive species with potentially suitable habitat in the affected area, occurrences of the following species intersect the affected area of the Dry Lake SEZ: rosy two-tone beardtongue, yellow two-tone beardtongue, and Nelson's bighorn sheep. Habitats in which BLM-designated sensitive species are found, the amount of potentially suitable habitat in the affected area, and known locations of the species relative to the SEZ are presented in Table 11.3.12.1-1. These species as related to the SEZ are described in the remainder of this section. Additional life history information for these species is provided in Appendix J.

Alkali Mariposa Lily

The alkali mariposa lily is a perennial forb restricted to wetlands in the western Mojave Desert. It inhabits alkaline seeps, springs, and meadows at elevations between 2,600 and 4,600 ft (792 and 1,400 m). This species is known to occur about 21 mi (34 km) southwest of the SEZ. According to the SWReGAP land cover model, potentially suitable habitat does not occur on the SEZ; however, potentially suitable riparian and wetland habitat may occur in the area of indirect effects (within 5 mi [8 km] of the SEZ boundary) (Table 11.3.12.1-1).

Gold Butte Moss

The Gold Butte moss is a bryophyte (moss) known only from Nevada and Texas on gypsiferous deposits and outcrops or limestone boulders. This species is typically associated with other mosses and lichens at elevations between 1,300 and 2,300 ft (400 and 700 m). This species is known to occur about 15 mi (24 km) southwest of the SEZ. According to the SWReGAP land cover model, potentially suitable habitat does not occur on the SEZ; however, potentially suitable rocky cliffs and outcrops may occur in the area of indirect effects (within 5 mi [8 km] of the SEZ boundary) (Table 11.3.12.1-1).

Halfring Milkvetch

The halfring milkvetch is a perennial forb endemic to Nevada on carbonate gravels and derived soils on terraced hills, ledges, open slopes, and along washes at elevations between 3,000 and 5,600 ft (915 and 1,700 m). This species is known to occur about 15 mi (24 km) northwest of the SEZ. According to the SWReGAP land cover model, potentially suitable habitat for this species may occur on the SEZ and throughout other portions of the affected area (Table 11.3.12.1-1).

Parish's Phacelia

The Parish's phacelia is an annual forb known from Arizona, California, and Nevada. This species inhabits wetlands and other mesic sites such as valley bottoms, lake deposits, and playa edges. This species is known to occur about 19 mi (30 km) southwest of the SEZ. According to the SWReGAP land cover model, potentially suitable habitat for this species may occur on the SEZ and throughout other portions of the affected area (Table 11.3.12.1-1).

Rosy Two-Tone Beardtongue

The rosy two-tone beardtongue is a perennial forb known from Arizona, California, and Nevada. This species occurs on calcareous, granitic, or volcanic substrates in washes, roadsides, scree and outcrop bases, rock crevices, or similar places receiving enhanced runoff at elevations between 1,800 and 4,850 ft (550 and 1,480 m). This species is known to occur on the SEZ and throughout the affected area. According to the SWReGAP land cover model, potentially suitable habitat for this species may occur on the SEZ and in portions of the area of indirect effects (Table 11.3.12.1-1).

Rough Dwarf Greasebush

The rough dwarf greasebush is a perennial shrub endemic to the Spring and Sheep ranges in southern Nevada. This species inhabits crevices of carbonate cliffs and outcrops, generally within pinyon-juniper and montane coniferous woodlands. This species is known to occur about 17 mi (27 km) west of the SEZ in the Desert National Wildlife Range. According to the SWReGAP land cover model, potentially suitable habitat does not occur on the SEZ; however, potentially suitable habitat may occur in the area of indirect effects (within 5 mi [8 km] west of the SEZ boundary [Table 11.3.12.1-1]).

Sheep Fleabane

The sheep fleabane is a perennial forb endemic to Mount Irish and the Sheep and Groom ranges in southern Nevada. This species inhabits crevices of carbonate cliffs and outcrops, generally within pinyon-juniper and montane coniferous woodlands. This species is known to occur about 17 mi (27 km) northwest of the SEZ in the Desert NWR. According to the SWReGAP land cover model, potentially suitable habitat does not occur on the SEZ; however, potentially suitable habitat may occur in the area of indirect effects (within 5 mi [8 km] west of the SEZ boundary [Table 11.3.12.1-1]).

Sheep Mountain Milkvetch

The Sheep Mountain milkvetch is a perennial forb known from the foothills of the Sheep Mountains in southern Nevada. This species occurs on carbonate alluvial gravels, drainages, roadsides, and other microsites with enhanced runoff at elevations between 4,400 and 6,000 ft (1,340 and 1,830 m). This species is known to occur about 6 mi (10 km) northwest of the SEZ. According to the SWReGAP land cover model, potentially suitable habitat for this species may occur on the SEZ and throughout other portions of the affected area (Table 11.3.12.1-1).

Silverleaf Sunray

The silverleaf sunray is a perennial forb primarily known from southern Nevada. This species occurs in dry, open, relatively barren areas on gypsum badlands, volcanic gravels, or loose sands at elevations between 1,200 and 2,400 ft (365 and 730 m). This species is known to occur about 15 mi (24 km) east of the SEZ. According to the SWReGAP land cover model, potentially suitable habitat for this species may occur on the SEZ and throughout other portions of the affected area (Table 11.3.12.1-1).

White Bearpoppy

The white bearpoppy is a perennial forb endemic to the Mojave Desert of California and Nevada. This species inhabits barren gravelly areas, rocky slopes, and limestone outcrops at elevations between 2,000 and 5,900 ft (610 and 1,800 m). This species is known to occur as near as 19 mi (30 km) southwest of the SEZ. According to the SWReGAP land cover model, potentially suitable habitat does not occur on the SEZ; however, potentially suitable habitat may occur in the area of indirect effects (within 5 mi [8 km] west of the SEZ boundary [Table 11.3.12.1-1]).

Yellow Two-Tone Beardtongue

The yellow two-tone beardtongue is a perennial forb endemic to Clark County, Nevada on mostly BLM lands in the vicinity of Las Vegas. This species occurs on calcareous or carbonate soils in washes, roadsides, rock crevices, or outcrops at elevations between 2,500 and 5,500 ft (760 and 1,675 m). This species is known to occur in the affected area of the SEZ about 2 mi (3 km) west of the SEZ. According to the SWReGAP land cover model, potentially suitable habitat for this species may occur on the SEZ and in portions of the area of indirect effects (Table 11.3.12.1-1).

Mojave Gypsum Bee

The Mojave gypsum bee is an insect endemic to Nevada, where the species is restricted to gypsum soils associated with habitats of its single larval host plant, silverleaf sunray. Such habitats include warm desert shrub communities, dry, open, relatively barren areas on gypsum badlands, and volcanic gravels. This species is known to occur about 8 mi (13 km) south of the SEZ. According to the SWReGAP land cover model, potentially suitable habitat for this species may occur on the SEZ and in portions of the area of indirect effects (Table 11.3.12.1-1).

Mojave Poppy Bee

The Mojave poppy bee is an insect known only from Clark County, Nevada, where it is dependent on poppy plants (*Arctemocon* spp.). Such habitats include roadsides, washes, and barren desert areas. The nearest recorded occurrence of this species is from the vicinity of Lake Mead approximately 17 mi (27 km) south of the SEZ. According to the SWReGAP land cover model, potentially suitable habitat for this species may occur on the SEZ and in portions of the area of indirect effects (Table 11.3.12.1-1).

Gila Monster

The Gila monster is a desert lizard with a scattered distribution in the Mojave and Sonoran Deserts. This species inhabits areas of rocky, deeply incised topography, including canyon bottoms, rocky bajadas, washes, desert scrub, desert riparian areas, oak woodlands, and semi-arid grasslands. This species is known to occur in Clark County, Nevada. According to the SWReGAP habitat suitability model, potentially suitable habitat for this species may occur on the SEZ and in portions of the area of indirect effects (Table 11.3.12.1-1).

American Peregrine Falcon

The American peregrine falcon occurs throughout the western United States in areas with high vertical cliffs and bluffs that overlook large open areas such as deserts, shrublands, and woodlands. Nests are usually constructed on rock outcrops and cliff faces. Foraging habitat varies from shrublands and wetlands to farmland and urban areas. Nearest occurrences of this species are in the vicinity of Las Vegas about 22 mi (35 km) southwest of the SEZ. According to the SWReGAP habitat suitability model, potentially suitable year-round foraging habitat for the American peregrine falcon may occur within the affected area of the Dry Lake SEZ. Most of the suitable habitat for this species in the affected area is foraging habitat represented by desert shrubland. On the basis of an evaluation of SWReGAP land cover types, there is no potentially suitable nesting habitat (rocky cliffs and outcrops) on the SEZ, but approximately 11,600 acres (47 km^2) of potentially suitable nesting habitat occurs in the area of indirect effects.

Crissal Thrasher

The crissal thrasher is a year-round resident in the deserts of southeastern California, southern Nevada, and western Arizona. The species is known to occur in Clark County, Nevada. This species nests and forages in dense thickets of mesquite or low trees in desert riparian and desert wash habitats. Individuals may occasionally occur in pinyon-juniper habitats. According to the SWReGAP habitat suitability model, potentially suitable year-round foraging and nesting habitat for the crissal thrasher may occur on the SEZ and in portions of the area of indirect effects (Table 11.3.12.1-1).

Ferruginous Hawk

The ferruginous hawk occurs throughout the western United States. According to the SWReGAP habitat suitability model, potentially suitable winter foraging habitat for this species occurs only within the affected area of the Dry Lake SEZ. This species inhabits open grasslands, sagebrush flats, desert scrub, and the edges of pinyon-juniper woodlands. This species is known to occur in Clark County, Nevada. According to the SWReGAP habitat suitability model, suitable foraging habitat for the ferruginous hawk may occur on the SEZ and in portions of the area of indirect effects (Table 11.3.12.1-1).

LeConte's Thrasher

The LeConte's thrasher is an uncommon year-round resident in Arizona, southern California, and southern Nevada. This species inhabits saltbush-cholla scrub communities in desert flats, dunes, or alluvial fans. This species is known to occur in Clark County, Nevada. According to the SWReGAP habitat suitability model, potentially suitable year-round foraging and nesting habitat for the LeConte's thrasher may occur on the SEZ and in portions of the area of indirect effects (Table 11.3.12.1-1). The availability of nest sites within the affected area has not been determined, but desert scrub habitat that may be suitable for either foraging or nesting occurs throughout the affected area.

Phainopepla

The phainopepla occurs in the southwestern United States and Mexico in desert scrub, mesquite, and pinyon-juniper woodland communities, as well as desert riparian areas and orchards. Nests are typically constructed in trees and shrubs 3 to 45 ft (1 to 15 m) above the ground. This species is known to occur in Clark County, Nevada. According to the SWReGAP habitat suitability model, potentially suitable foraging or nesting habitat for this species may occur on the SEZ and in portions of the area of indirect effects (Table 11.3.12.1-1). Potentially suitable nesting habitat in riparian areas in the Moapa Valley and other locations outside of the 5-mi (8-km) area surrounding the SEZ could be affected by groundwater withdrawals from the Garnet Valley regional groundwater system for construction and operations of solar energy facilities on the Dry Lake SEZ.

Western Burrowing Owl

The western burrowing owl forages in grasslands, shrublands, open disturbed areas, and nests in burrows usually constructed by mammals. This species occurs in Clark County, Nevada. According to the SWReGAP habitat suitability model for the western burrowing owl, potentially suitable year-round foraging and nesting habitat may occur in the affected area of the Dry Lake SEZ. Potentially suitable foraging and breeding habitat is expected to occur on the SEZ and in other portions of the affected area (Table 11.3.12.1-1). The availability of nest sites (burrows) within the affected area has not been determined, but shrubland habitat that may be suitable for either foraging or nesting occurs throughout the affected area.

Big Free-Tailed Bat

The big free-tailed bat is a year-round resident in the Dry Lake SEZ region, where it forages in a variety of habitats including coniferous forests and desert shrublands. The species roosts in rock crevices or in buildings. This species is known to occur in Clark County, Nevada. The SWReGAP habitat suitability model for the big free-tailed bat indicates that potentially suitable foraging habitat may occur on the SEZ and in other portions of the affected area (Table 11.3.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is no potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ, but approximately 11,600 acres (47 km^2) of potentially suitable roosting habitat occurs in the area of indirect effects.

Brazilian Free-Tailed Bat

The Brazilian free-tailed bat is known from isolated locations throughout the southwestern United States and is considered to be a year-round resident in the Dry Lake SEZ region. The species roosts in buildings, caves, mines, and hollow trees. Foraging occurs in desert grasslands, old fields, savannas, shrublands, woodlands, and urban areas. This species is known to occur in Clark County, Nevada. According to the SWReGAP habitat suitability model, potentially suitable foraging habitat may occur on the SEZ and in other portions of the affected area (Table 11.3.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is no potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ, but approximately 11,600 acres (47 km^2) of potentially suitable roosting habitat occurs in the area of indirect effects.

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. This species is known to occur in the Sheep Mountains, approximately 5 mi (8 km) west of the Dry Lake SEZ. According to the SWReGAP habitat suitability model, potentially suitable habitat for this species does not occur on the SEZ. However, information provided by the NDOW indicates that a portion of the year-round range for the Nelson's bighorn sheep intersects the SEZ. Despite the apparent lack of suitable habitat on the SEZ, this species may utilize portions of the Dry Lake SEZ as a migratory corridor between mountain ranges. Potentially suitable habitat for the Nelson's bighorn sheep occurs in the area of indirect effects (within 5 mi [8 km] outside the SEZ boundary [Table 11.3.12.1-1]).

Pallid Bat

The pallid bat is a large pale bat with large ears 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 the Dry Lake SEZ region. The nearest recorded occurrence is from the Desert NWR, approximately 10 mi (16 km) west of the SEZ. Potentially suitable habitat may occur on the SEZ and in other portions of the affected area (Table 11.3.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is no potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ, but approximately 11,600 acres (47 km^2) of potentially suitable roosting habitat occurs in the area of indirect effects.

Silver-Haired Bat

According to the SWReGAP habitat suitability model, the silver-haired bat is a year-round resident in the Dry Lake SEZ region, where it occurs in montane forested habitats such as aspen, pinyon-juniper, and spruce communities. Foraging may occur in desert shrubland habitats. This species roosts in tree foliage, cavities, or under loose bark. The species is known to occur about 15 mi (24 km) northeast of the SEZ. Potentially suitable habitat may occur on the SEZ and in other portions of the affected area (Table 11.3.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is no potentially suitable roosting habitat (rocky cliffs, outcrops, and woodlands) on the SEZ, but approximately 11,600 acres (47 km^2) of potentially suitable roosting habitat occurs in the area of indirect effects.

Spotted Bat

According to the SWReGAP habitat suitability model, the spotted bat is a year-round resident in the Dry Lake SEZ region, where it occurs in a variety of forested and shrubland habitats. It roosts in caves and rock crevices. The species is known to occur in the vicinity of Las Vegas, Nevada, approximately 16 mi (26 km) southwest of the SEZ. Potentially suitable habitat may occur on the SEZ and in other portions of the affected area (Table 11.3.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is no potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ, but approximately 11,600 acres (47 km^2) of potentially suitable roosting habitat occurs in the area of indirect effects.

Townsend's Big-Eared Bat

The Townsend's big-eared bat is widely distributed throughout the western United States. According to the SWReGAP habitat suitability model, the species forages year-round in a wide variety of desert and nondesert habitats in the Dry Lake SEZ region. The species roosts in caves, mines, tunnels, buildings, and other man-made structures. The nearest recorded occurrence is from the Desert National Wildlife Range, approximately 10 mi (16 km) west of the SEZ. Potentially suitable habitat may occur on the SEZ and in other portions of the affected area (Table 11.3.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is no potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ, but approximately 11,600 acres (47 km^2) of potentially suitable roosting habitat occurs in the area of indirect effects.

Western Small-Footed Bat

The western small-footed bat is widely distributed throughout the western United States. According to the SWReGAP habitat suitability model, this species is a year-round resident in southern Nevada, where it occupies a wide variety of desert and nondesert habitats, including cliffs and rock outcrops, grasslands, shrubland, and mixed woodlands. The species roosts in caves, mines, tunnels, beneath boulders or loose bark, buildings, and other man-made structures.

The nearest recorded occurrence is from the Desert NWR, approximately 10 mi (16 km) west of the SEZ. Potentially suitable habitat may occur on the SEZ and in other portions of the affected area (Table 11.3.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is no potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ, but approximately 11,600 acres (47 km^2) of potentially suitable roosting habitat occurs in the area of indirect effects.

Groundwater-Dependent Species

Four BLM-designated sensitive species not present within 5 mi (8 km) of the SEZ boundary do occur in areas dependent on groundwater discharge from the Garnet Valley regional groundwater system. Groundwater pumped from that system for solar energy development on the Dry Lake SEZ could affect aquatic and riparian habitats dependent on that groundwater. The following BLM-designated sensitive species inhabit areas dependent upon groundwater discharge in the SEZ region: Pahranagat Naucorid, Spring Mountains springsnail, southwestern toad, and phainopepla. The phainopepla is discussed above.

Pahranagat Naucorid. The Pahranagat naucorid is an aquatic insect known to occur only in the Muddy and White River Basins in southern Nevada. It inhabits warm quiet waters of spring-fed systems. The nearest recorded occurrence is from Big Muddy Spring, approximately 15 mi (24 km) north of the SEZ (Table 11.3.12.1-1).

Spring Mountains Springsnail. The Spring Mountains springsnail is endemic to freshwater springs of the Spring Mountains in southern Nevada. This species is known to occur in Clark County, Nevada. The amount of suitable habitat for this species in the SEZ region has not been determined (Table 11.3.12.1-1).

Southwestern Toad. The southwestern toad is an amphibian that occupies scattered habitats in Arizona, Nevada, New Mexico, and Utah. It occurs in woodlands and low-elevation riparian habitats in association with permanent or semipermanent water bodies. The nearest recorded occurrence of this species is from riparian areas along the Meadow Valley Wash, approximately 50 mi (80 km) north of the SEZ (Table 11.3.12.1-1).

11.3.12.1.5 State-Listed Species

There are 18 species listed by the State of Nevada that may occur in the Dry Lake SEZ affected area (Table 11.3.12.1-1). These state-listed species include the following: (1) plants: Las Vegas bearpoppy, sticky buckwheat, and threecorner milkvetch; (2) fish: Moapa dace, Moapa speckled dace, Moapa White River springfish, and Pahrump poolfish; (3) reptile: desert tortoise; (4) birds: American peregrine falcon, LeConte's thrasher, phainopepla, and southwestern willow flycatcher; and (5) mammals: Brazilian free-tailed bat, pallid bat, spotted bat, Townsend's big-eared bat, and western mastiff bat. All these species are protected in Nevada under NRS 501 or NRS 527. Of these species, the following four have not been previously described because of their status under the ESA or BLM: Las Vegas bearpoppy, sticky buckwheat, threecorner milkvetch, and western mastiff bat. These species as related to the SEZ are described in this section and in Table 11.3.12.1-1. Additional life history information for these species is provided in Appendix J.

Las Vegas Bearpoppy

The Las Vegas bearpoppy is a perennial forb known from only northwestern Arizona and southern Nevada. This species occurs in open, dry, spongy or powdery, or hummocked soils with high gypsum content, typically with well-developed soil crust, in areas of generally low relief with a sparse cover of other gypsum-tolerant species. This species is known to occur in the affected area of the Dry Lake SEZ, as near as 5 mi (8 km) south of the SEZ. According to the SWReGAP land cover model, potentially suitable habitat for this species occurs on the SEZ and in portions of the area of indirect effects (Table 11.3.12.1-1).

Sticky Buckwheat

The sticky buckwheat is a perennial forb known only from Clark County, Nevada, and Mohave County, Arizona. This species is dependent on sand dune communities, where it occurs on deep, loose sandy soils in washes, flats, roadsides, steep aeolian slopes, and stabilized dunes at elevation between 1,200 and 2,200 ft (365 and 670 m). The nearest recorded occurrences of this species are approximately 21 mi (34 km) northeast of the SEZ. According to the SWReGAP land cover model, potentially suitable habitat for this species occurs on the SEZ and in portions of the area of indirect effects (Table 11.3.12.1-1).

Threecorner Milkvetch

The threecorner milkvetch is a perennial forb known only from Clark County, Nevada, and Mohave County, Arizona. This species inhabits open, deep sandy soils, desert washes, or dunes, generally stabilized by vegetation and/or a gravel veneer at elevations between 1,500 and 2,500 ft (455 and 760 m). The threecorner milkvetch was identified in the scoping comments by the USFWS for the Dry Lake SEZ (Stout 2009); it is a USFWS species of concern. This species is known to occur in the affected area of the SEZ, about 1 mi (1.6 km) east of the SEZ. According to the SWReGAP land cover model, potentially suitable habitat for this species occurs on the SEZ and in portions of the area of indirect effects (Table 11.3.12.1-1).

Western Mastiff Bat

The western mastiff bat is an uncommon year-round resident in Arizona and southern California; the species is a summer resident in southern Nevada. The western mastiff bat occupies a wide variety of open semiarid habitats, including conifer and deciduous woodlands, shrublands, grasslands, chaparral, and urban areas. The species roosts in crevices in cliff faces, buildings, and tall trees. Nearest occurrences are from the vicinity of Las Vegas, approximately 20 mi southwest of the SEZ. According to the SWReGAP habitat suitability model, potentially suitable habitat for this species does not occur on the SEZ. However, potentially suitable foraging or roosting habitat may occur in portions of the area of indirect effects (Table 11.3.12.1-1).

11.3.12.1.6 Rare Species

There are 60 rare species (i.e., state rank of S1 or S2 in Nevada or a species of concern by the USFWS or State of Nevada) that may be affected by solar energy development on the Dry Lake SEZ (Table 11.3.12.1-1). Of these species, 15 have not been discussed previously: (1) plants: Ackerman milkvetch, Antelope Canyon goldenbush, bearded screwmoss, beaver dam breadroot, Charleston goldenbush, dune sunflower, Littlefield milkvetch, Meadow Valley sandwort, mottled milkvetch, New York Mountains catseye, rough fringemoss, sweet moustache moss, and Virgin River thistle; and (2) invertebrates: red-tailed blazing star bee and Warm Springs naucorid. These species as related to the SEZ are described in Table 11.3.12.1-1.

11.3.12.2 Impacts

The potential for impacts on special status species from utility-scale solar energy development within the proposed Dry Lake SEZ is presented 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 11.3.12.1, 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 11.3.12.3).

Solar energy development within the Dry Lake SEZ could affect a variety of habitats (see Sections 11.3.9 and 11.3.10). These impacts on habitats could in turn affect special status species dependent on those habitats. Based on NNHP records, the following 7 special status species are known to occur within 5 mi (8 km) of the SEZ boundary: Las Vegas bearpoppy, Meadow Valley sandwort, rosy two-tone beardtongue, threecorner milkvetch, yellow two-tone beardtongue, desert tortoise, and Nelson's bighorn sheep. There are 15 species that occur more than 5 mi (8 km) from the SEZ boundary in aquatic and riparian habitats (particularly within the Moapa Valley) that could be affected by groundwater withdrawals from the Garnet Valley regional groundwater system. These species include the following: (1) invertebrates: grated tryonia, Moapa pebblesnail, Moapa Valley pebblesnail, Moapa Warm Spring riffle beetle, Pahranagat naucorid, Spring Mountain springsnail, and Warm Springs naucorid; (2) fish: Moapa dace, Moapa speckled dace, Moapa White River springfish, Pahrump poolfish; (3) amphibian: southwestern toad; and (4) birds: phainopepla and southwestern willow flycatcher. Withdrawals from this regional groundwater system may be needed to support construction and operations of solar energy facilities on the Dry Lake SEZ, and these could in turn affect special status species with habitats dependent on groundwater. Other special status species may occur on the SEZ or within the affected area based on the presence of potentially suitable habitat. As discussed in Section 11.3.12.1, 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.

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 11.3.1.2, impacts of access road and transmission line construction, upgrade, or operation are not assessed in this evaluation due to 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 groundwater withdrawals, 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 developments 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., desert dunes, washes, and playas). Indirect impacts on special status species could be reduced to negligible levels by implementing programmatic design features, especially those engineering controls that would reduce groundwater consumption, runoff, sedimentation, spills, and fugitive dust.

11.3.12.2.1 Impacts on Species Listed under the ESA

In scoping comments on the proposed Dry Lake SEZ (Stout 2009), the USFWS expressed concern for impacts of project development within the SEZ on habitat for the Mojave population of the desert tortoise—a species listed as threatened under the ESA. In addition, three other species listed under the ESA may be affected by solar energy development (particularly groundwater withdrawals) on the Dry Lake SEZ: Moapa dace, Pahrump poolfish, and southwestern willow flycatcher. Impacts on these species are discussed below and summarized in Table 11.3.12.1-1.

Desert Tortoise

The Mojave population of the desert tortoise is listed as threatened under the ESA and the species is known to occur on the Dry Lake SEZ and within 5 mi (8 km) of the SEZ boundary (Figure 11.3.12.1-1). According to the USFWS (Stout 2009), desert tortoise populations have the potential to occur on the Dry Lake SEZ, and designated critical habitat for this species occurs in the Mormon Mesa critical habitat unit west of the SEZ (Figure 11.3.12.1-1). According to the SWReGAP habitat suitability model, approximately 15,000 acres (61 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations of solar energy development on the SEZ (Table 11.3.12.1-1). This direct effects area represents about 0.5% of available suitable habitat of the desert tortoise in the region. About 106,250 acres (430 km^2) of suitable habitat occurs in the area of potential indirect effects; this area represents about 3.8% of the available suitable habitat in the region (Table 11.3.12.1-1).

Based on estimates of desert tortoise density in the Mormon Mesa critical habitat unit adjacent to the western border of the SEZ, the USFWS estimated that full-scale solar energy development on the SEZ may directly affect up to 213 desert tortoises on the SEZ (USFWS 2009b). In addition to direct impacts, development on the SEZ could indirectly affect desert tortoises by fragmenting and degrading habitats between the Mormon Mesa critical habitat unit and other potentially suitable habitats in the vicinity of the Dry Lake SEZ. Fragmentation would be exacerbated by the installation of exclusionary fencing at the perimeter of the SEZ or individual project areas.

The overall impact on the desert tortoise from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake 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 region. The implementation of programmatic design features alone is unlikely to reduce these impacts to negligible levels. 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. Pre-disturbance surveys to determine the abundance of desert tortoises on the SEZ, to remove them from the affected area, and the implementation of a desert tortoise translocation plan and compensation plan could be used to reduce direct impacts.

Development of actions to reduce impacts (e.g., reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions of incidental take statements) for the desert tortoise, including development of a survey protocol, avoidance measures, minimization measures, and, potentially, translocation actions, and compensatory mitigation, would require formal consultation with the USFWS under Section 7 of the ESA. Consultation with the NDOW should also occur to determine any state mitigation requirements.

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 follow the *Guidelines for Handling Desert Tortoises During Construction Projects* (Desert Tortoise Council 1994) and other current translocation guidance provided by the USFWS. 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. Consultation with the USFWS and the NDOW would be necessary to determine the appropriate mitigation ratio to acquire, enhance, and preserve desert tortoise compensation lands.

Southwestern Willow Flycatcher

The southwestern willow flycatcher is listed as endangered under the ESA and is known to occur in the Moapa and Virgin River Valleys, approximately 20 mi (32 km) east of the Dry Lake SEZ. According to the SWReGAP habitat suitability model, suitable habitat for this species does not occur on the SEZ. However, approximately 50 acres (0.2 km^2) of potentially suitable habitat occurs in the area of potential indirect effects within 5 mi (8 km) of the SEZ; this area represents less than 0.1% of the available suitable habitat in the SEZ region (Table 11.3.12.1-1).

Riparian habitats in the vicinity of the Dry Lake SEZ (particularly within the Moapa Valley) that may provide suitable nesting and foraging habitat for the southwestern willow flycatcher may be affected by spring discharges associated with the Garnet Valley regional groundwater system. Withdrawals from this system for solar energy development on the Dry Lake SEZ could reduce groundwater discharge in these riparian areas, thus affecting habitat availability and quality for the southwestern willow flycatcher. As discussed for below for other groundwater-dependent species, impacts on this species could range from small to large depending upon the solar energy technology deployed, the scale of development within the SEZ, and the cumulative rate of groundwater withdrawals (Table 11.3.12.1-1). However, direct impacts on this species or its habitats are not likely to occur, because suitable habitats do not exist on the SEZ.

The implementation of programmatic design features and complete avoidance or limitations of groundwater withdrawals from the regional groundwater system could reduce impacts on the southwestern willow flycatcher to small or negligible levels. Impacts can be better quantified for specific projects once water needs are identified.

Development of actions to reduce impacts (e.g., reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions of incidental take statements) for the southwestern willow flycatcher, including development of a survey protocol, avoidance measures, minimization measures, and, potentially, compensatory mitigation, would require formal consultation with the USFWS under Section 7 of the ESA. Consultation with the NDOW should also occur to determine any state mitigation requirements.

Groundwater-Dependent Species

There are two species listed as threatened or endangered under the ESA that do not occur within 5 mi (8 km) of the SEZ boundary but do occur in areas dependent on groundwater discharge from the Garnet Valley basin: the Moapa dace (endangered) and the Pahrump poolfish (endangered). Groundwater withdrawn from this basin for construction and operations of solar energy facilities on the Dry Lake SEZ could affect aquatic and riparian habitats within the SEZ region, including habitat for the ESA-listed species dependent on groundwater. Such impacts would result from the lowering of the water table and alteration of hydrologic processes.

Impacts of groundwater depletion from solar energy development in the Dry Lake SEZ cannot be quantified without identification of the cumulative amount of groundwater withdrawals needed to support development on the SEZ. Consequently, the overall impact on these species could range from small to large and would depend in part on the solar energy technology deployed, the scale of development within the SEZ, the type of cooling system used, and the degree of influence water withdrawals in the SEZ on drawdown and surface water discharges in habitats supporting these species (Table 11.3.12.1-1).

The implementation of programmatic design features and complete avoidance or limitations of groundwater withdrawals from the regional groundwater system would reduce impacts on the groundwater-dependent species to small or negligible levels. Impacts can be better quantified for specific projects once water needs are identified through application of a regional groundwater model.

11.3.12.2.2 Impacts on Species That Are Candidates for Listing under the ESA

In scoping comments on the proposed Dry Lake SEZ, the USFWS did not mention any species that are candidates for listing under the ESA that may be affected by solar energy development on the SEZ (Stout 2009). However, one ESA candidate species—the Las Vegas buckwheat—may occur within the affected area of the Dry Lake SEZ. This species is endemic to southern Nevada in the vicinity of Las Vegas. The Las Vegas buckwheat inhabits areas of gypsum soils, washes and drainages, or areas of low relief at elevations between 1,900 and 3,850 ft (580 and 1,175 m). The nearest recorded occurrence of this species is approximately 12 mi (19 km) southwest of the SEZ (Figure 11.3.12.1-1; Table 11.3.12.1-1). According to the

SWReGAP land cover model, approximately 425 acres (2 km^2) of potentially suitable desert wash habitat on the SEZ may be directly affected by construction and operations of solar energy development on the SEZ (Table 11.3.12.1-1). This direct effects area represents about 0.7% of available suitable habitat in the region. About 3,400 acres (14 km^2) of potentially suitable desert wash habitat occurs in the area of potential indirect effects; this area represents about 5.4% of the available potentially suitable habitat in the SEZ region (Table 11.3.12.1-1).

The overall impact on the Las Vegas buckwheat from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because less than 1% of potentially suitable habitat for this species occurs in the area of direct effects. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Avoiding or minimizing disturbance to desert wash habitat on the SEZ could reduce direct impacts on this species. In addition, pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats on the SEZ could reduce impacts. If avoidance or minimization is not a feasible option, 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 potential for impact and need for mitigation should be developed in coordination with the USFWS and the NDOW.

11.3.12.2.3 Impacts on Species That Are under Review for Listing under the ESA

There are six species currently under review for ESA listing that may be affected by solar energy development on the Dry Lake SEZ: the grated tryonia, Moapa pebblesnail, Moapa Valley pebblesnail, Moapa Warm Springs riffle beetle, Moapa speckled dace, and Moapa White River springfish. These species do not occur within 5 mi (8 km) of the SEZ boundary, but they do occur in the Muddy (Moapa) River system, which is located between 15 and 20 mi (24 and 32 km) north and northeast of the Dry Lake SEZ and is hydrologically connected to groundwater in the Garnet Valley. Groundwater from the Garnet Valley basin may be used to support solar energy development on the Dry Lake SEZ. Potential impacts on these species (which could range from small to large) and mitigations that could reduce those impacts would be similar to those described for groundwater-dependent ESA-listed species in Section 11.3.12.2.1. For all these species, potential impacts and mitigation options should be discussed with the USFWS prior to project development.

11.3.12.2.4 Impacts on BLM-Designated Sensitive Species

There are 30 BLM-designated sensitive species that are not previously discussed as listed under the ESA, candidates, or under review for ESA listing. Impacts on these BLM-designated sensitive species that may be affected by solar energy development on the Dry Lake SEZ are discussed below.

Alkali Mariposa Lily

The alkali mariposa lily is known to occur approximately 21 mi (34 km) southwest of the Dry Lake SEZ. According to the SWReGAP land cover model, potentially suitable alkaline seeps and springs do not occur on the SEZ. However, approximately 375 acres (2 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents 0.5% of the available suitable habitat in the SEZ region (Table 11.3.12.1-1).

The overall impact on the alkali mariposa lily from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because no potentially suitable habitat for this species occurs in the area of direct effects and only indirect effects are possible. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Gold Butte Moss

The Gold Butte moss is known to occur approximately 15 mi (24 km) southeast of the Dry Lake SEZ. According to the SWReGAP land cover model, potentially suitable rocky cliffs and outcrops do not occur on the SEZ. However, approximately 11,600 acres (47 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents 3.2% of the available suitable habitat in the SEZ region (Table 11.3.12.1-1).

The overall impact on the Gold Butte moss from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because no potentially suitable habitat for this species occurs in the area of direct effects and only indirect effects are possible. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Halfring Milkvetch

The halfring milkvetch is known to occur approximately 15 mi (24 km) northwest of the Dry Lake SEZ. According to the SWReGAP land cover model, approximately 425 acres (2 km^2) of potentially suitable desert wash habitat on the SEZ may be directly affected by construction and operations of solar energy development (Table 11.3.12.1-1). This direct effects area represents about 0.7% of available suitable habitat in the region. About 15,000 acres (61 km^2) of potentially suitable habitat occurs in the area of potential indirect effects; this area represents about 3.6% of the available potentially suitable habitat in the SEZ region (Table 11.3.12.1-1).

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

Avoiding or minimizing disturbance to desert wash habitat on the SEZ may reduce direct impacts to negligible levels. Impacts also could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the area of direct effects. If avoidance or minimization is not a feasible option, 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 uses one or more of these options could be designed to completely offset the impacts of development.

Parish's Phacelia

The Parish's phacelia is known to occur approximately 19 mi (30 km) southwest of the Dry Lake SEZ. According to the SWReGAP land cover model, approximately 430 acres (2 km^2) of potentially suitable desert wash and playa habitats on the SEZ may be directly affected by construction and operations of solar energy development (Table 11.3.12.1-1). This direct effects area represents about 0.5% of available suitable habitat in the region. About 4,100 acres (17 km^2) of potentially suitable habitat occurs in the area of potential indirect effects; this area represents about 5.0% of the available potentially suitable habitat in the SEZ region (Table 11.3.12.1-1).

The overall impact on the Parish's phacelia from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because less than 1% of potentially suitable habitat for this species occurs in the area of direct effects. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Avoiding or minimizing disturbance to desert wash and playa habitats in the area of direct effects and the implementation of mitigation measures described previously for the halfring milkvetch could reduce direct impacts on this species to negligible levels. 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.

Rosy Two-Tone Beardtongue

The rosy two-tone beardtongue is known to occur on the Dry Lake SEZ and in other portions of the affected area. According to the SWReGAP land cover model, approximately 550 acres (2 km^2) of potentially suitable habitat on the SEZ may be directly affected by construction and operations of solar energy development on the SEZ (Table 11.3.12.1-1). This direct effects area is mostly desert wash habitat and represents 0.1% of available suitable habitat in the region. About 15,500 acres (63 km^2) of potentially suitable habitat occurs in the area of potential indirect effects; this area represents about 3.0% of the available suitable habitat in the SEZ region (Table 11.3.12.1-1).

The overall impact on the rosy two-tone beardtongue from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because less than 1% of potentially suitable habitat for this species occurs in the area of direct effects. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Avoiding or minimizing disturbance to desert wash habitat in the area of direct effects and the implementation of mitigation measures described previously for the halfring milkvetch could reduce direct impacts on this species to negligible levels. 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.

Rough Dwarf Greasebush

The rough dwarf greasebush is known to occur approximately 17 mi (27 km) west of the Dry Lake SEZ. According to the SWReGAP land cover model, potentially suitable rocky cliff and outcrop and pinyon-juniper habitats for this species do not occur on the SEZ. However, approximately 11,600 acres (47 km^2) of potentially suitable habitat occurs in the area of indirect effects (within 5 mi [8 km] of the SEZ); this area represents 1.9% of the available suitable habitat in the SEZ region (Table 11.3.12.1-1).

The overall impact on the rough dwarf greasebush from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because no potentially suitable habitat for this species occurs in the area of direct effects and only indirect effects are possible. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Sheep Fleabane

The sheep fleabane is known to occur approximately 17 mi (27 km) northwest of the Dry Lake SEZ. According to the SWReGAP land cover model, potentially suitable rocky cliff and outcrop and pinyon-juniper habitats for this species do not occur on the SEZ. However, approximately 11,600 acres (47 km^2) of potentially suitable habitat occurs in the area of indirect effects within 5 mi (8 km) of the SEZ; this area represents 2.0% of the available suitable habitat in the SEZ region (Table 11.3.12.1-1).

The overall impact on the sheep fleabane from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because no potentially suitable habitat for this species occurs in the area of direct effects and only indirect effects are possible. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Sheep Mountain Milkvetch

The Sheep Mountain milkvetch is known to occur about 6 mi (10 km) northwest of the Dry Lake SEZ. According to the SWReGAP land cover model, approximately 12,500 acres (51 km^2) of potentially suitable habitat on the SEZ may be directly affected by construction and operations of solar energy development on the SEZ (Table 11.3.12.1-1). This direct effects area represents 0.3% of available suitable habitat in the region. About 131,100 acres (531 km^2) of potentially suitable grassland habitat occurs in the area of potential indirect effects; this area represents about 3.4% of the available suitable habitat in the SEZ region (Table 11.3.12.1-1).

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

Avoidance of all potentially suitable habitats (desert shrublands) is not a feasible means of mitigating impacts on this species, because potentially suitable shrubland habitat is widespread throughout the area of direct effects and in other portions of the SEZ region. For this and all other special status plant species, impacts may be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the area of direct effects. 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 uses one or more of these options could be designed to completely offset the impacts of development.

Silverleaf Sunray

The silverleaf sunray is known to occur about 15 mi (24 km) east of the Dry Lake SEZ. According to the SWReGAP land cover model, approximately 425 acres (2 km^2) of potentially suitable desert pavement habitat on the SEZ may be directly affected by construction and operations of solar energy development (Table 11.3.12.1-1). This direct effects area represents 0.5% of available suitable habitat in the region. About 1,265 acres (5 km^2) of potentially suitable habitat occurs in the area of potential indirect effects; this area represents about 1.4% of the available suitable habitat in the SEZ region (Table 11.3.12.1-1).

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

Avoiding or minimizing disturbance to desert pavement habitat on the SEZ and the implementation of mitigation measures described previously for the Sheep Mountain milkvetch could reduce direct impacts on this species to negligible levels. 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.

White Bearpoppy

The white bearpoppy is known to occur approximately 19 mi (30 km) southwest of the Dry Lake SEZ. According to the SWReGAP land cover model, potentially suitable rocky cliff and outcrops do not occur on the SEZ. However, approximately 11,600 acres (47 km^2) of potentially suitable habitat occurs in the area of indirect effects within 5 mi (8 km) of the SEZ; this area represents 3.2% of the available suitable habitat in the SEZ region (Table 11.3.12.1-1).

The overall impact on the white bearpoppy from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because no potentially suitable habitat for this species occurs in the area of direct effects and only indirect effects are possible. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Yellow Two-Tone Beardtongue

The yellow two-tone beardtongue is known to occur approximately 2 mi (3 km) west of the Dry Lake SEZ. According to the SWReGAP land cover model, approximately 550 acres (2 km^2) of potentially suitable habitat on the SEZ may be directly affected by construction and operations of solar energy development on the SEZ (Table 11.3.12.1-1). This direct effects area is mostly desert wash habitat and represents 0.1% of available suitable habitat in the region. About 15,500 acres (63 km^2) of potentially suitable habitat occurs in the area of potential indirect effects; this area represents about 3.0% of the available suitable habitat in the SEZ region (Table 11.3.12.1-1).

The overall impact on the yellow two-tone beardtongue from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because less than 1% of potentially suitable habitat for this species occurs in the area of direct effects. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Avoiding or minimizing disturbance to desert wash habitat in the area of direct effects and the implementation of mitigation measures described previously for the halfring milkvetch could reduce direct impacts on this species to negligible levels. 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.

Mojave Gypsum Bee

The Mojave gypsum bee is known to occur about 8 mi (13 km) south of the Dry Lake SEZ. According to the SWReGAP land cover model, approximately 12,500 acres (51 km^2) of potentially suitable habitat on the SEZ may be directly affected by construction and operations of solar energy development (Table 11.3.12.1-1). This direct effects area represents 0.3% of available suitable habitat in the region. About 127,300 acres (515 km^2) of potentially suitable habitat occurs in the area of potential indirect effects; this area represents about 3.3% of the available suitable habitat in the SEZ region (Table 11.3.12.1-1).

The overall impact on the Mojave gypsum bee from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because less than 1% of potentially suitable habitat for this species occurs in the area of direct effects. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Avoidance of all potentially suitable habitats (desert shrublands and washes) is not a feasible means of mitigating impacts on this species, because potentially suitable shrubland habitat is widespread throughout the area of direct effects and in other portions of the SEZ region. Direct impacts could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the area of direct effects. 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 more of these options could be designed to completely offset the impacts of development.

Mojave Poppy Bee

The Mojave poppy bee is known to occur about 17 mi (27 km) south of the Dry Lake SEZ. According to the SWReGAP land cover model, approximately 550 acres (2 km^2) of potentially suitable habitat on the SEZ may be directly affected by construction and operations of solar energy development (Table 11.3.12.1-1). This direct effects area is mostly desert wash habitat and represents 0.1% of available suitable habitat in the region. About 13,300 acres (54 km^2) of potentially suitable habitat occurs in the area of potential indirect effects; this area represents about 3.2% of the available suitable habitat in the SEZ region (Table 11.3.12.1-1).

The overall impact on the Mojave poppy bee from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because less than 1% of potentially suitable habitat for this species occurs in the area of direct effects. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Avoiding or minimizing disturbance to desert wash habitat on the SEZ could reduce direct impacts on this species. Direct impacts could also be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the area of direct effects. 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 more of these options could be designed to completely offset the impacts of development.

Gila Monster

The Gila monster is known to occur in Clark County, Nevada. According to the SWReGAP habitat suitability model, approximately 14,700 acres (59 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.3.12.1-1). This direct effects area represents about 0.5% of potentially suitable habitat in the SEZ region. About 124,100 acres (502 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 3.9% of the potentially suitable habitat in the SEZ region (Table 11.3.12.1-1).

The overall impact on the Gila monster from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because the amount of potentially suitable foraging 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 (desert scrub) is not a feasible means of mitigating impacts on this species, because potentially suitable habitat is widespread throughout the area of direct effects and in other portions of the SEZ region. Direct impacts could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the area of direct effects. If avoidance or minimization is not feasible, individuals 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 uses one or more of these options could be designed to completely offset the impacts of development.

American Peregrine Falcon

The American peregrine falcon is a year-round resident in the Dry Lake SEZ region and is known to occur about 22 mi (35 km) southwest of the SEZ. According to the SWReGAP habitat suitability model, approximately 14,900 acres (60 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.3.12.1-1). This direct effects area represents 0.4% of potentially suitable habitat in the SEZ region. About 137,700 acres (557 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 2.8% of the potentially suitable habitat in the SEZ region (Table 11.3.12.1-1). Most of this area could serve as foraging habitat (open shrublands). On the basis of an evaluation of SWReGAP land cover data, potentially suitable nest sites for this species (rocky cliffs and outcrops) do not occur on the SEZ, but approximately 11,600 acres (47 km^2) of this habitat may occur in the area of indirect effects.

The overall impact on the American peregrine falcon from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because direct effects would occur only on potentially suitable foraging habitat and the amount of this habitat in the area of direct effects represents less than 1% of potentially suitable foraging 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 foraging habitats (desert shrublands) is not a feasible means of mitigating impacts on this species, because potentially suitable habitat is widespread throughout the area of direct effects and in other portions of the SEZ region.

Crissal Thrasher

The crissal thrasher is a year-round resident in the Dry Lake SEZ region and is known to occur in Clark County, Nevada. According to the SWReGAP habitat suitability model, approximately 350 acres (1.5 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.3.12.1-1). This direct effects area represents 0.4% of potentially suitable habitat in the SEZ region. About 3,440 acres (14 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 4.2% of the potentially suitable habitat in the SEZ region (Table 11.3.12.1-1). This potentially suitable habitat on the SEZ and within the area of indirect effects may represent potentially suitable nesting or foraging habitat for this species.

The overall impact on the crissal thrasher from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because the amount of potentially suitable habitat in the area of direct effects represents less than 1% of potentially suitable foraging 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.

Avoiding or minimizing disturbance to desert wash and riparian habitat on the SEZ could reduce impacts on the crissal thrasher. In addition, impacts could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats (especially nests) in the area of direct effects. 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 used 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 the Dry Lake SEZ region and is known to occur in Clark County, Nevada. According to the SWReGAP habitat suitability model, approximately 340 acres (1.5 km^2) of potentially suitable foraging habitat on the SEZ could be directly affected by construction and operations (Table 11.3.12.1-1). This direct effects area represents 0.1% of potentially suitable habitat in the SEZ region. About 15,150 acres (61 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 3.6% of the potentially suitable habitat in the SEZ region (Table 11.3.12.1-1).

The overall impact on the ferruginous hawk from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because direct effects would occur only on potentially suitable foraging habitat and the amount of this habitat in the area of direct effects represents less than 1% of potentially suitable foraging 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 foraging habitats (desert shrublands) is not a feasible means of mitigating impacts on this species, because potentially suitable habitat is widespread throughout the area of direct effects and in other portions of the SEZ region.

LeConte's Thrasher

The LeConte's thrasher is a year-round resident in the Dry Lake SEZ region and is known to occur in Clark County, Nevada. According to the SWReGAP habitat suitability model, approximately 15,000 acres (61 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.3.12.1-1). This direct effects area represents 0.4% of potentially suitable habitat in the SEZ region. About 127,500 acres (516 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 3.3% of the potentially suitable habitat in the SEZ region (Table 11.3.12.1-1). This potentially suitable habitat on the SEZ and within the area of indirect effects may represent potentially suitable nesting or foraging habitat for this species.

The overall impact on the LeConte's thrasher from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because the amount of potentially suitable habitat in the area of direct effects represents less than 1% of potentially suitable foraging 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 (desert scrub) is not a feasible means of mitigating impacts on this species, because potentially suitable habitat is widespread throughout the area of direct effects and in other portions of the SEZ region. However, impacts could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats (especially nests) in the area of direct effects. 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.

Phainopepla

The phainopepla is a year-round resident in the Dry Lake SEZ region and is known to occur in Clark County, Nevada. According to the SWReGAP habitat suitability model, approximately 340 acres (1.5 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations of solar energy development (Table 11.3.12.1-1). This direct effects area represents less than 0.1% of available suitable habitat of the phainopepla in the SEZ region. About 9,850 acres (40 km^2) of suitable habitat occurs in the area of potential indirect effects; this area represents about 0.9% of the available suitable habitat in the region (Table 11.3.12.1-1).

Riparian habitats in the Moapa Valley that may provide suitable nesting and foraging habitat for the phainopepla may be affected by spring discharges associated with the Garnet Valley regional groundwater basin. Solar energy development on the SEZ may require water from the same regional groundwater basin that supports these riparian habitats. As discussed for groundwater-dependent species in Section 11.3.12.2.1, impacts on this species could range from small to large depending upon the solar energy technology deployed, the scale of development within the SEZ, and the cumulative rate of groundwater withdrawals (Table 11.3.12.1-1).

The implementation of programmatic design features and complete avoidance or limitation of groundwater withdrawals from the regional groundwater system would reduce impacts on the phainopepla to small or negligible levels. Impacts can be better quantified for specific projects once water needs are identified. In addition, avoiding or minimizing disturbance to riparian areas on the SEZ would reduce direct impacts on the phainopepla. Impacts also could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats (especially nests) in the area of direct effects. 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.

Western Burrowing Owl

The western burrowing owl is a year-round resident in the Dry Lake SEZ region and is known to occur in Clark County, Nevada. According to the SWReGAP habitat suitability model, approximately 14,750 acres (60 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.3.12.1-1). This direct effects area represents 0.4% of potentially suitable habitat in the SEZ region. About 125,500 acres (508 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 3.1% of the potentially suitable habitat in the SEZ region (Table 11.3.12.1-1). Most of this area could serve as foraging and nesting habitat (shrublands). The abundance of burrows suitable for nesting in the affected area 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 Dry Lake 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 to negligible levels.

Avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts on the western burrowing owl, because potentially suitable desert shrub habitats are widespread throughout the area of direct effects and readily available in other portions of the SEZ region. Impacts on the western burrowing owl could be reduced to negligible levels by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the area of direct effects. 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. The need for mitigation, other than programmatic design features, should be determined by conducting pre-disturbance surveys for the species and its habitat in the area of direct effects.

Big Free-Tailed Bat

The big free-tailed bat is a year-round resident within the Dry Lake SEZ region, and potentially suitable habitat may occur in the affected area of the SEZ. According to the SWReGAP habitat suitability model, approximately 15,600 acres (63 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.3.12.1-1). This direct effects area represents 0.4% of potentially suitable habitat in the SEZ region. About 141,575 acres (573 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 3.5% of the available suitable habitat in the region (Table 11.3.12.1-1). Most of the potentially suitable habitat in the affected area is foraging habitat represented by desert shrubland. On the basis of an evaluation of SWReGAP land cover data, potentially suitable roost habitat (rocky cliffs and outcrops) does not occur on the SEZ, but about

11,600 acres (47 km^2) of potentially suitable roost habitat may occur in the area of indirect effects.

The overall impact on the big free-tailed bat from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because the amount of potentially suitable foraging habitat for this species in the area of direct effects represents less than 1% of potentially suitable foraging 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 foraging habitat is not feasible, because potentially suitable habitat is widespread throughout the area of direct effects and readily available in other portions of the SEZ region.

Brazilian Free-Tailed Bat

The Brazilian free-tailed bat is a year-round resident within the Dry Lake SEZ region and potentially suitable habitat may occur in the affected area of the SEZ. According to the SWReGAP habitat suitability model, approximately 15,200 acres (62 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.3.12.1-1). This direct effects area represents 0.4% of potentially suitable habitat in the SEZ region. About 133,500 acres (540 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 3.6% of the available suitable habitat in the region (Table 11.3.12.1-1). Most of the potentially suitable habitat in the affected area is foraging habitat represented by desert shrubland. On the basis of an evaluation of SWReGAP land cover data, potentially suitable roost habitat (rocky cliffs and outcrops) does not occur on the SEZ, but about 11,600 acres (47 km^2) of potentially suitable roost habitat may occur in the area of indirect effects.

The overall impact on the Brazilian free-tailed bat from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because the amount of potentially suitable foraging habitat for this species in the area of direct effects represents less than 1% of potentially suitable foraging 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 foraging habitats is not feasible, because potentially suitable habitat is widespread throughout the area of direct effects and readily available in other portions of the SEZ region.

Nelson's Bighorn Sheep

The Nelson's bighorn sheep is known to occur within the affected area of the Dry Lake SEZ (Sheep Mountains), but suitable range habitat is not expected to occur on the SEZ. However, approximately 8,400 acres (34 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 1.4% of the available suitable habitat in the region (Table 11.3.12.1-1). Despite the apparent lack of suitable habitat on the SEZ, the Nelson's bighorn sheep may utilize portions of the Dry Lake SEZ as a migratory corridor between range habitats.

The overall impact on the Nelson's bighorn sheep from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because no potentially suitable habitat for this species has been identified in the area of direct effects, and only indirect effects are possible. The implementation of programmatic design features it expected to 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 pre-disturbance surveys and avoiding or minimizing disturbance to important movement corridors within the area of direct effects.

Pallid Bat

The pallid bat is a year-round resident within the Dry Lake SEZ region, and potentially suitable habitat may occur in the affected area of the SEZ. According to the SWReGAP habitat suitability model, approximately 15,100 acres (62 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.3.12.1-1). This direct effects area represents 0.4% of potentially suitable habitat in the SEZ region. About 134,100 acres (543 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 3.6% of the available suitable habitat in the region (Table 11.3.12.1-1). Most of the potentially suitable habitat in the affected area is foraging habitat represented by desert shrubland. On the basis of an evaluation of SWReGAP land cover data, potentially suitable roost habitat (rocky cliffs and outcrops) does not occur on the SEZ, but about 11,600 acres (47 km^2) of potentially suitable roost habitat may occur in the area of indirect effects.

The overall impact on the pallid bat from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because the amount of potentially suitable foraging habitat for this species in the area of direct effects represents less than 1% of potentially suitable foraging 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 foraging habitats is not feasible, because potentially suitable habitat is widespread throughout the area of direct effects and readily available in other portions of the SEZ region.

Silver-Haired Bat

The silver-haired bat is a year-round resident within the Dry Lake SEZ region, and potentially suitable habitat may occur in the affected area of the SEZ. According to the SWReGAP habitat suitability model, approximately 14,800 acres (62 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.3.12.1-1). This direct effects area represents 0.4% of potentially suitable habitat in the SEZ region. About 130,100 acres (526 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 3.6% of the available suitable habitat in the region (Table 11.3.12.1-1).

Most of the potentially suitable habitat in the affected area is foraging habitat represented by desert shrubland. On the basis of an evaluation of SWReGAP land cover data, potentially suitable roost habitat (rocky cliffs, outcrops, and woodland habitat) does not occur on the SEZ, but about 11,600 acres (47 km^2) of potentially suitable roost habitat may occur in the area of indirect effects.

The overall impact on the silver-haired bat from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because the amount of potentially suitable foraging habitat for this species in the area of direct effects represents less than 1% of potentially suitable foraging 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 foraging habitats is not feasible, because potentially suitable habitat is widespread throughout the area of direct effects and readily available in other portions of the SEZ region.

Spotted Bat

The spotted bat is a year-round resident within the Dry Lake SEZ region, and potentially suitable habitat may occur in the affected area of the SEZ. According to the SWReGAP habitat suitability model, approximately 15,000 acres (61 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.3.12.1-1). This direct effects area represents 0.3% of potentially suitable habitat in the SEZ region. About 139,300 acres (564 km^2) of potentially suitable foraging habitat occurs in the area of indirect effects; this area represents about 3.2% of the available suitable habitat in the region (Table 11.3.12.1-1). Most of the potentially suitable habitat in the affected area is foraging habitat represented by desert shrubland. On the basis of an evaluation of SWReGAP land cover data, potentially suitable roost habitat (rocky cliffs and outcrops) does not occur on the SEZ, but about 11,600 acres (47 km^2) of potentially suitable roost habitat may occur in the area of indirect effects.

The overall impact on the spotted bat from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because the amount of potentially suitable foraging habitat for this species in the area of direct effects represents less than 1% of potentially suitable foraging 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 foraging habitats is not feasible, because potentially suitable habitat is widespread throughout the area of direct effects and readily available in other portions of the SEZ region.

Townsend's Big-Eared Bat

The Townsend's big-eared bat is a year-round resident within the Dry Lake SEZ region, and potentially suitable habitat may occur in the affected area. According to the SWReGAP habitat suitability model, approximately 14,900 acres (60 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.3.12.1-1). This direct effects area represents 0.4% of potentially suitable habitat in the SEZ region. About 131,100 acres (530 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 3.4% of the available suitable foraging habitat in the region (Table 11.3.12.1-1). Most of the potentially suitable habitat in the affected area is foraging habitat represented by desert shrubland. On the basis of an evaluation of SWReGAP land cover data, potentially suitable roost habitat (rocky cliffs and outcrops) does not occur on the SEZ, but about 11,600 acres (47 km^2) of potentially suitable roost habitat may occur in the area of indirect effects.

The overall impact on the Townsend's big-eared bat from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because the amount of potentially suitable foraging habitat for this species in the area of direct effects represents less than 1% of potentially suitable foraging 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 foraging habitats is not feasible, because potentially suitable habitat is widespread throughout the area of direct effects and readily available in other portions of the SEZ region.

Western Small-Footed Myotis

The western small-footed myotis is a year-round resident within the Dry Lake SEZ region, and potentially suitable habitat may occur in the affected area. According to the SWReGAP habitat suitability model, approximately 14,900 acres (60 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.3.12.1-1). This direct effects area represents 0.3% of potentially suitable habitat in the SEZ region. About 137,600 acres (557 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 3.2% of the available suitable foraging habitat in the region (Table 11.3.12.1-1). Most of the potentially suitable habitat in the affected area is foraging habitat represented by desert shrubland. On the basis of an evaluation of SWReGAP land cover data, potentially suitable roost habitat (rocky cliffs and outcrops) does not occur on the SEZ, but about 11,600 acres (47 km^2) of potentially suitable roost habitat may occur in the area of indirect effects.

The overall impact on the western small-footed myotis from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because the amount of potentially suitable foraging habitat for this species in the area of direct effects represents less than 1% of potentially suitable foraging 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 foraging habitats is not feasible, because potentially suitable habitat is widespread throughout the area of direct effects and readily available in other portions of the SEZ region.

Groundwater-Dependent Species

There are four BLM-designated sensitive species that may be affected by solar energy development on the Dry Lake SEZ: the Pahranagat naucorid, Spring Mountains springsnail, southwestern toad, and phainopepla. These species do not occur within 5 mi (8 km) of the SEZ boundary, but they do occur in areas dependent on groundwater discharge from the Garnet Valley groundwater basin, from which groundwater may also be used to support solar energy development on the Dry Lake SEZ (Table 11.3.12.1-1). Potential impacts on these species (which could range from small to large) and mitigations that could reduce those impacts would be similar to those described for groundwater-dependent ESA-listed species in Section 11.3.12.2.1. For all these species, potential impacts and mitigation options should be discussed with the USFWS prior to project development. Additional impacts and mitigation for the phainopepla are discussed above.

11.3.12.2.5 Impacts on State-Listed Species

There are 18 species listed by the State of Nevada that may be affected by solar energy development on the Dry Lake SEZ (Table 11.3.12.1-1). Of these species, impacts on the following four state-listed species have not been previously described: Las Vegas bearpoppy, sticky buckwheat, threecorner milkvetch, and western mastiff bat. Impacts on each of these four species are discussed below and summarized in Table 11.3.12.1-1.

Las Vegas Bearpoppy

The Las Vegas bearpoppy is known to occur within the affected area of the Dry Lake SEZ, approximately 5 mi (8 km) south of the SEZ. According to the SWReGAP land cover model, approximately 425 acres (2 km^2) of potentially suitable desert pavement habitat on the SEZ may be directly affected by construction and operations of solar energy development (Table 11.3.12.1-1). This direct effects area represents about 0.7% of available suitable habitat in the region. About 1,250 acres (5 km^2) of potentially suitable habitat occurs in the area of potential indirect effects; this area represents about 1.9% of the available potentially suitable habitat in the SEZ region (Table 11.3.12.1-1).

The overall impact on the Las Vegas bearpoppy from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because less than 1% of potentially suitable habitat for this species occurs in the area of direct effects. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Avoiding or minimizing disturbance to desert pavement habitat on the SEZ and the implementation of mitigation measures described previously for the Sheep Mountain milkvetch (Section 11.3.12.2.4) could reduce direct impacts on this species to negligible levels. 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.

Sticky Buckwheat

The sticky buckwheat is known to occur approximately 21 mi (34 km) northeast of the Dry Lake SEZ. According to the SWReGAP land cover model, approximately 125 acres (0.5 km^2) of potentially suitable disturbed roadside habitat on the SEZ may be directly affected by construction and operations of solar energy development (Table 11.3.12.1-1). This direct effects area represents about 0.1% of available suitable habitat in the region. About 440 acres (2 km^2) of potentially suitable habitat occurs in the area of potential indirect effects; this area represents about 0.4% of the available potentially suitable habitat in the SEZ region (Table 11.3.12.1-1).

The overall impact on the sticky buckwheat from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because less than 1% of potentially suitable habitat for this species occurs in the area of direct effects. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts to negligible levels. In addition, the implementation of mitigation measures described previously for the Sheep Mountain milkvetch (Section 11.3.12.2.4) could reduce direct impacts on this species. 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.

Threecorner Milkvetch

The threecorner milkvetch is known to occur within the affected area of the Dry Lake SEZ, approximately 1 mi (1.6 km) east of the SEZ. According to the SWReGAP land cover model, approximately 850 acres (3.5 km^2) of potentially suitable desert wash pavement habitats on the SEZ may be directly affected by construction and operations of solar energy development (Table 11.3.12.1-1). This direct effects area represents about 0.8% of available suitable habitat in the region. About 4,700 acres (19 km^2) of potentially suitable habitat occurs in the area of potential indirect effects; this area represents about 4.4% of the available potentially suitable habitat in the SEZ region (Table 11.3.12.1-1).

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

Avoiding or minimizing disturbance to desert wash and pavement habitats on the SEZ and the implementation of mitigation measures described previously for the Sheep Mountain milkvetch (Section 11.3.12.2.4) could reduce direct impacts on this species to negligible levels. 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.

Western Mastiff Bat

The western mastiff bat is a summer resident in the Dry Lake SEZ region and is known to occur approximately 20 mi (32 km) southwest of the SEZ. According to the SWReGAP habitat suitability model, potentially suitable habitat for this species does not occur on the SEZ (Table 11.3.12.1-1). However, about 200 acres (1 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 0.2% of the available suitable habitat in the region (Table 11.3.12.1-1). Most of the potentially suitable habitat in the affected area is foraging habitat represented by desert shrubland.

The overall impact on the western mastiff bat from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake SEZ is considered small, because no potentially suitable habitat for this species occurs in the area of direct effects, and only indirect effects are possible. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts to negligible levels.

11.3.12.2.6 Impacts on Rare Species

There are 60 rare species (i.e., state rank of S1 or S2 in Nevada or a species of concern by the USFWS or State of Nevada) that may be affected by solar energy development on the Dry Lake SEZ (Table 11.3.12.1-1). Impacts on 15 rare species have not been discussed previously: (1) plants: Ackerman milkvetch, Antelope Canyon goldenbush, bearded screwmoss, beaver dam breadroot, Charleston goldenbush, dune sunflower, Littlefield milkvetch, Meadow Valley sandwort, mottled milkvetch, New York Mountains catseye, rough fringemoss, sweet moustache moss, and Virgin River thistle; and (2) invertebrates: red-tailed blazing star bee and Warm Springs naucorid. Impacts on and potential mitigation for these species are presented in Table 11.3.12.1-1.

11.3.12.3 SEZ-Specific Design Features and Design Feature Effectiveness

The implementation of required programmatic design features described in Appendix A 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 specific 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 special status species, including those identified in Table 11.3.12.1-1; disturbance to occupied habitats for these species should be avoided or minimized to the extent practicable. If avoiding or minimizing impacts to 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 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.

- Consultation with the USFWS and the NDOW should be conducted to address the potential for impacts on the following four species currently listed as threatened or endangered under the ESA: Moapa dace, Pahrump poolfish, desert tortoise, and southwestern willow flycatcher. Consultation would identify an appropriate survey protocol, avoidance and minimization measures, and, if appropriate, reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions for incidental take statements.

- Coordination with the USFWS and NDOW should be conducted for the following seven species that are candidates or under review for listing under the ESA that may be affected by solar energy development on the SEZ: Las Vegas buckwheat, grated tryonia, Moapa pebblesnail, Moapa Valley pebblesnail, Moapa Warm Spring riffle beetle, Moapa speckled dace, and Moapa White River springfish. Coordination would identify an appropriate survey protocol and mitigation requirements, which may include avoidance, minimization, translocation, or compensation.

- Avoiding or minimizing disturbance to desert wash habitat on the SEZ could reduce or eliminate impacts on the following 10 special status species: beaver dam breadroot, dune sunflower, halfring milkvetch, Las Vegas buckwheat, Littlefield milkvetch, Parish's phacelia, rosy two-tone beardtongue, sticky buckwheat, threecorner milkvetch, and yellow two-tone beardtongue.

- Avoiding or minimizing disturbance to desert pavement habitat on the SEZ could reduce or eliminate impacts on the following six special status species: dune sunflower, Las Vegas bearpoppy, mottled milkvetch, silverleaf sunray, threecorner milkvetch, and red-tail blazing star bee.

- Avoiding or minimizing disturbance to playa habitat on the SEZ could reduce or eliminate impacts on the following two special status species: Littlefield milkvetch and Parish's phacelia.

- Avoidance or minimization of groundwater withdrawals from the Garnet Valley basin could reduce or eliminate impacts on the following 13 groundwater-dependent special status species: grated tryonia, Moapa pebblesnail, Moapa Valley pebblesnail, Moapa Warm Springs riffle beetle, Spring Mountains springsnail, Warm Springs naucorid, Moapa dace, Moapa speckled dace, Moapa White River springfish, Pahrump poolfish, southwestern toad, phainopepla, and southwestern willow flycatcher.

- Harassment or disturbance of special status species and their habitats in the affected area should be avoided or minimized, by identifying any additional sensitive areas and implementing necessary protection measures based upon consultation with the USFWS and the NDOW.

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

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11.3.13 Air Quality and Climate

11.3.13.1 Affected Environment

11.3.13.1.1 Climate

The proposed Dry Lake SEZ is located in the north-central portion of Clark County in southernmost Nevada. Nevada lies on the eastern lee side of the Sierra Nevada Range, which markedly influences the climate of the state under the prevailing westerlies (NCDC 2010a). In addition, the mountains east and north of Nevada act as barriers to the cold arctic air masses, and thus long periods of extremely cold weather are uncommon. The SEZ lies at an average elevation of about 2,110 ft (643 m) in the northeastern portion of the Mojave Desert, which has an extremely arid climate marked by mild winters and hot summers, large daily temperature swings due to dry air, scant precipitation, high evaporation rates, low relative humidity, and abundant sunshine. Meteorological data collected at the Las Vegas McCarran International Airport, about 25 mi (40 km) southwest of the Dry Lake SEZ boundary, and at the Valley of Fire State Park, about 18 mi (29 km) east, are summarized below.

A wind rose from the Las Vegas McCarran International Airport, based on data collected 33 ft (10 m) above the ground over the 5-year period 2005 to 2009, is presented in Figure 11.3.13.1-1 (NCDC 2010b). During this period, the annual average wind speed at the airport was about 7.1 mph (3.2 m/s); the prevailing wind direction was from the south-southwest (about 15.3% of the time) and secondarily from the southwest (about 12.7% of the time). South-southwesterly winds occurred more frequently throughout the year. Wind speeds categorized as calm (less than 1.1 mph [0.5 m/s]) occurred frequently (about 18.3% of the time) because of the stable conditions caused by strong radiative cooling from late night to sunrise. Average wind speeds by season were the highest in spring at 8.6 mph (3.8 m/s); lower in summer and fall at 7.6 mph (3.4 m/s) and 6.2 mph (2.8 m/s), respectively; and lowest in winter at 6.0 mph (2.7 m/s).

In southern Nevada, the summers are long and hot, while the winters are short and mild (NCDC 2010a). For the period 1972 to 2010, the annual average temperature at the Valley of Fire State Park was 69.2°F (20.7°C) (WRCC 2010c). December was the coldest month, with an average minimum temperature of 38.2°F (3.4°C), and July was the warmest, with an average maximum of 105.6°F (40.9°C). In the summer, daytime maximum temperatures over 100°F (37.8°C) are common, and minimums are in the 70s. The minimum temperatures recorded were below freezing (≤32°F [0°C]) during the colder months (from November to March, with a peak of about 4 days in January and December), but subzero temperatures were never recorded. During the same period, the highest temperature, 117°F (47.2°C), was reached in July 1973 and the lowest, 12°F (−11.1°C), in December 1990. In a typical year, about 140 days had a maximum temperature of at least 90°F (32.2°C), while about 11 days had minimum temperatures at or below freezing.

Because of the rain shadow effect caused by the Sierra Nevada Range to the west, very little precipitation occurs in Nevada (NCDC 2010a). For the 1972 to 2010 period, annual precipitation at the Valley of Fire State Park averaged about 6.45 in. (16.4 cm) (WRCC 2010c).

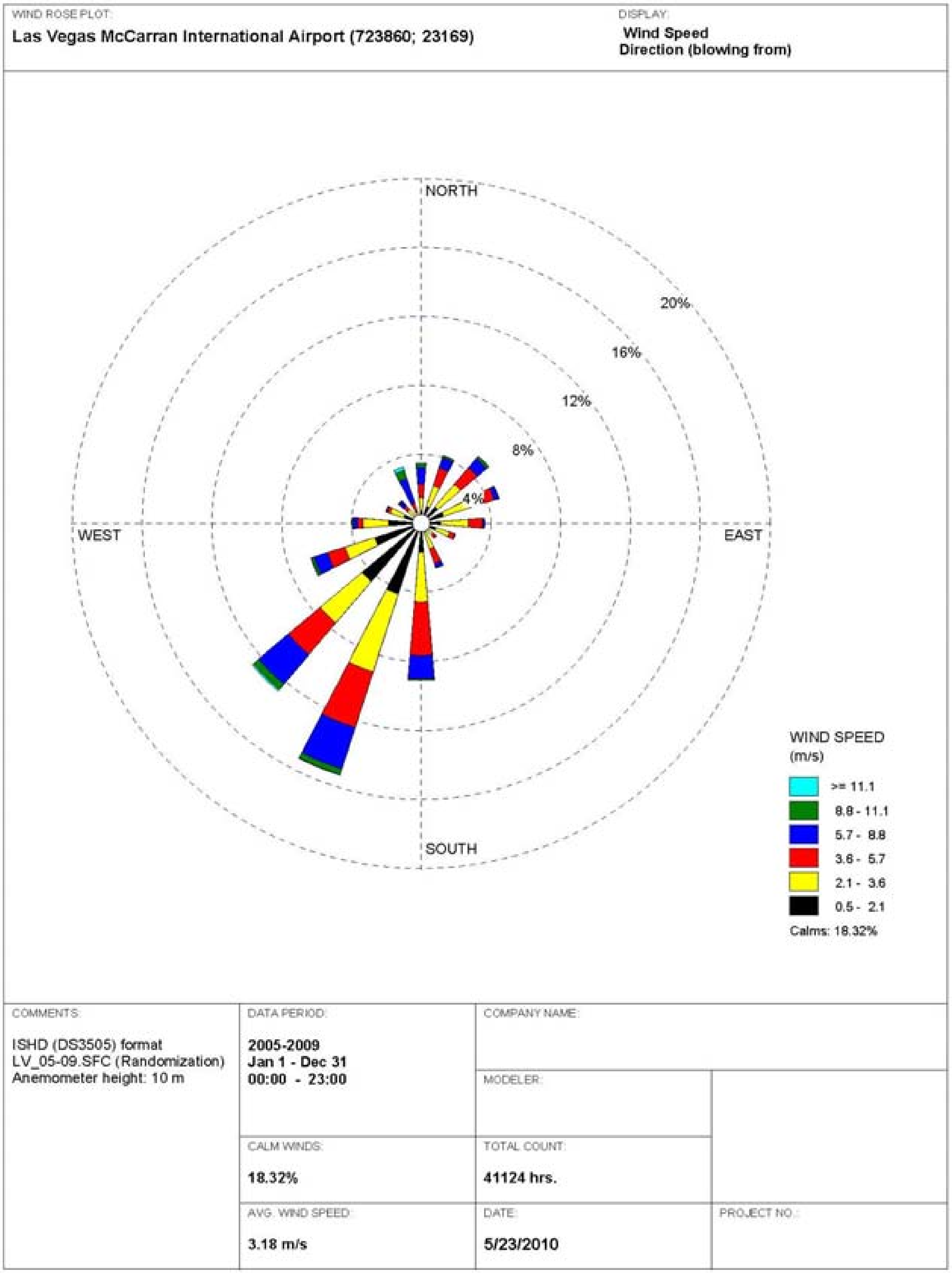


FIGURE 11.3.13.1-1 Wind Rose at 33 ft (10 m) at the Las Vegas McCarran International Airport, Nevada, 2005 to 2009 (Source: NCDC 2010b)

On average, 30 days a year have measurable precipitation (0.01 in. [0.025 cm] or higher). Seasonally, precipitation is the highest during winter (about 40% of the annual total) and evenly distributed among the other three seasons. Snow occurs mostly from November to February but is a rarity in the area. The annual average snowfall at the Valley of Fire State Park was about 0.3 in. (0.8 cm), with the highest monthly snowfall of 3.0 in. (7.6 cm) in February 1987 and December 1998.

The proposed Dry Lake SEZ is far from major water bodies (more than 260 mi [418 km] to the Pacific Ocean). Severe weather events, such as severe thunderstorms and tornadoes are rare in Clark County, which encompasses the Dry Lake SEZ (NCDC 2010c).

In Nevada, flooding could occur from melting of heavy snowpack. On occasion, heavy summer thunderstorms also cause flooding of local streams, usually in sparsely populated mountainous areas, but they are seldom destructive (NCDC 2010a). Since 1993, 99 floods (88 flash floods, 9 urban/small stream floods, and 2 floods), most of which occurred from July through September (NCDC 2010c), were reported in Clark County. These floods caused 4 deaths and 12 injuries, and did cause significant property damage. In January 2005, heavy rain and rapid snow melt caused extensive flooding in southern Lincoln and northeast Clark Counties that brought about significant property damage.

In Clark County, 53 hail events in total have been reported since 1961, some of which caused property damage. Hail measuring 1.75 in. (4.4 cm) in diameter was reported more than 10 times. Fifty-two high wind events have been reported in Clark County since 1995, and those up to a maximum wind speed of 81 mph (36 m/s) have occurred more frequently in March and April, causing no death, 1 injury, and some property and crop damage (NCDC 2010c). In Clark County, 139 thunderstorm wind events have been reported since 1959, and those up to a maximum wind speed of 116 mph (52 m/s) have occurred primarily from July through September, causing 3 deaths, 12 injuries, and significant property damage (NCDC 2010c).

In Clark County, one dust storm event was reported in 2002 (NCDC 2010c). However, the ground surface of the SEZ is covered primarily with gravelly clay loam to gravelly sandy loam (and very stony loam), both of which have relatively moderate dust storm potential. High winds can trigger large amounts of blowing dust in areas of Clark County that have dry and loose soils with sparse vegetation. Dust storms can deteriorate air quality and visibility and may have adverse effects on health, particularly for people with asthma or other respiratory problems. Clark County experienced between 2 and 4 high-wind events per year during the 2002 to 2004 period when dust levels exceeded federal health standards (Clark County DAQEM 2005). In Clark County, dust storm events with unhealthy PM_{10} levels are likely to occur during late winter and early spring.

Hurricanes and tropical storms formed off the coast of Central America and Mexico but weaken over the cold waters off the California coast. Accordingly, hurricanes never hit Nevada: Historically, two tropical depressions have passed within 100 mi (160 km) of the proposed Dry Lake SEZ (CSC 2010). In the period from 1950 to July 2010, a total of 11 tornadoes (0.2 per year) were reported in Clark County (NCDC 2010c). Most tornadoes occurring in Clark County were relatively weak (i.e., one was F [uncategorized[5]], six were F0, and four were F1 on the Fujita tornado scale), and these tornadoes caused no deaths or injuries, although they did cause some property damage. Most of these tornadoes occurred far from the SEZ; the nearest one hit about 11 mi (18 km) southeast of the SEZ.

11.3.13.1.2 Existing Air Emissions

Clark County has many industrial emission sources over the county, and several coal- and natural gas–fired power plants release substantial amounts of SO_2 and/or NO_x emissions. Several emission sources, such as natural gas–fired power plants, are located in and around the southern portion of the proposed Dry Lake SEZ. Several major roads, such as I-15, I-215, I-515, U.S. 93, U.S. 95, and several state routes, exist in Clark County. Thus, onroad mobile source emissions are substantial, especially CO emissions in Clark County. Data on annual emissions of criteria pollutants and VOCs in Clark County are presented in Table 11.3.13.1-1 for 2002 (WRAP 2009). Emissions 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, point sources were primary contributors to total emissions of SO_2 (about 85%) and NO_x (about 48%). Onroad sources were primary contributors to CO emissions (about 51%) and secondary contributors to NO_x (about 28%), while nonroad sources were secondary contributors to CO emissions (about 34%). Biogenic sources (i.e., vegetation—including trees, plants, and crops—and soils) that release naturally occurring emissions accounted for most of VOC emissions (about 83%). Area sources were primary contributors to PM_{10} and $PM_{2.5}$ emissions (about 88% and 80%, respectively). In Clark County, fire emissions sources were minor contributors to criteria pollutants and VOCs.

TABLE 11.3.13.1-1 Annual Emissions of Criteria Pollutants and VOCs in Clark County, Nevada, Encompassing the Proposed Dry Lake SEZ, 2002[a]

Pollutant[b]	Emissions (tons/yr)[c]
SO_2	50,105
NO_x	79,225
CO	355,591
VOCs	254,008
PM_{10}	55,787
$PM_{2.5}$	14,131

[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.

[c] To convert tons to kilograms, multiply by 907.

Source: WRAP (2009).

In 2005, Nevada produced about 56.3 MMt of *gross*[6] carbon dioxide equivalent (CO_2e)[7] emissions, which is about 0.8% of total U.S. GHG emissions in that year (NDEP 2008). Gross

[5] Not categorized by the Fujita tornado scale because damage level was not reported.

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

[7] 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.

GHG emissions in Nevada increased by about 65% from 1990 to 2005 because of Nevada's rapid population growth, compared to 16.3% growth in U.S. GHG emissions during the same period. In 2005, electrical generation (48%) and transportation (30%) were the primary contributors to gross GHG emission sources in Nevada. Fuel use in the residential, commercial, and industrial sectors combined accounted for about 12% of total state emissions. Nevada's *net* emissions were about 51.3 MMt CO_2e, considering carbon sinks from forestry activities and agricultural soils throughout the state. The EPA (2009a) also estimated 2005 emissions in Nevada. Its estimate of CO_2 emissions from fossil fuel combustion was 49.6 MMt, which was comparable to the state's estimate. Electric power generation and transportation accounted for about 52.7% and 33.6% of the CO_2 emissions total, respectively, while the residential, commercial, and industrial sectors accounted for the remainder (about 13.7%).

11.3.13.1.3 Air Quality

The EPA set NAAQS for six criteria pollutants (EPA 2010a): SO_2, NO_2, CO, O_3, PM (PM_{10} and $PM_{2.5}$), and Pb. Nevada has its own State Ambient Air Quality Standards (SAAQS), which are similar to the NAAQS but with some differences (NAC 445B.22097). In addition, Nevada has set standards for 1-hour H_2S, which are not addressed by the NAAQS. The NAAQS and Nevada SAAQS for criteria pollutants are presented in Table 11.3.13.1-2.

Clark County is located administratively within the Las Vegas Intrastate Air Quality Control Region (Title 40, Part 81, Section 80 of the *Code of Federal Regulations* [40 CFR 81.80]). Clark County has experienced air quality problems, notably CO, ozone, and PM_{10} pollution due to rapid population and industrial growth along with long-range transport of air pollutants from the South Coast Air Basin, including Los Angeles. Currently, portions of Clark County are designated as being in nonattainment for CO, 8-hour ozone, and PM_{10} (40 CFR 81.329). The Dry Lake SEZ is located outside the CO and PM_{10} nonattainment areas but within the 8-hour ozone nonattainment area. Accordingly, the area surrounding the proposed Dry Lake SEZ is in attainment for all six criteria pollutants except 8-hour ozone.

As briefly discussed in Section 11.3.13.1.1, Clark County frequently experiences natural dust storm events, which cause PM_{10} exceedances of the NAAQS. Western states frequently plagued by natural dust storms requested that the EPA develop a commonsense policy, called the Natural Events Policy (NEP), to address high PM_{10} pollution caused by natural events. Under the NEP, state and local governments are required to develop a Natural Events Action Plan (NEAP), which provides alternatives for controlling significant sources of human-caused windblown dust, with the understanding that dust storms sometimes override the best dust control efforts. Clark County prepared an NEAP for review and comment by the EPA, and should reevaluate the NEAP every 5 years at a minimum and make appropriate changes to the plan (Clark County DAQEM 2005). The NEAP is applicable to the Las Vegas Valley, currently designated as a PM_{10} nonattainment area, and to the Apex Valley, which encompasses the Dry Lake SEZ.

Ambient concentration data representative of the proposed Dry Lake SEZ for all criteria pollutants except Pb are available for Clark County. To characterize ambient air quality around

TABLE 11.3.13.1-2 NAACQS, SAAQS, and Background Concentration Levels Representative of the Proposed Dry Lake SEZ in Clark County, Nevada, 2004 to 2008

				Background Concentration Level	
Pollutant[a]	Averaging Time	NAAQS	SAAQS	Concentration[b,c]	Measurement Location, Year
SO_2	1-hour	75 ppb[d]	NA[e]	NA	NA
	3-hour	0.5 ppm	0.5 ppm	0.009 ppm (1.8%)	Las Vegas, 2005
	24-hour	0.14 ppm	0.14 ppm	0.008 ppm (5.7%)	Las Vegas, 2005
	Annual	0.030 ppm	0.030 ppm	0.006 ppm (20%)	Las Vegas, 2005
NO_2	1-hour	100 ppb[f]	NA	NA	NA
	Annual	0.053 ppm	0.053 ppm	0.006 ppm (11%)	North Las Vegas, 2007
CO	1-hour	35 ppm	35 ppm	5.7 ppm (16%)	Las Vegas, 2004
	8-hour	9 ppm	9 ppm	3.9 ppm (43%)	Las Vegas, 2005
O_3	1-hour	0.12 ppm[g]	0.12 ppm	0.104 ppm (87%)	North Las Vegas, 2005
	8-hour	0.075 ppm	NA	0.081 ppm (108%)	North Las Vegas, 2007
PM_{10}	24-hour	150 $\mu g/m^3$	150 $\mu g/m^3$	97 $\mu g/m^3$ (65%)	North Las Vegas, 2006
	Annual	NA	50 $\mu g/m^3$	22 $\mu g/m^3$ (44%)	North Las Vegas, 2008
$PM_{2.5}$	24-hour	35 $\mu g/m^3$	NA	10.2 $\mu g/m^3$ (29%)	North Las Vegas, 2005
	Annual	15.0 $\mu g/m^3$	NA	4.1 $\mu g/m^3$ (27%)	North Las Vegas, 2005
Pb	Calendar quarter	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$	NA	NA
	Rolling 3-month	0.15 $\mu g/m^3$ [h]	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 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 Values in parentheses are background concentration levels as a percentage of NAAQS or SAAQS, respectively. Calculation of 1-hour SO_2 and NO_2 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 January 12, 2009.

Sources: EPA (2010a,b); NAC 445B.22097.

the SEZ, ambient concentrations of NO_2, O_3, PM_{10}, and $PM_{2.5}$ from the Apex station, which is located just outside the southern Dry Lake SEZ boundary, are presented. CO concentrations at the East Tonopah station in Las Vegas, which is the farthest downwind station of Las Vegas, were presented. The East Sahara Avenue station, which is on the outskirts of Las Vegas, has only one SO_2 monitor in the area. No Pb measurements have been made in the state of Nevada because of low Pb concentration levels after the phaseout of leaded gasoline. The highest background concentrations of criteria pollutants at these stations for the period 2004 to 2008 are presented in Table 11.3.13.1-2 (EPA 2010b). Other than O_3, which approaches the 1-hour standard but exceeds the 8-hour NAAQS, the highest concentration levels were lower than their respective standards (up to 65%).

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 source 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. Several Class I areas are located in Arizona and Utah; one is within 62 mi (100 km) of the proposed SEZ. The nearest is Grand Canyon NP in Arizona (40 CFR 81.403), about 53 mi (85 km) east-southeast of the Dry Lake SEZ. This Class I area is not located downwind of prevailing winds at the Dry Lake SEZ (Figure 11.3.13.1-1). The next nearest Class I area includes Zion NP in Utah, which is located about 108 mi (173 km) northeast of the SEZ.

11.3.13.2 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 levels of 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, use of solar facilities to generate electricity could 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 Dry Lake 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 through any additional mitigation applied. Section 11.3.13.3 below identifies SEZ-specific design features of particular relevance to the Dry Lake SEZ.

11.3.13.2.1 Construction

The Dry Lake SEZ site 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 with 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 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 Section M.13 of Appendix M. Estimated air concentrations were compared with the applicable NAAQS/SAAQS levels at the site boundaries and nearby communities and with Prevention of Significant Deterioration (PSD) increment levels at nearby Class I areas.[8] However, no receptors were modeled for PSD analysis at the nearest Class I area, Grand Canyon NP in Arizona, because it is about 53 mi (85 km) from the SEZ, which is over the maximum modeling distance of 31 mi (50 km) for the AERMOD. Rather, several regularly spaced receptors in the direction of the Grand Canyon NP were selected as surrogates for the PSD analysis. For the Dry Lake SEZ, the modeling was conducted based on the following assumptions and input:

- Uniformly distributed emissions of 3,000 acres (12.1 km^2) each and 6,000 acres (24.3 km^2) total in the southern portion of the SEZ, close to the nearest residences near North Las Vegas,

- Surface hourly meteorological data from the Las Vegas McCarran International Airport and upper air sounding data from the Mercury/Desert Rock Airport for the 2005 to 2009 period, and

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

Results

The modeling results for concentration increments and total concentrations (modeled plus background concentrations) for both PM_{10} and $PM_{2.5}$ that would result from construction-related fugitive emissions are summarized in Table 11.3.13.2-1. Maximum 24-hour PM_{10} concentration

[8] To provide a quantitative assessment, the modeled air impacts of construction were compared to the NAAQS/SAAQS 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 11.3.13.2-1 Maximum Air Quality Impacts from Emissions Associated with Construction Activities for the Proposed Dry Lake SEZ

			Concentration ($\mu g/m^3$)				Percentage of NAAQS/SAAQS	
Pollutant[a]	Averaging Time	Rank[b]	Maximum Increment[b]	Background[c]	Total	NAAQS/ SAAQS	Increment	Total
PM_{10}	24 hours	H6H	579	97.0	676	150	386	450
	Annual	–[d]	88.4	22.0	110	50	177	221
$PM_{2.5}$	24 hours	H8H	38.0	10.2	48.2	35	109	138
	Annual	–	8.8	4.1	12.9	15.0	59	86

[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 5-year period. For the annual average, multiyear averages of annual means over the 5-year period are presented. Maximum concentrations are predicted to occur at the site boundaries.

[c] See Table 11.3.13.1-2.

[d] A dash indicates not applicable.

increments modeled to occur at the site boundaries would be an estimated 579 $\mu g/m^3$, which far exceeds the relevant standard level of 150 $\mu g/m^3$. Total 24-hour PM_{10} concentrations of 676 $\mu g/m^3$ would also exceed the standard level at the SEZ boundary. However, high PM_{10} concentrations would be limited to the immediate areas surrounding the SEZ boundary and would decrease quickly with distance. Predicted maximum 24-hour PM_{10} concentration increments would be about 28 $\mu g/m^3$ at Moapa (closest downwind community, about 19 mi [31 km] northeast of the SEZ), about 20 $\mu g/m^3$ at Moapa Valley and Overton, and about 10 to 15 $\mu g/m^3$ at upwind communities such as North Las Vegas, about 12 mi (19 km) southwest of the SEZ. Annual average modeled concentration increments and total concentrations (increment plus background) for PM_{10} at the SEZ boundary would be about 88.4 $\mu g/m^3$ and 110 $\mu g/m^3$, respectively, which are higher than the SAAQS level of 50 $\mu g/m^3$. Annual PM_{10} increments would be much lower, about 0.7 $\mu g/m^3$ at Moapa, about 0.3 $\mu g/m^3$ at Moapa Valley and Overton, and less than 0.5 $\mu g/m^3$ at North Las Vegas. Total 24-hour $PM_{2.5}$ concentrations would be 48.2 $\mu g/m^3$ at the SEZ boundary, which is higher than the NAAQS level of 35 $\mu g/m^3$; modeled increments contribute about four times the amount of background concentration to this total. The total annual average $PM_{2.5}$ concentration would be 12.9 $\mu g/m^3$, which is lower than the NAAQS level of 15.0 $\mu g/m^3$. At Moapa, predicted maximum 24-hour and annual $PM_{2.5}$ concentration increments would be about 1.0 and 0.1 $\mu g/m^3$, respectively.

Predicted 24-hour and annual PM_{10} concentration increments at the surrogate receptors for the nearest Class I Area—Grand Canyon NP, Arizona—would be about 14.4 and 0.21 $\mu g/m^3$, or 180% and 5.2% of the PSD increments for the Class I area, respectively. These surrogate receptors are more than 23 mi (37 km) from the Grand Canyon NP, and thus, predicted concentrations in Grand Canyon NP would be lower than the above values (about 105% of the PSD increments for 24-hour PM_{10}, somewhat higher than the PSD increments), considering the same decay ratio with distance.

In conclusion, predicted 24-hour and annual PM_{10} and 24-hour $PM_{2.5}$ concentration levels could exceed the standard levels at the SEZ boundaries and in the 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 nearby communities would be much lower. Annual $PM_{2.5}$ concentration levels are predicted to be lower than its standard level. Modeling indicates that emissions from construction activities are anticipated to somewhat exceed Class I PSD PM_{10} increments at the nearest federal Class I area (Grand Canyon NP in Arizona). Construction activities are not subject to the PSD program, and the comparison provides only a screen for gauging the magnitude of the impact. Accordingly, it is anticipated that impacts of construction activities on ambient air quality would be moderate and temporary.

Emissions from the engine exhaust from heavy construction equipment and vehicles have the potential to cause impacts on AQRVs (e.g., visibility and acid deposition) at the nearby federal Class I area. However, SO_x emissions from engine exhaust would be very low, because programmatic design features would require ultra-low-sulfur fuel with a sulfur content of 15 ppm. 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.

For this analysis, the impacts of construction and operation of transmission lines outside of the SEZ were not assessed, assuming that the existing regional 500-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 could occur within the SEZ. Potential impacts on ambient air quality would be a minor component of construction impacts in comparison to solar facility construction, and would be temporary in nature.

11.3.13.2.2 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 was implemented (drift constitutes low-level PM emissions).

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

Estimates of potential air emissions displaced by solar project development at the Dry Lake SEZ are presented in Table 11.3.13.2-2. Total power generation capacity ranging from 1,391 to 2,504 MW is estimated for the Dry Lake SEZ for various solar technologies (see Section 11.3.2). 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 technologies is assumed (EPA 2009c). It is estimated that if the Dry Lake SEZ would eventually have development on 80% of its land, emissions avoided could range from 6.4 to 12% of total emissions of SO_2, NO_x, Hg, and CO_2 from electric power systems in the state of Nevada (EPA 2009c). Avoided emissions could be up to 2.5% of total emissions from electric power systems in the six-state study area. When compared to all source categories, power production from the same solar facilities could displace up to 9.4% of SO_2, 3.5% of NO_x, and 6.2% of CO_2 emissions in the state of Nevada (EPA 2009a; WRAP 2009). These emissions could

TABLE 11.3.13.2-2 Annual Emissions from Combustion-Related Power Generation Avoided by Full Solar Development of the Proposed Dry Lake 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
15,649	1,391–2,504	2,437–4,387	3,438–6,189	2,949–5,308	0.020–0.035	1,893–3,407
Percentage of total emissions from electric power systems in Nevada[d]			6.4–12%	6.4–12%	6.4–12%	6.4–12%
Percentage of total emissions from all source categories in Nevada[e]			5.2–9.4%	2.0–3.5%	–[f]	3.5–6.2%
Percentage of total emissions from electric power systems in the six-state study area[d]			1.4–2.5%	0.80–1.4%	0.67–1.2%	0.72–1.3%
Percentage of total emissions from all source categories in the six-state study area[e]			0.73–1.3%	0.11–0.20%	–	0.23–0.41%

[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 PV technologies) would be required.

[b] A capacity factor of 20% was assumed.

[c] Composite combustion-related emission factors for SO_2, NO_x, Hg, and CO_2 of 2.82, 2.42, 1.6×10^{-5}, and 1,553 lb/MWh, respectively, were used for the state of Nevada.

[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] A dash indicates not estimated.

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

be up to 1.3% of total emissions from all source categories in the six-state study area. Power generation from fossil fuel–fired power plants accounts for about 93% of the total electric power generated in Nevada (EPA 2009c). The contribution of natural gas combustion is about 47%, followed by that of coal combustion at about 45%. Thus, solar facilities built in the Dry Lake SEZ could displace relatively more fossil fuel emissions than those built in other states that rely less on fossil fuel–generated power.

As discussed in Section 5.11.1.5, the operation of associated transmission lines would generate some air pollutants from activities such as periodic site 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 high-voltage lines during rain or very humid conditions. Since the proposed Dry Lake SEZ is located in an arid desert environment, these emissions would be small, and potential impacts on ambient air quality associated with transmission lines would be negligible, considering the infrequent occurrences and small amount of emissions from corona discharges.

11.3.13.2.3 Decommissioning/Reclamation

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

11.3.13.3 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 Dry Lake 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.

11.3.14 Visual Resources

11.3.14.1 Affected Environment

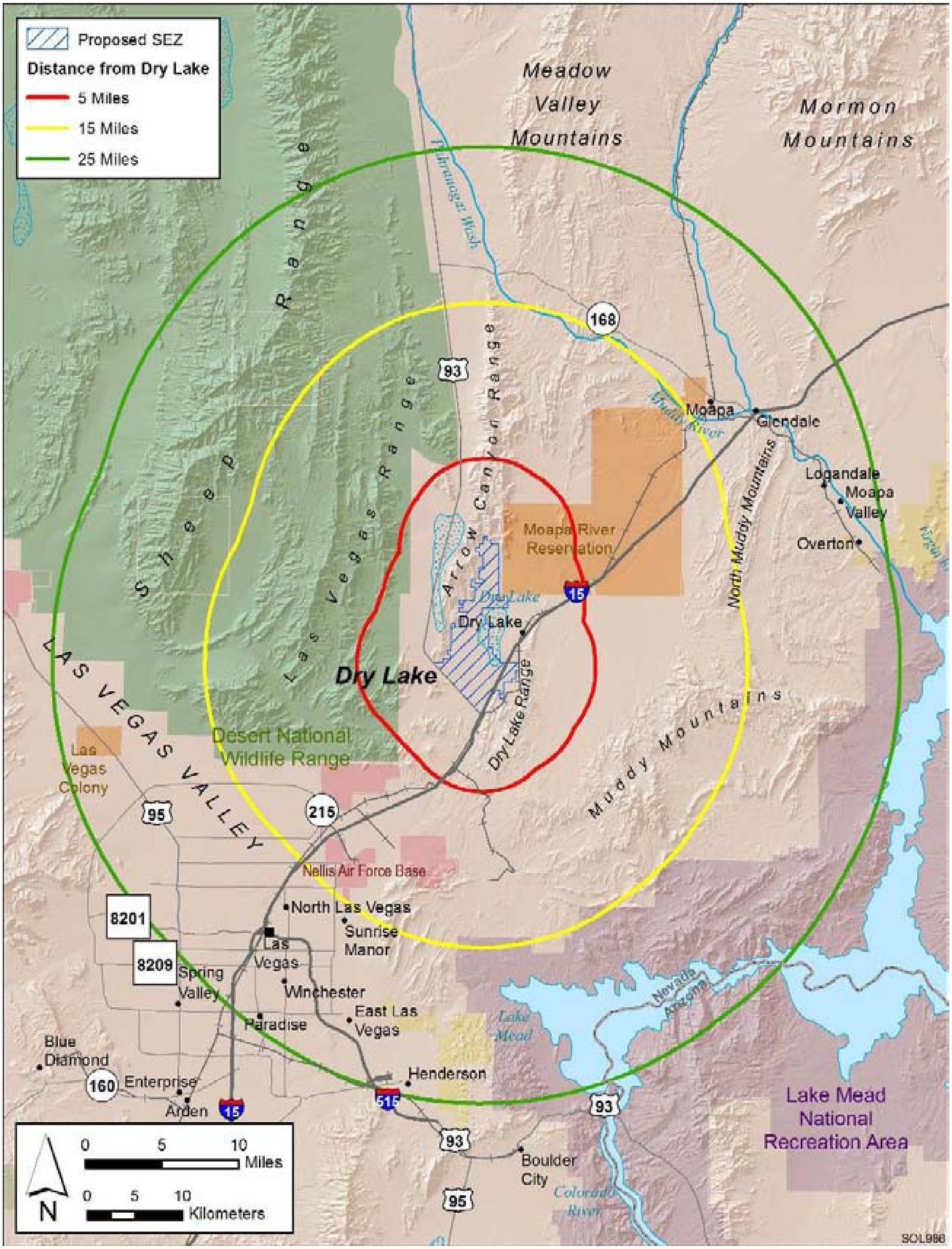
The proposed Dry Lake SEZ is located in Clark County in southern Nevada. The SEZ occupies 15,649 acres (63.329 km^2) within the Dry Lake Valley. It extends about 11 mi (18 km) north–south and is about 5.6 mi (9.0 km) wide. The SEZ ranges in elevation from 1,980 ft (603.5 m) in the central portion to 2,540 ft (775 m) in the southwestern portion.

The SEZ lies within the Mojave Basin and Range Level III ecoregion, which consists of broad basins and scattered mountains. Within the region, heavy use of off-road vehicles and motorcycles in some areas has caused soil erosion, and there is relatively little grazing activity because of the lack of water and forage for livestock. Most land is federally owned. Dry Lake SEZ encompasses portions of three Level IV ecoregions. The eastern boundary is within the mostly barren Mojave Playas Level IV ecoregion. Where moisture is sufficient, cold-intolerant trees and woody legumes occur on the Mojave Playas, particularly toward the south. Portions of the northwestern section of the proposed Dry Lake SEZ are in the Arid Footslopes Level IV ecoregion, which is composed of alluvial fans, basalt flows, hills, and low mountains that rise above the floors of the Mojave Desert. A significant portion of the SEZ is within the Creosote Bush-Dominated Basins Level IV ecoregion, which includes valleys that lie between scattered mountain ranges. These valleys contain stream terraces, floodplains, alluvial fans, isolated hills, mesas, buttes, and eroded washes (Bryce et al. 2003).

The SEZ occupies the relatively narrow, generally flat north-south oriented Dry Lake Valley floor. The valley is located east of the Arrow Canyon Range and west of the Dry Lake Range. These mountains vary in elevation from about 3,000 ft (900 m) to over 4,000 ft (1,200 m). The mountain slopes and peaks surrounding the SEZ generally appear to be visually pristine, although transmission corridors cross the mountains at some points. The SEZ and surrounding mountain ranges are shown in Figure 11.3.14.1-1.

The strong horizon line and lines and forms of the surrounding mountain ranges are the dominant visual features in the vicinity of the proposed SEZ. These nearby mountain ranges add significantly to the scenic value of the SEZ. The banded mesas of the Dry Lake Range dominate views east from the SEZ, adding strong horizontal line elements to the landscape, but contrasting strongly with the jagged, angular forms of the Arrow Canyon Range to the west. The surrounding mountains are generally brown in color, but with greens from scattered shrubs visible on some mountains, especially in the Arrow Canyon Range. In contrast, gray to tan gravels dominate the desert floor, which is sparsely dotted with the greens and tans of vegetation. Very light colored, unvegetated playas on the valley floor provide strong color and texture contrast in the central portion of the SEZ.

Vegetation is generally sparse in much of the SEZ, with widely spaced shrubs growing on more or less barren gravel flats. Vegetation within the SEZ is predominantly scrubland, with creosotebush and other low shrubs dominating the desert floor within the SEZ. During an August 2009 site visit, the vegetation presented a range of greens (mostly the olive green of



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2 **FIGURE 11.3.14.1-1 Proposed Dry Lake SEZ and Surrounding Lands**

creosotebushes) with some grays and tans (from lower shrubs), with medium to coarse textures. Visual interest is generally low. No permanent surface water is present within the SEZ.

Major cultural disturbances occur both within and near the SEZ; these disturbances include multiple transmission lines and related facilities, several power plants and other industrial facilities, mining operations, I-40, other roads, a railroad, and debris scattered throughout the SEZ. These cultural disturbances add major contrasts in form, line, color, and texture from many viewpoints within and near the SEZ and greatly reduce the relative visual values within and near the SEZ.

The general lack of topographic relief, water, and physical 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 open desert, the SEZ presents sweeping views of the surrounding mountains that add significantly to the scenic values within the SEZ viewshed. In general, however, the major cultural disturbances visible throughout Dry Valley have seriously degraded scenic values in the SEZ vicinity. Panoramic views of the SEZ are shown in Figures 11.3.14.1-2, 11.3.14.1-3, and 11.3.14.1-4.

The BLM conducted a VRI for the SEZ and surrounding lands in 2007 (BLM 2009g). 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 where 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 presented in Section 5.12 and in *Visual Resource Inventory*, BLM Manual Handbook 8410-1 (BLM 1986a).

The VRI values for the SEZ and immediate surroundings are VRI Class IV, indicating low visual values. The inventory indicates low scenic quality for the SEZ and its immediate surroundings. Positive scenic quality attributes included landform.

The *Las Vegas Resource Management Plan and Final Environmental Impact Statement* (BLM 1998) indicates that most of the SEZ is managed as VRM Class IV, except the southeast portion of the SEZ near I-15, which is managed as VRM Class III. VRM Class III objectives include partial retention of landscape character and permit moderate modification of the existing character of the landscape. VRM Class IV permits major modification of the existing character of the landscape. The VRM map for the SEZ and surrounding lands is shown in Figure 11.3.14.1.-5. More information about the BLM VRM program is presented in Section 5.12 and in *Visual Resource Management,* BLM Manual Handbook 8400 (BLM 1984).

FIGURE 11.3.14.1-2 Panoramic View of the Proposed Dry Lake SEZ from Western Edge of Dry Lake on Eastern Border of the SEZ, Facing Northwest toward Arrow Canyon Range

FIGURE 11.3.14.1-3 Approximately 180° Panoramic View of the Proposed Dry Lake SEZ from Southeastern Portion of SEZ Facing Northwest, Arrow Canyon Range at Left, Dry Lake Range at Right

FIGURE 11.3.14.1-4 Approximately 120° Panoramic View of the Proposed Dry Lake SEZ from Southwestern Portion of SEZ Facing Northeast, Arrow Canyon Range at Left, Dry Lake at Center, Dry Lake Range at Right

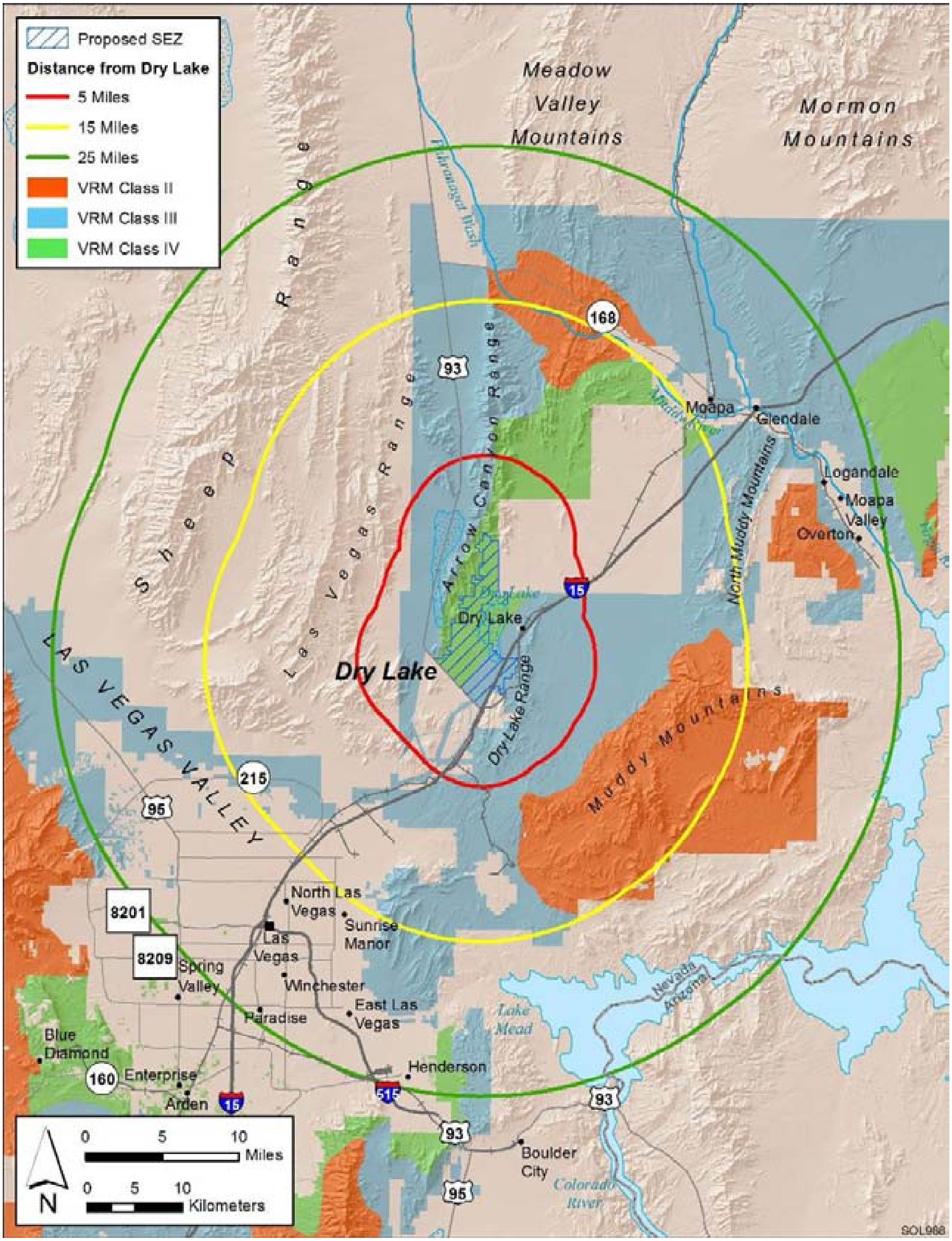

FIGURE 11.3.14.1-5 Visual Resource Management Classes for the Proposed Dry Lake SEZ and Surrounding Lands

11.3.14.2 Impacts

The potential for impacts from utility-scale solar energy development on visual resources within the proposed Dry Lake SEZ and surrounding lands, as well as the impacts of related developments (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 assess precisely 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 the 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.

11.3.14.2.1 Impacts on the Proposed Dry Lake 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 E. 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 components (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 views nearby. 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 11.3.22.4.13 of this 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 presented 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) 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 level. Given 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.

11.3.14.2.2 Impacts on Lands Surrounding the Proposed Dry Lake 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 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 would be no impact.

Preliminary viewshed analyses were conducted to identify which lands surrounding the proposed SEZ would have views of solar facilities in at least some portion of the SEZ (see Appendix M for information on the assumptions and limitations of the methods used). Four viewshed analyses were conducted, assuming four different heights representative of project components associated with potential solar energy technologies: PV and parabolic trough arrays (24.6 ft [7.5 m]), solar dishes and power blocks for 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 11.3.14.2-1 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, 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, dark purple, and at least the upper portions of power tower receivers 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 described 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 11.3.14.2-2 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 to illustrate which of these sensitive visual resource areas would have views of solar facilities within the SEZ and therefore potentially would be subject to visual impacts from those facilities. Distance zones that correspond with 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.

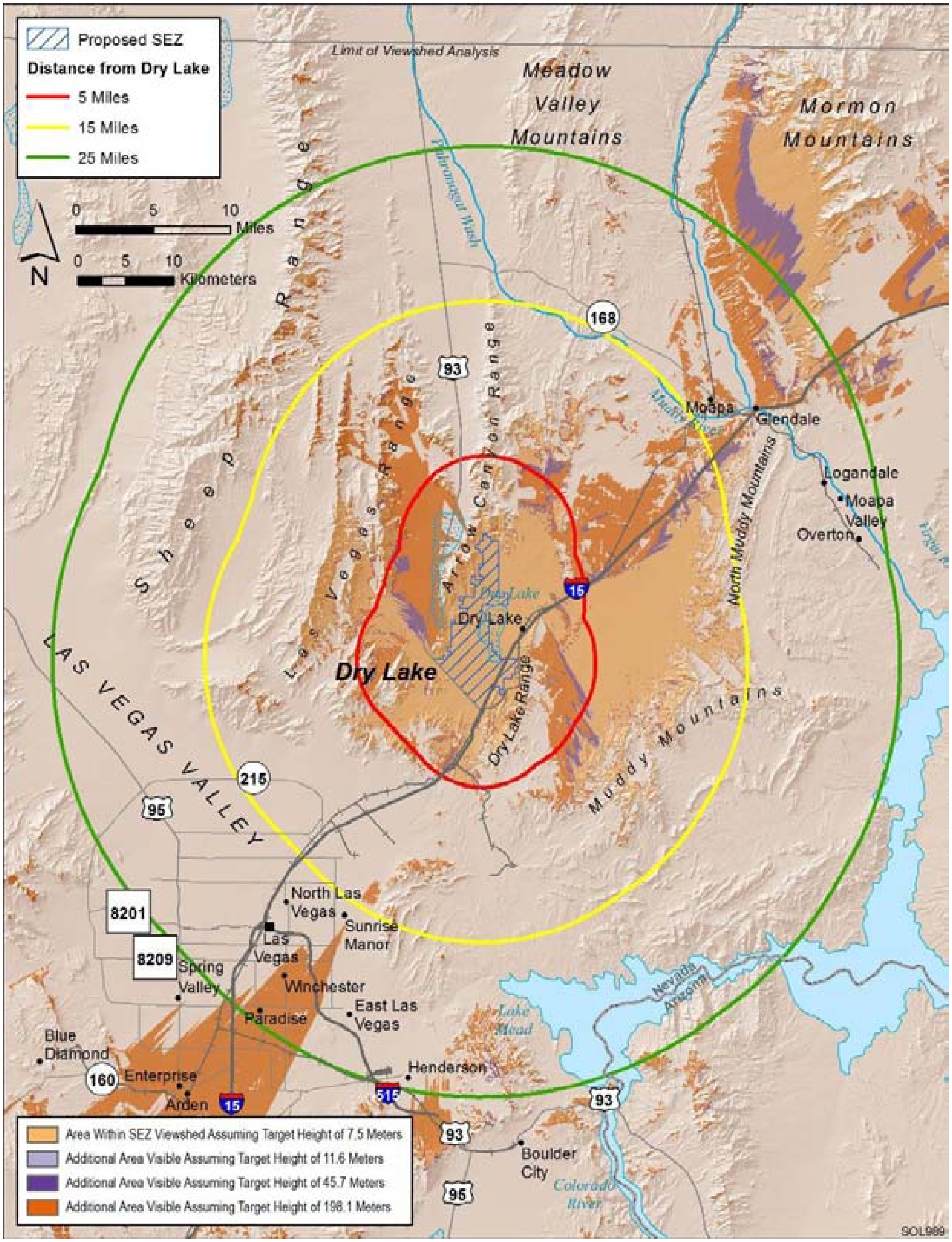

FIGURE 11.3.14.2-1 Viewshed Analyses for the Proposed Dry Lake SEZ and Surrounding Lands, Assuming Solar Technology Heights of 24.6 ft (7.5 m), 38 ft (11.6 m), 150 ft (45.7 m), and 650 ft (198.1 m) (shaded areas indicate lands from which solar development within the SEZ could be visible)

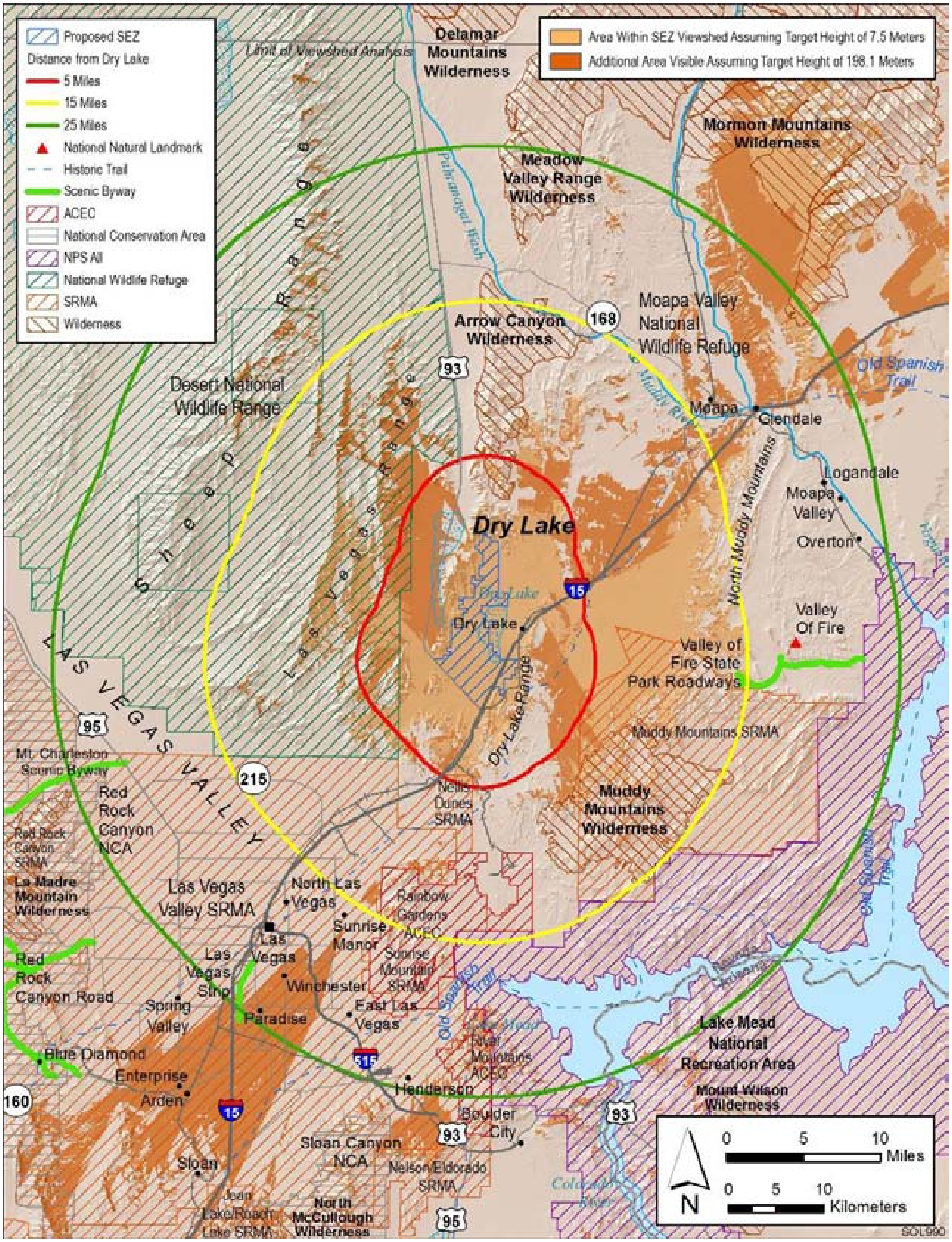

FIGURE 11.3.14.2-2 Overlay of Selected Sensitive Visual Resource Areas onto Combined 650-ft (198.1-m) and 24.6-ft (7.5-m) Viewsheds for the Proposed Dry Lake SEZ

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 Dry Lake SEZ are discussed below. The results of this analysis are also summarized in Table 11.3.14.2-1. Further discussion of impacts on these areas is presented in Sections 11.3.3 (Specially Designated Areas and Lands with Wilderness Characteristics) and Section 11.3.17 (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 landscape as seen by viewers, including changes in the forms, lines, colors, and textures of objects seen. 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 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 the PEIS analysis. These variables 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 discussion of visual contrasts and impacts, see Section 5.12 of the PEIS.

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 the PEIS, but it should be noted that 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.

National Recreation Area

- *Lake Mead National Recreation Area*. Lake Mead NRA contains 1,105,951 acres (4,475.625 km^2) and is located about 14 mi (23 km) south of the SEZ at the point of closest approach (see Figure 11.3.14.2-2). Lake Mead NRA offers year-round recreational opportunities for boaters, swimmers, and fishermen, as well as for hikers, wildlife photographers, and roadside sightseers.

  Within the 25-mi (40-km) SEZ viewshed in Lake Mead NRA, visibility of solar facilities within the SEZ would be limited to the southwestern portion of the NRA, in scattered areas of visibility at high elevations in the River Mountains and Black Mountains. The area within the NRA with views of the SEZ includes about 1,826 acres (7.390 km^2) in the 650-ft (198.1-m) viewshed, or 0.2% of the total NRA acreage, and 69 acres (0.28 km^2) in the 24.6-ft (7.5-m) viewshed, or 0.01% of the total NRA acreage. Within the NRA, the areas with potential visibility of solar facilities in the SEZ are located from 19 mi (31 km) south of the SEZ to beyond 25 mi (40 km) from the southeastern boundary of the SEZ.

  For the vast majority of these areas, visibility would be limited to the upper portions of tall power towers within the SEZ, and at the very long distance to the SEZ, minimal visual contrasts would be expected from solar facilities within the SEZ. For scattered areas in the peaks of the River Mountains totaling about 210 acres (0.850 km^2), the upper portions of transmission towers and lower-height power towers might be visible, but expected contrast levels would still be minimal.

TABLE 11.3.14.2-1 Selected Potentially Affected Sensitive Visual Resources within a 25-mi (40-km) Viewshed of the Proposed Dry Lake SEZ, Assuming a Target Height of 650 ft (198.1 m)

		Feature Area or Linear Distance		
			Visible between	
Feature Type	Feature Name (Total Acreage/Linear Distance)[a]	Visible within 5 mi	5 and 15 mi	15 and 25 mi
National Recreation Area	Lake Mead National Recreation Area (1,105,951 acres)	0 acres	0 acres	1,826 acres (0.2%)[b]
National Wildlife Range	Desert National (1,626,903 acres)	12,098 acres (0.7%)	33,632 acres (2%)	5,546 acres (0.3%)
National Historic Trail	Old Spanish	7.3 mi	10.3 mi	5.2 mi
Wilderness Areas	Arrow Canyon (27,521 acres)	764 acres (3%)	721 acres (3%)	0 acres
	Meadow Valley Range (123,481 acres)	0 acres	0 acres	133 acres (0.1%)
	Mormon Mountains (157,645 acres)	0 acres	0 acres	1,051 acres (0.7%)
	Muddy Mountains (44,522 acres)	0 acres	5,764 acres (13%)	34 acres (0.08%)
ACECs	Rainbow Gardens (38,777 acres)	0 acres	680 acres (2%)	164 acres (0.4%)
	River Mountains (10,950 acres)	0 acres	0 acres	1,962 acres (18%)
Scenic Byways	Bitter Springs Backcountry (28 mi)	0 acres	6.3 mi	0 acres
	Las Vegas Strip (4.5 mi)	0 acres	0 acres	0.7 mi
SRMAs	Las Vegas Valley (447,244 acres)	0 acres	1,489 acres (0.3%)	16,677 acres (4%)
	Muddy Mountains (128,493 acres)	391 acres (0.3%)	25,192 acres (20%)	158 acres (0.1%)
	Nellis Dunes (8,921 acres)	389 acres (4%)	59 acres (0.7%)	0 acres

TABLE 11.3.14.2-1 (Cont.)

		Feature Area or Linear Distance		
			Visible between	
Feature Type	Feature Name (Total Acreage/Linear Distance)[a]	Visible within 5 mi	5 and 15 mi	15 and 25 mi
SRMAs *(Cont.)*	Sunrise Mountain (33,322 acres)	0 acres	726 acres (2%)	165 acres (0.5%)

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

[b] Value in parentheses is percentage of total feature acreage or road length viewable.

If visible, operating power towers in the SEZ would be seen as distant points of light on the northern horizon. At night, sufficiently tall power towers in the SEZ would have red or white flashing hazard navigation lighting that could potentially be visible from the NRA. Under the 80% development scenario analyzed in the PEIS, visual contrast levels from solar energy development within the SEZ would be expected to be minimal for viewpoints within the Lake Mead NRA.

National Wildlife Range

- *Desert*. The 1,626,903-acre (6,583.843-km^2) Desert National Wildlife Range is located 2.3 mi (3.7 km) west of the SEZ at the point of closest approach, west of the Arrow Canyon Range (see Figure 11.3.14.2-2). The NWR extends beyond the 25-mi (40-km) viewshed of the SEZ. The Wildlife Range contains six major mountain ranges, the highest rising from 2,500-ft (762-m) valleys to nearly 10,000 ft (3,048 m). Camping, hiking, backpacking, horseback riding, hunting, and bird watching are all popular activities enjoyed by refuge visitors.

  About 51,276 acres (207.51 km2), or 3 % of the NWR, are within the 650-ft (198.1-m) viewshed of the SEZ, and 23,233 acres (94.021 km2), 1% of the NWR, are within the 24.6-ft (7.5-m) viewshed. The areas within the NWR with potential visibility of solar facilities in the SEZ include the eastern slopes of mountains and ridges of the Las Vegas Range, primarily within 10 mi (16 km) of the SEZ, but extending for some areas to beyond 15 mi (24 km) into the NWR, along the peaks of the Sheep Range.

  For many low-elevation viewpoints in the eastern part of the NWR, the Arrow Canyon Range would completely screen views of solar facilities within the SEZ. For some elevated viewpoints in the eastern portion of the NWR, however, the Arrow Canyon Range would provide only partial screening of the SEZ.

The highest elevations within the NWR within the 25-mi (40-km) SEZ viewshed are the peaks and east-facing slopes of the highest mountains in the Sheep Range. At elevations exceeding 7,000 ft (2,100 m), viewpoints are high enough that the tops of collector/reflector arrays for facilities within the SEZ could be visible, resulting in strong visual contrast levels.

Figure 11.3.14.2-3 is a Google Earth visualization of the SEZ as seen from the peak of Quartzite Mountain in the NWR, about 9.2 mi (14.8 km) west of 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 (140-m) power tower with an 867-acre (3.5-km^2) field of 12-ft (3.7-m) heliostats, and the tower/heliostat system represents about 100 MW of electric generating capacity. Six power tower 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 viewpoint in the visualization is about 4,900 ft (1,500 m) higher in elevation than the SEZ; this is one of the highest elevations within the SEZ 25-mi (40-km) viewshed. Although the Arrow Canyon Range would still screen solar facilities in substantial portions of the SEZ from view, particularly in the northern portions of the SEZ, much of the SEZ would be visible over the southern end of the Arrow Canyon Range. The view direction is roughly perpendicular to the long north-south axis of the SEZ, and despite the partial screening, the SEZ would stretch across nearly the entire horizontal field of view. From this elevated viewpoint, the tops of collector/reflector arrays for solar facilities within the SEZ would be visible, which would make their large areal extent and strong regular geometry more apparent, tending to increase visual contrast with the more natural-appearing surroundings. Ancillary facilities, such as buildings, cooling towers, and transmission towers, as well as any plumes, would likely be visible, and their forms, vertical lines, and movement (for plumes) projecting above the strongly horizontal shapes of the collector/receiver arrays would create additional visual contrasts.

Operating power tower receivers in the nearer portions of SEZ would likely appear as bright non-point light sources against the backdrop of the Dry Valley floor. At night, sufficiently tall the power towers could have red or white flashing hazard navigation lighting that would likely be visible from this location. The lighting could attract visual attention, although other lights

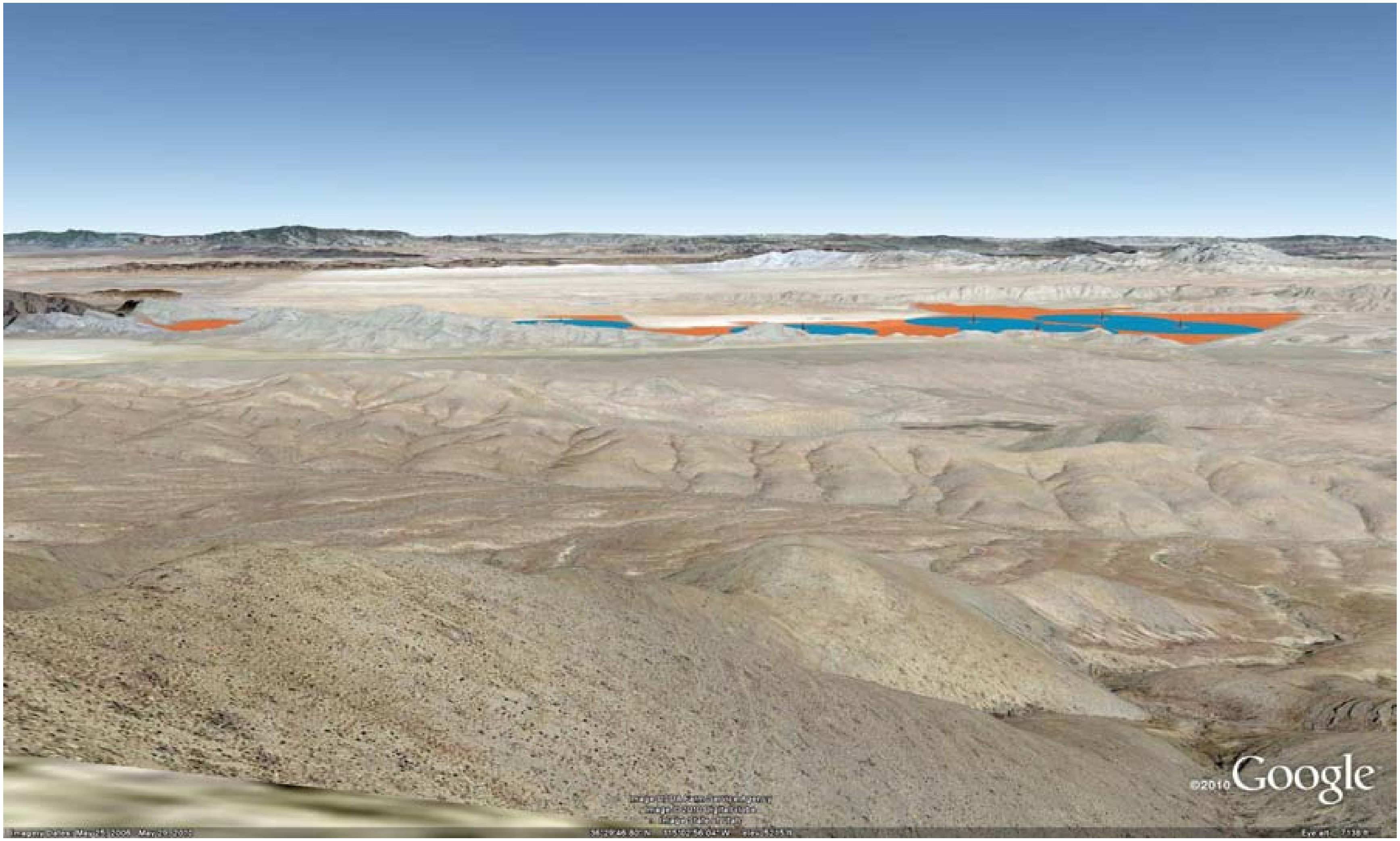

FIGURE 11.3.14.2-3 Google Earth Visualization of the Proposed Dry Lake SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Model, as Seen from Quartzite Mountain in the Desert National Wildlife Range

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

Visual contrasts associated with solar facilities within the SEZ would depend on the numbers, types, sizes and locations of solar facilities in the SEZ, and other visibility factors. Under the 80% development scenario analyzed in the PEIS, strong visual contrasts could be expected at this viewpoint.

Much lower levels of contrast would be expected at lower elevation viewpoints within the WA in the SEZ viewshed, because of more extensive screening of the SEZ by intervening mountains south of the WA.
Figure 11.3.14.2-4 is a Google Earth visualization of the SEZ as seen from the peak of an unnamed low mountain in the Las Vegas Range, about 4.3 mi (6.9 km) west of the westernmost point in the SEZ, although the westernmost portions of the SEZ are screened from view. At 4.3 mi (6.9 km), the viewpoint is with the BLM VRM Programs' foreground/middleground distance of 3 to 5 mi (5 to 8 km).

The viewpoint in the visualization is about 2,300 ft (700 m) higher in elevation than the SEZ. From this much closer but lower viewpoint, the mountains of the Arrow Canyon Range would screen most of the SEZ from view. The view direction is roughly perpendicular to the long north-south axis of the SEZ, and despite the partial screening, the SEZ would stretch across much of the horizontal field of view. The viewpoint is sufficiently elevated that the tops of collector/reflector arrays for solar facilities within the SEZ would be visible, which would make their large areal extent and strong regular geometry more apparent, tending to increase visual contrast with the more natural-appearing surroundings.

Ancillary facilities, such as buildings, cooling towers, and transmission towers, as well as any plumes, would likely be visible, and their forms, vertical lines, and movement (for plumes) projecting above the strongly horizontal shapes of the collector/receiver arrays would create additional visual contrasts. Color and texture contrasts would also be likely, but their extent would depend on the materials and surface treatments utilized in the facilities.

Where visible, operating power tower receivers in the nearer portions of the SEZ would likely appear as very bright non-point light sources atop discernable tower structures against the backdrop of the Dry Valley floor. At night, sufficiently tall power towers could have red or white flashing hazard navigation lighting that would likely be visible from this location. The lighting could attract visual attention, although other lights would be visible in the vicinity of the SEZ. Other lighting associated with solar facilities in the SEZ could be visible as well.

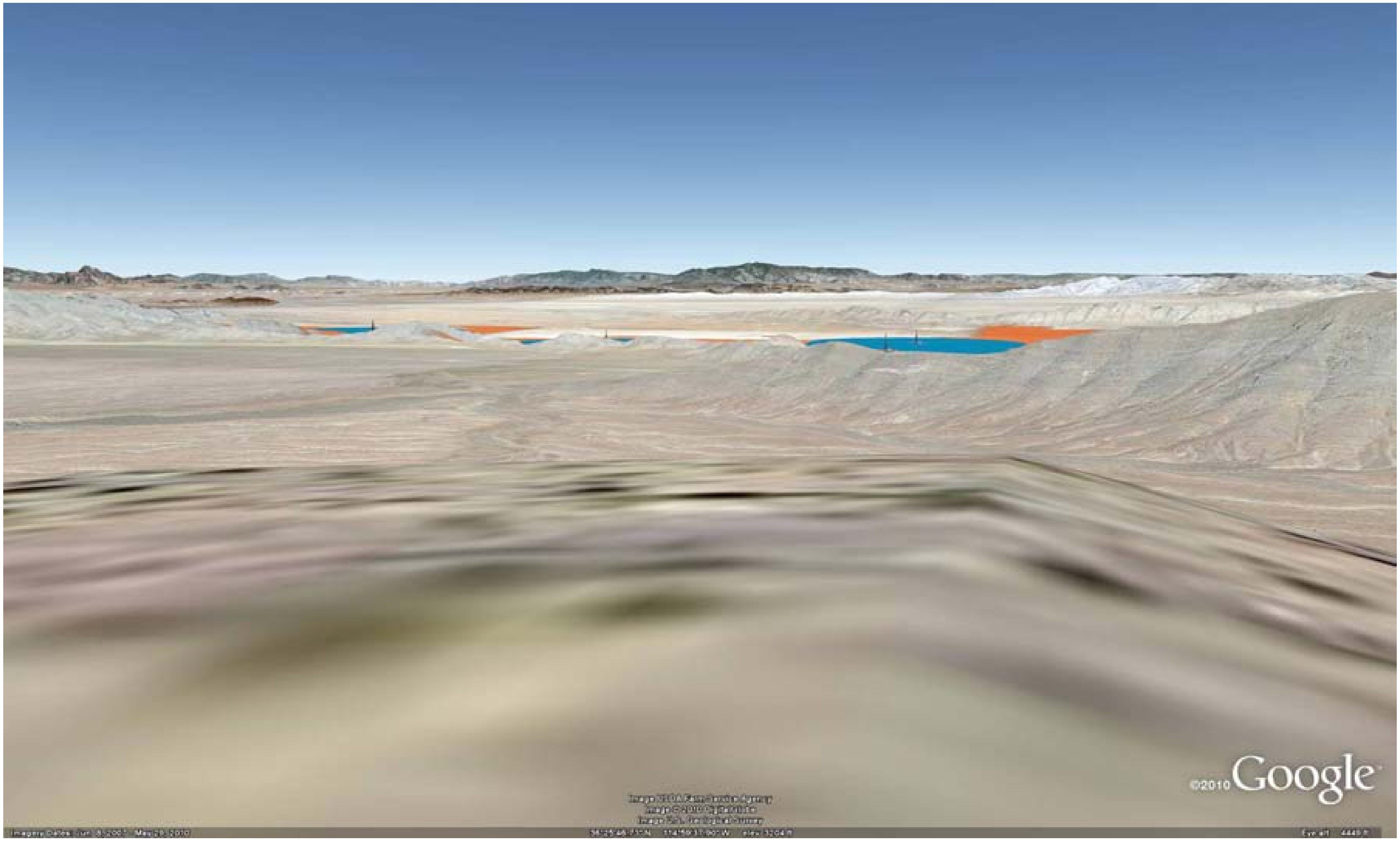

FIGURE 11.3.14.2-4 Google Earth Visualization of the Proposed Dry Lake SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Model, as Seen from a Peak in the Las Vegas Range in the Desert National Wildlife Range

Depending on project location within the SEZ, the types of solar facilities and their designs, and other visibility factors, under the 80% development scenario analyzed in the PEIS, moderate to strong visual contrasts could be expected at this viewpoint.

In general, visual contrasts associated with solar facilities within the SEZ would depend on viewer location within the NWR, the numbers, types, sizes and locations of solar facilities in the SEZ, and other project- and site-specific factors. Under the 80% development scenario analyzed in the PEIS, strong levels of visual contrast would be expected for some high-elevation viewpoints in the NWR, with weak or moderate levels of visual contrast expected for most lower-elevation viewpoints in the NWR located within the SEZ 25-mi (40-km) viewshed.

National Historic Trail

- *Old Spanish Trail.* The Old Spanish National Historic Trail is a congressionally designated multistate historic trail that passes within 1.3 mi (2.1 km) of the SEZ at the point of closest approach on the southeast side of the SEZ. About 30 mi (48 km) of the trail are within the viewshed of the SEZ. About 8.8 mi (14.2 km) of the trail located within the viewshed are within a *high-potential segment.*[9] Portions of the trail within the SEZ viewshed range from as close as 1.4 mi (2.3 km) (including the high-potential segment) from the SEZ to beyond 25 mi (40 km) from the SEZ.

  Within 20 mi (32 km) of the SEZ, the trail is oriented generally southwest–northeast, parallel to the Union Pacific Railroad, and through the Moapa River Indian Reservation. The SEZ is within view of the trail for much of the area. Within the viewshed, the trail runs through shrubland and steppes.

  About 30 mi (48 km) of the Old Spanish National Historic Trail are within the SEZ viewshed to the east and northeast of the SEZ (Figure 11.3.14.2-2). For all but about 5 mi (8 km) of the trail, visibility of solar facilities within the SEZ would be limited to the upper portions of power towers, and expected visual contrast levels in these portions of the trail would likely be minimal or weak. Expected visual contrasts would include visibility of the receivers of operating power towers during the day, and, if power towers exceeded 200 ft (61 m) in height, visibility of hazard warning lights on the power towers at night. Hazard warning lighting could be flashing red lights or red or white strobe lights, both which could be visible for long distances.

[9] High-potential segments or sites provide an opportunity to interpret the historic significance of the trail. Criteria for selection of a high-potential segment or site include "historic significance, presence of visible historic remnants, scenic quality, and relative freedom from intrusion."

There could be intermittent visibility of solar facilities within the SEZ in a number of places, but the trail segment with full visibility of solar facilities within the SEZ would be a 5-mi (8-km) stretch roughly paralleling the SEZ's eastern boundary, 3 to 5 mi (5 to 8 km) east of the SEZ. For much of this segment, views of the SEZ would be partially screened by the Dry Lake Range, but some portions of the SEZ would be visible through gaps in the range and beyond the range's northern extent. Although in most locations expected contrasts would not exceed weak levels, in a few locations, moderate or even strong visual contrasts could be observed.

From the southwest, the trail enters the 25-mi (40-km) SEZ viewshed in the Dry Lake Range about 2.6 mi (4.2 km) southeast of the SEZ's southeast corner, as the centerline of the trail ascends a high ridge in the Dry Lake Range. Contrasts would quickly reach strong levels as trail user traveled northward along the ridge top. The trail in this area is in a high-potential segment.

Figure 11.3.14.2-5 is a Google Earth visualization of the SEZ (highlighted in orange) as seen from the Old Spanish National Historic Trail near the point of maximum potential visibility of solar facilities within the SEZ on the ridge just described, about 2.5 mi (4.0 km) from the closest point in the SEZ. The viewpoint is within the BLM VRM Program's foreground-middleground distance of 3-5 mi (5-8 km). The viewpoint is about 1,000 ft (300 m) higher in elevation than the SEZ.

The visualization suggests that from this elevated point on the trail, much of the SEZ would be visible over the tops of intervening ridges in the Dry Lake Range, although some of the easternmost portion of the SEZ would be screened. The view would be oblique to the long north-south axis of the SEZ, so that nearly the full north-south extent of the SEZ would be visible, and the SEZ would occupy nearly all of the horizontal field of view.

Because of the elevation difference between the viewpoint and the SEZ and the relatively short distance to the SEZ, the vertical angle of view would be high enough that the tops of collector/reflector arrays in the SEZ would be visible, which would make the large areal extent of the facilities and their strong regular geometry more apparent, tending to increase their visual contrast with the strongly horizontal and more natural appearing landscape setting. However, facilities at the northern end of the SEZ would have a more flattened appearance and reduced apparent size, which would make them blend into the landscape setting more readily.

Taller ancillary facilities, such as buildings, transmission structures, cooling towers, and plumes (if present) would likely be visible projecting above the collector/reflector arrays. The structural details of at least nearby facilities could be evident. The ancillary facilities could create form and line contrasts

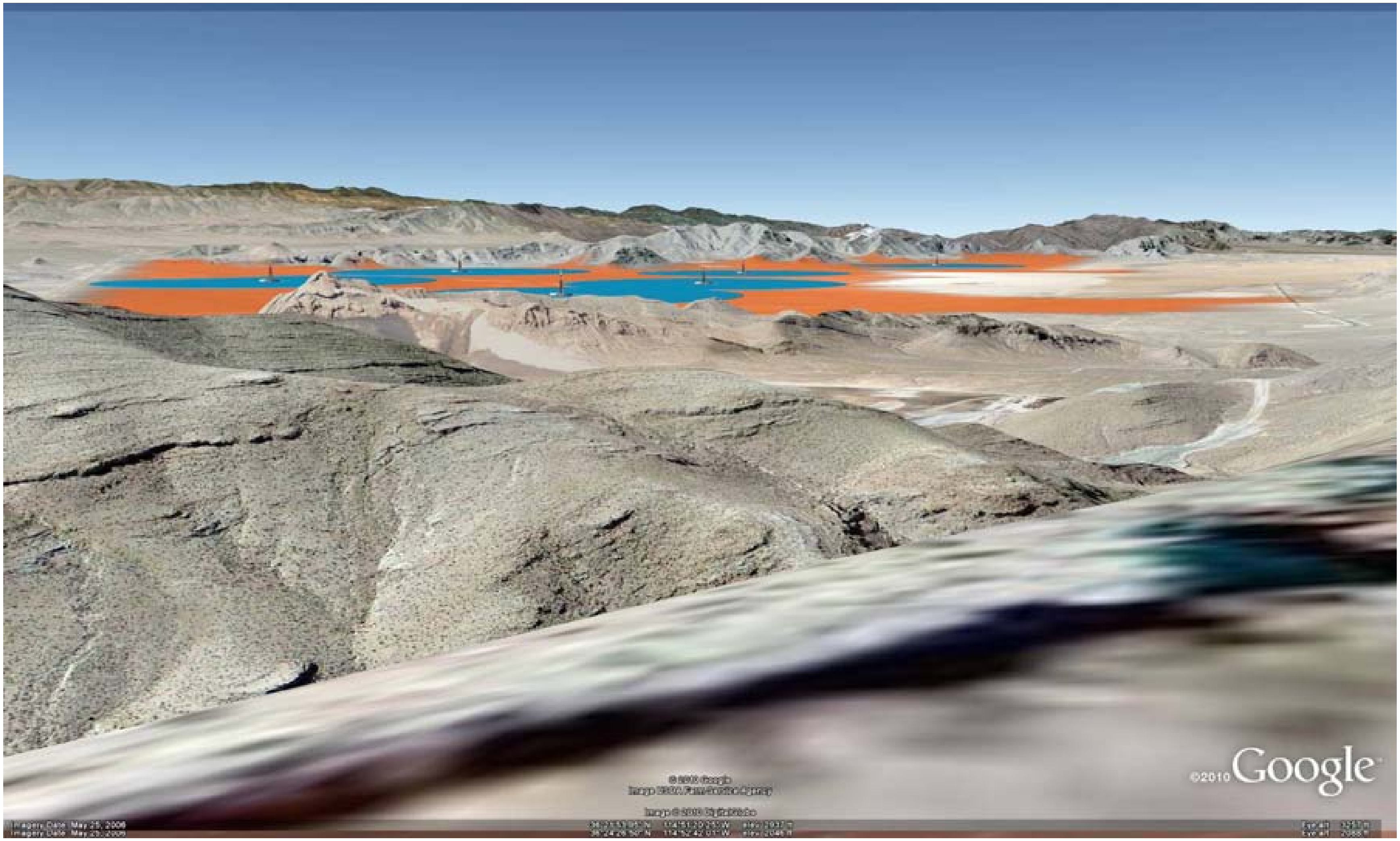

FIGURE 11.3.14.2-5 Google Earth Visualization of the Proposed Dry Lake SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Model, as Seen from the Old Spanish National Historic Trail 2.5 mi (4.0 km) from the SEZ

with the strongly horizontal, regular, and repeating forms and lines of the collector/reflector arrays. Color and texture contrasts would also be likely, but their extent would depend on the materials and surface treatments utilized in the facilities.

The receivers of operating power towers in the closest parts of the SEZ would likely appear as brilliant white non-point light sources atop tower structures with clearly discernable structural details, while those farther from the viewpoint would have diminished brightness and less detail visible. Also, under certain viewing conditions, sunlight on dust particles in the air might result in the appearance of light streaming down from the tower(s). At night, sufficiently tall power towers could have flashing red or white hazard lighting that could be visible for long distances, and would likely be visually conspicuous from this viewpoint, although other lighting would be visible in the SEZ area. Other light sources associated with the solar facilities within the SEZ could be visible as well.

As noted above, numerous large-scale cultural disturbances already are visible in and near the SEZ, and the addition of solar facilities into the already visually complex and partially man-made appearing landscape would result in lower contrast levels than if the solar facilities were being placed in a visually pristine landscape. Under the 80% development scenario analyzed in the PEIS, the SEZ could contain numerous solar facilities utilizing differing solar technologies as well as a variety of roads and ancillary facilities. The addition of multiple solar facilities could add substantially to the existing visually complex landscape, to the extent that it would exceed the visual absorption capability of the valley in which the SEZ is located, leading to a perception of visual clutter that could be perceived negatively by viewers.

Because the SEZ would occupy most of the horizontal field of view, and because of the potentially very close proximity of solar facilities to this location, strong visual contrasts from solar energy development within the SEZ would be expected at this viewpoint. However, the actual contrast levels experienced would depend on project location within the SEZ, the types of solar facilities and their designs, and other visibility factors.

About 0.4 mi (0.6 km) of the trail along the high ridge top would potentially be subject to strong contrasts from solar facilities within the SEZ. At the end of this segment, the trail passes to the east sides of the next several succeeding ridges and hills so that the SEZ is screened entirely from view of the trail centerline for the next 1.2 mi (1.9 km). At about 1.2 mi (1.9 km), there would be a short segment of the trail near a hill summit that could have views of a small portion of the SEZ, with contrasts levels not expected to exceed weak levels. Another hill with limited visibility of the SEZ would be reached at about 1.5 mi (2.4 km) beyond the end of the first high ridge, but the view from this hill would be through a gap in the Dry Lake Range through which a large transmission line with lattice towers would extend west down to the SEZ. After crossing the transmission ROW, the trail ascends to another high ridge with visibility of the SEZ. Figure 11.3.14.2-6 is a Google Earth visualization of the SEZ (highlighted in orange) as seen from the Old Spanish National Historic Trail from this second ridge, about 1.7 mi (2.7 km) from the closest point in the SEZ. The viewpoint is within the BLM VRM Program foreground-middleground distance of 3 to 5 mi (5 to 8 km). The viewpoint is about 850 ft (260 m) higher in elevation than the SEZ.

The visualization suggests that from this elevated point on the trail, much of the SEZ would be screened by intervening ridges in the Dry Lake Range, although a small area in the southernmost portion of the SEZ would be visible. Because of the extensive screening, the SEZ would occupy a moderate portion of the horizontal field of view. The aspect and appearance of solar facilities would be very similar to that described for the view shown in Figure 11.3.14.2-5, but the expected contrast levels would be moderate, because of the limited view of the SEZ.

After passing this second high ridge, the trail turns lightly eastward and eventually descends from the Dry Lake Range, with views of the SEZ largely screened by the Dry Lake Range during the descent, except for very limited potential views restricted to taller solar facility components through a gap in the Dry Lake Range. Expected contrast levels associated with views of solar facilities within the SEZ would be minimal.

About 3.8 mi (6.1 km) past the first high ridge, the trail turns almost directly east for a short distance before turning back northeast, but from this point forward (for northbound travelers) views of the SEZ would be very limited because of screening by the Dry Lake Range and/or very low angle views where the Dry Lake Range did not completely screen the SEZ from view. Furthermore, the direction of travel would be away from the SEZ, so that views of the SEZ would be behind northbound travelers. Therefore, views would be less frequent and likely of shorter duration. Finally, the distance from the SEZ would gradually increase as travelers moved north on the trail, and any visual contrasts would slowly decrease. For most locations north of the westward turn in the trail, if solar facilities within the SEZ were visible at all, expected contrast levels would be minimal, and nowhere would they be expected to exceed weak levels.

Southbound travelers on the Old Spanish Trail would experience the same visual contrasts as northbound travelers, but in reverse order. The overall experience would be somewhat different because southbound travelers would approach the SEZ more gradually than northbound travelers, with intermittent visibility for a much longer duration.

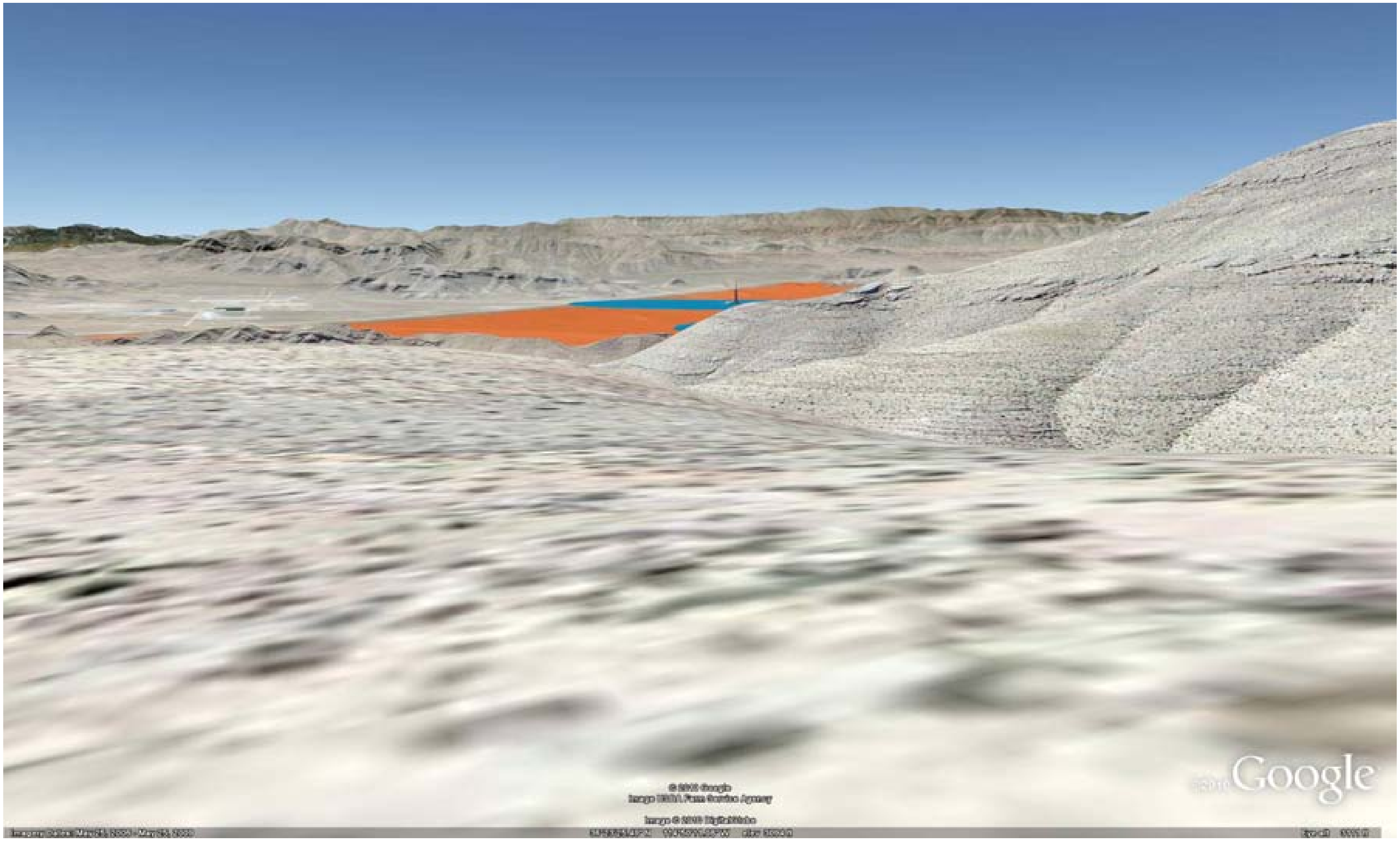

FIGURE 11.3.14.2-6 Google Earth Visualization of the Proposed Dry Lake SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Model, as Seen from the Old Spanish National Historic Trail 1.7 mi (2.7 km) from the SEZ

Although there could be very limited and brief views of solar facilities in the SEZ as far out as 25 mi (40 km) northeast of the SEZ or even farther, southbound trail users would likely only notice those views at around 22 mi (35 km) as the trail crossed a ridge where it crosses I-15 northeast of the State Route 169 interchange. At this viewpoint, the upper portions of power towers could be visible, and the receivers of operating power towers could appear as distant star-like points of light on the southwest horizon. They could also be visible at night if tall enough to require hazard warning lighting. Expected contrast levels would be minimal, and visibility would be intermittent.

Intermittent visibility of solar facilities would continue, with expected contrast levels generally minimal, but not exceeding weak levels until southbound travelers reached the high ridges discussed above, with the views shown in Figures 11.3.14.2-6 and 11.3.14.2-5. After reaching the viewpoint shown in Figure 11.3.14.2-5, the trail would descend from the Dry Lake Range and pass the southern end of the SEZ and pass out of the SEZ 25-mi (40-km) viewshed.

Wilderness Areas

- *Arrow Canyon.* Arrow Canyon is a 27,521-acre (111.37-km^2) congressionally designated WA 2.5 mi (4.0 km) north of the SEZ (Figure 11.3.14.2-2). The WA is known for its exceptional scenic values.

  Within 25 mi (40 km) of the SEZ, solar energy facilities within the SEZ could be visible from the southern portions of the WA (about 1,485 acres [6.010 km^2] in the 650-ft [198.1-m] viewshed, or 5% of the total WA acreage, and 1,129 acres [4.569 km^2] in the 25-ft [7.5-m] viewshed, or 4% of the total WA acreage). Within the WA, the areas with potential views of solar facilities in the SEZ extend to 9.1 mi (14.7 km) from the northern boundary of the SEZ.

  Mountains of the Arrow Canyon Range just south of the WA screen views of the SEZ from all but the highest elevations of the southern peaks in the WA. From a few of these peaks, nearly open views of the SEZ exist, looking down the long north-south axis of the SEZ, with moderate to strong contrast levels expected for these viewpoints.

  Figure 11.3.14.2-7 is a Google Earth visualization of the SEZ as seen from a high, unnamed peak in the far southern portion of the WA, about 2.9 mi (4.7 km) north of the SEZ, and within the BLM VRM program foreground-middleground distance of 3 to 5 mi (5 to 8 km), although the nearest parts of the SEZ are screened from view in the visualization. In the visualization, the SEZ area is depicted in orange, the heliostat fields in blue.

  The viewpoint in the visualization is about 1,900 ft (580 m) higher in elevation than the SEZ. Solar facilities within the SEZ would be partially

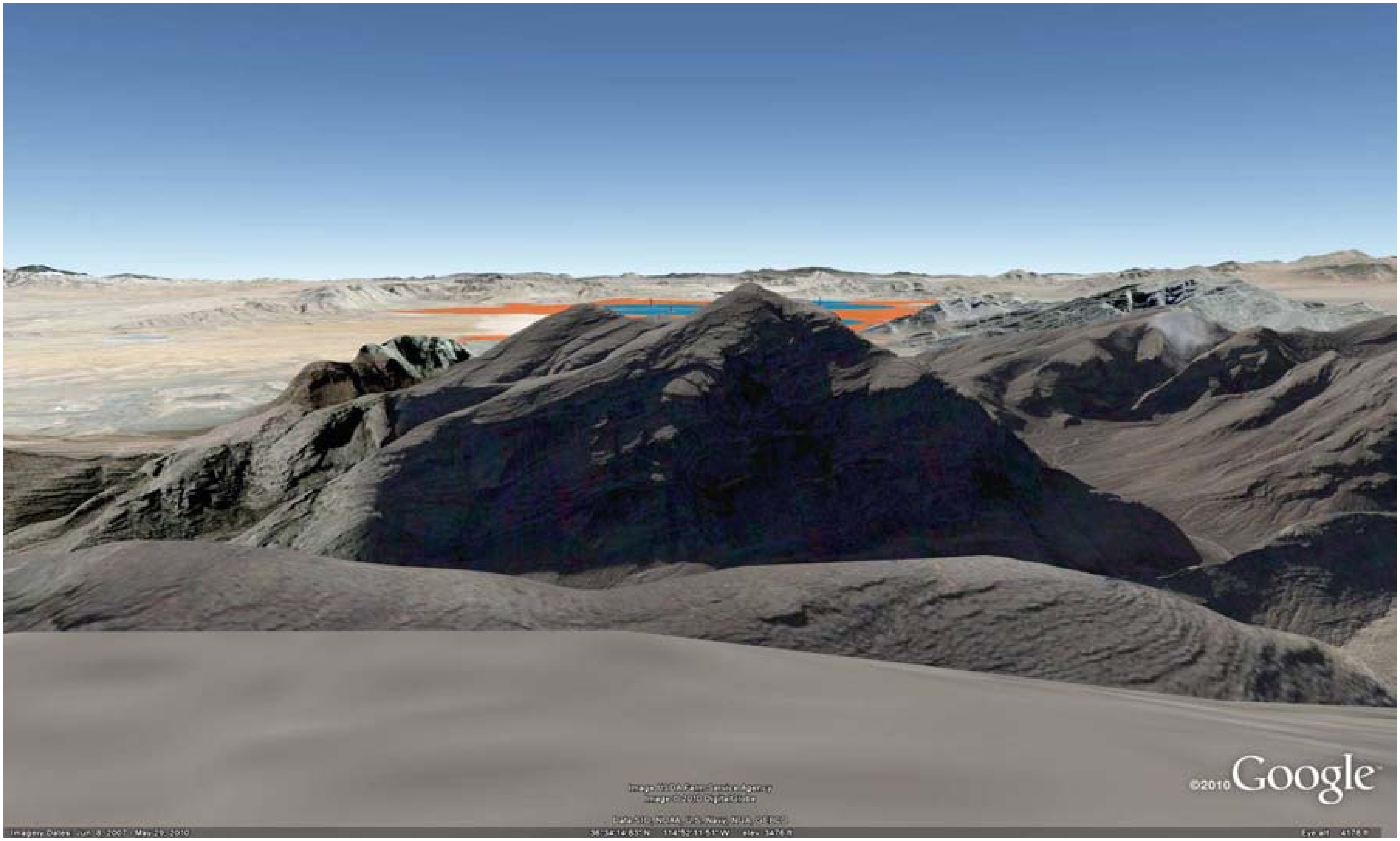

FIGURE 11.3.14.2-7 Google Earth Visualization of the Proposed Dry Lake SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Model, as Seen from a Peak in the Far Southern Portion of Arrow Canyon WA

screened by mountains south of the WA in the Arrow Canyon Range. The view direction is along the long north-south axis of the SEZ, but the viewpoint is close enough to the SEZ that it would occupy a moderate amount of the horizontal field of view. The viewpoint is sufficiently elevated that the tops of collector/reflector arrays for solar facilities within the SEZ would be visible, which would make their large areal extent and strong regular geometry more apparent, tending to increase visual contrast with the more natural-appearing surroundings.

Ancillary facilities, such as buildings, cooling towers, and transmission towers, as well as any plumes, would likely be visible, and their forms, vertical lines, and movement (for plumes) projecting above the strong horizontal line of the collector/receiver arrays would add visual contrast.

Operating power tower receivers in the nearer portions of SEZ would likely appear as bright non-point light sources against the backdrop of the Dry Valley floor. At night, sufficiently tall power towers could have red or white flashing hazard navigation lighting that would likely be visible from this location. The lighting could attract visual attention, although other lights would be visible in the vicinity of the SEZ, and beyond, in the direction of Las Vegas. Other lighting associated with solar facilities in the SEZ could be visible as well.

Depending on project location within the SEZ, the types of solar facilities and their designs, and other visibility factors, under the 80% development scenario analyzed in the PEIS, moderate contrasts could be expected at this viewpoint.

Figure 11.3.14.2-8 is a Google Earth visualization of the SEZ as seen from a higher, unnamed peak farther north in the WA than the viewpoint just described. This viewpoint is about 4.4 mi (7.0 km) north of the SEZ and is still within the BLM VRM program foreground-middleground distance of 3 to 5 mi (5 to 8 km). In the visualization, the SEZ area is depicted in orange, the heliostat fields in blue.

The viewpoint in the visualization is about 2,500 ft (580 m) higher in elevation than the SEZ. Because this viewpoint is higher than the mountains to the south, much more of the SEZ is in view than from the previous viewpoint. The view direction is along the long north-south axis of the SEZ, but the viewpoint is close enough to the SEZ that it would occupy a moderate amount of the horizontal field of view. From this higher-elevation viewpoint, more of the tops of collector/reflector arrays for solar facilities within the SEZ would be visible, which would make their large areal extent and strong regular geometry more apparent, tending to increase visual contrast with the more natural-appearing surroundings.

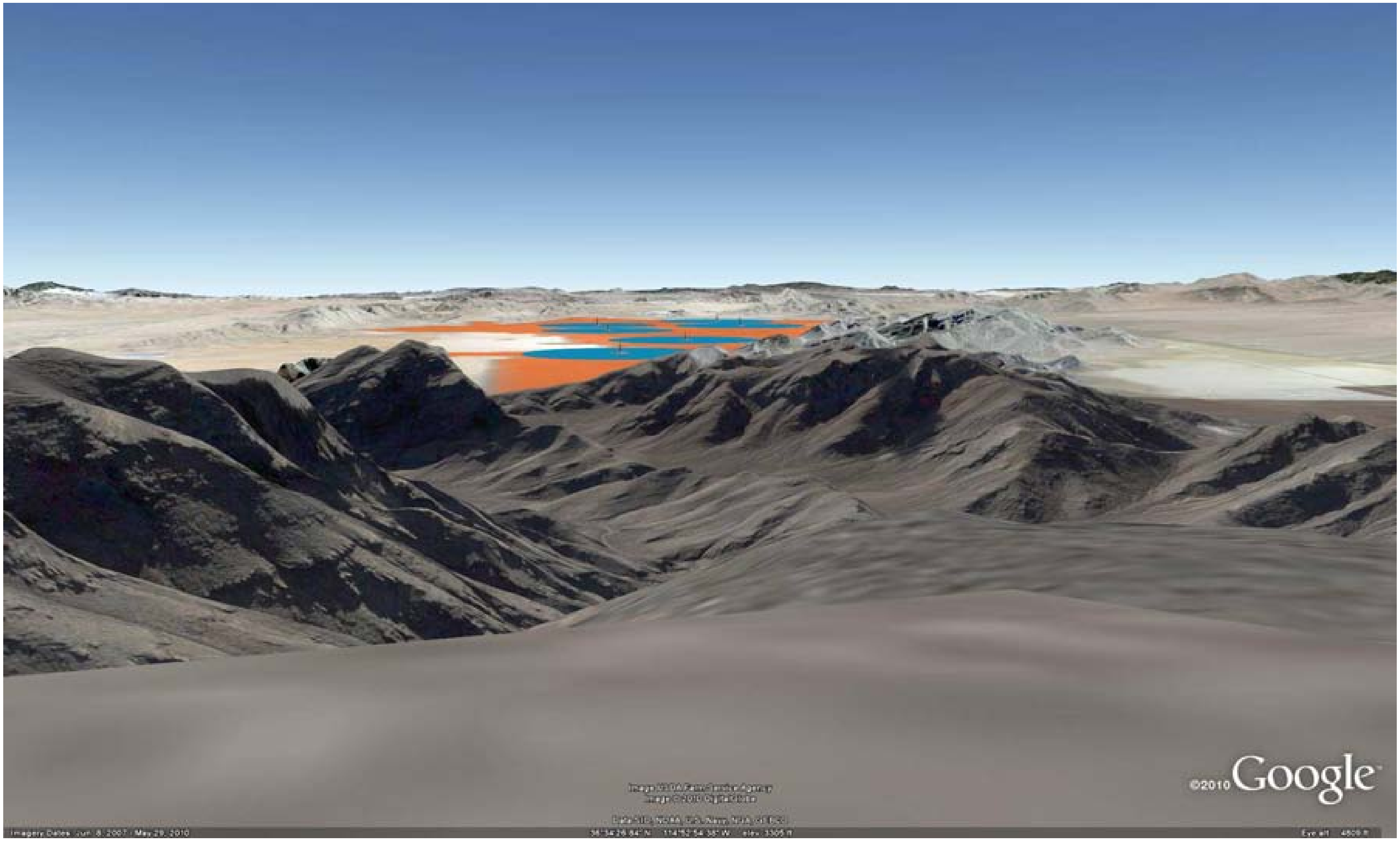

FIGURE 11.3.14.2-8 Google Earth Visualization of the Proposed Dry Lake SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Model, as Seen from a Peak in the Southern Portion of Arrow Canyon WA

Ancillary facilities, such as buildings, cooling towers, and transmission towers, as well as any plumes, would likely be visible, and their forms, vertical lines, and movement (for plumes) projecting above the strong horizontal line of the collector/receiver arrays would add visual contrast.

Operating power tower receivers in the nearer portions of SEZ would likely appear as bright non-point light sources against the backdrop of the Dry Valley floor, but power towers at the far southern end of the SEZ would be far enough away that they would likely create substantially lower levels of visual contrast. At night, sufficiently tall power towers could have red or white flashing hazard navigation lighting that would likely be visible from this location. The lighting could attract visual attention, although other lights would be visible within and in the vicinity of the SEZ and beyond, in the direction of Las Vegas.

Depending on project location within the SEZ, the types of solar facilities and their designs, and other visibility factors, under the 80% development scenario analyzed in the PEIS, strong visual contrasts could be expected at this viewpoint.

Much lower levels of visual contrast would be expected at lower-elevation viewpoints within the WA in the SEZ viewshed, because of more extensive screening of the SEZ by intervening mountains south of the WA. The steepness of the mountains in the WA results in a rapid drop-off in elevation away from the peaks, so that viewpoints away from the mountain tops are nearly completely screened, resulting in much lower contrasts from solar facilities in the SEZ.

In general, under the 80% development scenario analyzed in the PEIS, moderate or even strong levels of visual contrast would be expected for high-elevation viewpoints in the WA, with weak levels of visual contrast expected for most lower-elevation viewpoints in the WA located within the SEZ 25-mi (40-km) viewshed.

- *Meadow Valley Range.* Meadow Valley Range is a 123,481-acre (499.710-km^2) congressionally designated WA located 19 mi (31 km) away at the point of closest approach north of the SEZ (Figure 11.3.14.2-2). The long ridgeline of the Meadow Valley Range includes many peaks, narrow canyons, and passes.

  Within 25 mi (40 km), solar energy facilities within the SEZ could be visible from areas in the far southern portion of the WA. Visible areas of the WA within the 25-mi (40-km) radius of analysis total about 133 acres (0.538 km^2) in the 650-ft (198.1-m) viewshed, or 0.1% of the total WA acreage. None of the WA is visible in the 24.6-ft (7.5-m) viewshed. The visible area of the WA extends to beyond 25 mi (40 km) from the northern boundary of the SEZ.

Within the SEZ 25-mi (40-km) viewshed in the WA, areas with potential visibility of solar facilities within the SEZ are scattered across a few peaks between Wildcat Wash and Dead Man Wash in the far southern end of the WA. Within this area, visibility of solar facilities within the SEZ would be limited to the upper portions of power towers. If visible, operating power towers in the SEZ would be seen as distant points of light on the southern horizon. At night, sufficiently tall power towers in the SEZ could have red or white flashing hazard navigation lighting that could potentially be visible from the WA. Other lighting associated with solar facilities could potentially be visible as well.

Because of the long distance to the SEZ and screening of much of the SEZ by intervening topography, under the 80% development scenario analyzed in the PEIS, visual contrast levels from solar energy development within the SEZ would be expected to be minimal for viewpoints within the Meadow Valley Range WA.

- *Mormon Mountains.* Mormon Mountains is a 157,645-acre (638 km^2) congressionally designated WA located 24 mi (39 km) away at the point of closest approach northeast of the SEZ (Figure 11.3.14.2-2). The WA's rocky cliffs, narrow drainages, and rolling bajadas provide numerous opportunities for solitude. Recreational opportunities include camping, hiking, backpacking, hunting, and horseback riding.

  Visible areas of the WA within the 25-mi (40-km) radius of analysis total about 1,501 acres (6.1 km^2) in the 650-ft (198.1-m) viewshed, or 0.7% of the total WA acreage, and 981 acres (4.0 km^2) in the 24.6-ft (7.5-m) viewshed, or 0.6% of the total WA acreage. Areas of the WA with potential visibility of solar facilities within the SEZ extend to beyond 25 mi (40 km) from the northeastern corner of the SEZ.

  Solar facilities within the SEZ would be in view of many of the west- and southwest-facing slopes of the Mormon Mountains, but most of these areas are beyond 25 mi (40 km) from the SEZ. Within the 25-mi (40-km) SEZ viewshed, areas in the WA with views of the SEZ occur on the lower portions of a bajada in the far southern end of the WA.

  Intervening terrain provides substantial partial screening of the SEZ for nearly all WA viewpoints within the 25-mi (40-km) SEZ viewshed. Views toward the SEZ would be at a very low vertical angle, and the SEZ would occupy a very small portion of the horizontal field of view. Both factors would substantially reduce visual contrast levels. Where visible, collector/reflector arrays for solar facilities within the SEZ would be seen edge on, which would reduce their apparent size and cause them to appear to repeat the line of the valley floor in which the SEZ is located. This would tend to reduce visual contrast. Operating power tower receivers within the SEZ would likely appear as distant points of light against the floor of the valley in which the SEZ is located, or against the base of the Arrow Canyon Range. At night, sufficiently tall power towers in the SEZ could have red or white flashing hazard navigation lighting that could potentially be visible from the WA.

Because of the partial screening and the very long distance to the SEZ (24+ mi [39+ km]), expected visual contrast levels associated with solar energy development within the SEZ would be minimal for WA viewpoints within the 25-mi (40 km) SEZ viewshed.

- *Muddy Mountains.* Muddy Mountains is a 44,522-acre (180.2-km^2) congressionally designated WA located 6.6 mi (10.6 km) away at the point of closest approach southeast of the SEZ (Figure 11.3.14.2-2). Portions of the Muddy Mountains WA provide outstanding opportunities for solitude. The wilderness provides outstanding recreation opportunities for hiking on and off trail, scenic viewing, hunting, and exploration (BLM and NPS 2007).

  Visible areas of the WA within the 25-mi (40-km) radius of analysis total about 5,798 acres (23.5 km^2) in the 650-ft (198.1-m) viewshed, or 13% of the total WA acreage, and 3,940 acres (16.0 km^2) in the 24.6-ft (7.5-m) viewshed, or 9% of the total WA acreage. The visible area of the WA extends about 12 mi (19 km) from the southeastern boundary of the SEZ.

  Solar facilities could be visible from scattered areas throughout the peaks of the Muddy Mountains in much of the western half of the WA. The Dry Valley Range provides at least partial screening of the SEZ for lower elevation views within the WA, but for some of the higher peaks, a substantial portion of the SEZ would be in view over the mountains of the Dry Lake Range. For some of the very highest viewpoints within the WA, the SEZ would stretch across most of the horizontal field of view, and moderate visual contrasts would be expected as a result.

  Figure 11.3.14.2-9 is a Google Earth visualization of the SEZ as seen from an unnamed peak in the northern portion of the SRMA, about 10 mi (16 km) southeast of the SEZ. In the visualization, the SEZ area is depicted in orange, the heliostat fields in blue.

  The viewpoint in the visualization is about 2,800 ft (850 m) higher in elevation than the SEZ. Solar facilities within the SEZ would be seen in a narrow band just above the Dry Lake Range and just under the Arrow Canyon Range. The view direction is offset 45 degrees to the long north-south axis of the SEZ, which would result in the SEZ occupying most of the horizontal field of view. The viewpoint is sufficiently elevated that the tops of collector/reflector arrays for solar facilities within the SEZ would be visible,

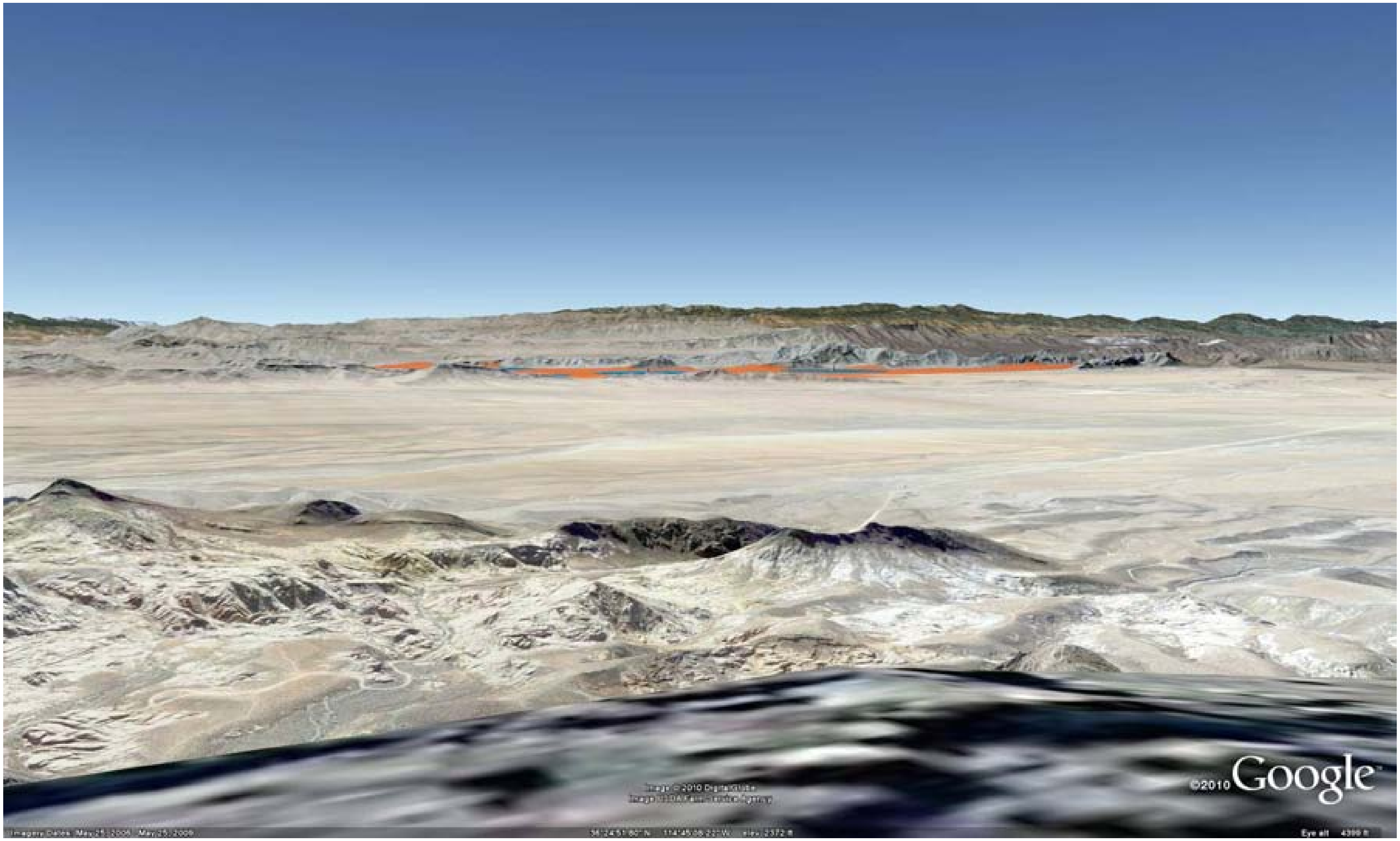

FIGURE 11.3.14.2-9 Google Earth Visualization of the Proposed Dry Lake SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Model, as Seen from a Peak in Muddy Mountains WA

which would make their large areal extent and strong regular geometry more apparent, tending to increase visual contrast with the more natural-appearing surroundings.

Ancillary facilities, such as buildings, cooling towers, and transmission towers, as well as any plumes, would likely be visible, and their forms, vertical lines, and movement (for plumes) projecting above the strong horizontal line of the collector/receiver arrays would add visual contrast.

Operating power tower receivers within the SEZ would likely appear as points of light against the backdrop of the Arrow Canyon Range. At night, sufficiently tall power towers could have red or white flashing hazard navigation lighting that would likely be visible from this location. The lighting could attract visual attention, although other lights would be visible within and in the vicinity of the SEZ.

Depending on project location within the SEZ, the types of solar facilities and their designs, and other visibility factors, primarily because of the large amount of horizontal field of view that solar facilities in the SEZ would occupy under the 80% development scenario analyzed in the PEIS, moderate visual contrasts would be expected at this viewpoint.

For other high-elevation viewpoints in the WA, views of solar facilities within the SEZ and resulting expected contrast levels would be similar. At lower elevations throughout the WA, however, contrast levels would be lower, even for viewpoints closer to the SEZ because of more extensive screening of views to the SEZ by the intervening Dry Lake Range. In general, under the 80% development scenario analyzed in the PEIS, moderate levels of visual contrast would be expected for high-elevation viewpoints in the WA, with weak levels of visual contrast expected for most lower-elevation viewpoints in the WA located within the SEZ 25-mi (40-km) viewshed.

ACECs

- *Rainbow Gardens.* The 38,777-acre (156.9-km^2) Rainbow Gardens ACEC is 9.3 mi (15.0 km) south of the SEZ at the closest point of approach (Figure 11.3.14.2-2). The resource values under protection within the Rainbow Gardens ACEC include geological, scientific, scenic, cultural, and sensitive plants (BLM 1998).

  About 844 acres (3.42 km^2), or 2% of the ACEC, is within the 650-ft (198.1-m) viewshed of the SEZ, and 217 acres (0.9 km^2) is in the 24.6-ft (7.5-m) viewshed, or 0.6% of the total ACEC acreage. The visible area of the ACEC extends from about 10 to 16 mi (16 to 26 km) from the southern boundary of the SEZ.

Solar facilities within the SEZ could be visible from scattered areas in the northwestern portion of the WA, generally at the summits and on north-facing slopes of Sunrise and Frenchman Mountains, and from neighboring peaks and ridges. From these high-elevation viewpoints, views of the SEZ would be over the tops of mountains in the Dry Lake Range and hills more directly south of the SEZ. Although the viewpoints are 1,000 to 2,000 ft (300 to 600 m) above the elevation of the SEZ, the vertical angle of view is low, and the SEZ area is partially screened by intervening topography. In addition, the views are along the SEZs' relatively narrow north-south axis, so that the SEZ would occupy only a small portion of the horizontal field of view, with weak visual contrasts expected from solar facilities within the SEZ as a result.

Where visible within the SEZ, the collector/reflector arrays of solar facilities would be seen nearly edge-on, which would decrease their apparent size and tend to conceal the strong regular geometry of the arrays, tending to reduce visual contrasts. The solar arrays would appear as lines just over the Dry Lake Range and would be partially screened by mountains in the range. Where visible, the facilities' edge-on appearance would tend to replicate the line of the valley in which the SEZ is located, reducing visual contrast.

Where visible, operating power tower receivers within the SEZ would likely appear as points of light on the northern horizon. The tower structures underneath the receivers would likely be discernable. Power towers in the closest parts of the SEZ might attract the attention of casual viewers located in the closest parts of the ACEC. At night, sufficiently tall power towers in the SEZ could have red or white flashing hazard navigation lighting that could potentially be visible from the WA. Because of the extensive screening and the long distance to the SEZ (20+ mi [32+ km]), expected visual contrast levels associated with solar energy development within the SEZ would be minimal for ACEC viewpoints within the 25-mi (40 km) SEZ viewshed.

- *River Mountains.* The 10,950-acre (44.313-km^2) River Mountains ACEC is located about 20 mi (32 km) south of the SEZ at the closest point of approach. The resource values under protection within the River Mountains ACEC include bighorn sheep habitat and the scenic viewshed for Henderson and Boulder City (BLM 1998).

  About 1,962 acres (7.9 km^2), or 18% of the ACEC, is within the 650-ft (198.1-m) viewshed of the SEZ. None of the ACEC is within the 24.6-ft (7.5-m) viewshed. The visible area of the ACEC extends from the point of closest approach to beyond 25 mi (40 km) from the southern boundary of the SEZ.

  Solar facilities within the SEZ could be visible from scattered locations throughout the peaks and ridge tops within the WA. Views of the SEZ from the ACEC are largely screened by mountains in the Dry Lake Range, and visibility of solar facilities within the SEZ would be limited to the upper portions of power towers. In addition, the views are along the SEZ's relatively narrow north-south axis, so that the SEZ would occupy only a very small portion of the horizontal field of view.

Where visible, operating power tower receivers within the SEZ would likely appear as distant points of light on the northern horizon. Because of the extensive screening and the long distance to the SEZ (20+ mi [32+ km]), expected visual contrast levels associated with solar energy development within the SEZ would be minimal for ACEC viewpoints within the 25-mi (40 km) SEZ viewshed.

Scenic Byways

- *Bitter Springs Backcountry Byway*. The Bitter Springs Backcountry Byway is a 28-mi (45-km) BLM-designated scenic byway that passes within about 6.6 mi (10.6 km) of the SEZ; about 9.3 mi (15.0 km) of the byway are within the SEZ 650-ft (198.1-m) and 24.6-ft (7.5 m) viewsheds. The byway follows Bitter Springs Road, a single lane dirt road.

  The SEZ would be visible from the byway east of the Crystal exit on I-15 up to where the byway enters the Muddy Mountains. Maximum visibility of solar facilities within the SEZ would occur close to I-15; as the road passes southeast, the Dry Lake Range screens all but the northernmost portions of the SEZ from view. Because of screening by intervening topography, even near Crystal, contrast levels from solar facilities would be relatively low and would not be expected to rise above weak levels.

  Eastbound travelers would be in the SEZ viewshed at the beginning of the trail where it splits off from the Valley of Fire Highway. The SEZ would be directly west of the byway at this point; however, the direction of travel would be south-southeast, so that vehicle occupants would have to turn their heads to the right and slightly behind them to see solar facilities within the SEZ. If travelers looked toward the SEZ, the Dry Lake Range would screen most of the SEZ from view. Furthermore, the roadway is about 100 ft (30 m) lower in elevation than the SEZ, so visibility of solar facilities within the SEZ would be very limited. If power towers and other tall ancillary facility components, such as transmission towers or cooling towers, were located in the SEZ such that they were visible through one or more of several gaps in the Dry Lake Range, they could create visual contrasts for eastbound byway travelers, and at a distance of 8 mi (13 km), contrasts could be noticeable to casual viewers. However, the gaps are small so that views would be fleeting, and given the direction of travel away from the SEZ, expected impacts resulting from brief views of these visual contrasts from solar facilities in the SEZ would be minimal.

Westbound travelers on the byway would have a different visual experience than eastbound travelers because the view to the SEZ would be generally close to the direction of travel, so the number of views and the average view length would be greater.

From the east, the Bitter Springs Backcountry Byway enters the 25-mi (40-km) SEZ viewshed as it descends from the Muddy Mountains about 11 mi (18 km) east of the SEZ. In these hills, screening vegetation is largely absent, and there could be intermittent visibility of solar facilities in the SEZ because of screening by hills in the foreground between the byway and the SEZ. Solar facilities could be viewed only briefly as the road twists and turns among the hills, and would occupy a very small portion of the field of view. However, at about 10 mi (16 km [straight line distance]) from the SEZ, a larger portion of the SEZ would come into view and for a brief segment would be more or less directly in front of eastbound Bitter Springs Backcountry Byway travelers. A Google Earth visualization depicting the view from this location on the byway is shown in Figure 11.3.14.2-10. In the visualization, the SEZ area is depicted in orange, the heliostat fields in blue.

The viewpoint in this visualization is about 10 mi (16 km) from the closest point in the SEZ, but the closest point in the SEZ visible in the visualization is about 14 mi (23 km) from the viewpoint. The viewpoint is about 1,000 ft (300 m) higher in elevation than the SEZ.

The visualization shows that the northern portion of the SEZ would be visible from the byway through a substantial gap in the Dry Lake Range. Despite the elevated viewpoint, at about 14 mi (23 km) the vertical angle of view would be very low. Because of screening by the Dry Lake Range, the visible portions of the SEZ would occupy a small portion of the horizontal field of view. The collector/reflector arrays of solar facilities within the SEZ would be seen nearly edge-on, which would make their large areal extent less apparent and conceal their strong regular geometry, as well as making them appear to repeat the strong horizontal line of the Dry Lake Valley floor.

If power towers were located in the SEZ, depending on their height and location within the SEZ, when operating the receivers could be visible over the tops of the mountains in the Dry Lake Range. The receivers would likely appear as points of light atop barely discernable tower structures against the backdrop of the Arrow Canyon Range. At night, sufficiently tall power towers could have red or white flashing hazard navigation lighting that would likely be visible from this location.

Because of the partial screening of the SEZ, the low viewing angle, and the relatively long distance to the SEZ, under the 80% development scenario analyzed in the PEIS, weak levels of visual contrast from solar facilities in the SEZ would be expected for this viewpoint.

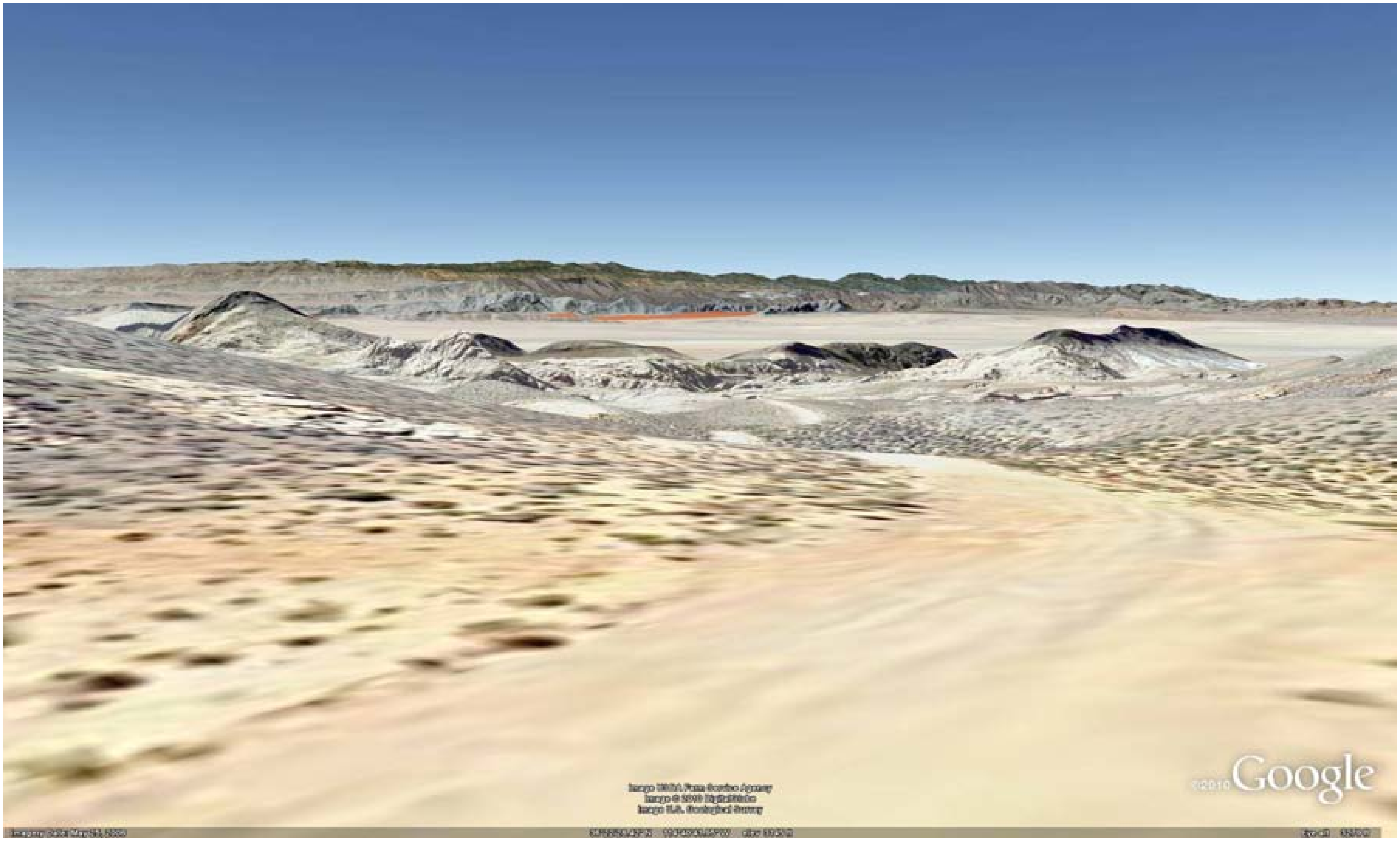

FIGURE 11.3.14.2-10 Google Earth Visualization of the Proposed Dry Lake SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Model, as Seen from the Bitter Springs Backcountry Byway in the Muddy Mountains

Beyond this section of the byway, the elevation drops rapidly, and views of the SEZ would be screened by canyon walls and hills until the byway leaves the Muddy Mountains about 8.6 mi (13.8 km) from the nearest point in the SEZ. Having lost several hundred feet of elevation, as the byway runs north-northwest toward I-15, the Dry Lake Range would continue to screen most of the SEZ from view. The lowered elevation would result in very low-angle views to solar facilities in the SEZ, and visual contrast levels would not be expected to rise above weak levels.

Contrast levels for westbound travelers would peak (still at weak levels) near the northern terminus of the Bitter Springs Backcountry Byway at Valley of Fire Highway. A Google Earth visualization depicting the view from this location on the byway is shown in Figure 11.3.14.2-11. In the visualization, the SEZ area is depicted in orange, the heliostat fields in blue.

The viewpoint in this visualization is about 7 mi (11 km) from the closest point in the SEZ. The viewpoint is about 100 ft (30 m) lower in elevation than the SEZ.

The visualization shows that portions of the SEZ would be visible from the byway through two gaps in the Dry Lake Range. Because the viewpoint elevation is lower than the SEZ, the vertical angle of view would be extremely low. The visible portions of the SEZ would occupy a moderate portion of the horizontal field of view. The collector/reflector arrays of solar facilities within the SEZ would be seen edge-on, which would make their large areal extent much less apparent and conceal their strong regular geometry, as well as making them appear to repeat the strong horizontal line of the Dry Lake Valley floor. Ancillary facilities such as buildings, cooling towers, transmission structures, and plumes (if present) would likely be visible projecting above the collector/reflector arrays of solar facilities within the SEZ. This would result in form, line, and potentially color contrast with the strongly horizontal collector/reflector arrays and the more natural appearing surrounding landscape.

If power towers were located in the SEZ, depending on their height and location within the SEZ, the power tower receivers would likely appear as bright points of light atop discernable tower structures against the backdrop of the Arrow Canyon Range. At night, sufficiently tall power towers could have red or white flashing hazard navigation lighting that would likely be visible from this location, and other lighting associated with solar facilities in the SEZ could be visible as well.

Because of the partial screening of the SEZ, the low viewing angle, and the relatively long distance to the SEZ, under the 80% development scenario analyzed in the PEIS, weak levels of visual contrast from solar facilities in the SEZ would be expected for this viewpoint.

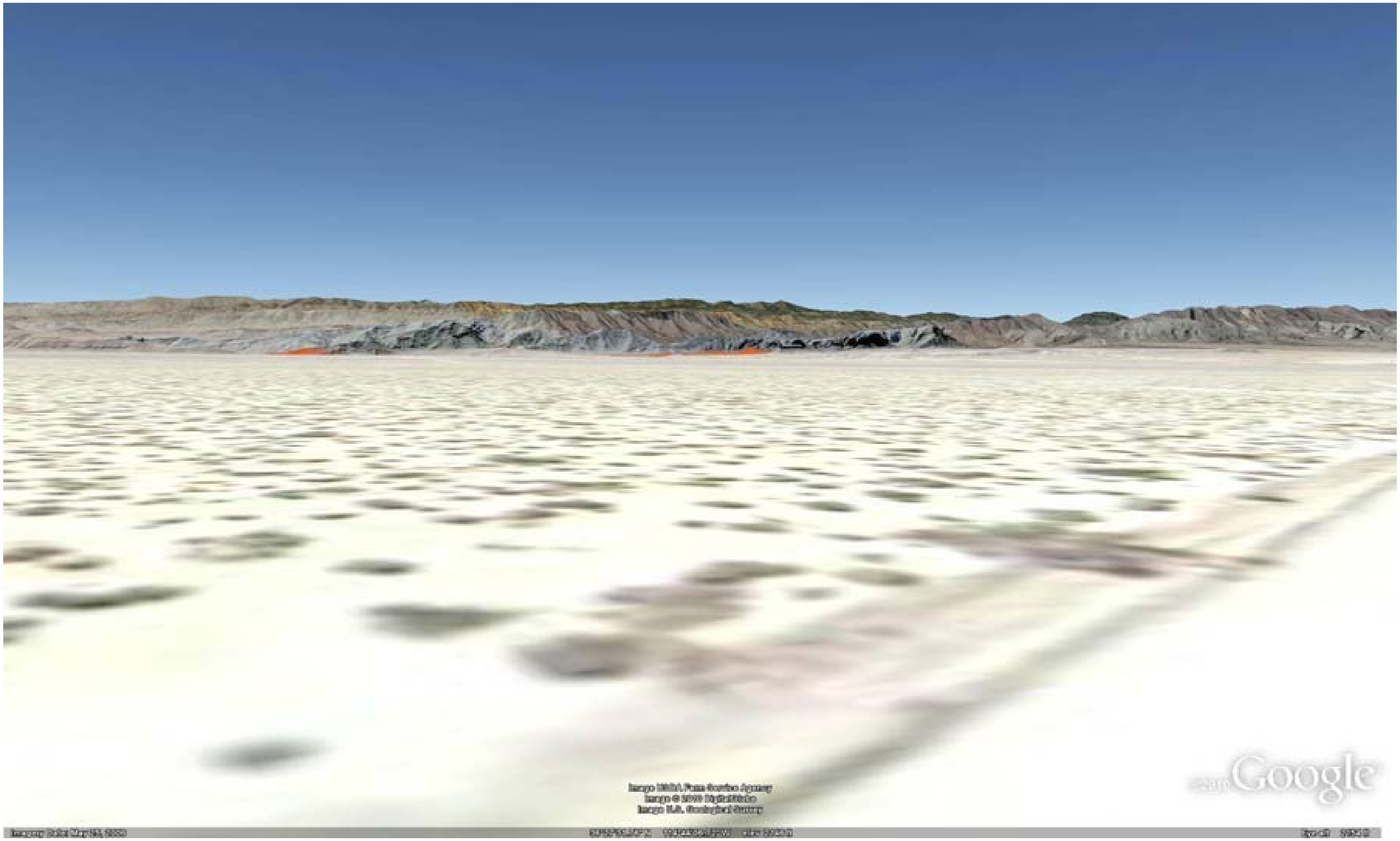

FIGURE 11.3.14.2-11 Google Earth Visualization of the Proposed Dry Lake SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Model, as Seen from the Bitter Springs Backcountry Byway near Valley of Fire Highway

In general, given the partial screening of much of the SEZ by the Dry Lake Range and the low vertical angle of view from the byway to the SEZ, under the 80% development scenario analyzed in the PEIS, weak levels of visual contrast would be expected for travelers on the Bitter Springs Backcountry Byway.

- *Las Vegas Strip*. The Las Vegas Strip is a 4.5-mi (7.2-km) All American Road (congressionally designated) and state-designated scenic boulevard that is located 19 mi (31 km) southwest of the SEZ. About 0.8 mi (1.3 km) of the scenic byway is within the SEZ 650-ft (198.1-m) viewshed.

  The Las Vegas Strip Scenic Byway is located in a highly developed urban center and is surrounded by buildings and other obstructions. Although indicated as falling within the 25-mi (40 km) viewshed of the SEZ, solar development within the SEZ would not be visible from the Las Vegas Strip, and no visual impacts would be expected.

Special Recreation Management Areas

- *Las Vegas Valley*—The Las Vegas Valley SRMA is a BLM-designated SRMA located 6.1 mi (9.8 km) southwest of the SEZ at the point of closest approach (Figure 11.3.14.2-2). It covers 447,244 acres (1,809.9 km^2). The area of the SRMA within the 650-ft (198.1-m) viewshed of the SEZ includes 18,166 acres (73.5 km^2), or 4% of the total SRMA acreage. The area of the SRMA within the 24.6-ft (7.5-m) viewshed of the SEZ includes 9 acres (0.04 km^2), or 0.002% of the total SRMA acreage. The areas within the SRMA with potential views of solar facilities within the SEZ extend from about 11 mi (18 km) from the southern boundary of the SEZ to beyond 25 mi (40 km) into the SRMA; however, as noted, for all but 9 acres (0.04 km^2), visibility would be limited to the upper portions of sufficiently tall power towers within the SEZ.

  The viewshed analysis indicates that in the SRMA, potential visibility of solar facilities would be limited to two areas: about 1,600 acres (6.5 km^2) in the northeast portion of the SRMA and a much larger area within the heavily urbanized center of Las Vegas. Because of screening by buildings and other obstructions, and given the very long distance to the SEZ, in actuality it is expected that there would be no visibility of the solar facilities within the SEZ from the central area of Las Vegas. Solar facilities within the SEZ could, however, be visible from the smaller area in the northwest portion of the SEZ. The area is about 11 mi (18 km) south of the SEZ. Views toward the SEZ from this area would include a number of cultural disturbances–Nellis Air Force Base would be seen just north of the viewpoint, and closer to the SEZ I-15, a major transmission line, a railroad line, a mining facility, and various other facilities and roads would also be visible.

From about 9 acres (0.04 km^2) at the northern end of the ridge at the peak of Sunrise Mountain, low-height solar facilities within the SEZ could be visible, but most of the SEZ would be screened from view by hills south of the SEZ. Solar facilities within a very small portion of the SEZ could be visible, but the angle of view would be very low, and the visible portions of the SEZ would occupy a very small portion of the horizontal field of view.

Where visible within the SEZ, the collector/reflector arrays of solar facilities would be seen nearly edge-on, which would decrease their apparent size and tend to conceal the strong regular geometry of the arrays, thus reducing visual contrasts. The solar arrays would appear as lines just over the hills immediately south of the SEZ. Where visible, the facilities' edge-on appearance would tend to replicate the line of the valley in which the SEZ is located, thereby reducing visual contrast.

Where visible, operating power tower receivers within the SEZ would likely appear as points of light at the base of the Arrow Canyon Range north of the SEZ. The tower structures underneath the receivers would likely be discernable. Power towers in the closest parts of the SEZ might attract the attention of casual viewers located in the closest parts of the ACEC. At night, sufficiently tall power towers in the SEZ could have red or white flashing hazard navigation lighting that could potentially be visible from the SRMA. Other lighting associated with solar facilities could potentially be visible as well.

At lower elevations within the SEZ, contrasts from solar facilities within the SEZ would be less, because of nearly complete screening of views of the SEZ by the hills south of the SEZ. Because of the extensive screening of views of the SEZ from viewpoints within the SRMA, expected visual contrast levels associated with solar energy development within the SEZ would be weak for SRMA viewpoints within the 25-mi (40-km) SEZ viewshed.

- *Muddy Mountains.* The Muddy Mountains SRMA is a BLM-designated SRMA located 4.5 mi (7.2 km) southeast of the SEZ at the point of closest approach (see Figure 11.3.14.2-2). It covers 128,493 acres (520 km^2).

  The area of the SRMA within the 650-ft (198.1-m) viewshed of the SEZ includes 25,741 acres (104.2 km^2), or 20% of the total SRMA acreage. The area of the SRMA within the 24.6-ft (7.5-m) viewshed of the SEZ includes 21,027 acres (85.1 km^2), or 16% of the total SRMA acreage. The visible area extends from the point of closest approach to 12 mi (19 km) into the SRMA from the southeast boundary of the SEZ.

  Solar facilities could be visible from scattered areas throughout the peaks of the Muddy Mountains in much of the western half of the SRMA, as well as the bajada at the base of the western slopes of the Muddy Mountains. The Dry

Valley Range provides at least partial screening of the SEZ for lower-elevation views within the SRMA, but for some of the higher peaks closer to the SEZ, a substantial portion of the SEZ would be in view over the mountains of the Dry Lake Range. For some of the very highest viewpoints within the SRMA, the SEZ would stretch across most of the horizontal field of view, and strong visual contrast would be expected as a result.

Figure 11.3.14.2-12 is a Google Earth visualization of the SEZ as seen from an unnamed peak in the northern portion of the SRMA, about 11 mi (18 km) from the easternmost point of the SEZ. In the visualization, the SEZ area is depicted in orange, the heliostat fields in blue.

The viewpoint in the visualization is about 2,100 ft (640 m) higher in elevation than the SEZ. Solar facilities within the SEZ would be seen in a narrow band just above the Dry Lake Range and just under the Arrow Canyon Range. The view direction is nearly perpendicular to the long north-south axis of the SEZ, which would result in the SEZ's occupying most of the horizontal field of view. Despite the elevated viewpoint, collector/reflector arrays for solar facilities within the SEZ would be seen nearly edge-on, which would reduce their apparent size and cause them to appear to repeat the line of the valley floor in which the SEZ is located, thus tending to reduce visual contrast.

Ancillary facilities, such as buildings, cooling towers, and transmission towers, as well as any plumes, would likely be visible, and their forms, vertical lines, and movement (for plumes) projecting above the strong horizontal line of the collector/receiver arrays would add visual contrast.

Operating power tower receivers within the SEZ would likely appear as points of light against the backdrop of the Arrow Canyon Range. At night, sufficiently tall power towers could have red or white flashing hazard navigation lighting that would likely be visible from this location. Despite the distance, the lighting could attract visual attention, although other lights would be visible within and in the vicinity of the SEZ.

Depending on project location within the SEZ, the types of solar facilities and their designs, and other visibility factors, primarily because of the large amount of horizontal field of view that solar facilities in the SEZ would occupy under the 80% development scenario analyzed in the PEIS, moderate visual contrasts could be expected at this viewpoint.

Farther south from this viewpoint within the SRMA, views of solar facilities within the SEZ and resulting expected contrast levels would be similar. At lower elevations throughout the SRMA, however, contrast levels would be lower, even for viewpoints closer to the SEZ because of more extensive

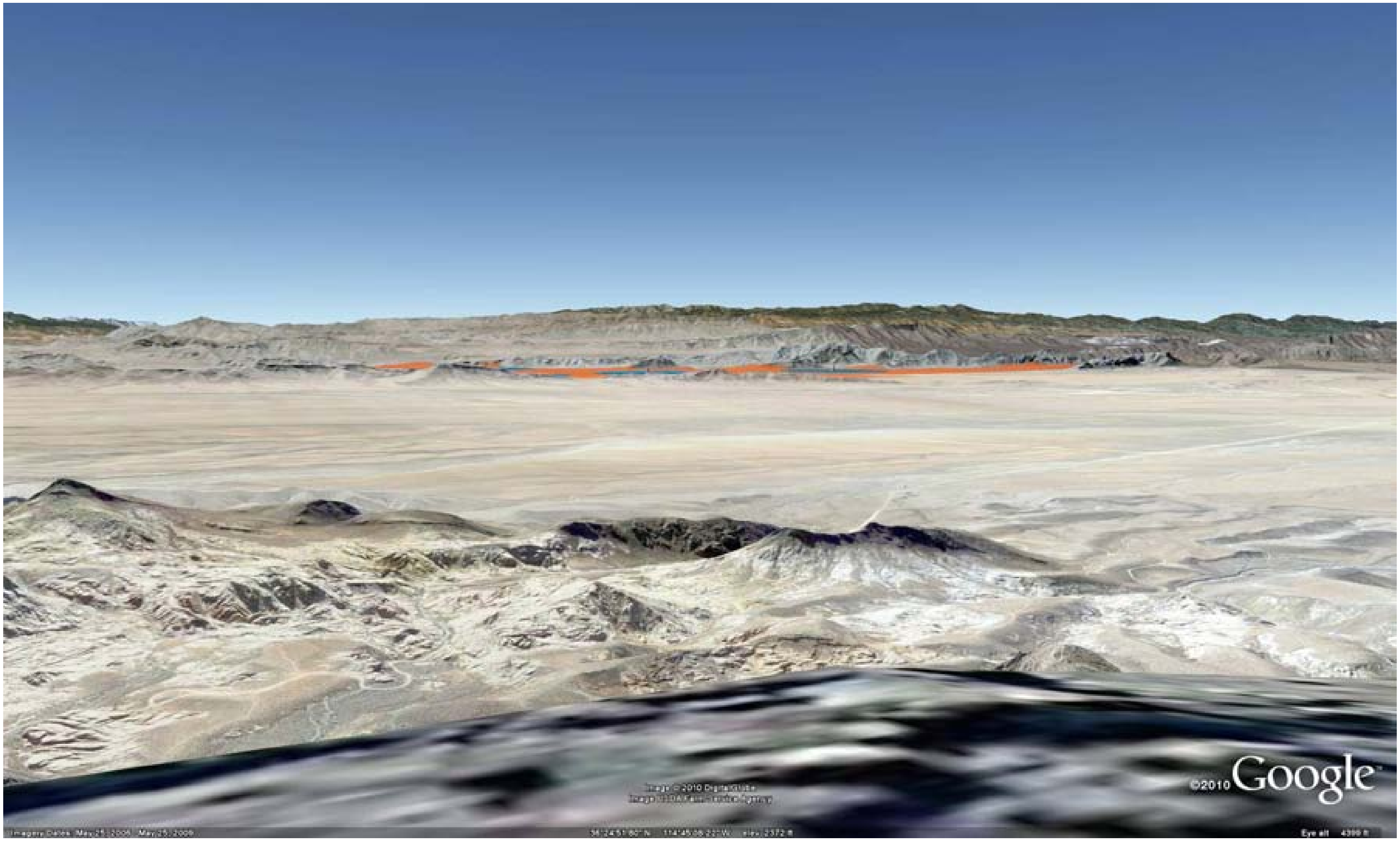

FIGURE 11.3.14.2-12 Google Earth Visualization of the Proposed Dry Lake SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Model, as Seen from a Peak in Muddy Mountains SRMA

screening of views to the SEZ by the intervening Dry Lake Range. In general, under the 80% development scenario analyzed in the PEIS, moderate levels of visual contrast would be expected for high-elevation viewpoints in the SRMA, with weak levels of visual contrast expected for most lower-elevation viewpoints in the SRMA located within the SEZ 25-mi (40-km) viewshed.

- *Nellis Dunes.* The Nellis Dunes SRMA is a BLM-designated SRMA located 4.3 mi (6.9 km) south of the SEZ at the point of closest approach (Figure 11.3.14.2-2). It contains 8,921 acres (36.1 km^2). The area of the SRMA within the 650-ft (198.1-m) viewshed of the SEZ includes 448 acres (1.8 km^2), or 5% of the total SRMA acreage. The area of the SRMA within the 24.6-ft (7.5-m) viewshed of the SEZ includes 310 acres (1.3 km^2), or 4% of the total SRMA acreage. The areas within the SRMA with potential views of low-height solar facilities in the SEZ extend from the point of closest approach at the northern boundary of the SRMA to 5.2 mi (8.4 km) into the SRMA. These areas are thus in the far northern portion of the SRMA. There is an area farther south in the SRMA where visibility of solar facilities would be limited to the upper portions of tall power towers because of screening from ridges in the northern portions of the SRMA. This small area is located about 7.1 mi (11.4 km) from the closest point in the SEZ.

  The northern portions of the Nellis Dunes SRMA include southwest–northeast trending ridges with peaks 500 to 600 ft (150 to 180 m) higher than the SEZ. From the tops of the highest ridges in the SRMA, visibility of the SEZ within the SRMA would be good, with solar development likely to be plainly visible despite partial screening of the SEZ by the Dry Lake Range and hills directly north of the SRMA. Views toward the SEZ would include a number of cultural disturbances, including I-15, a major transmission line, a railroad line, a mining facility, and various other facilities and roads. Currently existing transmission facilities in the SEZ could also be visible.

  Figure 11.3.14.2-13 is a Google Earth visualization of the SEZ as seen from the highest ridge in the SRMA, about 5.0 mi (8.0 km) from the SEZ. The viewpoint is just within the BLM VRM program foreground-middleground distance of 3 to 5 mi (5 to 8 km).

  The viewpoint in the visualization is about 600 ft (180 m) lower in elevation than the nearest point in the SEZ. The SEZ would be viewed along its long and narrow south-to-north axis, which would decrease the apparent width of the SEZ as seen from this viewpoint. The SEZ would occupy a moderate amount of the horizontal field of view. Solar facilities within the SEZ would be seen in a band along the horizon at the base of the Arrow Canyon Range.

  Because of the elevated viewpoint and relatively short distance to the SEZ, the vertical angle of view would be high enough that the tops of solar collector/ reflector arrays in the SEZ would be visible, which would make their large

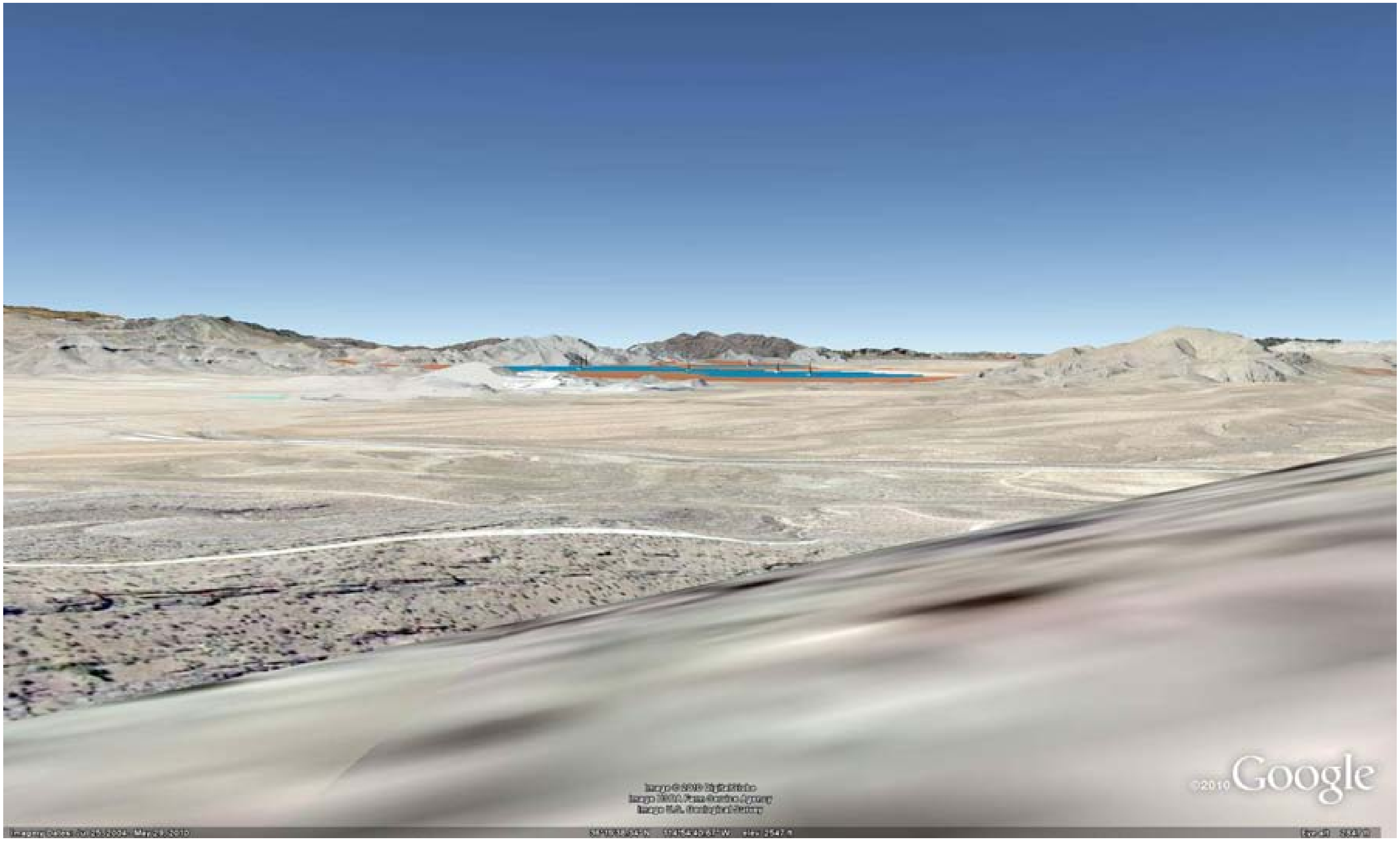

FIGURE 11.3.14.2-13 Google Earth Visualization of the Proposed Dry Lake SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Model, as Seen from a High Ridge in the Nellis Dunes SRMA

areal extent and strong regular geometry more apparent, tending to increase visual contrast with the surrounding natural-appearing landscape.

Ancillary facilities, such as buildings, cooling towers, and transmission towers, as well as any plumes, would likely be visible, and their forms, lines, and movement (for plumes) projecting above the strong horizontal line of the collector/receiver arrays could attract visual attention.

Operating power tower receivers within closer portions of the SEZ would likely appear as very bright, nonpoint light sources atop the tower structures, against a backdrop of the mountains, and could strongly attract visual attention. Power tower receivers in the more distant northern portion of the SEZ (up to 16 mi [26 km] from the viewpoint) would create substantially lower levels of contrast. At night, sufficiently tall towers could have red flashing lights, or white or red flashing strobe lights that could be visually conspicuous, although other lights would be visible within the SEZ and in surrounding areas.

Depending on project location within the SEZ, the types of solar facilities and their designs, and other visibility factors, under the 80% development scenario analyzed in this PEIS, moderate visual contrasts from solar energy development within the SEZ could be expected at this viewpoint. The presence within the viewshed of the existing major cultural disturbances described above would tend to reduce contrast from solar facilities in the SEZ, relative to contrast levels that would be observed in a more visually pristine setting.

At lower elevation viewpoints north of the ridges in the SRMA, the angle of view to the SEZ is much lower, increasing screening due to intervening terrain, but also reducing the apparent size of solar collector/reflector arrays in the SEZ and concealing their strong regular geometry, thereby reducing visual contrasts to weak levels. For the area farther south in the SRMA where visibility of solar facilities within the SEZ would be limited to the upper portions of tall power towers, expected visual contrast levels would also be weak, because of the partial screening and the increased distance to the SRMA.

In summary, the Nellis Dunes SRMA is sufficiently close to the SEZ that for some viewpoints within the SRMA, solar energy development within the SEZ would be expected to result in moderate visual contrast levels. Lower contrast levels would be expected for lower elevation viewpoints throughout the SRMA, and for higher elevation viewpoints farther south in the SRMA, farther from the SEZ.

- *Sunrise Mountain.* Sunrise Mountain SRMA is a 33,322-acre (134.9-km^2) BLM-designated SRMA located 9.3 mi (15.0 km) south of the SEZ at the point of closest approach (Figure 11.3.14.2-2).

  The area of the SRMA within the 650-ft (198.1-m) viewshed of the SEZ includes 891 acres (3.61 km^2), or 3% of the total SRMA acreage. The area of the SRMA within the 24.6-ft (7.5-m) viewshed of the SEZ includes 218 acres (0.9 km^2), or 0.7% of the total SRMA acreage. The visible area extends from 11 mi (18 km) from the southern boundary of the SEZ to 17 mi (27 km) into the SRMA.

  The Sunrise Mountain SRMA is wholly contained within the Rainbow Gardens ACEC. Visual contrast levels associated with solar facilities in the SEZ as observed from the Sunrise Mountain SRAM would be identical to those observed from the Rainbow Gardens ACEC (see analysis above).

Additional scenic resources exist at the national, state, and local levels, and impacts may occur on both federal and nonfederal lands, 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 other 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. A 500-kV transmission line goes through the proposed SEZ, so no new construction would be required outside of the SEZ to connect to that line. Roads and transmission lines would be constructed within the SEZ as part of the development of the area. For this analysis, the impacts of construction and operation of transmission lines outside of the SEZ were not assessed, assuming that the existing 500-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. 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 5.12.1. A detailed site-specific NEPA analysis would be required to determine visibility and associated impacts precisely for any future solar projects, based on more precise knowledge of facility location and characteristics.

Impacts on Selected Other Lands and Resources

Interstate 15. Almost 38 mi (61 km) of I-15 are within the proposed Dry Lake SEZ viewshed, and almost 3.7 mi (6.0 km) of I-15 pass along and through the southeasternmost portion of the SEZ. The AADT value for I-15 in the vicinity of the SEZ was about 24,000 vehicles in 2009 (NV DOT 2010). I-15 is the main travel route between Las Vegas and Salt Lake City.

For northbound travelers on I-15, solar facilities within the SEZ would first come into view about 1.0 mi (1.6 km) north of the I-15–State Route 604 interchange and about 5 mi (8 km) south of the SEZ itself. Hills immediately south of the SEZ would screen much of the SEZ from view from I-15 until about 3 mi (5 km) from the SEZ, as travelers approached a mining operation in hills just south of the SEZ and west of I-15. At this point, views of the southern portion of the SEZ would open up, and expected visual contrasts would quickly rise to strong levels. I-15 enters the SEZ at the SEZ's southeast corner, and for about the next 1.5 mi (2.4 km) passes along the SEZ's southeastern boundary, with potential views of solar facilities in the SEZ to the front and left side of northbound vehicles only. After 1.5 mi (2.4 km), the SEZ extends to the east of I-15, and solar facilities could be visible on all sides of north-bound vehicles, although the bulk of the SEZ would still be west of I-15. Throughout this section of the highway, strong visual contrasts from solar facilities within the SEZ would be expected.

Figure 11.3.14.2-14 is a Google Earth visualization of the SEZ as seen from I-15, about 1.9 mi (3.1 km) north of the U.S. 93 interchange, facing west toward a cluster of four power tower models northwest of the viewpoint. The center of the cluster is about 2.0 mi (3.2 km) from the viewpoint, and the closest tower is about 1.1 mi (1.8 km) from the viewpoint. The visualization suggests that from this location, solar facilities within the SEZ would be in full view. The SEZ would occupy more than the entire field of view, so travelers would have to turn their heads to scan across the full SEZ. Facilities located within the southern portion of the SEZ would strongly attract the eye and likely dominate views. Structural details of some facility components for nearby facilities would likely be visible. Buildings, transmission towers and other tall facility components, as well as plumes (if present) would be seen projecting above the collector/reflector arrays, and they could contrast noticeably with the strongly horizontal and regular geometry of the collector/reflector arrays. From this viewpoint, solar collector arrays would be seen nearly edge-on and would repeat the horizontal line of the plain in which the SEZ is situated, which would tend to reduce visual line contrast. For nearby facilities, the collector arrays could be of large enough apparent size that their individual forms could be seen, and they would no longer appear as horizontal lines.

If power towers were located within the SEZ close to this viewpoint, the receivers would likely appear as brilliant white non-point light sources atop towers with structural details clearly discernable. The towers and receivers would be viewed against either a sky backdrop or the darker hues of the Arrow Canyon Range and would strongly attract visual attention. Also, under certain viewing conditions, sunlight on dust particles in the air might result in the appearance of light streaming down from the tower(s).

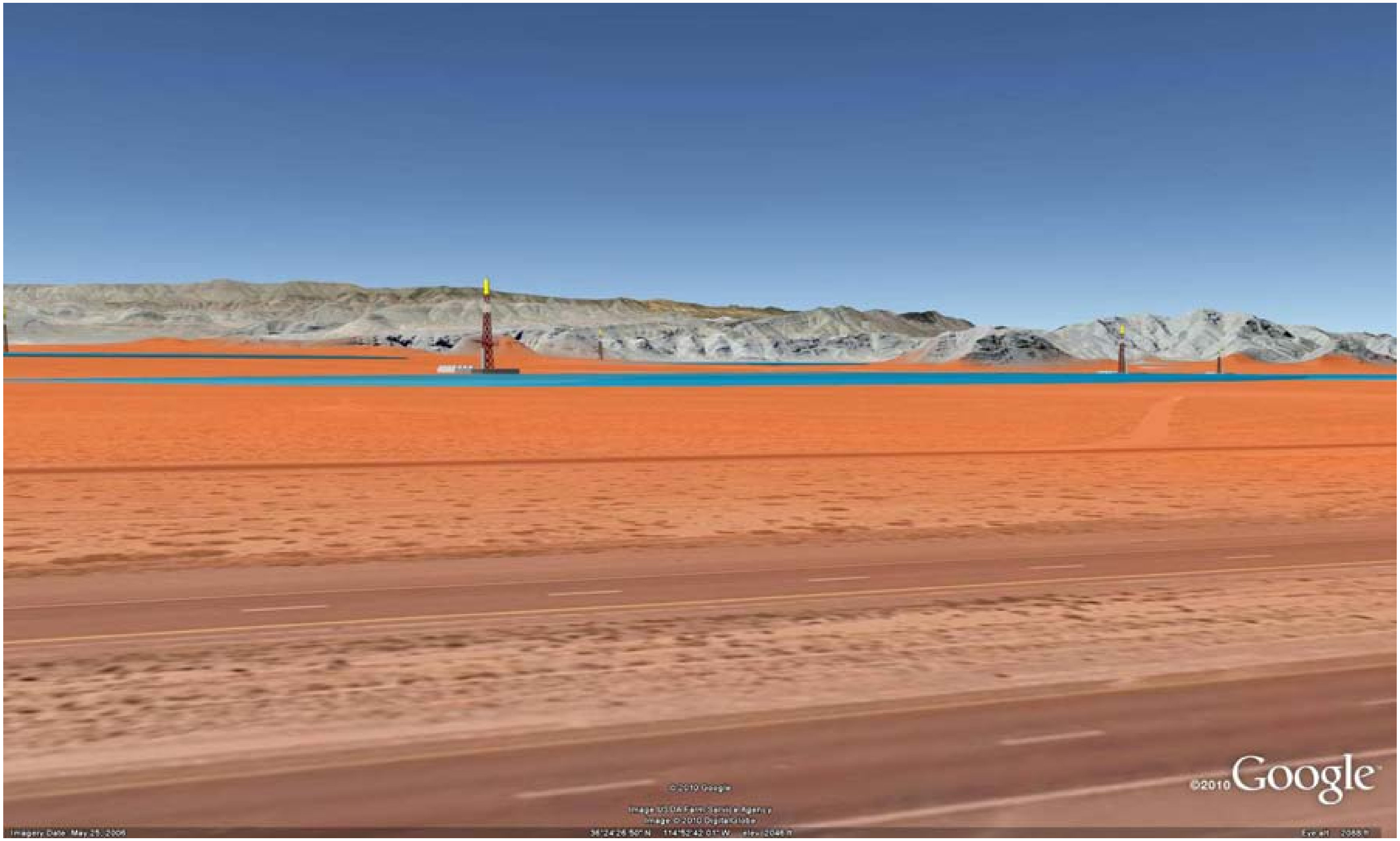

FIGURE 11.3.14.2-14 Google Earth Visualization of the Proposed Dry Lake SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from I-15 within the Proposed Dry Lake SEZ

At night, sufficiently tall visible power towers in the SEZ would have red flashing lights, or white or red flashing strobe lights that could be very conspicuous from this viewpoint. However, there would be other lights visible within and in the area of the SEZ, which could decrease the perception of visual impact created by the lights.

As noted above, there are numerous large-scale cultural disturbances already visible in and near the SEZ, and the addition of solar facilities into the already visually complex and partially man-made appearing landscape would result in lower contrast levels than if the solar facilities were being placed into a visually pristine landscape. However, under the 80% development scenario analyzed in the PEIS, the SEZ could contain numerous solar facilities utilizing differing solar technologies as well as a variety of roads and ancillary facilities. The addition of multiple solar facilities could add substantially to the existing visually complex landscape, to the extent that it would exceed the visual absorption capability of the valley in which the SEZ is located, leading to a perception of visual "clutter" that could be perceived negatively by viewers.

Because the SEZ would occupy more than the horizontal field of view and because of the potentially very close proximity of solar facilities to this location, although contrast levels would depend on project location within the SEZ, the types of solar facilities and their designs, and other visibility factors, strong visual contrasts from solar energy development within the SEZ would be expected at this viewpoint.

At highway speeds, travelers would pass through the 3.8 mi (6.1 km) segment of I-15 along and in the SEZ in about 3.5 minutes. Shortly after reaching the viewpoint just described, visual contrast for northbound I-15 travelers would begin to diminish, as the direction of travel would be toward the northeast, away from the SEZ. Views to the left of northbound vehicles, however, would still be subject to strong visual contrasts, as solar facilities within the SEZ could still stretch across the entire horizontal field of view and would still be relatively close to the viewers (less than 4 mi [6 km]). About 3.6 mi (5.8 km) north of the point where I-15 passes out of the SEZ, I-15 turns farther to the northeast, and contrast levels would drop more quickly after that point. Ridges immediately west of I-15 would cut off views of the SEZ intermittently as travelers proceeded north on I-15.

Southbound travelers on I-15 would see the same types and levels of visual contrasts from solar development within the proposed Dry Lake SEZ as northbound travelers, but in reverse order. The upper portions of tall power towers could potentially be seen briefly starting northeast of the SEZ, but glimpses would be fleeting and contrast levels generally minimal. After passing the Valley of Fire Highway, visual contrast levels would rise and then very quickly reach strong levels as travelers approached and passed through the SEZ after entering the Dry Lake Range. Contrasts would drop quickly after southbound travelers passed through the SEZ.

In summary, solar facilities within the SEZ could be in view from I-15 for about 35 minutes driving time at highway speeds, but most travelers' views would be much briefer. Facilities within the SEZ could be in view from about 38 mi (61 km) of the roadway, but contrast levels would generally be minimal or weak for I-15 except where the highway passes through the Dry Lake Range and especially the SEZ itself, where contrast levels would likely be strong.

U.S. Highway 93. Almost 13 mi (21 km) of U.S. 93 are within the SEZ viewshed, and about 4.5 mi (7.2 km) of U.S. 93 pass along the SEZ's southwestern boundary. The road then passes the southern end of the Arrow Canyon Range and turns north, paralleling the SEZ's western boundary, but largely screened from view of the SEZ by the Arrow Canyon Range. Strong visual contrast levels would be expected for those portions of the road that pass along the SEZ boundary and for about 2.1 mi (3.4 km) beyond, after which point contrast levels would drop greatly due to screening of the SEZ. On the western side of the Arrow Canyon Range, only the upper portions of sufficiently tall power towers might be visible through gaps in the Arrow Canyon Range, and only weak visual contrasts would be expected as a result. The AADT value for U.S. 93 in the vicinity of the SEZ was about 2,300 vehicles in 2009 (NV DOT 2010).

For northbound travelers, U.S. 93 begins at the junction with I-15, adjacent to the southwest corner of the SEZ. Because U.S. 93 borders the SEZ, expected visual contrast levels would start at strong levels and not drop to lower levels until northbound travelers passed the SEZ after about 4.5 mi (7.2 km), or about 4 minutes driving time at highway speeds. After passing the SEZ, visibility of solar facilities would be screened by the Arrow Canyon Range as U.S. 93 passed the southern end of the range.

Figure 11.3.14.2-15 is a Google Earth visualization of the SEZ as seen from U.S. 93, about 0.9 mi (1.5 km) west of the I-15 interchange, facing north toward a cluster of four power tower models. (Note because of the display properties of Google Earth, the SEZ is not shown directly adjacent to U.S. 93, but in fact U.S. 93 borders the SEZ.) The center of the cluster is about 2.5 mi (4.0 km) from the viewpoint, and the closest tower is about 1.8 mi (2.9 km) from the viewpoint. The visualization suggests that from this location, solar facilities within the SEZ would be in full view. The SEZ would occupy more than the entire field of view north of U.S. 93, so travelers would have to turn their heads to scan across the full SEZ. Facilities located within the southern portion of the SEZ would strongly attract the eye and likely dominate views from U.S. 93. Structural details of some facility components for nearby facilities would likely be visible. Steam plumes, transmission towers and other tall facility components would be seen against a sky backdrop, or could project above the mountains north of the SEZ. From this viewpoint, solar collector arrays would be seen nearly edge-on, and would repeat the horizontal line of the plain in which the SEZ is situated, which would tend to reduce visual line contrast. However, as the viewer approached closer to the collector arrays, they could increase in apparent size until their forms were visible, and they no longer appeared as horizontal lines.

If power towers were located within the SEZ close to this viewpoint, the receivers would likely appear as brilliant white non-point light sources atop towers with structural details clearly visible. The towers and receivers would strongly attract visual attention. Also, under certain viewing conditions, sunlight on dust particles in the air might result in the appearance of light streaming down from the tower(s).

At night, sufficiently tall visible power towers in the SEZ would have red flashing lights or white or red flashing strobe lights that could be very conspicuous from this viewpoint, but there would be other lights visible within and in the area of the SEZ, which could decrease the perception of visual impact created by the lights.

FIGURE 11.3.14.2-15 Google Earth Visualization of the Proposed Dry Lake SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from U.S. 93 West of I-15 Interchange

As noted above, numerous large-scale cultural disturbances already are visible in and near the southern portion of the SEZ, and the addition of solar facilities into the already visually complex and partially man-made appearing landscape would result in lower contrast levels than if the solar facilities were being placed into a visually pristine landscape. However, under the 80% development scenario analyzed in the PEIS, the SEZ could contain numerous solar facilities utilizing differing solar technologies as well as a variety of roads and ancillary facilities. The array of facilities could add substantially to the existing visually complex landscape to the extent that it would exceed the visual absorption capability of the valley in which the SEZ is located, leading to a perception of visual "clutter" that could be perceived negatively by viewers.

Because the SEZ would occupy so much of the horizontal field of view, strong visual contrasts from solar energy development within the SEZ would be expected at this viewpoint, although contrast levels would depend on project location within the SEZ, the types of solar facilities and their designs, and other visibility factors.

Immediately after passing the western boundary of the SEZ, westbound vehicles would pass the southern end of the Arrow Canyon Range, completely cutting off views of low-height facilities in the SEZ. U.S. 93 would then turn north and travel parallel to the Arrow Canyon Range until passing entirely out of the SEZ viewshed north of the SEZ. For the stretch of the roadway west of the Arrow Canyon Range (about 11 mi [18 km], or about 10 minutes driving time at highway speeds) intermittent visibility of the upper portions of power towers in particular locations within the SEZ would be possible, but if such views did occur, they would be fleeting and visual contrast levels would be expected to be minimal.

Southbound travelers on U.S. 93 would see the same types and levels of visual contrasts from solar development within the proposed Dry Lake SEZ as northbound travelers, but in reverse order. The upper portions of tall power towers could potentially be seen briefly starting just north of the SEZ, but glimpses would be fleeting and contrast levels minimal; however, after the southern end of the Arrow Canyon Range was passed, visual contrast levels would very quickly reach strong levels as travelers would immediately pass along the southern border of the SEZ.

In summary, solar facilities within the SEZ could be in view from U.S. 93 for about 15 minutes driving time at highway speeds, but most travelers' views would be much briefer. Facilities within the SEZ could be in view from about 13 mi (21 km) of the roadway. Northbound travelers on U.S. 93 would first see solar facilities within the SEZ at the I-15 interchange, with strong visual contrasts visible for several minutes until views of the SEZ would be screened by the Arrow Canyon Range. After that point, expected contrast levels would drop to minimal levels. Southbound travelers would see minimal contrast until they passed the Arrow Canyon Range, and they would likely see strong contrasts thereafter until they reached I-15.

Communities of Glendale, Moapa, Paradise, and Winchester. The viewshed analyses indicate potential visibility of the SEZ from the communities of Glendale (about 19 mi [31 km] northeast of the SEZ), Moapa (about 17 mi [27 km] northeast of the SEZ), Paradise (about 25 mi [40 km] southeast of the SEZ), and Winchester (about 22 mi [35 km] southeast of the SEZ). For all of these communities, the viewshed analysis indicates that visibility would be limited to the upper portions of tall power towers.

The communities of Paradise and Winchester are suburbs of Las Vegas and are located within the highly urbanized Las Vegas area. Because of screening by buildings and vegetation, solar facilities within the SEZ would not be visible, and no visual impacts would be expected.

The community of Moapa is 17 mi (27 km) northeast of the SEZ, and Glendale is close by at 19 mi (31 km). Within these communities, at least partial screening of ground-level views of the SEZ are likely, due either to slight variations in topography, structures, vegetation, or a combination of these screening types. A detailed future site-specific NEPA analysis is required to determine visibility precisely; however, expected visual contrast levels for these communities would be minimal.

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, project types, locations, sizes, and layouts, as well as the presence of screening, but 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.

11.3.14.2.3 Summary of Visual Resource Impacts for the Proposed Dry Lake SEZ

Under the 80% development scenario analyzed in the PEIS, the SEZ would contain multiple solar facilities utilizing differing solar technologies, as well as a variety of roads and ancillary facilities. The array of facilities could create a visually complex landscape that would contrast strongly with the strongly horizontal landscape of the flat valley in which the SEZ is located. Large visual impacts on the SEZ and surrounding lands within the SEZ viewshed would be associated with solar energy development within the proposed Dry Lake SEZ because of major modification of the character of the existing landscape. The potential exists for additional impacts from construction and operation of transmission lines and access roads within and outside the SEZ.

The SEZ is in an area of low scenic quality, with major cultural disturbances already present in and around the SEZ. 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 Dry Lake SEZ is likely to result in strong visual contrasts for some high-elevation viewpoints in the Desert National Wildlife Range, which is 2.3 mi (3.7 km) west of the SEZ.

Strong visual contrasts would also be expected for some high-elevation viewpoints on the Old Spanish National Historic Trail, which passes within 1.3 mi (2.1 km) of the SEZ. The points of highest potential visual contrast are located within a high-potential segment of the trail.

Strong visual contrasts would also be expected for some high-elevation viewpoints in the Arrow Canyon WA, located 2.5 mi (4.0 km) north of the SEZ. Moderate to strong visual contrasts would be expected for some high-elevation viewpoints the Muddy Mountains WA, which is 6.6 mi (10.6 km) southeast of the SEZ, and strong contrast levels would be expected for viewpoints in the partially overlapping Muddy Mountains SRMA, located 4.5 mi (7.2 km) east of the SEZ. Moderate visual contrast levels would be expected for high-elevation viewpoints in the Nellis Dunes SRMA, 4.3 mi (6.9 km) south 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.

Almost 38 mi (61 km) of I-15 are within the proposed Dry Lake SEZ viewshed, and almost 3.7 mi (6.0 km) of I-15 pass along and through the SEZ's southeasternmost portion. Travelers on I-15 would be likely to experience strong visual contrasts from solar energy development within the SEZ. Almost 13 mi (21 km) of U.S. 93 are within the SEZ viewshed, and about 4.5 mi (7.2 km) of U.S. 93 pass along the SEZ's southwestern boundary. Travelers on U.S. 93 would also be likely to experience strong visual contrasts from solar energy development within the SEZ.

11.3.14.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features have been identified to protect visual resources for the proposed Dry Lake SEZ. As noted in Section 5.12, 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. Implementation of 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 level. Given the large scale, reflective surfaces, 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 is the primary means of mitigating visual impacts. The effectiveness of other visual impact mitigation measures would generally be limited.

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11.3.15 Acoustic Environment

11.3.15.1 Affected Environment

The proposed Dry Lake SEZ is located in the north-central portion of Clark County in southernmost Nevada. Neither the State of Nevada nor Clark County has established quantitative noise-limit regulations applicable to solar energy development.

The southern portion of Dry Lake SEZ is bordered or crossed by I-15, which runs northeast–southwest; it is also bordered by U.S. 93, which trends southeast–northwest. Several dirt roads through the SEZ are present. A railroad, paralleling a part of I-15, runs close to the southern SEZ boundary or crosses the SEZ. The nearest airport is Nellis Air Force Base, which is about 12 mi (19 km) southwest of the SEZ and is under military airspace. Other nearby airports include North Las Vegas Air Terminal, about 20 mi (32 km) southwest of the SEZ; Echo Bay Airport, about 23 mi (37 km) east-southeast; Overton Municipal Airport, about 24 mi (39 km) east-northeast; and Las Vegas McCarran International Airport, about 25 mi (40 km) southwest. There are no agricultural activities in and around the SEZ, but cattle grazing seems to occur within the SEZ. Henry Allen Generating Station, a large electric substation, and a natural gas compressor station exist within the SEZ. Several transmission lines and two natural gas pipelines run across the SEZ. Many industrial activities, including a quarry, lime and gypsum facilities, a waste management facility, several natural gas–fired power plants, and transmission lines, exist outside the southern SEZ boundary. Recreational land use such as OHV and shooting use occurs within the SEZ. No sensitive receptors (e.g., residences, hospitals, schools, or nursing homes) exist close to the proposed Dry Lake SEZ. The nearest residences lie about 12 mi (19 km) southwest of the SEZ, near Nellis Air Force Base in North Las Vegas. Other nearby residences and communities are located in the Moapa Valley, including Moapa, as close as 19 mi (31 km) northeast, and Overton, about 23 mi (37 km) east of the SEZ. Accordingly, noise sources around the SEZ include road traffic, railroad traffic, aircraft flyover, cattle grazing, industrial activities, and recreational activities. Other than in the southern portion, the proposed Dry Lake SEZ is mostly undeveloped and its overall character is considered to range from rural in the north to industrial to the south. Background noise levels in the southern portion of the SEZ would be higher, especially along I-15, while those in the northern portion of the SEZ would be lower. To date, no environmental noise survey has been conducted around the proposed Dry Lake SEZ. On the basis of the population density, the day–night average noise level (L_{dn} or DNL) is estimated to be 44 dBA for Clark County, near the upper end of the range of 33 to 47 dBA L_{dn} typical of a rural area (Eldred 1982; Miller 2002).[10]

[10] Rural and undeveloped areas have sound levels in the range of 33 to 47 dBA as L_{dn} (Eldred 1982). Typically, nighttime levels are 10 dBA lower than daytime levels, and they 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.

11.3.15.2 Impacts

Potential noise impacts associated with solar projects in the Dry Lake SEZ would occur during all phases of the projects. During the construction phase, potential noise impacts on the nearest residences (about 12 mi [19 km] to the southwest of the SEZ boundary) associated with operation of heavy equipment would be minimal due to considerable separation distance. During the operations phase, potential impacts on the nearest residences would be anticipated to be minimal as well. Even though the Dry Lake SEZ is fully developed, potential noise impacts on residences along the roads from commuter, visitor, support, and delivery vehicular traffic to and from the SEZ would be minimal, compared with current heavy traffic volume along I-15. 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 proposed Dry Lake 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 through any additional SEZ-specific design features applied (see Section 11.3.15.3 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.

11.3.15.2.1 Construction

The proposed Dry Lake 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).

For the parabolic trough and power tower technologies, the highest construction noise levels would occur at the power block area, where key components (e.g., steam turbine/ generator) needed to generate electricity are located; 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) from the facility boundary. 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 a 40-dBA level 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 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 southern SEZ boundary, estimated noise levels at the nearest residences would be about 14 dBA, which is well below the typical daytime mean rural background level of 40 dBA. In addition, an estimated 40-dBA L_{dn}[11] at these residences (i.e., no contribution from construction activities) is well below the EPA guidance of 55 dBA L_{dn} for residential areas.

It is assumed that a maximum of two projects at any one time would be developed for SEZs greater than 10,000 acres (40.5 km^2) but less than 30,000 acres (121.4 km^2), such as the Dry Lake SEZ. If two projects were to be built in the southern portion of the SEZ near the closest residences, noise levels would be about 17 dBA, 3 dBA higher than the value for a single project. These levels would be still well below the typical mean rural background level, and thus their contribution to the existing L_{dn} would be minimal.

In addition, noise levels are estimated at the specially designated areas within a 5-mi (8-km) range of the Dry Lake SEZ, which is the farthest distance that noise, except extremely loud noise, would be discernable. There are several specially designated areas within the range where noise might be an issue: Coyote Springs ACEC, about 0.25 mi (0.4 km) west of the SEZ; Old Spanish National Historic Trail, as close as about 1.3 mi (2.1 km) southeast; Desert NWR, about 2.2 mi (3.5 km) west of the SEZ; Arrow Canyon WA, about 2.5 mi (4.0 km) north; and Muddy Mountains WA, about 4.5 mi (7.2 km) southeast. For construction activities occurring near the SEZ boundary close to the specially designated areas, noise levels are estimated to be about 58 and 39 dBA at the boundaries of the Coyote Springs ACEC and Old Spanish National Historic Trail, respectively, which are much higher and comparable to the typical daytime mean rural background level of 40 dBA. As discussed in Section 5.10.2, sound levels above 90 dB are likely to adversely affect wildlife (Manci et al. 1988). Thus, construction noise from the SEZ is not likely to adversely affect wildlife at nearby specially designated areas. In addition, construction noise from the SEZ is not anticipated to affect any activities at the Old Spanish National Historic Trail.

Depending on soil conditions, pile driving might be required for installation of solar dish engines. However, the pile drivers used, such as vibratory or sonic drivers, would be relatively small and quiet, in contrast to the impulsive impact pile drivers frequently used at large-scale construction sites. Potential impacts on the nearest residences would be anticipated to be negligible, considering the distance to the nearest residences (about 12 mi [19 km] from the southern 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 within the proposed Dry Lake SEZ would cause negligible unavoidable, but localized, short-term noise impacts on neighboring communities, even when construction activities occurred near the southern 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

[11] For this analysis, background levels of 40 and 30 dBA for daytime and nighttime hours, respectively, are assumed, which result in a day-night average noise level (L_{dn}) of 40 dBA.

ground vibration to some degree, but activities that typically generate the most severe vibrations are high-explosive detonations and impact pile driving. As is the case 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 pile driving for dish engines.

For this analysis, the impacts of construction and operation of transmission lines outside of the SEZ were not assessed, assuming that the existing regional 500-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 could occur within the SEZ. Potential noise impacts on nearby residences would be a minor component of construction impacts in comparison to solar facility construction, and would be temporary in nature.

11.3.15.2.2 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 firewater pump engines would be additional sources of noise, but their operations would be limited to several hours per month (for preventive maintenance testing).

With respect to the main solar energy technologies, noise-generating activities in the PV solar array area would be minimal, related mainly to solar tracking, if used. On the other hand, dish engine technology, which employs collector and converter devices in a single unit, 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 around the power block would be more than 85 dBA, but about 51 dBA at the facility boundary, about 0.5 mi (0.8 km) from the power block area. For a facility located near the southern SEZ boundary, the predicted noise level would be about 20 dBA at the nearest residences, located about 12 mi (19 km) from the SEZ boundary, which is well below the typical daytime mean rural background level of 40 dBA. If TES were not used (i.e., if the operation were limited to daytime, 12 hours only[12]), the EPA guideline level of 55 dBA (as L_{dn} for residential areas) would occur at

[12] Maximum possible operating hours at the summer solstice, but limited to 7 to 8 hours at the winter solstice.

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 40 dBA L_{dn} (i.e., no contribution from facility operation) would be estimated. This is well below the EPA guideline of 55 dBA L_{dn} for residential areas. As for construction, if two parabolic trough and/or power tower facilities were operating close to the nearest residences, combined noise levels would be about 23 dBA, 3 dBA higher than the value for a single project. These levels are still well below the typical daytime mean background level of 40 dBA, and their contribution to existing L_{dn} levels would be minimal. However, day–night average noise levels higher than those estimated above by using simple noise modeling would be anticipated if TES were used during nighttime hours, as explained below and in Section 4.13.1.

On a calm, clear night typical of the proposed Dry Lake 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[13] within 1 or 2 mi (1.6 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 noise levels are lowest. To estimate the 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 residences (about 12 mi [19 km] from the southern SEZ boundary) would be 30 dBA, which is equivalent to the typical nighttime mean rural background level of 30 dBA. The day–night average noise level is estimated to be about 41 dBA L_{dn}, which is still well below the EPA guideline of 55 dBA L_{dn} 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 41 dBA L_{dn} at the nearest residences, even if TES were used at a solar facility. Consequently, operating parabolic trough or power tower facilities using TES and located near the southern SEZ boundary could result in minimal adverse noise impacts on the nearest residences, depending on background noise levels and meteorological conditions.

Associated with operation of solar facilities occurring near the western SEZ boundary and using TES, the estimated daytime level of 48 dBA at the boundary of the Coyote Springs ACEC is higher than the typical daytime mean rural background level of 40 dBA, while the estimated nighttime level of 58 dBA is much higher than the typical nighttime mean rural background level of 30 dBA. However, sound levels above 90 dB are likely to adversely affect wildlife; thus, operation noise from solar facilities with TES is not likely to adversely affect wildlife at the nearby specially designated areas (Manci et al. 1988). For a solar facility near the southern SEZ boundary, daytime and nighttime noise levels at the Old Spanish National Historic Trail are estimated to be 39 and 49 dBA, respectively. Operations noise from a solar facility with TES would not be anticipated to affect any daytime activities at the Old Spanish National Historic Trail, but could have adverse impacts on nighttime activities there. A considerable portion of the operation noise might be masked by nearby road traffic on I-15, railroad traffic, and industrial activities along I-15.

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[13] A shadow zone is defined as the region in which direct sound does not penetrate because of upward diffraction.

In the permitting process, refined noise propagation modeling might 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 proposed Dry Lake SEZ, on the basis of the assumption of dish engine facilities of up to 1,391-MW total capacity (covering 80% of the total area, or 12,519 acres [50.7 km^2]), up to 55,640 25-kW dish engines could be employed. For a large dish engine facility, about a thousand step-up transformers would be embedded in the dish engine solar field, along with a substation; however, the noise from these sources would be masked by dish engine noise.

The composite noise level of a single dish engine would be about 88 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 330 ft (100 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, they would be about 51 dBA at 1.0 mi (1.6 km) and 47 dBA at 2 mi (3 km) from the boundary of the square-shaped dish engine solar field; both values are higher than the typical daytime mean rural background level of 40 dBA. However, these levels would occur at somewhat shorter distances than the aforementioned distances, considering noise attenuation by atmospheric absorption and temperature lapse during daytime hours. To estimate noise levels at the nearest residences, it was assumed dish engines were placed all over the Dry Lake SEZ at intervals of 98 ft (30 m). Under these assumptions, the estimated noise level at the nearest residences, about 12 mi (19 km) southwest of the SEZ boundary, would be about 32 dBA, which is below the typical daytime mean rural background level of 40 dBA. On the basis of 12-hr daytime operation, the estimated 40 dBA L_{dn} at these residences (i.e., no contribution from dish engines) is well below the EPA guideline of 55 dBA L_{dn} for residential areas. On the basis of other noise attenuation mechanisms, noise levels at the nearest residences would be lower than the values estimated above. Accordingly, noise from dish engines is not anticipated to cause adverse impacts on the nearest residences, even assuming lower background noise levels and unfavorable meteorological conditions.

For dish engines placed all over the SEZ, estimated noise levels would be about 54 and 47 dBA at the boundaries of the Coyote Springs ACEC and Old Spanish National Historic Trail, respectively, which are higher than the typical daytime mean rural background level of 40 dBA. However, dish engine noise from the SEZ is not likely to adversely affect wildlife at the nearby specially designated areas (Manci et al. 1988). In addition, dish engine noise from the SEZ could have some adverse impacts on the Old Spanish National Historic Trail. A considerable portion of this dish engine noise might be masked by nearby road traffic on I-15, railroad traffic, and industrial activities along I-15.

Thus, consideration of minimizing noise impacts is very important when siting dish engine facilities. Direct mitigation of dish engine noise through noise control engineering could also be considered, depending on refined noise modeling in the permitting process.

During operations, no major ground-vibrating equipment would be used. In addition, no sensitive structures are located close enough to the proposed Dry Lake SEZ to experience physical damage. Therefore, during operation of any solar facility, potential vibration impacts on surrounding communities and vibration-sensitive structures would be negligible.

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 not be heard at the nearest residences, assuming a 12.5-mi (20-km) distance (at least 0.5 mi [0.8 km] to the facility boundary and 12 mi [19 km] to the nearest residences). Accordingly, potential impacts of these noise sources on the nearest residences would be negligible.

For impacts from transmission line corona discharge noise during rainfall events (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 tower would be about 39 and 31 dBA (Lee et al. 1996), respectively, typical of daytime and nighttime mean background noise levels in rural environments. The noise levels at 65 ft (20 m) and 300 ft (91 m) from the center of 500-kV transmission line towers would be about 49 and 42 dBA, typical of high-end and mean, respectively, daytime background noise levels in rural environments. Corona noise includes high-frequency components, which may be judged to be more annoying than other environmental noises. However, corona noise would not likely cause impacts, unless a residence was located close to the source (e.g., within 500 ft [152 m] of a 230-kV transmission line or 0.5 mi [0.8 km] of a 500-kV transmission line). The proposed Dry Lake SEZ is located in an arid desert environment, and incidents of corona discharge would be infrequent. Therefore, potential impacts on nearby residents along the transmission line ROW would be negligible.

11.3.15.2.3 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 for construction, but more limited. 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 minimal and temporary in nature. The same mitigation measures 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 negligible.

11.3.15.3 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. Due to the considerable separation distances, activities within the proposed Dry Lake SEZ during construction and operation would be anticipated to cause only minimal increases in noise levels at the nearest residences and to have minor impacts on nearby specially designated areas. Accordingly, no SEZ-specific design features are required.

11.3.16 Paleontological Resources

11.3.16.1 Affected Environment

The surface geology of the proposed Dry Lake SEZ is predominantly composed of thick alluvial deposits (more than 100-ft [30.5-m] thick), ranging in age from the Pliocene to Holocene, with some playa deposits of similar age in the east-central portion of the SEZ. The total acreage of the alluvial deposits within the SEZ is 14,063 acres (57 km^2), or nearly 90% of the SEZ; there are 980 acres (4 km^2) of playa deposits, or 6% of the SEZ. Portions of the western edge of the SEZ are composed of residual materials developed in carbonate rocks. These discontinuous residual deposits account for 648 acres (2.6 km^2), or slightly more than 4% of the SEZ. In the absence of a PFYC map for Nevada, a preliminary classification of PFYC Class 3b is assumed for the playa and residual 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). A preliminary classification of PFYC Class 2 is assumed for the young Quaternary alluvial deposits, similar to that assumed for the Amargosa Valley SEZ (Section 11.1.16). Class 2 indicates that the potential for the occurrence of significant fossil material is low.

11.3.16.2 Impacts

Few, if any, impacts on significant paleontological resources are likely to occur in 90% of the proposed Dry Lake SEZ. However, a more detailed look at the geological deposits of the SEZ is needed to determine whether a paleontological survey is warranted. If the geological deposits are determined to be as described above and are classified as PFYC Class 2, further assessment of paleontological resources in most of the SEZ is not likely to be necessary. Important resources could exist; if identified, they would need to be managed on a case-by-case basis. The potential for impacts on significant paleontological resources in the remaining 10% of the SEZ is unknown. A more detailed investigation of the playa and residual deposits is needed prior to project approval. A paleontological survey will likely be needed following consultation with the BLM. The appropriate course of action would be determined as established in BLM IM2008-009 and IM2009-011 (BLM 2007a, 2008c). Section 5.14 discusses the types of impacts that could occur to any significant paleontological resources found to be present within the Dry Lake SEZ. Impacts would be minimized through the implementation of required 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 are currently anticipated for the Dry lake SEZ, assuming existing corridors would be used; thus no impacts on paleontological resources are anticipated related to the creation of new access pathways. Impacts on paleontological resources related to the creation of new corridors not assessed in this PEIS 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 excavation of the resource, if warranted. Depending on the significance of the find, it could also result in some modification to the project footprint. Since the SEZ is located in an area partially classified as PFYC Class 3b, a stipulation would be included in permitting documents to alert solar energy developers of the possibility of a delay if paleontological resources were uncovered during surface-disturbing activities.

11.3.16.3 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.

If the geological deposits are determined to be as described above and are classified as PFYC Class 2, mitigation of paleontological resources within 90% of the Dry Lake SEZ is not likely to be necessary. The need for and nature of any SEZ-specific design features for the remaining 10% of the SEZ would depend on the results of future paleontological investigations.

11.3.17 Cultural Resources

Cultural resources present or adjacent to the Dry Lake SEZ include archaeological sites, landscapes, and features sacred to Native Americans; prehistoric and historic trails; historic railroad grades and associated sites; historic mining camps and associated artifacts and sites relating to the NTS and Nellis Air Force Base.

11.3.17.1 Affected Environment

11.3.17.1.1 Prehistory

The proposed Dry Lake SEZ is located in the eastern portion of the Mojave Desert, within the geographical area referred to as the Great Basin. The earliest known human use of the area was likely during the Paleoindian Period, sometime between 12,000 and 10,000 years B.P. Surface finds of Paleoindian fluted projectile points, the hallmark of the Clovis culture, have been found in the area, but no sites with any stratigraphic context have been excavated. The Clovis culture is characterized by the aforementioned fluted projectile point and a hunting and gathering subsistence economy that followed migrating herds of Pleistocene mega fauna. The ephemeral nature of Paleoindian sites in the southeastern Great Basin has given rise to speculation that the Paleoindians may have been inclined to subsist off of the lake and marsh habitats provided by the ancient Pleistocene pluvial lakes that occupied a large portion of the Great Basin, and consequently the sites are difficult to find because they have been buried by the ebb and flow of the pluvial lakes. This slightly later cultural material associated with the pluvial lake habitations is referred to as the Western Pluvial Lakes Tradition or Lake Mojave culture. The archaeological assemblage associated with this cultural tradition is characterized by stemmed projectile points, leaf-shaped bifaces, scrapers, crescents, and in some cases groundstone tools for milling plant material (Fowler and Madsen 1986).

The Early Archaic Period in the region began with the recession of most of the pluvial lakes in the area, about 8,000 to 6,000 B.P. and lasted until about 4,000 B.P. Archaic Period groups likely still congregated around marsh areas, but also used the vast caves that can be found in the mountains of the Great Basin. The settlement system in some areas was likely based around a central base camp, with temporary camps on the margins of their territory to exploit resources not in the immediate vicinity. Some of the key Archaic sites in the area near the proposed Dry Lake SEZ are Corn Creek Dunes and Tule Springs, both located north of Las Vegas and west of the proposed SEZ; Stuart Rockshelter to the north of the SEZ; and Gypsum Cave to the south. The Lake Lahontan Basin, a large Pleistocene pluvial lake north of the proposed Dry Lake SEZ, is also home to several early Archaic Period sites; the archaeological assemblages from these sites maintain some cultural continuity with the previous period, consisting of Pinto points, leaf-shaped bifaces, scrapers, drills, gravers, and manos and metates (Fowler and Madsen 1986).

The Middle Archaic Period, 4,000 to 1,500 B.P., saw the climactic shift known as the Little Pluvial, a wetter and cooler climate that caused some of the pluvial lakes to fill back up.

The cultural material of this time period is similar to that of the Early Archaic, with an increased concentration of millingstones, mortars, and pestles and the appearance of normally perishable items, such as wicker baskets, split-twig figurines, duck decoys, and woven sandals (Neusius and Gross 2007).

In the vicinity of the proposed Dry Lake SEZ, the Late Archaic Period began about 1,500 B.P. and extended until contact with the Europeans. This period saw major technological shifts, evidenced by smaller projectile points that were more useful because groups began using bow-and-arrow technology instead of the atlatl, and by changes in subsistence techniques in the use of horticulture. Most groups in the Muddy and Virgin River valleys were a part of the Virgin Anasazi cultural group, an extension of the Puebloan groups from the southwest into the Great Basin region. These groups brought with them the knowledge of horticulture, which they used on the floodplains of the river valleys which they inhabited. Pueblo Grande de Nevada, east of the proposed Dry Lake SEZ near Overton, Nevada, is a prime example of the Virgin Anasazi culture in the vicinity of the SEZ. Also characteristic of this period are grey-ware ceramics (sometimes decorated), rock art and intaglios, bedrock milling features, and turquoise mining. A site consisting of rock circles in association with Paiute ceramics has been documented in the central portion of the proposed Dry Lake SEZ. The following section describes the cultural history of the time period in greater detail.

11.3.17.1.2 Ethnohistory

The proposed Dry Lake SEZ is located within the traditional use area of the Southern Paiute. While Southern Paiute groups tended to be wide ranging and shared resources, the SEZ lies in the area most often attributed to the Moapa Band, whose core areas of settlements and activities were along the Moapa or Muddy River and the Virgin River (Kelly 1934; Kelly and Fowler 1986). The Moapa Valley was a central location where the western Southern Paiute bands gathered and traded (Stoffle and Dobyns 1983) and may have been associated with the ritually important Salt Song Trail (Laird 1976). Close to this important gathering place, the SEZ is likely to have been known to many of the Southern Paiute bands, including the neighboring Las Vegas Band, other bands traveling along the Moapa River to the Colorado River, and well-traveled groups of Chemehuevi.

Southern Paiute

The Southern Paiute appear to have moved into southern Nevada and southwestern Utah about 1150 (Euler 1964). Most of the territory occupied by the Southern Paiute lies within the Mojave Desert, stretching from the high Colorado Plateaus westward through canyon country and southwestward following the bend in the Colorado River through the Basin and Range geologic province into southeastern California. The territory includes several different vegetation zones, reflected in corresponding differences in subsistence practices. There is some evidence that before the arrival of Euro-American colonists, the Southern Paiute may have been organized on a tribal level under the ritual leadership of High Chiefs and that their territory was bound together by a network of trails used by specialist runners (Stoffle and Dobyns 1983). The proposed Dry Lake SEZ falls within *Paranayi*, the western subdivision of the Southern Paiute Nation (Stoffle et al. 1997). Situated in the Dry Lake Valley, it is directly adjacent to the Moapa River Reservation. It is bounded on the east and west by low but rugged mountains characteristic of Moapa Band territory (Kelly 1934). The culturally important Arrow Canyon Range is on the east and the Dry Lake Range on the west. The nearby ribbon oasis of the Virgin River and its tributaries was the single most important ribbon oasis in Southern Paiute Territory (Stoffle and Dobyns 1983).

When first described by ethnographers, Southern Paiute groups had survived a 75% reduction in population resulting from the spread of European diseases, Ute slave raids, and displacement from high-quality resource areas by Euro-American settlers. They did not maintain any overall tribal organization; territories were self-sufficient economically; and the only known organizations were kin-based bands, often no larger than that of a nuclear family (Kelly and Fowler 1986). The Southern Paiute practiced a mixed subsistence economy. They maintained floodplain and irrigated agricultural fields and husbanded wild plants through transplanting, pruning, burning, and irrigation. They supplemented their food supply by hunting and fishing (Stoffle and Dobyns 1983). The diet of the Southern Paiute was varied, but the harsh climate of the area at times made subsistence precarious. They made use of a wide variety of indigenous plants. Botanical knowledge was maintained primarily by the women, and this knowledge of seasonal plant exploitation meant that at times the agricultural fields would have been little maintained while groups were away from their base camp gathering resources (Stoffle et al. 1999). The Southern Paiute maintained dwellings to match the seasons. In the summer, they constructed sun shades and windbreaks. After the fall harvest, they resided in conical or subconical shaped houses or in caves. It was not until the late nineteenth century that teepees and sweathouses were adopted from the Utes. Basketry was one of the most important crafts practiced by the Southern Paiute. Conical burden baskets, fan-shaped trays for winnowing and parching, seed beaters, and water jugs were made from local plants. Pottery, usually unfired, was also made for daily use. The annual cycle of seasonal plant exploitation required great mobility on the part of the Southern Paiute, and consequently they often used the lightweight burden baskets (Kelly and Fowler 1986).

The Southern Paiute were not a war-like group, and consequently they were often the target of raids by their more aggressive neighbors. Despite the Ute aggression, the Southern Paiute were on friendly terms with most of the other groups north of the Colorado River and would visit, trade, hunt, or gather in each other's territory and occasionally intermarry.

The arrival of Europeans in the New World had serious consequences for the Southern Paiute. Even before direct contact occurred, the spread of European diseases and the slave trade implemented by Utes and Navajo on horseback for the Spanish colonial markets in New Mexico, Sonora, and California resulted in significant depopulation. The Southern Paiutes retreated from areas where there was an increased presence of Euro-American travelers, such as along the Old Spanish Trail. They were further displaced by Euro-American settlers in Utah and Nevada, who sought the same limited water supplies used by the Southern Paiute. Dependence on wild plant resources increased during this time, as the Southern Paiute withdrew into more remote areas. As Euro-American settlements grew, the Southern Paiute were drawn into the new economy, often serving as transient wage labor. Settlements or colonies of laborers grew up around settlements, farms, and mines, often including individuals from across the Southern Paiute homeland (Kelly and Fowler 1986).

In 1865, an initial attempt by the U.S. Government to settle the Southern Paiutes in northeastern Utah with their traditional enemies, the Utes, failed. Mormon settlers began to arrive in the Moapa Valley the same year, but returned to Utah in 1871. The Moapa River Reservation was established in 1875, although the original reservation as authorized by President Ulysses S. Grant was severely reduced by Congress to 1,000 acres (4 km^2) of mostly unirrigable land. Nonetheless, limited commercial farming was established. Although plagued by disease and poor water, the reservation slowly became more prosperous. Capitalizing on its share of a judgment awarded by the Indian Claims Commission and on the 1980 restoration of part of their original reservation, Moapa River Reservation has continued to develop into a center of Southern Paiute activity (Stoffle and Dobyns 1983).

11.3.17.1.3 History

The earliest documented European presence in the Great Basin region was the Dominguez-Escalante Expedition, which began in July 1776.[14] Two Catholic priests, Fathers Francisco Atanasio Dominguez and Silvestre Velez de Escalante, were looking for a route from the Spanish capital city of Santa Fe to the Spanish settlement of Monterey on the California coast. The group did not initially complete the goal of reaching California—they turned back to Santa Fe when the weather got too bad; however, their maps and journals describing their travels and encounters would prove valuable to later expeditions that traversed the area, such as Spanish/New Mexican traders and Anglo-American fur trappers traveling the Old Spanish Trail in the 1820s and 1830s (BLM 1976).

The Old Spanish Trail was an evolving trail system generally established in the early nineteenth century, tending to follow previously established paths used by earlier explorers like Dominguez and Escalante, but also Native Americans. The trail is not a direct route due to a desire to avoid hostile Indian Tribes, as well as natural land formations such as the Grand Canyon. Several forks and cutoffs were established as more and more travelers made use of the trail system. The 2,700-mi (4,345-km) trail network crosses through six states with various paths between Santa Fe and Los Angeles. It was used primarily between 1829 and 1848 by New Mexican traders exchanging textiles for horses. In 1829 while following the Old Spanish Trail, Antonio Armijio found an oasis that served as a crucial stopping point along the trail. This oasis was named Las Vegas, Spanish for "The Meadows," and in utilizing this oasis groups traveling on the trail were able to significantly shorten their trip through the harsh desert (Fehner and Gosling 2000). The Old Spanish National Historic Trail is a congressionally designated trail, and consequently, the trail, trail resources, and setting are required to be managed in accordance with the National Trail System Act. Within the eastern portion of the proposed Dry Lake SEZ, a site is identified as a portion of the Old Spanish Trail and is listed in the NRHP as part of a larger

[14] Although slavery was technically illegal, traders from New Spain (New Mexico) would travel north to acquire Native American slaves for New Mexican settlers from at least the mid 1700s.

Old Spanish Trail/Mormon Road District. However, this section of trail is not identified as part of the congressionally designated Old Spanish National Historic Trail, located farther to the east.

With the ratification of the Treaty of Guadalupe Hidalgo in 1848, which closed out the Mexican-American War, the area came under American control. In 1847, the first American settlers arrived in the Great Basin, among them Mormon immigrants under the leadership of Brigham Young, who settled in the Valley of the Great Salt Lake in Utah. They sought to bring the entire Great Basin under their control, establishing an independent State of Deseret. From its center in Salt Lake City, the church sent out colonizers to establish agricultural communities in surrounding valleys and missions to acquire natural resources such as minerals and timber. Relying on irrigation to support their farms, the Mormons often settled in the same places as the Fremont and Virgin Anasazi centuries before. The result was a scattering of planned agricultural communities from northern Arizona to southern Idaho and parts of Wyoming, Nevada, and southern California. In 1855 Brigham Young sent 30 men, led by William Bringhurst, to the Las Vegas valley, southwest of the proposed Dry Lake SEZ, in an effort to establish a mission in the southern portion of Nevada. They called their mission Las Vegas Fort, but stayed in the area for only a few years before abandoning the mission because of the harsh climate and the closing of the nearby Potosi mine that provided the majority of the income and patronage at the mission (Fehner and Gosling 2000).

Nevada's nickname is the "Silver State," so named for the 1859 Comstock Lode strike in Virginia City about 290 mi (467 km) north of the proposed Dry Lake SEZ. This was the first major silver discovery in the United States, and with the news of the strike hopeful prospectors flocked to the area in an effort to capitalize on the possible wealth under the surface of the earth. The discovery of the Comstock Lode led to the creation of Virginia City and other nearby towns that served the burgeoning population influx. The population increase was so dramatic that in 1850 there were less than a dozen non-native people in the state of Nevada; by 1860 there were 6,857; and by 1875 an estimated 75,000 people had migrated to the state. The Comstock Lode strike is important to the history of Nevada not only because of the population growth and significant amount of money that was consequently brought to the area, but also for technological innovations that were created and employed in the mines, namely, the use of square-set timbering. This technique kept loose soil from collapsing on miners, a concept that eventually was employed around the world in other mines (Paher 1970).

Mining for valuable deposits occurred in all regions of the state of Nevada, including in the vicinity of the proposed Dry Lake SEZ. Clark County is home to the earliest lode mine in the state at Potosi mine, about 65 mi (105 km) southwest of the proposed Dry Lake SEZ. Other notable mines were Goodspring Mine, near Jean, Nevada; Searchlight Mine, at the town of the same name; and El Dorado Canyon Mine, near Nelson, Nevada, all located about 15 to 20 mi (24 to 32 km) southwest of Las Vegas. There were also two smaller mines closer to the proposed Dry Lake SEZ: Key West, a copper mine near Glendale, Nevada, northwest of the SEZ; and Gold Butte, a short-lived gold mine east of the SEZ, on the eastern side of Lake Mead. Mining in the area was likely undertaken by the Native Americans in the area prior to the arrival of the Euro-Americans, mainly for copper deposits. Intensive mining by Euro-Americans began around 1865 at the Potosi mine by Mormons, and continued until the abandonment of the area by the Mormons about 1863.

The construction of railroads in Nevada was often directly related to the mining activities that occurred in the state, and the San Pedro, Salt Lake, and Los Angeles Railroad acted as a stimulant to the depraved mining economy with its construction in 1905. A portion of the still-used railroad runs through the extreme far eastern portion of the proposed Dry Lake SEZ. The construction of this railroad was one of the most significant factors in making Las Vegas the city that it has become. At the turn of the nineteenth century, no railroad existed that connected two of the largest towns in the western United States, Salt Lake City and Los Angeles. Fierce competition between U.S. Senator William Clark and UP owner Edward Harriman ensued, eventually resulting in Clark constructing the critical railroad, shortening the trip from Salt Lake City to Los Angeles to one day and making Las Vegas a critical railroad hub along the line. Several sites have been documented in the SEZ related to the railroad and its construction. The railroad itself has been designated as a site, although it is currently under the ownership of the UP Railroad. This railroad passes through the southeastern portion of the SEZ. Another recorded site is a railroad grade affiliated with the San Pedro, Salt Lake, and Los Angeles Railroad. Two railroad camps associated with the construction of the San Pedro, Salt Lake, and Los Angeles Railroad have been documented in the SEZ: one of the sites consists of 31 features, 28 of which are structures; and another consists of several structural features and artifact scatters—both sites are in the southeastern portion of the SEZ. In addition to the railroads and the Old Spanish Trail, the Old Arrowhead Highway passes through portions of the proposed Dry Lake SEZ. Currently a frontage road for I-15, this road was the earliest highway developed across southern Nevada, connecting Las Vegas and St. Thomas (a town now under Lake Mead, south of Overton). Completed in 1915, this road followed portions of earlier emigrant trails, and although it was renamed several times in its existence, it continued to provide a valuable transportation route for southern Nevada until the construction of I-15.

Several historic towns in the vicinity of the proposed Dry Lake SEZ were not related to mining activities but to Mormon settlement: West Point, Nevada (near present day Glendale); St. Joseph, Nevada; Junction City, Nevada; and St. Thomas, Nevada. Although all but West Point are now under Lake Mead, remnants of some of the foundations of some of the buildings can be seen when the lake levels are low. The Mormon presence in southern Nevada is further evidenced by the fact that the Old Spanish Trail is also sometimes referred to as the Mormon Road, because this route became a popular emigrant route for the Mormons to take from Salt Lake City to points south (Fehner and Gosling 2000; Paher 1970).

Nevada's desert-mountain landscape has made it a prime region for use by the U.S. military for several decades. Beginning in October 1940, President Franklin D. Roosevelt established the Las Vegas Bombing and Gunnery Range, a 3.5-million-acre (14,164-km^2) parcel of land northwest of Las Vegas, near Indian Springs, Nevada. The main purpose of the range was to serve as air-to-air gunnery practice, but at the end of World War II, the gunnery range was closed. It was reopened at the start of the Cold War in 1948, recommissioned as the Las Vegas Air Force Base, and later renamed Nellis Air Force Base in 1950 (Fehner and Gosling 2000).

Prior to the dropping of the atomic bomb on the Japanese cities of Nagasaki and Hiroshima, the only testing of nuclear weapons on U.S. soil was at the Trinity site, near Los Alamos Laboratory in Alamogordo, New Mexico. Tests of nuclear weapons had been conducted at the newly acquired Marshall Islands in the Pacific, but because of logistical constraints, financial expenditures, and security reasons, a test site for nuclear weapons was needed in a more convenient region. Project Nutmeg commenced in 1948 as a study to determine the feasibility and necessity of a test site in the continental United States. It was determined that because of public relations issues, radiological safety, and security issues, a continental test site should be pursued only in the event of a national emergency. In 1949 that emergency occurred when the Soviet Union conducted its first test of a nuclear weapon and the Korean War started in the summer of 1950. Five initial test sites were proposed: Alamogordo/White Sands Missile Range in New Mexico, Camp LeJeune in North Carolina, the Las Vegas–Tonopah Bombing and Gunnery Range in Nevada, a site in central Nevada near Eureka, and Utah's Dugway Proving Ground/Wendover Bombing Range. Several factors were considered in making the final decision, such as fallout patterns, prevailing winds and predictability of weather, terrain, downwind populations, security, and public awareness and relations. The Las Vegas–Tonopah Bombing and Gunnery Range was chosen as the NTS by President Truman in December 1950.

Covering 879,997 acres (3,561 km^2), the NTS was a part of the Las Vegas–Tonopah Bombing and Gunnery Range, stretching from Mercury, Nevada in the southeast to Pahute Mesa in the northwest. The first set of nuclear tests was conducted in January 1951, originally named FAUST (First American Drop United States Test) and later renamed Ranger; these bombs were detonated over Frenchman Flat, an area about 70 mi (113 km) west of the proposed Dry Lake SEZ. Tests were later conducted at Yucca Flat, an area northwest of Frenchman Flat, in an effort to minimize the effect of the blasts on the population in Las Vegas, which reported some disturbances (nonradiological in nature) from the series of tests conducted at Frenchman Flat. Tests were also conducted at Jackass Flats, west of the proposed Dry Lake SEZ, and Pahute Mesa, north and west of the proposed Dry Lake SEZ. Nuclear tests were conducted in an effort to verify new weapons concepts, proof test existing weapons, test the impact of nuclear weapons on man-made structures and the physical environment, and conduct experimental testing in search of possible peaceful uses, namely, the Pluto ramjet, Plowshare, and Rover rocket programs. The Pluto ramjet project was funded by the Air Force to design a system that could propel a vehicle at supersonic speeds and low altitudes, while the Rover rocket was a design for a nuclear-powered rocket for space travel. The Plowshare project was an attempt to show that nuclear weapons could be effective in moving large amounts of earth for canal and harbor construction. None of these three projects resulted in any sustained results in terms of their goals, yet they were important in their contribution to the overall work done at the NTS. In the fall of 1958, President Dwight Eisenhower declared a moratorium on nuclear testing, with the Soviet Union following suit, until 1961 when testing resumed. However, this testing was performed mostly underground at the NTS, and most atmospheric tests were conducted in the Pacific. The last atmospheric test at the NTS was on July 17, 1962, with the Limited Test Ban Treaty being signed by the United States and the Soviet Union on August 5, 1963, ending nuclear testing in the atmosphere, ocean, and space. The last underground nuclear detonation at the NTS was on September 23, 1992, after which Congress declared a moratorium on nuclear testing. In 1996 a Comprehensive Test Ban Treaty was proposed by an international organization. It has yet to be ratified by the U.S. Senate, but nuclear tests have not been conducted since then. In total, 1,021 of the 1,149 nuclear detonations by the United States during the Cold War were conducted at the NTS (Fehner and Gosling 2000).

11.3.17.1.4 Traditional Cultural Properties—Landscape

The Southern Paiutes have traditionally taken a holistic view of the world, in which the sacred and profane are inextricably intertwined. According to their traditions, they were created in their traditional use territory and have a divine right to the land along with a responsibility to manage and protect it. Landscapes as a whole are often culturally important. Adverse effects on one part damage the whole (Stoffle 2001). From their perspective, landscapes include places of power. Among the most important such places are sources of water; peaks, mountains, and elevated features; caves; distinctive rock formations; and panels of rock art. Places of power are important to the religious beliefs of the Southern Paiute. They may be sought out for individual vision quests or healing and may likewise be associated with culturally important plant and animal species. The view from such a point of power or the ability to see from one important place to another can be an important element of its integrity (Stoffle and Zedeño 2001b). Landscapes as a whole are tied together by a network of culturally important trails (Stoffle and Dobyns 1983; Stoffle and Zedeño 2001a).

The proposed Dry Lake SEZ is close to the core traditional Southern Paiute use area formed by the Virgin River and its tributaries. The Virgin River lies 26 mi (42 km) to the east. Its major tributary, the Moapa River, which runs through the culturally important Arrow Canyon, is 14 mi (23 km) to the north–northeast. Euro-American travelers passing through the area in the mid-nineteenth century described well-developed Native American agriculture along the Moapa River. Arrow Canyon connected the Moapa River villages with summer villages to the northwest in Pahrangat Valley and was a source of game and important wild plants. The SEZ lies at the southern end of the Arrow Canyon Range, identified by Southern Paiutes from across their traditional range as culturally important, but of particular importance to the Moapa Band. The bajada at the northern end of this range traditionally was a culturally important meeting ground—the site of ceremonial gatherings and trade. The mountains themselves provided habitat for bighorn sheep an important game animal. Members of the Moapa Band also consider the Dry Lake Range to be culturally important, but somewhat less so than the Arrow Canyon Range (Stoffle and Dobyns 1983).

The southern Paiutes consider the visible remains of traditional foot paths, which have been identified by Southern Paiute informants, as a culturally significant part of the landscape (Stoffle and Dobyns 1983). Such trails tied villages and camps with important resources. Some trails have a ritual as well as a physical component. The Salt Song Trail, both a physical and spiritual trail, important in Southern Paiute mortuary rituals appears to cross the Moapa River in this area and proceeds to the southwest to the Las Vegas area, coming close to or through the SEZ (Laird 1976).

11.3.17.1.5 Cultural Surveys and Known Archaeological and Historical Resources

With respect to the proposed Dry Lake SEZ, 58 cultural resource surveys have been conducted in the SEZ, covering about 9,446 acres (38 km^2), 60.2% of the total SEZ area. Within 5 mi (8 km) of the proposed Dry Lake SEZ, another 125 surveys have been conducted. These surveys have resulted in the recording of 22 sites in the SEZ and at least 229 sites within 5 mi

(8 km) of the SEZ. Of the 22 sites in the SEZ, 7 are prehistoric; 15 are historic. Six of the sites in the SEZ have been determined to be eligible for inclusion in the NRHP (de Dufour 2009). The Old Spanish Trail/Mormon Road intersects the southeastern portion of the proposed Dry Lake SEZ. A railroad grade associated with the San Pedro, Salt Lake, and Los Angeles Railroad is also in the southeastern portion of the SEZ. The railroad itself and two camps affiliated with the construction of the railroad are also present within the SEZ boundaries. The Old Arrowhead Highway intersects portions of the proposed Dry Lake SEZ as well.

Of the 229 sites that have been documented within 5 mi (8 km) of the SEZ, 171 are prehistoric in nature, 56 are historic, and 2 are multicomponent. Fifteen of these sites have been determined to be NRHP-eligible. Nine of these sites are rockshelters and are located in the mountains surrounding the Dry Lake SEZ. Other prehistoric NRHP-eligible sites include a camp with fire-affected rock and metates and two lithic scatters likely dating to the Late Archaic Period. The NRHP-eligible sites from the historic period are all related to the railroad and its construction, including a campsite associated with the railroad and the historic trails that pass through the area, a railroad siding and a construction camp, and an historic camp associated with the railroad as well.

The BLM has designated several ACECs in the vicinity of the proposed Dry Lake SEZ to protect the cultural resources contained within these areas. The Hidden Valley ACEC is about 9 mi (14 km) east of the SEZ; the Rainbow Gardens ACEC is 10 mi (16 km) south; and the Arrow Canyon ACEC is about 13 mi (21 km) south. The Arden ACEC, Sloan Rock ACEC, and Virgin River ACEC are protected for their cultural resources but are located farther than 25 mi (40 km) from the SEZ.

Other known cultural resources near the Dry Lake SEZ are the congressionally designated Old Spanish National Historic Trail, including a high-potential segment; the San Pedro, Salt Lake, and Los Angeles Railroad (now the UP line); and the Old Arrowhead Highway. Additionally, the NTS and Nellis Air Force Base are located just west of the SEZ, adding to the rich cultural heritage of the region.

National Register of Historic Places

There is one property listed in the NRHP that falls within the boundaries of the SEZ, the Old Spanish Trail/Mormon Road. Six additional sites in the SEZ have been determined to be NRHP-eligible. Within 5 mi (8 km) of the SEZ there are no sites listed in the NRHP, however, 15 of these sites that have been documented have been determined to be NRHP-eligible.

In Clark County, 53 properties are listed in the NRHP, 32 of which are in Las Vegas or the vicinity of Las Vegas, about 17 mi (27 km) southwest of the proposed Dry Lake SEZ. Other NRHP sites are located in Overton (5 sites), 23 mi (37 km) east of the SEZ, and in Indian Springs (1 site), 25 mi (40 km) west of the SEZ. The remaining NRHP sites are further than 25 mi (40 km) from the SEZ: 6 in Boulder City, 4 in Mesquite and Bunkerville, 1 in Goodsprings, 2 in Laughlin, and 2 in Searchlight.

11.3.17.2 Impacts

Direct impacts on significant cultural resources could occur in the proposed Dry Lake SEZ; however, further investigation is needed. At least 22 sites have been recorded within the SEZ, one of which is listed in the NRHP, the Old Spanish Trail/Mormon Road, and 6 additional sites that have been determined to be NRHP-eligible. Consistent with findings at other SEZs, dune areas continue to have potential to contain significant sites within the valley floors suitable for solar development. A cultural resource survey of the entire area of potential effects, including consultation with affected Native American Tribes, would need to be conducted first to identify archaeological sites, historic structures and features, and traditional cultural properties, and then an evaluation would follow to determine whether any are eligible for listing in the NRHP as historic properties. Section 5.15 discusses the types of effects that could occur on the seven known sites and any additional significant cultural resources found within the proposed Dry Lake SEZ. Impacts would be minimized through the implementation of required programmatic design features described in Section A.2.2 of Appendix A. Programmatic design features assume that the necessary surveys, evaluations, and consultations will occur. No traditional cultural properties have been identified to date within the vicinity of the SEZ.

Indirect impacts on cultural resources that result from erosion outside of the SEZ boundary (including along ROWs) are unlikely, assuming programmatic design features to reduce water runoff and sedimentation are implemented (as described in Appendix A, Section A.2.2).

Visual impacts on the Old Spanish National Historic Trail are possible, but depending on the exact location of the high potential segment near the proposed SEZ, it would appear that intervening topography may alleviate the potential impact. Verification of the location of the trail would be needed to assess impact. GIS data for the congressionally designated National Historic Trail location and the site location of the NRHP-listed Old Spanish Trail/Mormon Road appear to be in conflict. If portions of the Old Spanish Trail National Register District go through the proposed SEZ, direct impacts could occur on the trail during construction.

No needs for new transmission or access corridors have currently been identified, assuming existing corridors would be used; therefore, no new areas of cultural concern would be made accessible as a result of development within the proposed Dry Lake SEZ, so indirect impacts resulting from vandalism or theft of cultural resources are not anticipated. However, impacts on cultural resources related to the creation of new corridors not assessed in this PEIS would be evaluated at the project-specific level if new road or transmission construction or line upgrades are to occur.

11.3.17.3 SEZ-Specific Design Features and Design Feature Effectiveness

Programmatic design features to mitigate adverse effects on significant cultural resources, such as avoidance of significant sites and features, cultural awareness training for the workforce, and measures for addressing possible looting/vandalism issues through formalized agreement documents, are provided in Appendix A, Section A.2.2.

. SEZ-specific design features would be determined in consultation with the Nevada SHPO and affected Tribes and would depend on the results of future investigations.

- Coordination with the Trail Administration for the Old Spanish Trail and Old Spanish Trail Association is recommended for identifying potential mitigation strategies for avoiding or minimizing potential impacts on the congressionally designated Old Spanish National Historic Trail, and also to any remnants of the NRHP-listed site associated with the Old Spanish Trail/Mormon Road that may be located within the SEZ. Avoidance of the Old Spanish Trail NRHP-listed site within the southeastern portion of the proposed SEZ is recommended.

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11.3.18 Native American Concerns

Native Americans share many environmental and socioeconomic concerns with other ethnic groups. This section focuses on concerns that are specific to Native Americans or to which Native Americans bring a distinct perspective. For a discussion of issues of possible Native American concern shared with the population as a whole, several sections in this PEIS should be consulted. General topics of concern are addressed in Section 4.16. Specifically for the proposed Dry Lake SEZ, Section 11.3.17 discusses archaeological sites, structures, landscapes, trails, and traditional cultural properties; Section 11.3.8 discusses mineral resources; Section 11.3.9.1.3 discusses water rights and water use; Section 11.3.10 discusses plant species; 11.3.11 discusses wildlife species, including wildlife migration patterns; Section 11.3.13 discusses air quality; Section 11.3.14 discusses visual resources; Sections 11.3.19 and 11.3.20 discuss socioeconomics and environmental justice, respectively; and issues of human health and safety are discussed in Section 5.21.

11.3.18.1 Affected Environment

The proposed Dry Lake SEZ falls within the Tribal traditional use area generally attributed to the Southern Paiute (Kelly and Fowler 1986). All federally recognized Tribes with Southern Paiute roots have been contacted and provided an opportunity to comment or consult regarding this PEIS. They are listed in Table 11.3.18.1-1. Details of government-to-government consultation efforts are presented in Chapter 14; a listing of all federally recognized Tribes contacted for this PEIS is found in Appendix K.

TABLE 11.3.18.1-1 Federally Recognized Tribes with Traditional Ties to the Proposed Dry Lake SEZ

Tribe	Location	State
Chemehuevi Indian Tribe	Lake Havasu	California
Kaibab Paiute Tribe	Fredonia	Arizona
Las Vegas Paiute Tribe	Las Vegas	Nevada
Moapa Band of Paiutes	Moapa	Nevada
Pahrump Paiute Tribe	Pahrump	Nevada
Paiute Indian Tribe of Utah	Cedar City	Utah
Cedar Band	Cedar City	Utah
Indian Peak Band	Cedar City	Utah
Kanosh Band	Kanosh	Utah
Koosharem Band	Cedar City	Utah
Shivwits Band	Ivins	Utah
San Juan Southern Paiute Tribe	Tuba City	Arizona

11.3.18.1.1 Territorial Boundaries

Southern Paiutes

The traditional territory of the Southern Paiute lies mainly in the Mojave Desert, stretching from California to the Colorado Plateau. It generally follows the right bank of the Colorado River, including its tributary streams and canyons in southern Nevada and Utah; this includes most of Clark and Lincoln Counties in Nevada and extends as far north as Beaver County in Utah (Kelly and Fowler 1986). This area has been judicially recognized as the traditional use area of the Southern Paiute by the Indian Claims Commission (Royster 2008).

11.3.18.1.2 Plant Resources

The Southern Paiutes continue to make use of a wide range of indigenous plants for food, medicine, construction material, and other uses. The vegetation present at the proposed Dry Lake SEZ is described in Section 11.3.10. The cover type present at the SEZ is predominantly Sonora–Mojave Creosotebush–White Bursage Desert Shrub, with smaller areas of North American Warm Desert Playa, and small patches of Sonora-Mojave Mixed Salt Desert Scrub, and North American Warm Desert Wash (USGS 2005a). The SEZ is sparsely vegetated and crisscrossed with dirt roads and power lines. It includes part of a dry lake or playa. Creosotebush and white bursage are the dominant species, with some mesquite and yucca appearing in swale and wash environments. Of these, creosotebush has Native American medicinal uses, while mesquite and yucca were food sources. As shown in Table 11.3.18.1-2, there are likely to be some plants used by Native Americans for food in the SEZ (Stoffle et al. 1999; Stoffle and Dobyns 1983). Project-specific analyses will be needed to determine their presence at any proposed building site. Traditional plant knowledge is found most abundantly among Tribal elders, especially female elders (Stoffle et al. 1999).

11.3.18.1.3 Other Resources

Members of the Moapa Band rate springs as the most important cultural resource in their cultural landscape (Stoffle and Dobyns 1983). Water is an essential prerequisite for life in the arid areas of the Great Basin. As a result, water is a keystone of many desert cultures' religion. They tend to consider all water sacred and a purifying agent. Water sources are often associated with rock art. Springs are often associated with powerful beings, and hot springs in particular figure in Southern Paiute creation stories. Water sources are seen as connected, so damage to one damages all (Fowler 1991; Stoffle and Zedeño 2001a). Tribes are also sensitive regarding the use of scarce local water supplies for the benefit of far-distant communities and recommend determination of adequate water supplies be a primary consideration in determining whether a site is suitable for the development of a utility-scale solar energy facility (Moose 2009).

TABLE 11.3.18.1-2 Plant Species Important to Native Americans Observed or Likely To Be Present in the Proposed Dry Lake SEZ

Common Name	Scientific Name	Status
Food		
Beavertail Prickly Pear	*Opuntia basilaris*	Observed
Desert Trumpet (Buckwheat)	*Eriogonum inflatum*	Observed
Cat Claw	*Acacia greggii*	Possible
Cholla Cactus	*Cylindropuntia* spp.	Observed
Dropseed	*Sporobolus* spp.	Possible
Greasewood	*Sarcobatus vermiculatus*	Observed
Indian Rice Grass	*Oryzopsis hymenoides*	Possible
Iodine Bush	*Allenrolfea occidentalis*	Possible
Honey Mesquite	*Prosopis Glandolosa*	Observed
Wolfberry	*Lycium andersonii*	Possible
Yucca	*Yucca* spp.	Observed
Medicine		
Burro Bush	*Hymenoclea salsola*	Possible
Creosotebush	*Larrea tridentata*	Observed
Greasewood	*Sacarbatus vermiculatus*	Possible
Mormon Tea	*Ephedra* sp.	Observed
Palmer's Phacelia	*Phacelia palermi*	Possible
Saltbush	*Atriplex* spp.	Observed

Sources: Field visit; USGS (2005a); Stoffle and Dobyns (1983); Stoffle et al. (1999).

Wildlife likely to be found in the proposed Dry Lake SEZ is described in Section 11.3.11. Bighorn sheep are the animals of greatest concern to local Native Americans. They recognize two varieties: a smaller version inhabiting the Arrow Canyon Range and a larger, preferred variety found farther east in the Sheep Range. Although now restricted, in the past, the hunting of sheep was an important part of Southern Paiute culture with religious significance, as reflected in the many panels of sheep petroglyphs found throughout Southern Paiute territory. The desert tortoise is often mentioned by the Moapa Band as a species that should be protected, and was once a food source (Stoffle and Dobyns 1983). Although generally arid, the SEZ is within the range of some game species traditionally important to Native Americans (see Table 11.3.18.1-3). The most important is the black-tailed jackrabbit (*Lepus californicus*) (Stoffle and Dobyns 1983; Kelly and Fowler 1986). Large game species possible in the SEZ include mule deer (*Odocoileus hemionus*), and bighorn sheep (*Ovis Canadensis*) are likely present in the neighboring mountains. Smaller game species important to Native Americans that can be found in the SEZ include desert cottontails (*Sylvilagus audubonii*) and woodrats (*Neotoma lepida*).

TABLE 11.3.18.1-3 Animal Species Used by Native Americans as Food whose Range Includes the Proposed Dry Lake SEZ

Common Name	Scientific Name	Status
Mammals		
Badger	*Taxidea taxus*	All year
Black-tailed jackrabbit	*Lepus californicus*	All year
Bobcat	*Lynx rufus*	All year
Desert cottontail	*Silvilagusaudubonii*	All year
Kangaroo rats	*Dipodomys* spp.	All year
Kit fox	*Vulpes macotis*	All year
Mule deer	*Odocoileus hemionus*	All year
Pocket gopher	*Thomomys bottae*	All year
Porcupine	*Erethizon dorsatum*	All year
Red fox	*Vulpes vulpes*	All year
Rock squirrel	*Spermophilus variegates*	All year
Birds		
Golden eagle	*Aquila chrysaetos*	All year
Greater roadrunner	*Geococcyx californianus*	All year
Mourning dove	*Zenaida macroura*	All year
Reptiles		
Large lizards	Various species	All year

Sources: USGS (2005b); Fowler (1986); Stoffle and Dobyns (1983).

Other animals traditionally important to the Southern Paiute include lizards, which are likely to occur in the SEZ, and the golden eagle (*Aquila chrysaetos*). The SEZ falls within the range of the wide-ranging eagle.

Other natural resources traditionally important to Native Americans include clay for pottery, salt, and naturally occurring mineral pigments for the decoration and protection of the skin (Stoffle and Dobyns 1983). Of these, clay beds are possible in the dry lake within the SEZ (see Section 11.3.7).

11.3.18.2 Impacts

During past project-related consultation, the Southern Paiutes have expressed concerns over project impacts on a variety of resources. From their holistic perspective, cultural and natural features are inextricably bound together. Effects on one part have ripple effects on the whole. Western distinctions between the sacred and the secular have no meaning in their traditional worldview (Stoffle and Dobyns 1983). While no comments specific to the proposed Dry Lake SEZ have been received from Native American Tribes to date, the Paiute

Indian Tribe of Utah has asked to be kept informed of PEIS developments. During energy development projects in adjacent areas, the Southern Paiute have expressed concern over adverse effects on a wide range of resources. Geophysical features and physical cultural remains are discussed in Section 11.3.17.1.4. These sites and features are often seen as important because they are the location of or have ready access to a range of plant, animal, and mineral resources (Stoffle et al. 1997). Resources considered important include food plants, medicinal plants, plants used in basketry, plants used in construction, large game animals, small game animals, birds, and sources of clay, salt, and pigments (Stoffle and Dobyns 1983). Those likely to be found within the proposed Dry Lake SEZ are discussed in Section 3.1.18.1.2.

The Moapa River Valley is a core area of Southern Paiute population and culture. Dry Lake Valley is adjacent to the valley and may lie on a communication corridor leading from the Moapa River towards Las Vegas. Although the SEZ is sparsely vegetated, its proximity to a traditionally settled area and a modern reservation suggests that the area is likely well known to modern Southern Paiutes, and that the resources that do exist there are likely to be exploited by them. That said, other nearby areas, such as Arrow Canyon and the Arrow Canyon Range, are likely to be more important sources of plant and animal resources. This should be confirmed during consultation with the Tribes.

The culturally important Salt Song Trail approaches or passes through the SEZ and could experience visual and noise impacts from the development of utility-scale solar energy facilities within the proposed SEZ.

The development of utility-scale solar power facilities within the SEZ would most likely result in the removal of some culturally important plants and result in the loss of some habitat for culturally important wildlife species. Impacts to vegetation are expected to be moderate to small (Section 11.3.10) because similar vegetation is widespread in the area. Likewise there is abundant similar habitat and impacts to wildlife are expected to be small (Section 11.3.11). These expected impacts should be confirmed through government-to-government consultation. As consultation with the Tribes continues and project-specific analyses are undertaken, it is also possible that there will be Native American concerns expressed over potential visual and other effects on specific resources and any culturally important landscapes within or adjacent to the SEZ.

Implementation of programmatic design features, as presented in Appendix A, Section A.2.2, should eliminate impacts on Tribes' reserved water rights and the potential for groundwater contamination issues.

11.3.18.3 SEZ-Specific Design Features and Design Feature Effectiveness

Programmatic design features to address impacts of potential concern to Native Americans, such as avoidance of sacred sites, water resources, and tribally important plant and animal species are provided in Appendix A, Section A.2.2. Mitigation of impacts on archaeological sites and traditional cultural properties is discussed in Section 11.3.17.3, in addition to design features for historic properties discussed in Section A.2.2 in Appendix A.

The need for and nature of SEZ-specific design features addressing issues of potential concern would be determined during government-to-government consultation with the affected Tribes listed in Table 11.3.18.1-1.

11.3.19 Socioeconomics

11.3.19.1 Affected Environment

This section describes current socioeconomic conditions and local community services within the ROI surrounding the proposed Dry Lake SEZ. The ROI, which consists solely of Clark County, Nevada, encompasses the area in which workers are expected to spend most of their salaries and in which a portion of site purchases and non-payroll expenditures from the construction, operation, and decommissioning phases of solar facilities in the proposed SEZ is expected to take place.

11.3.19.1.1 ROI Employment

In 2008, employment in the ROI stood at 922,878 (Table 11.3.19.1-1). Over the period 1999 to 2008, the annual average employment growth rate was 3.2% in Clark County, which was higher than the average rate for Nevada as a whole (2.7%). In 2006, the services sector provided the highest percentage of employment in the ROI at 59.6%, followed by wholesale and retail trade at 14.8%, with a smaller employment share held by construction (11.6%) (Table 11.3.19.1-2).

11.3.19.1.2 ROI Unemployment

Over the period 1999 to 2008, the average unemployment rate in Clark County was 5.0%, the same as the average rate for the state as a whole (Table 11.3.19.1-3). Unemployment rates for the first 11 months of 2009 contrast with rates for 2008 as a whole. The average rates for the ROI (11.8%) and for Nevada as a whole (11.7%) were also higher during this period than the corresponding average rates for 2008.

11.3.19.1.3 ROI Urban Population

The population of the ROI in 2008 was 57% urban. The largest city, Las Vegas, had an estimated 2008 population of 562,849; other large cities in Clark County include Henderson (253,693) and North Las Vegas (217,975) (Table 11.3.19.1-4). The county also has two smaller cities—Mesquite (16,528) and Boulder City (14,954). A number of unincorporated urban areas in Clark County are not included in the urban population, meaning that the percentage of the county population not living in urban areas is overstated.

Population growth rates in the ROI have varied over the period 2000 to 2008 (Table 11.3.19.1-4). North Las Vegas grew at an annual rate of 8.3% during this period, with higher than average growth also experienced in Mesquite (7.3%) and Henderson (4.7%). Las Vegas (2.1%) experienced a lower growth rate between 2000 and 2008, while Boulder City (0.0%), experienced static growth during this period.

TABLE 11.3.19.1-1 Employment in the ROI for the Proposed Dry Lake SEZ

Location	1999	2008	Average Annual Growth Rate, 1999–2008 (%)
Clark County	675,693	922,878	3.2
Nevada	978,969	1,282,012	2.7

Sources: U.S. Department of Labor (2009a,b).

TABLE 11.3.19.1-2 Employment in the ROI for the Proposed Dry Lake SEZ by Sector, 2006

Industry	Clark County	Percentage of Total
Agriculture[a]	213	0.0
Mining	522	0.1
Construction	100,817	11.6
Manufacturing	25,268	2.9
Transportation and public utilities	38,529	4.4
Wholesale and retail trade	128,498	14.8
Finance, insurance, and real estate	56,347	6.5
Services	516,056	59.6
Other	105	0.0
Total	866,093	

[a] Agricultural employment includes 2007 data for hired farmworkers.

Sources: U.S. Bureau of the Census (2009a); USDA (2009).

11.3.19.1.4 ROI Urban Income

Median household incomes vary across cities in the ROI. Two cities for which data are available for 2006 to 2008—Henderson ($67,886), North Las Vegas ($60,506)—had median incomes in 2006 to 2008 that were higher than the state average ($56,348), while median incomes in Las Vegas ($55,113) were slightly lower than the state average (Table 11.3.19.1-4).

Income growth rates between 1999 and 2006 to 2008 were small in North Las Vegas (0.2%), and negative in Henderson (–0.7%) and Las Vegas (–0.3%). The average median household income growth rate for the state as a whole over this period was 0.2%.

TABLE 11.3.19.1-3 Unemployment Rates (%) in the ROI for the Proposed Dry Lake SEZ

Location	1999–2008	2008	2009[a]
Clark County	5.0	6.6	11.8
Nevada	5.0	6.7	11.7

[a] Rates for 2009 are the average for January through November.

Sources: U.S. Department of Labor (2009a–c).

TABLE 11.3.19.1-4 Urban Population and Income in the ROI for the Proposed Dry Lake SEZ

	Population			Median Household Income ($ 2008)		
City	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	1999	2006–2008	Average Annual Growth Rate, 1999 and 2006–2008 (%)[a]
Boulder City	14,966	14,954	0.0	65,049	NA[b]	NA
Henderson	175,381	253,693	4.7	72,035	67,886	–0.7
Las Vegas	478,434	562,849	2.1	56,739	55,113	–0.3
Mesquite	9,389	16,528	7.3	52,005	NA	NA
North Las Vegas	115,488	217,975	8.3	56,299	60,506	0.2

[a] Data are averages for the period 2006 to 2008.

[b] NA = data not available.

Source: U.S. Bureau of the Census (2009b-d).

11.3.19.1.5 ROI Population

Table 11.3.19.1-5 presents recent and projected populations in the ROI and state as a whole. Population in the ROI stood at 1,879,093 in 2008, having grown at an average annual rate of 4.0% since 2000. Growth rates for ROI were higher than the state rate for Nevada (3.4%) over the same period. The ROI population is expected to increase to 2,710,303 by 2021 and to 2,791,161 by 2023.

11.3.19.1.6 ROI Income

Total personal income in Clark County stood at $74.1 billion in 2007, having grown at an annual average rate of 5.0% for the period 1998 to 2007 (Table 11.3.19.1-6). Per-capita income

TABLE 11.3.19.1-5 Population of the ROI for the Proposed Dry Lake SEZ

Location	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	2021	2023
Clark County	1,375,765	1,879,093	4.0	2,710,303	2,791,161
Nevada	1,998,257	2,615,772	3.4	3,675,890	3,779,745

Sources: U.S. Bureau of the Census (2009e,f); Nevada State Demographers Office (2008).

TABLE 11.3.19.1-6 Personal Income in the ROI for the Proposed Dry Lake SEZ

Location	1998	2007	Average Annual Growth Rate, 1998–2007 (%)
Clark County			
Total income[a]	45.7	74.1	5.0
Per-capita income ($)	36,509	40,307	1.0
Nevada			
Total income[a]	68.9	105.3	4.3
Per-capita income ($)	37,188	41,022	1.0

[a] Unless indicated otherwise, values are reported in $ billion 2008.

Sources: U.S. Department of Commerce (2009); U.S. Bureau of Census (2009e,f).

also rose over the same period at an annual rate of 1.0%, increasing from $36,509 to $40,307. Personal income growth rates in the ROI were higher than the state rate (4.3%), but per-capita income growth rates in Clark County was the same as in Nevada as a whole (0.8%).

Median household income in the ROI in 2006 to 2008 stood at $49,615 (U.S. Bureau of the Census 2009d).

11.3.19.1.7 ROI Housing

In 2007, more than 754,000 housing units were located in Clark County (Table 11.3.19.1-7). Owner-occupied units composed about 59% of the occupied units, with rental housing making up 41% of the total. Vacancy rates in 2007 were 12.2% in Clark County. There were 92,144 vacant housing units in the ROI in 2007, of which 37,381 are estimated to be rental units that would be available to construction workers. There were 8,416 units in seasonal, recreational, or occasional use in the ROI at the time of the 2000 Census, with 1.5% of housing units in Clark County used for seasonal or recreational purposes.

Housing stock in the ROI as a whole grew at an annual rate of 4.3% over the period 2000 to 2007, with 194,370 new units added (Table 11.3.19.1-7). The median value of owner-occupied housing in Clark County in 2008 was $243,150 (U.S. Bureau of the Census 2009c,d).

The median value of owner-occupied housing in 2006 to 2008 was $299,200 in Clark County (U.S. Bureau of the Census 2009g).

11.3.19.1.8 ROI Local Government Organizations

The various local and county government organizations in the ROI are listed in Table 11.3.19.1-8. In addition, two Tribal governments are located in the ROI. Members of other Tribal groups also are located in the state, but their Tribal governments are located in adjacent states.

11.3.19.1.9 ROI Community and Social Services

This section describes educational, health-care, law enforcement, and firefighting resources in the ROI.

TABLE 11.3.19.1-7 Housing Characteristics in the ROI for the Proposed Dry Lake SEZ

Parameter	2000	2007[a]
Clark County		
Owner-occupied	302,834	393,453
Rental	209,419	268,572
Vacant units	47,546	92,144
Seasonal and recreational use	8,416	NA
Total units	559,799	754,169

[a] NA = data not available.

Sources: U.S. Bureau of the Census (2009h-j).

TABLE 11.3.19.1-8 Local Government Organizations and Social Institutions in the ROI for the Proposed Dry Lake SEZ

Governments	
City	
Boulder City	Mesquite
Henderson	North Las Vegas
Las Vegas	
County	
Clark County	
Tribal	
Las Vegas Tribe of Paiute Indians of the Las Vegas Indian Colony, Nevada	
Moapa Band of Paiute Indians of the Moapa River Indian Reservation, Nevada	

Sources: U.S. Bureau of the Census (2009b); U.S. Department of the Interior (2010).

Schools

In 2007, the ROI had 344 public and private elementary, middle, and high schools (NCES 2009). Table 11.3.19.1-9 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 Clark County schools was 19.0, while the level of service was 8.7.

Health Care

The total number of physicians in Clark County was 4,220, and the level of service was 2.3 physicians per 1,000 population (Table 11.3.19.1-10).

TABLE 11.3.19.1-9 School District Data for the Proposed Dry Lake SEZ ROI, 2007

Location	Number of Students	Number of Teachers	Student-Teacher Ratio	Level of Service[a]
Clark County	303,448	15,930	19.0	8.7

[a] Number of teachers per 1,000 population.

Source: NCES (2009).

TABLE 11.3.19.1-10 Physicians in the Proposed Dry Lake SEZ ROI, 2007

Location	Number of Primary Care Physicians	Level of Service[a]
Clark County	4,220	2.3

[a] Number of physicians per 1,000 population.

Source: AMA (2009).

Public Safety

Several state, county, and local police departments provide law enforcement in the ROI (Table 11.3.19.1-11). Clark County has 3,214 officers and would provide law enforcement services to the SEZ. The level of service of police protection in Clark County is 1.7 officers per 1,000 population. Currently, there are 991 professional firefighters in the ROI (Table 11.3.19.1-11).

11.3.19.1.10 ROI Social Structure and Social Change

Community social structures and other forms of social organization within the ROI are related to various factors, including historical development, major economic activities and sources of employment, income levels, race and ethnicity, and forms of local political organization. Although an analysis of the character of community social structures is beyond the scope of the current programmatic analysis, project-level NEPA analyses would include a description of ROI social structures, contributing factors, their uniqueness, and, consequently, the susceptibility of local communities to various forms of social disruption and social change.

TABLE 11.3.19.1-11 Public Safety Employment in the Proposed Dry Lake SEZ ROI

Location	Number of Police Officers[a]	Level of Service[b]	Number of Firefighters[c]	Level of Service
Clark County	3,214	1.7	991	0.5

[a] 2007 data.

[b] Number per 1,000 population.

[c] 2008 data; number does not include volunteers.

Sources: U.S. Department of Justice (2008); Fire Departments Network (2009).

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 would deteriorate (BLM 1980, 1983, 1996). Data on violent crime and property crime rates and on alcoholism and illicit drug use, mental health, and divorce, which might be used as indicators of social change, are presented in Tables 11.3.19.1-12 and 11.3.2.19.1-13. Violent crime in Clark County in 2007 stood at 8.0 crimes per 1,000 population (Table 11.3.19.1-12), while property-related crime rates was 34.5 per 1,000 people, producing an overall crime rate of 42.5 per 1,000. Data on 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 (Table 11.3.19.1-13).

TABLE 11.3.19.1-12 Crime Rates[a] for the Proposed Dry Lake SEZ ROI

	Violent Crime[b]		Property Crime[c]		All Crime	
Location	Offenses	Rate	Offenses	Rate	Offenses	Rate
Clark County	15,505	8.0	66,905	34.5	82,410	42.5

[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 11.3.19.1-13 Alcoholism, Drug Use, Mental Health, and Divorce in the Proposed Dry Lake SEZ ROI

Location	Alcoholism[a]	Illicit Drug Use[a]	Mental Health[b]	Divorce[c]
Nevada Clark	8.2	2.7	10.5	NA[d]
Nevada				6.5

[a] Data for alcoholism and drug use represent percentage of the population over 12 years of age with dependence or abuse of alcohol or 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 2007.

[d] NA = data not available.

Sources: SAMHSA (2009); CDC (2009).

11.3.19.1.11 ROI Recreation

Various areas in the vicinity of the proposed SEZ are used for recreational activities, with natural, ecological, and cultural resources in the ROI attracting visitors for a range of recreation, including hunting, fishing, boating, canoeing, wildlife watching, camping, hiking, horseback riding, mountain climbing, and sightseeing. These activities are discussed in Section 11.3.5.

Because data on the number of visitors using state and federal lands for recreational activities are 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 5.17.1.1.1).

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, 241,376 people were employed in the ROI in the various sectors identified as recreational, constituting 26.8% of total ROI employment (Table 11.3.19.1-14). Recreation spending also produced more than $9,421 million in income in the ROI in 2007. The primary sources of recreation-related employment were hotels and lodging places and eating and drinking places.

TABLE 11.3.19.1-14 Recreation Sector Activity in the Proposed Dry Lake SEZ ROI, 2007

Sector	Employment (No. People)	Income ($ million)
Amusement and recreation services	4,614	143.7
Automotive rental	2,902	118.0
Eating and drinking places	107,014	3,209.6
Hotels and lodging places	116,510	5,615.4
Museums and historic sites,	285	17.8
Recreational vehicle parks and campsites	331	9.9
Scenic tours	5,424	220.3
Sporting goods retailers	4,296	86.4
Total ROI	241,376	9,421.1

Source: MIG, Inc. (2010).

11.3.19.2 Impacts

The following analysis of potential socioeconomic impacts from development of solar energy facilities in the proposed SEZ 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 developments employing various solar energy technologies are analyzed in detail in subsequent sections.

11.3.19.2.1 Common Impacts

Construction and operation of solar energy facilities at the proposed 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 developments 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 proposed 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 residing temporarily in the ROI would occupy accommodations 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 developments in small rural communities are 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 and 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 0.1% in county population during construction of the solar 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 would 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 the 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 developments 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 developments 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.

11.3.19.2.2 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), BLM acreage rental and capacity payments, 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) would be required for the solar trough technology. 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 two projects could be constructed within a given year, with a corresponding maximum land disturbance of up to 6,000 acres (24 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 5,842 jobs (Table 11.3.19.2-1). Construction activities would constitute 0.4% of total ROI employment. A solar facility would also produce $361.5 million in income. Direct sales taxes would be $2.4 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 1,486 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) in the ROI mean that the impact of solar facility construction on the number of vacant rental housing units would not be expected to be large, with 743 rental units expected to be occupied in the ROI. This occupancy rate would represent 1.3% 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, 13 new teachers, 3 physicians, and 3 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 822 jobs (Table 11.3.19.2-1). Such a solar facility would also produce $31.1 million in income. Direct sales taxes would be $0.3 million. Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), acreage rental payments would be $2.9 million, and solar generating capacity payments would total at least $16.5 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 70 persons in-migrating into the ROI. Although

TABLE 11.3.19.2-1 Socioeconomic Impacts in the ROI Assuming Full Build-out of the Proposed Dry Lake SEZ with Trough Facilities[a]

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	3,488	547
Total	5,842	822
Income[b]		
Total	361.5	31.1
Direct state taxes[b]		
Sales	2.4	0.3
BLM payments[b]		
Rental	NA[c]	2.9
Capacity[d]	NA	16.5
In-migrants (no.)	1,486	70
Vacant housing[e] (no.)	743	63
Local community service employment		
Teachers (no.)	13	1
Physicians (no.)	3	0
Public safety (no.)	3	0

[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 1,200 MW (corresponding to 6,000 acres [24 km^2] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 2,510 MW..

[b] Unless otherwise indicated, values are reported in $ million 2008. There is currently no individual income tax in Nevada.

[c] NA = not applicable.

[d] 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.

[e] Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

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 63 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, one new teacher 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 2,327 jobs (Table 11.3.19.2-2). Construction activities would constitute 0.2% of total ROI employment. Such a solar facility would also produce $144.0 million in income. Direct sales taxes would be $0.9 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 592 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 296 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, five 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.

Operations. Total operations employment impacts in the ROI (including direct and indirect impacts) of a build-out using power tower technologies would be 376 jobs (Table 11.3.19.2-2). Such a solar facility would also produce $13.0 million in income. Direct sales taxes would be less than $0.1 million. Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), acreage rental payments would be $2.9 million, and solar generating capacity payments would total at least $9.2 million.

TABLE 11.3.19.2-2 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Dry Lake SEZ with Power Tower Facilities[a]

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	1,389	282
Total	2,327	376
Income[b]		
Total	144.0	13.0
Direct state taxes[b]		
Sales	0.9	<0.1
BLM payments[b]		
Rental	NA[c]	2.9
Capacity[d]	NA	9.2
In-migrants (no.)	592	36
Vacant housing[e] (no.)	296	32
Local community service employment		
Teachers (no.)	5	0
Physicians (no.)	1	0
Public safety (no.)	1	0

[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 667 MW (corresponding to 6,000 acres [24 km^2] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 1,395 MW.

[b] Unless otherwise indicated, values are reported in $ million 2008. There is currently no individual income tax in Nevada.

[c] NA = not applicable.

[d] 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.

[e] Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

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 36 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 32 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.

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 946 jobs (Table 11.3.19.2-3). Construction activities would provide 0.1% of total ROI employment. Such a solar facility would also produce $58.5 million in income. Direct sales taxes would be $0.4 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 241 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 120 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, two 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.

Operations. Total operations employment impacts in the ROI (including direct and indirect impacts) of a build-out using dish engine technologies would be 366 jobs (Table 11.3.19.2-3). Such a solar facility would also produce $12.6 million in income. Direct sales taxes would be less than $0.1 million. Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), acreage rental payments would be $2.9 million, and solar generating capacity payments would total at least $9.2 million.

TABLE 11.3.19.2-3 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Dry Lake SEZ with Dish Engine Facilities[a]

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	565	274
Total	946	366
Income[b]		
Total	58.5	12.6
Direct state taxes[b]		
Sales	0.4	<0.1
BLM payments[b]		
Rental	NA[c]	2.9
Capacity[d]	NA	9.2
In-migrants (no.)	241	35
Vacant housing[e] (no.)	120	31
Local community service employment		
Teachers (no.)	2	0
Physicians (no.)	1	0
Public safety (no.)	1	0

[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 667 MW (corresponding to 6,000 acres [24 km^2] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 1,395 MW.

[b] Unless otherwise indicated, values are reported in $ million 2008. There is currently no individual income tax in Nevada.

[c] NA = not applicable.

[d] 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.

[e] Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

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 35 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 31 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.

Photovoltaic

Construction. Total construction employment impacts in the ROI (including direct and indirect impacts) from the use of PV technologies would be up to 441 jobs (Table 11.3.19.2-4). Construction activities would constitute less than 0.1 % of total ROI employment. Such a solar development would also produce $27.3 million in income. Direct sales taxes would be $0.2 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 112 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 56 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, one new teacher would be required in the ROI. This increase would represent less than 0.1% of total ROI employment expected in this occupation.

Operations. Total operations employment impacts in the ROI (including direct and indirect impacts) of a build-out using PV technologies would be 36 jobs (Table 11.3.19.2-4). Such a solar facility would also produce $1.3 million in income. Direct sales taxes would be less than $0.1 million. Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), acreage rental payments would be $2.9 million, and solar generating capacity payments would total at least $7.3 million.

TABLE 11.3.19.2-4 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Dry Lake SEZ with PV Facilities[a]

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	263	27
Total	441	36
Income[b]		
Total	27.3	1.3
Direct state taxes[b]		
Sales	0.2	<0.1
BLM payments[b]		
Rental	NA[c]	2.9
Capacity[d]	NA	7.3
In-migrants (no.)	112	3
Vacant housing[e] (no.)	56	3
Local community service employment		
Teachers (no.)	1	0
Physicians (no.)	0	0
Public safety (no.)	0	0

[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 667 MW (corresponding to 6,000 acres [24 km^2] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 1,395 MW.

[b] Unless otherwise indicated, values are reported in $ million 2008. There is currently no individual income tax in Nevada.

[c] NA = not applicable.

[d] 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.

[e] Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

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 3 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 three 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.

11.3.19.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features addressing socioeconomic impacts have been identified for the Dry Lake 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.

11.3.20 Environmental Justice

11.3.20.1 Affected Environment

On February 11, 1994, the President signed Executive Order 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 CEQ's *Environmental Justice Guidance under the National Environmental Policy Act* (CEQ 1997). The analysis method has three parts: (1) a description is undertaken 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 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 within a 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 11.3.20.1-1 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 Arizona, 13.4% of the population is classified as minority, while 13.9% 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 does not exceed the state average by 20 percentage points or more; thus, in aggregate, there is no minority population in the Arizona portion of 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 not exceed 50% of the total population in the area; thus, in aggregate, there are no low-income populations in the Arizona portion of the SEZ.

In the Nevada portion of the 50-mi (80-km) radius, 39.8% of the population is classified as minority, while 10.8% 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, in aggregate, there is no minority population in the Nevada portion of the SEZ area based on 2000 Census data and CEQ guidelines. The number of low-income individuals does not exceed the state average by

TABLE 11.3.20.1-1 Minority and Low-Income Populations within the 50-mi (80-km) Radius Surrounding the Proposed Dry Lake SEZ

Parameter	Arizona	Nevada
Total population	6,138	1,370,970
White, non-Hispanic	5,315	824,859
Hispanic or Latino	588	301,519
Non-Hispanic or Latino minorities	235	244,592
One race	165	207,962
Black or African American	35	121,226
American Indian or Alaskan Native	82	7,766
Asian	25	71,078
Native Hawaiian or Other Pacific Islander	12	5,855
Some other race	11	2,037
Two or more races	70	36,630
Total minority	823	546,111
Low-income	987	145,576
Percentage minority	13.4	39.8
State percentage minority	36.2	34.8
Percentage low-income	16.1	10.8
State percentage low-income	13.9	10.5

Source: U.S. Bureau of the Census (2009k,l).

20 percentage points or more and does not exceed 50% of the total population in the area; thus, in aggregate, there are no low-income populations in the Nevada portion of the SEZ.

Figures 11.3.20.1-1 and 11.3.20.1-2 show the locations of minority and low-income population groups, respectively, within the 50-mi (80-km) radius around the boundary of the SEZ.

Within 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 Las Vegas, in the downtown area, and east of downtown. Block groups with minority populations more than 20 percentage points higher than the state average located in the city of Las Vegas, to the west of the downtown area, and in one block group to the northeast of the city, associated with the Moapa River Indian Reservation.

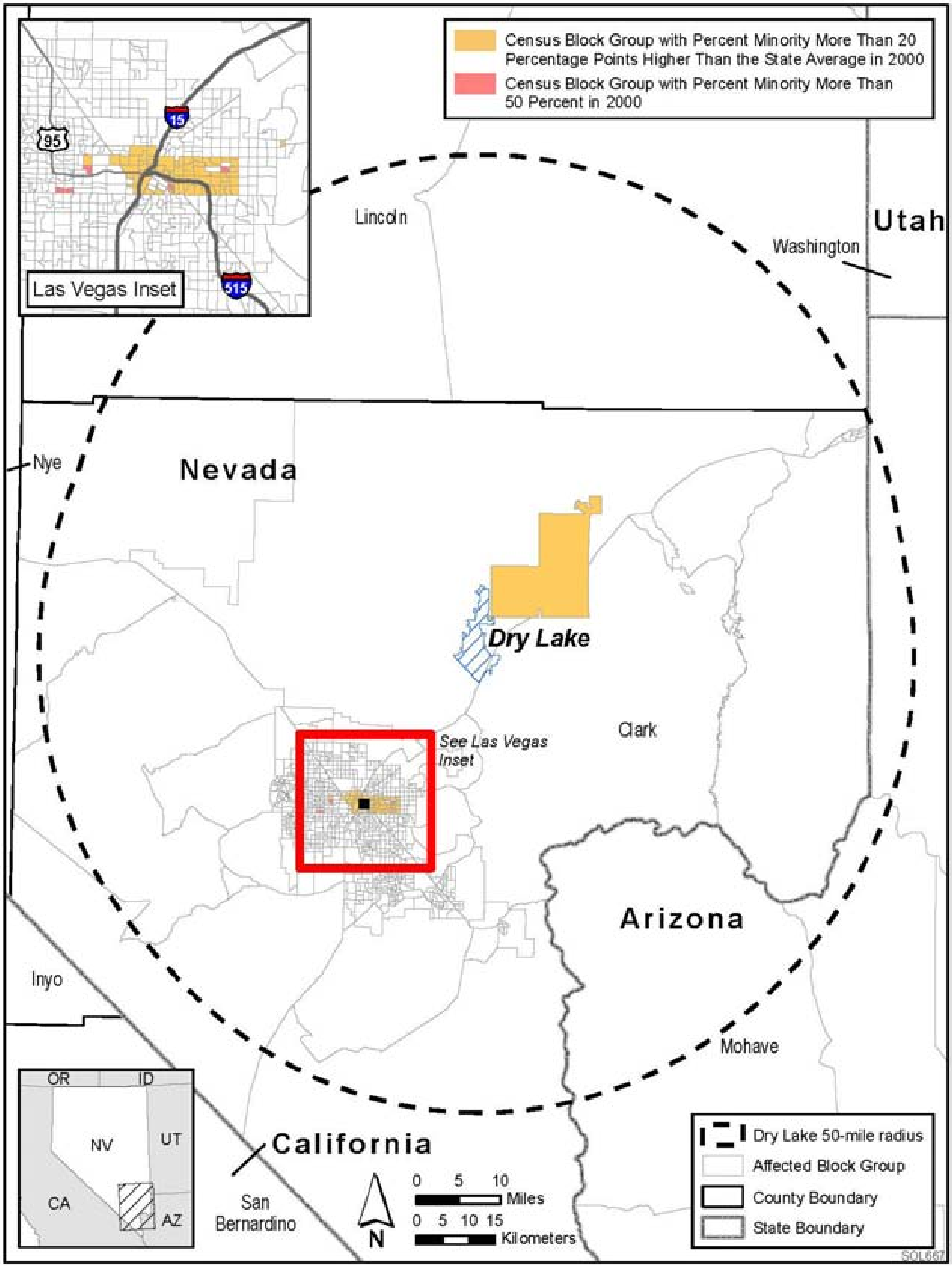

FIGURE 11.3.20.1-1 Minority Population Groups within the 50-mi (80-km) Radius Surrounding the Proposed Dry Lake SEZ

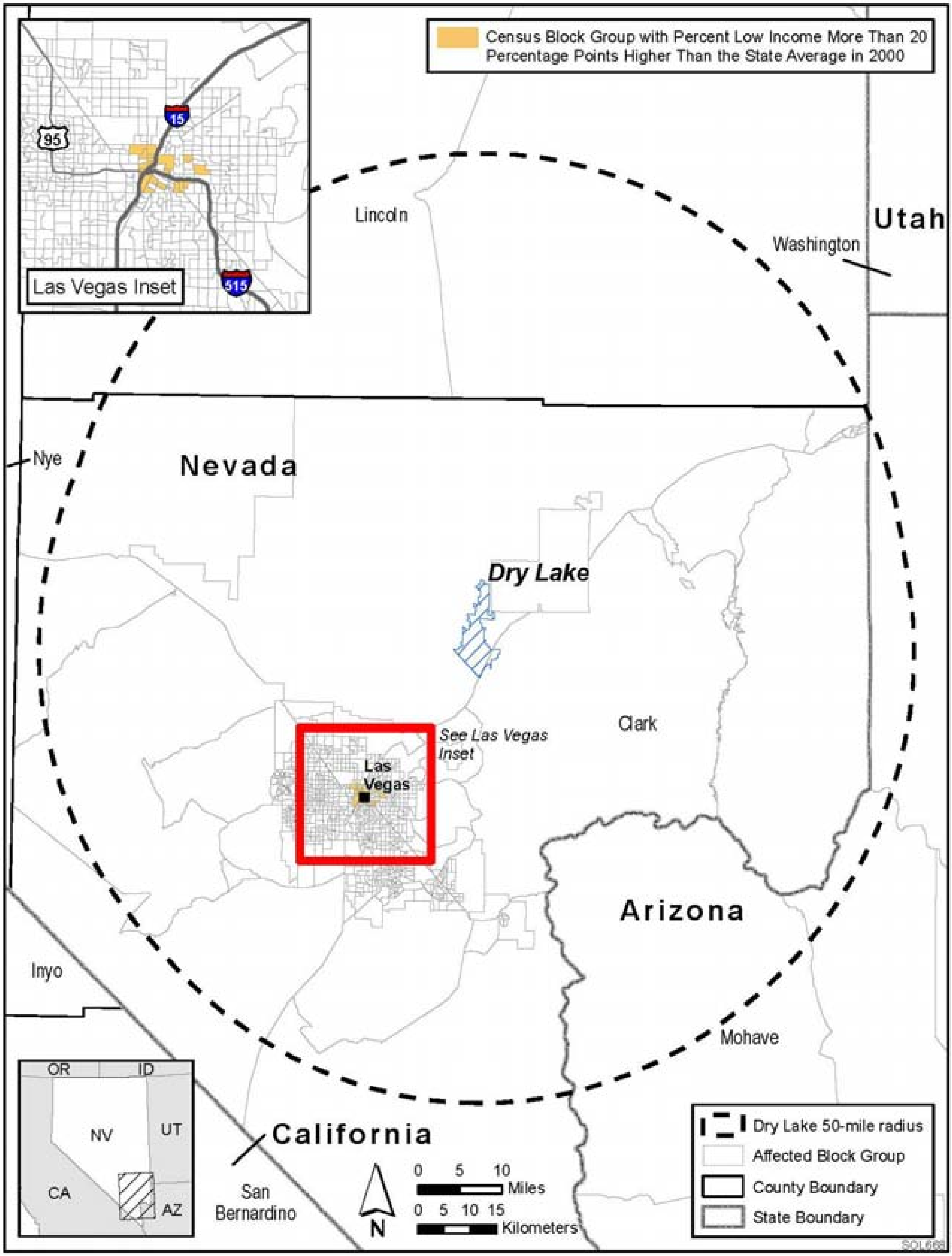

FIGURE 11.3.20.1-2 Low-Income Population Groups within the 50-mi (80-km) Radius Surrounding the Proposed Dry Lake SEZ

Census block groups within the 50-mi (80-km) radius where the low-income population is more than 20 percentage points higher than the state average are located in the city of Las Vegas, in the downtown area.

11.3.20.2 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 Dry Lake 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.

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 11.3.20.1) 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 low-income populations within the 50-mi (80-km) radius, there could also be impacts on low-income populations.

11.3.20.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features addressing environmental justice impacts have been identified for the proposed Dry Lake 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.

11.3.21 Transportation

The proposed Dry Lake SEZ is accessible by road and by rail. One interstate highway and one U.S. highway serve the immediate area, as does a major railroad. A major airport also serves the area, along with several smaller airports. General transportation considerations and impacts are discussed in Sections 3.4 and 5.19, respectively.

11.3.21.1 Affected Environment

Interstate 15 (I-15) passes through the southeastern portion of the proposed Dry Lake SEZ, running southwest–northeast, as shown in Figure 11.3.21.1-1. The Las Vegas metropolitan area is approximately 15 mi (24 km) southwest of the SEZ along I-15. In the opposite direction, Salt Lake City is approximately 400 mi (644 km) away along I-15. State Route 604 (North Las Vegas Boulevard) runs parallel to I-15 along the southeast edge of the SEZ. Going south, U.S. 93 joins I-15 at the southern tip of the proposed Dry Lake SEZ. Traveling to the northwest from I-15, U.S. 93 borders the southwestern edge of the SEZ before it heads in a more northerly direction after passing the SEZ. Several local unimproved dirt roads cross the SEZ. OHV use in the SEZ and surrounding area has been designated as "Limited to existing roads, trails, and dry washes" (BLM 2010b). As listed in Table 11.3.21.1-1, I-15 and U.S. 93 carry average traffic volumes of about 20,000 and 1,900 vehicles per day, respectively, in the vicinity of the Dry Lake SEZ (NV DOT 2010).

The UP Railroad serves the region. The main line passes through Las Vegas on its way from Los Angeles to Salt Lake City. The railroad passes the southeastern border of the Dry Lake SEZ about 15 mi (24 km) northeast of Las Vegas. The nearest rail access is in Las Vegas, and additional access is available in Moapa, approximately 24 mi (39 km) to the northeast of the SEZ.

Nellis Air Force Base, available only to military aircraft, is the nearest airport. It is located approximately 13 mi (21 km) southwest of the proposed Dry Lake SEZ. Nellis Air Force Base is one of the largest fighter bases in the world and is involved in conducting advanced fighter training. Operations occur over the Nevada Test and Training Range, which offers 3 million acres (12,173 km^2) of restricted land, more than 50 mi (80 km) northwest of the SEZ (U.S. Air Force 2010).

The nearest public airport is the North Las Vegas Airport, a regional airport about a 21 mi (34 km) drive southwest of the SEZ. The airport does not have scheduled commercial passenger service, but caters to smaller private and business aircraft (Clark County Department of Aviation 2010a). In 2008, 22,643 and 23,950 passengers arrived at and departed from North Las Vegas Airport, respectively (BTS 2009). Farther to the south, in Las Vegas, McCarran International Airport is served by all major U.S. airlines. In 2008, 20.43 million and 20.48 million passengers arrived at and departed from McCarran International Airport, respectively (BTS 2009). About 83.2 million lb (37.7 million kg) of freight departed and 117 million lb (53.2 million kg) arrived at McCarran in 2008 (BTS 2009).

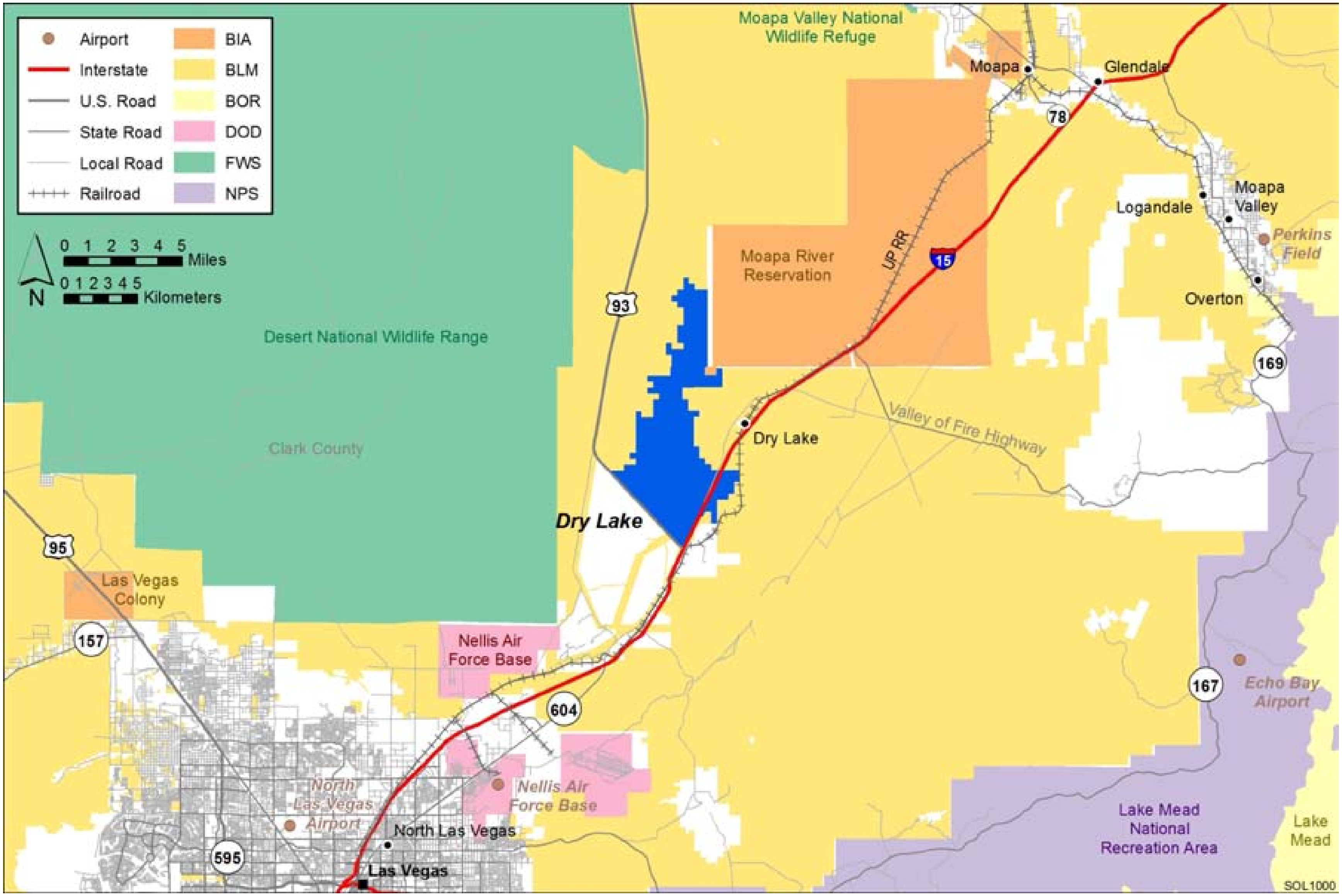

FIGURE 11.3.21.1-1 Local Transportation Serving the Proposed Dry Lake SEZ

TABLE 11.3.21.1-1 AADT on Major Roads near the Proposed Dry Lake SEZ for 2009

Road	General Direction	Location	AADT
I-15	Southwest–northeast	North of Speedway Blvd. (exit 54)	20,000
		North of State Route 604 (exit 58)	24,000
		Between Valley of Fire Highway (exit 75) and Ute interchange (exit 80)	18,000
U.S. 93	North–south	North of I-15 junction (I-15 exit 64)	2,300
State Route 604	Southwest–northeast	North of Nellis Air Force Base Main Gate	14,000
		South of I-15 interchange	2,000
Valley of Fire Highway	East–west	5 mi (8 km) east of I-15 junction (I-15 exit 75)	510

Source: NV DOT (2010).

In addition to the North Las Vegas and McCarran International Airports, there are five small airports in the region, all within approximately a 55 mi (89 km) drive of the proposed Dry Lake SEZ, as listed in Table 11.3.21.1-2. None of these airports have scheduled commercial passenger service. Similarly to North Las Vegas Airport, Henderson Executive Airport caters to smaller private and business aircraft (Clark County Department of Aviation 2010b) as Clark County works to reduce congestion at McCarran International Airport. Boulder City Municipal Airport, southeast of Las Vegas, is home to planes that provide sightseeing air tours of the Grand Canyon and nearby areas (City of Boulder 2010).

11.3.21.2 Impacts

As discussed in Section 5.19, the primary transportation impacts are anticipated to be from commuting worker traffic. Single projects could involve up to 1,000 workers each day, with an additional 2,000 vehicle trips per day (maximum) or possibly 4,000 vehicle trips per day if two large projects were developed at the same time. The volume of traffic on I-15 would represent an increase in traffic of about 10 or 20% in the area of the SEZ for one or two projects, respectively. Such traffic levels would represent a 100 to 200% increase of the traffic level experienced on U.S. 93 north of its junction with I-15 if all project traffic were routed through U.S. 93. Because higher traffic volumes would be experienced during shift changes, traffic on I-15 could experience minor slowdowns during these time periods near exits in the vicinity of the SEZ where projects are located. Local road improvements would be necessary in the vicinity of exits off I-15 or on any portion of U.S. 93 that might be developed so as not to overwhelm the local access 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. If there are any designated as open within the proposed SEZ, open routes crossing areas issued ROWs for solar facilities would be re-designated as closed (see Section 5.5.1 for more details on how routes coinciding with proposed solar facilities would be treated).

11.3.21.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features have been identified related to impacts on transportation systems around the proposed Dry Lake SEZ. The programmatic design features described 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 the site. Depending on the location of solar facilities within the SEZ, more specific access locations and local road improvements could be implemented.

TABLE 11.3.21.1-2 Airports Open to the Public in the Vicinity of the Proposed Dry Lake SEZ

			Runway 1[a]			Runway 2[a]		
Airport	Location	Owner/Operator	Length (ft [m])	Type	Condition	Length (ft [m])	Type	Condition
Boulder City Municipal	Southeast of Las Vegas, near U.S. 93, approximately a 47-mi (76-km) drive from the SEZ	Boulder City	3,850 (1,173)	Asphalt	Good	4,800 (1,463)	Asphalt	Good
Echo Bay	South–southeast of the SEZ by Lake Mead, a 50-mi (80-km) drive, northeast on I-15 to Valley of Fire Highway (State Route 169), south on State Route 167	Lake Mead National Recreational Area	3,400 (1,036)	Asphalt	Good	–[b]	–	–
Henderson Executive	South of Las Vegas, about a 40-mi (64-km) drive from the SEZ	Clark County	5,001 (1,524)	Asphalt	Excellent	6,501 (1,982)	Asphalt	Excellent
North Las Vegas	Near I-15 in North Las Vegas, a 21-mi (34-km) drive from the SEZ	Clark County	4,202 (1,281)	Asphalt	Good	5,000 (1,524)	Asphalt	Good
			5,004 (1,525)	Asphalt	Good	–	–	–
McCarran International	Off I-15 in Las Vegas, about 29 mi (47 km)	Clark County	8,985 (2,739)	Concrete	Good	9,775 (2,979)	Concrete	Good
			10,526 (3,208)	Asphalt	Good	14,510 (4,423)	Asphalt	Good
			6,196 (1,889)	Asphalt	Good	7,161 (2,183)	Asphalt	Good
Mesquite	Near I-15, 55 mi (88 km) northeast on I-15	City of Mesquite	5,121 (1,561)	Asphalt	Good	–	–	–

TABLE 11.3.21.1-2 (Cont.)

			Runway 1[a]			Runway 2[a]		
Airport	Location	Owner/Operator	Length (ft [m])	Type	Condition	Length (ft [m])	Type	Condition
Perkins Field	I-15 northeast to State Route 169, south on State Route 169, 36 mi (58 km)	Clark County	4,800 (1,463)	Asphalt	Good	–	–	–

[a] Source: FAA (2010).

[b] A dash indicates not applicable.

11.3.22 Cumulative Impacts

The analysis presented in this section addresses the potential cumulative impacts in the vicinity of the proposed Dry Lake SEZ in Clark County, Nevada. 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 farther than 5 to 10 years in the future.

The Dry Lake SEZ is located 20 mi (32 km) northeast of downtown Las Vegas, Nevada, and north of the intersection of I-15 and U.S. 93. The Apex Industrial Park, which already contains two electric generating stations, is located here. The Moapa Valley National Wildlife Refuge is located 10 mi (16 km) north of the SEZ; the Desert National Wildlife Range is located 2 mi (3 km) west of the SEZ; the Lake Mead National Recreation Area is about 25 mi (40 km) to the east and south of the SEZ; Valley of Fire State Park is located 15 mi (24 km) east of the SEZ; Grand Canyon–Parashant National Monument in Arizona is 45 mi (72 km) east of the SEZ; and Red Rock Canyon National Conservation Area is 30 mi (48 km) west of the SEZ. The Arrow Canyon WA is located just north of the SEZ. Three other WAs are within 50 mi (80 km) of the SEZ. The BLM administers approximately 68% of the lands in the Southern Nevada District that contains the Dry Lake SEZ. In addition, the Delamar Valley SEZ is located about 51 mi (82 km) north of the Dry Lake SEZ and the proposed East Mormon Mountain SEZ is located about 40 mi (64 km) northeast; for some resources, the geographic extents of impacts from multiple SEZs overlap.

The geographic extent of the cumulative impacts analysis for potentially affected resources near the Dry Lake SEZ is identified in Section 11.3.22.1. An overview of ongoing and reasonably foreseeable future actions is presented in Section 11.3.22.2. General trends in population growth, energy demand, water availability, and climate change are discussed in Section 11.3.22.3. Cumulative impacts for each resource area are discussed in Section 11.3.22.4.

11.3.22.1 Geographic Extent of the Cumulative Impacts Analysis

The geographic extent of the cumulative impacts analysis for potentially affected resources evaluated near the Dry Lake SEZ is provided in Table 11.3.22.1-1. These geographic areas define the boundaries encompassing potentially affected resources. Their extent may vary based on 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 visual resources). The BLM, the USFWS, the NPS, and the Department of Defense administer most of the land around the SEZ; there are also some nearby Tribal lands at the Moapa River Reservation adjacent to the northeast boundary of the SEZ. The BLM administers approximately 45.4% of the lands within a 50-mi (80-km) radius of the SEZ.

TABLE 11.3.22.1-1 Geographic Extent of the Cumulative Impacts Analysis by Resource Area: Proposed Dry Lake SEZ

Resource Area	Geographic Extent
Land Use	North Central Clark County
Specially Designated Areas and Lands with Wilderness Characteristics	Within a 25-mi (40-km) radius of the Dry Lake SEZ
Rangeland Resources	North Central Clark County
Grazing	Grazing allotments within 5 mi (8 km) of the Dry Lake SEZ
Wild Horses and Burros	A 50-mi (80-km) radius from the Center of the Dry Lake SEZ
Recreation	North Central Clark County
Military and Civilian Aviation	North Clark County, southwest Lincoln County, and central Nye County
Soil Resources	Areas within and adjacent to the Dry Lake SEZ
Minerals	North Central Clark County
Water Resources	
Surface Water	Dry Lake and ephemeral wash tributaries to Dry Lake
Groundwater	Garnet Valley, Hidden Valley, and Coyote Spring Valley groundwater basins; central and lower portions of the regional groundwater flow system
Air Quality and Climate	A 31-mi (50-km) radius from the center of the Dry Lake SEZ
Vegetation, Wildlife and Aquatic Biota, Special Status Species	A 50-mi (80-km) radius from the center of the Dry Lake SEZ, including portions of Clark and Lincoln Counties in Nevada, Washington County in Utah, and Mohave County in Arizona
Visual Resources	Viewshed within a 25-mi (40-km) radius of the Dry Lake SEZ
Acoustic Environment (noise)	Areas adjacent to the Dry Lake SEZ
Paleontological Resources	Areas within and adjacent to the Dry Lake SEZ
Cultural Resources	Areas within and adjacent to the Dry Lake SEZ for archaeological sites; viewshed within a 25-mi (40-km) radius of the Dry Lake SEZ for other properties, such as traditional cultural properties
Native American Concerns	Areas within and adjacent to the Dry Lake SEZ; viewshed within a 25-mi (40-km) radius of the Dry Lake SEZ
Socioeconomics	A 50-mi (80-km) radius from the center of the Dry Lake SEZ
Environmental Justice	A 50-mi (80-km) radius from the center of the Dry Lake SEZ
Transportation	I-15, U.S. 93

11.3.22.2 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:

- 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 11.3.22.2.1); and (2) other ongoing and reasonably foreseeable actions, including those related to electric power generation, water management, natural gas and petroleum distribution, communication systems, residential development, and mining (Section 11.3.22.2.2). Together, these actions and trends have the potential to affect human and environmental receptors within the geographic range of potential impacts over the next 20 years.

11.3.22.2.1 Energy Production and Distribution

On February 16, 2007, Governor Gibbons signed an Executive Order to encourage the development of renewable energy resources in Nevada (Gibbons 2007a). The Executive Order requires all relevant state agencies to review their permitting processes to ensure the timely and expeditious permitting of renewable energy projects. On May 9, 2007, and June 12, 2008, the Governor signed Executive Orders creating the Nevada Renewable Energy Transmission Access Advisory Committee Phase I and Phase II that will propose recommendations for improved access to the grid system for renewable energy industries (Gibbons 2007b, 2008). In May 28, 2009, the Nevada legislature passed a bill modifying the Renewable Energy Portfolio Standards (Nevada State Senate Bill 358, 2009). The bill requires that 25% of the electricity sold be produced by renewable energy sources by 2025.

Reasonably foreseeable future actions related to renewable energy production and energy distribution within 50 mi (80 km) of the proposed Dry Lake SEZ are identified in

Table 11.3.22.2-1 and described in the following sections. Renewable energy project applications on public lands are shown in Figure 11.3.22.2-1 by application serial number.

Renewable Energy Development

Renewable energy applications on public lands are considered in two categories, fast-track and regular-track applications. Fast-track applications, which apply principally to solar and wind energy facilities, are those applications on public lands for which the environmental review and public participation process is under way and applications could be approved by December 2010. A fast-track project would be considered foreseeable, because the permitting and environmental review processes would be under way. Regular-track proposals are considered potential future projects, but not necessarily foreseeable projects, since not all applications would be expected to be carried to completion. These proposals are considered together as a general level of interest in development of renewable energy in the region. Foreseeable projects on private land are also considered.

Table 11.3.22.2-1 lists one foreseeable wind energy project and four foreseeable solar energy projects; the solar projects are located on private land. Foreseeable renewable energy projects are described in the following paragraphs.

Mohave County Wind Farm (AZA 032315). BP Wind Energy proposes to build the 500-MW Mohave County Wind Farm, comprising 335 wind turbine generators. Construction would include access roads, ancillary facilities, meteorological towers, and transmission lines to connect to the grid. The site would require 41,577 acres (198 km^2) of public land, located 20 mi (32 km) southeast of the Hoover Dam and 40 mi (64 km) southeast of the SEZ. It is estimated that 169 acres (0.68 km^2) would be permanently disturbed and 507 acres (2.05 km^2) temporarily disturbed. The expected date for commercial operation is 2012. The facility would be built in several phases. Phase I would produce 350 MW from up to 235 turbines. Subsequent phases would produce an additional 150 MW from 50 to 100 turbines. Construction would require about 100 to 200 workers, operations would require about 10 to 20 employees (BLM 2010d).

Boulder City Solar. NextLight Renewable Power intends to build the Boulder City Solar Plant, a 150-MW PV generating facility. The facility will be located on 1,100 acres (4.45 km^2) of private land about 12 mi (19 km) southwest of Boulder City, Nevada, and 40 mi (64 km) south of the SEZ. Water use is projected to be less than 20 acre-ft/year (24,600 m^3/yr) during operation, which is expected to begin in 2010 (First Solar, Inc. 2009).

El Dorado Solar Expansion. Sempra Energy intends to expand its 10-MW El Dorado Solar Plant, utilizing thin-film solar cell panels, to 58 MW. The facility will be located on 80 acres (0.32-km^2) of private land, which is adjacent to the El Dorado Energy Generating Station, 17 mi (27 km) southwest of downtown Boulder City, Nevada, and about 45 mi (72 km) south of the SEZ. The expansion could be operational in 2010 (BRW 2009).

TABLE 11.3.22.2-1 Reasonably Foreseeable Future Actions Related to Energy Development and Distribution near the Proposed Dry Lake SEZ[a]

Description	Status	Resources Affected	Primary Impact Location
Renewable Energy Projects			
Mohave County Wind Farm (AZA 32315), 500 MW, 41,577 acres	NOI Nov. 20, 2009	Terrestrial habitats, wildlife cultural resources, land use	40 mi (64 km) southeast of the SEZ in Arizona
Renewable Energy Projects on Private Lands			
Boulder City Solar, 150 MW, PV, 1100 acres	Construction stage	Terrestrial habitats, wildlife, cultural resources, land use	40 mi (64 km) south of the SEZ
El Dorado Solar Expansion, 10 MW, PV, 80 acres	Construction stage	Terrestrial habitats, wildlife, cultural resources, land use	45 mi (72 km) south of the SEZ
BrightSource Coyote Springs Project, 960 MW, solar tower, 7,680 acres	Planning stage	Terrestrial habitats, vegetation, wildlife, soil, water, visual, cultural	15 mi (24 km) north of the SEZ
BrightSource Overton Project, 400 MW, solar tower	Planning stage	Terrestrial habitats, vegetation, wildlife, soil, water, visual, cultural	30 mi (48 km) northeast of the SEZ
Transmission and Distribution Systems			
One Nevada Transmission Line Project	Draft Supplemental EIS Nov. 30, 2009	Disturbed areas, terrestrial habitats along transmission line ROW	Corridor passes through the SEZ
Southwest Intertie Project	FONSI issued July 30, 2008 In-service in 2010	Disturbed areas, terrestrial habitats along transmission line ROW	Corridor passes through the SEZ
TransWest Transmission Project	Permit Application Nov. 2009	Disturbed areas, terrestrial habitats along transmission line ROW	Corridor passes through the SEZ
Zephyr and Chinook Transmission Line Project	Permit Applications in 2011/2012	Disturbed areas, terrestrial habitats along transmission line ROW	Corridor passes near or through the SEZ

[a] Projects in later stages of agency environmental review and project development.

BrightSource Energy Coyote Springs Project. BrightSource Energy is planning to build a 960-MW solar thermal-powered facility on private land at the Coyote Springs Investment Planned Development Project at the junction of U.S. 93 and State Route 168. The facility would utilize the Luz Power Tower, which consists of thousands of mirrors that reflect sunlight onto a boiler filled with water sitting on top of a tower. The high-temperature steam produced would be piped to a conventional turbine that generates electricity. The station would utilize a dry-cooling system. The site, approximately 7,680 acres (31 km^2), would be 15 mi (24 km) north of the SEZ (BrightSource Energy 2009).

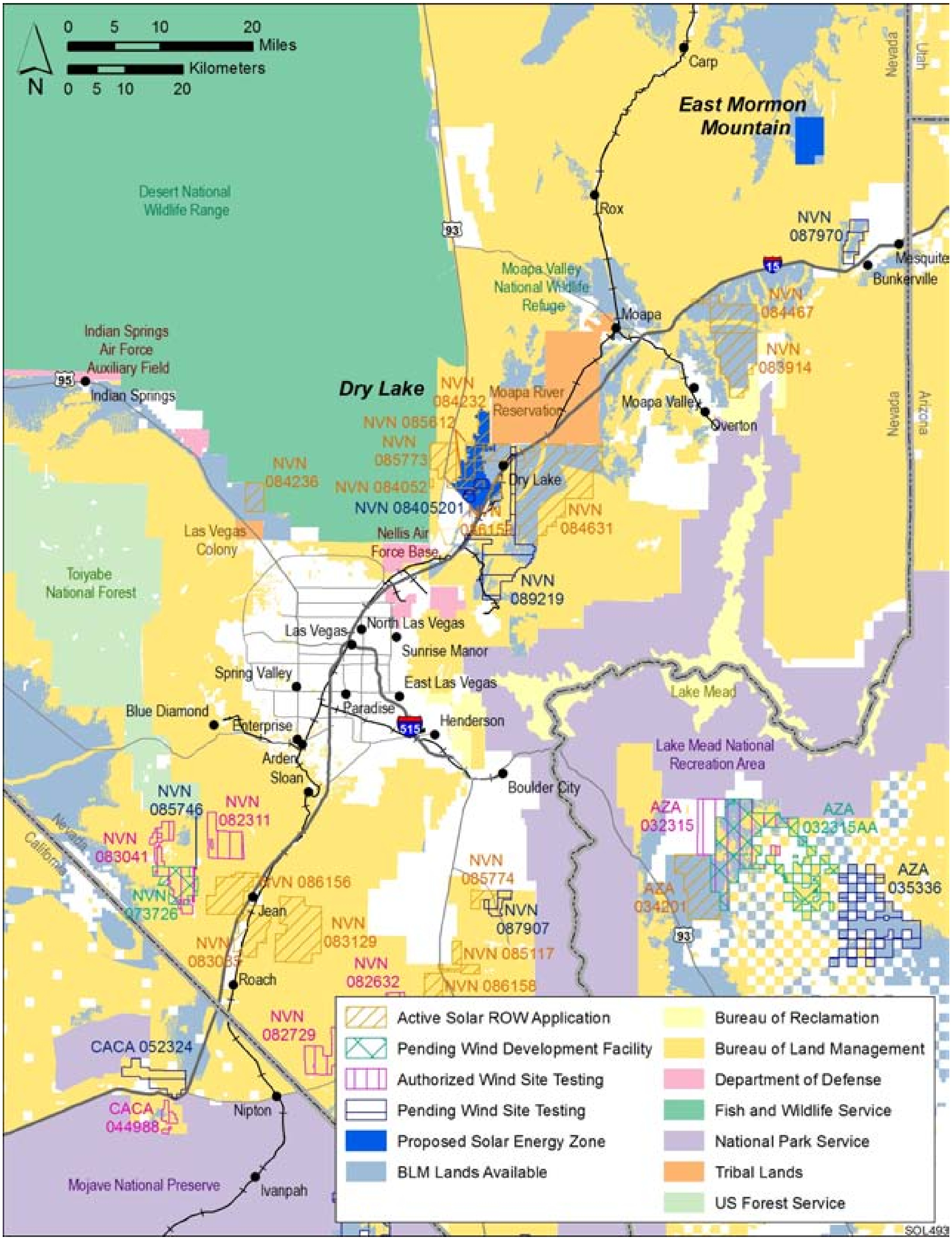

FIGURE 11.3.22.2-1 Locations of Renewable Energy Project ROW Applications on Public Land within a 50-mi (80-km) Radius of the Proposed Dry Lake SEZ

BrightSource Energy Overton Project. BrightSource Energy is planning to build three 400-MW solar thermal power facilities on private land east of the airport at Overton, Nevada. The facility would utilize the Luz Power Tower, which consists of thousands of mirrors that reflect sunlight onto a boiler filled with water sitting on top of a tower. The high temperature steam produced would be piped to a conventional turbine that generates electricity. The station would utilize a dry-cooling system. The site would be 30 mi (48 km) northeast of the SEZ. The plan is for initial operation in 2012 (Cleantech 2008).

Pending Solar ROW Applications on BLM-Administered Lands. Applications for ROW grants that have been submitted to the BLM include 16 pending solar projects, 4 pending authorizations for wind site testing, 3 authorized projects for wind testing, and 2 pending authorizations for development of wind facilities that would be located either within Dry Lake SEZ or within 50 mi (80 km) of the SEZ (BLM 2009a,b). No applications for geothermal projects have been submitted. Table 11.3.22.2-2 lists these applications and Figure 11.3.22.2-1 shows their locations.

The likelihood of any of the regular-track application projects actually being developed is uncertain, but it is generally assumed to be less than that for fast-track applications. The projects, listed in Table 11.3.22.2-2 for completeness, are an indication of the level of interest in development of renewable 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 testing would involve some relatively minor activities that could have some environmental effects, mainly the erection of meteorological towers and monitoring of wind conditions. These towers may or may not employ guy wires and may be 200 ft (60 m) high.

Transmission and Distribution Systems

Table 11.3.22.2-1 identifies four major new transmission projects, which are described below.

One Nevada Transmission Line Project. NV Energy proposes to construct and operate a 236-mi (382-km) long, single-circuit, 500-kV transmission line with fiber-optic telecommunication and appurtenant facilities in White Pine, Nye, Lincoln, and Clark counties. It will consist of self-supporting, steel-lattice and steel-pole H-frame structures, placed 900 to 1,600 ft (274 to 488 m) apart. The width of the right-of-way is 200 ft (61 m). New 500-kV electrical facilities would be installed inside the existing footprint of the Harry Allen Substation. The proposed action includes new substations outside the ROI of the Dry Lake SEZ. The transmission line would be within the SWIP utility corridor that passes through the SEZ. Construction could have potential impacts on the Mojave Desert Tortoise (BLM 2009c).

TABLE 11.3.22.2-2 Pending Renewable Energy Project ROW Applications on BLM-Administered Land within 50 mi (80 km) of the Proposed Dry Lake SEZ[a,b]

Serial Number	Applicant	Application Received	Size (acres)[c]	MW	Technology	Status	Field Office
Solar Applications							
NVN 83083	Cogentrix Solar Services, LLC	Jan. 18, 2007	9,760	1,000	CSP	Pending	Las Vegas
NVN 83129	Cogentrix Solar Services, LLC	Jan. 18, 2007	19,840	1,000	CSP	Pending	Las Vegas
NVN 83914	Bright Source Energy Solar	–[d]	10,000	500	CSP	Pending	Las Vegas
NVN 84052	NV Power Co.	Aug. 14, 2007	1,775	120	CSP	Pending	Las Vegas
NVN 84232	First Solar	Oct. 22, 2007	5,500	400	PV	Pending	Las Vegas
NVN 84236	First Solar	Oct. 22, 2007	3,800	400	PV	Pending	Las Vegas
NVN 84467	Pacific Solar Investments, Inc.	Dec. 7, 2007	11,000	1,000	Parabolic Trough	Pending	Las Vegas
NVN 84631	Bright Source Energy Solar	Jan. 28, 2008	2,000	1,200	CSP	Pending	Las Vegas
NVN 85117	Bull Frog Green Energy	March 18, 2008	3,639	500	PV	Pending	Las Vegas
NVN 85612	Cogentrix Solar Services, LLC	July 11, 2008	2,012	240	CSP	Pending	Las Vegas
NVN 85773	Cogentrix Solar Services, LLC	July 11, 2008	11,584	1,000	CSP	Pending	Las Vegas
NVN 85774	Bull Frog Green Energy	Aug. 14, 2008	3,177	500	PV	Pending	Las Vegas
NVN 86156	Power Partners Southwest, LLC	–	10,815	250	CSP	Pending	Las Vegas
NVN 86158	Power Partners Southwest, LLC	Sept. 18, 2008	3,885	250	CSP	Pending	Las Vegas
NVN 86159	Power Partners Southwest, LLC	Sept. 19, 2008	1,751	250	CSP	Pending	Las Vegas
AZA 34201	Boulevard Assoc., LLC	June 22, 2007	15,634	250	Parabolic Trough	Pending	Kingman
Wind Applications							
NVN 85746	Desert Research Institute	Aug. 1, 2008	28,428	–	Wind	Pending wind site testing	Las Vegas
NVN 87907	Pacific Wind Development	–	2,200	–	Wind	Pending wind site testing	Las Vegas
NVN 87970	Pacific Wind Development	Sept. 29, 2009	5,089	–	Wind	Pending wind site testing	Las Vegas
NVN 89219	Pioneer Green Energy		20,680	–	Wind	Pending wind site testing	Las Vegas
NVN 82311	Competitive Power Vent	July 3, 2006	8,944	–	Wind	Authorized wind site testing	Las Vegas

TABLE 11.3.22.2-2 (Cont.)

Serial Number	Applicant	Application Received	Size (acres)[c]	MW	Technology	Status	Field Office
Wind Applications (Cont.)							
NVN 83041	Table Mtn Wind	Jan. 31, 2006	11,570	–	Wind	Authorized wind site testing	Las Vegas
AZA 32315	BP Wind Energy	–	31,338	–	Wind	Authorized wind site testing	Kingman
NVN 73726	Table Mtn Wind	May 5, 2000	8,320	–	Wind	Pending wind facilities development	Las Vegas
AZA 32315AA	BP Wind Energy	–	44,860	–	Wind	Pending wind facilities development	Kingman

[a] Sources: BLM (2009a,b).

[b] Information for pending solar and wind (BLM and USFS 2010b) energy projects downloaded from GeoCommunicator.

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

[d] A dash indicates data not available.

Southwest Intertie Project (SWIP). The SWIP is a 520-mi (830-km) long, single-circuit, overhead 500-kV transmission line project. The first phase, the Southern Portion, is a 264-mi (422-km) long transmission line that begins at the existing Harry Allen Substation in Dry Lake, Nevada, and runs north to a proposed substation approximately 18 mi (29 km) northwest of Ely, Nevada. The transmission line will pass through the SEZ. It will consist of self-supporting, steel-lattice and steel-pole H-frame structures, placed 1,200 to 1,500 ft (366 to 457 m) apart. The SWIP proposed completion date is 2012. Construction could have potential impacts on the Mojave Desert Tortoise (BLM 2007b).

TransWest Transmission Project. TransWest Express proposes to construct a high-voltage electric utility transmission line. The single-circuit 600-kV direct current transmission line would extend from south central Wyoming to Southern Nevada, a distance of 765 mi (1,224 km). It will consist of self-supporting steel-lattice and steel-pole structures. A terminal/converter station would be located near Boulder City, Nevada. A communication system for command and control will require a fiber-optic network and periodic regenerative sites. The proposed routes have been sited to parallel existing facilities and occupy designated utility corridors to the extent practicable, and will pass the southern boundary of the SEZ (TransWest Express 2009).

Zephyr and Chinook Transmission Line Project. TransCanada is proposing the construction of two 500-kV high-voltage DC transmission lines. The Zephyr project would originate in southeastern Wyoming. The Chinook project would originate in south-central Montana. Both would travel along the same corridor from northern Nevada, passing near or through the SEZ, and terminate in the El Dorado Valley south of Las Vegas. Construction is expected to be complete in 2015 or 2016 (TransCanada 2010).

11.3.22.2.2 Other Actions

There are a number of energy production facilities within a 50-mi (80-km) radius from the center of the Dry Lake SEZ, which includes portions of Clark and Lincoln Counties in Nevada, Washington County in Utah, and Mohave County in Arizona. Other major ongoing and foreseeable actions within 50 mi (80 km) of the proposed Dry Lake are listed in Table 11.3.22.2-3 and described in the following sections.

Ongoing Renewable Energy Projects

El Dorado Solar. Sempra Energy operates the 10-MW El Dorado Solar Plant, utilizing more than 167,000 thin-film, solar cell panels. The 80-acre (0.32-km^2) site is adjacent to the El Dorado Energy Generating Station, 17 mi (27 km) southwest of downtown Boulder City, Nevada, and about 45 mi (72 km) south of the SEZ (Sempra Generation 2010).

TABLE 11.3.22.2-3 Other Ongoing and Foreseeable Actions near the Proposed Dry Lake SEZ[a]

Description	Status	Resources Affected	Primary Impact Location
Renewable Energy Projects			
El Dorado Solar	Operating since 2009	Terrestrial habitats, wildlife, visual	45 mi (72 km) south of the SEZ
Nellis Air Force Base Solar	Operating since 2007	Terrestrial habitats, wildlife, visual	10 mi (16 km) south of the SEZ
Nevada Solar One	Operating since 2007	Terrestrial habitats, wildlife, water, cultural, visual	40 mi (64 km) south of the SEZ
Sithe Global Flat Top Mesa Solar	Proposed	Terrestrial habitats, wildlife, cultural, visual	42 mi (67 km) northeast of the SEZ
Other Energy Projects			
Apex Generating Station	Operating since 2003	Terrestrial habitats, wildlife, water, air, cultural, visual	Adjacent to the SEZ
Chuck Lenzie Generating Station	Operating since 2006	Terrestrial habitats, wildlife, water, air, cultural, visual	Adjacent to the SEZ
Edward W. Clark Generating Station	Operating since 1973	Terrestrial habitats, wildlife, water, air, cultural, visual	25 mi (40 km) southwest of the SEZ
El Dorado Energy Generating Station	Operating since 2000	Terrestrial habitats, wildlife, water, air, cultural, visual	45 mi (72 km) south of the SEZ
Goodsprings Waste Heat Recovery Facility	EA and FONSI Sept. 2009	T&E species, air, visual	50 mi (80 km) southwest of the SEZ
Harry Allen Generating Station	Operating since early 1980s	Terrestrial habitats, wildlife, water, air, cultural, visual	Within the SEZ
Harry Allen Expansion	Under construction	Terrestrial habitats, wildlife, water, air, cultural, visual	Within the SEZ
Reid Gardner Generating Station	Operating since 1965	Terrestrial habitats, wildlife, water, air, cultural, visual	20 mi (32 km) northeast of the SEZ
Reid Gardner Expansion	EA and FONSI March 2008	Terrestrial habitats, wildlife, soil, air, water	20 mi (32 km) northeast of the SEZ
Saguaro Power Company	Operating since 2000	Terrestrial habitats, wildlife, water, air, cultural, visual	20 mi (32 km) south of the SEZ
Silverhawk Generating Station	Operating since 2004	Terrestrial habitats, wildlife, water, air, cultural, visual	Adjacent to the SEZ

TABLE 11.3.22.2-3 (Cont.)

Description	Status	Resources Affected	Primary Impact Location
Other Energy Projects (Cont.)			
Sunrise Generating Station	Operating since 1964	Terrestrial habitats, wildlife, water, air, cultural, visual	20 mi (32 km) south of the SEZ
Toquop Energy Project	Coal-fired plant FEIS 2009, changed to natural gas in 2010	Terrestrial habitats, wildlife, soil, water, air, cultural, visual	50 mi (80 km) northeast of the SEZ
Distribution Systems			
Kern River Gas Transmission System	Operating since 1992	Disturbed areas, terrestrial habitats along pipeline ROW	Corridor passes through the SEZ
UNEV Pipeline Project	FEIS April 2010	Disturbed areas, terrestrial habitats along pipeline ROW	Corridor passes through the SEZ
Other Projects			
Arizona Nevada Tower Corporation Communication Sites	EA issued April 2007	Terrestrial habitats, wildlife, cultural resources	West and north of the SEZ
Clark, Lincoln, and White Pine Counties Groundwater Development Project	DEIS expected in 2011	Terrestrial habitats, wildlife, groundwater	Within the SEZ
Coyote Springs Investment Planned Development Project	FEIS issued Sept. 2008, ROD issued Oct. 2008	Terrestrial habitats, wildlife, water, socioeconomics	15 mi (24 km) north of the SEZ
Dry Lake Groundwater Testing/Monitoring Wells	EA and FONSI issued Sept. 2009	Terrestrial habitats, wildlife cultural resources	Within the SEZ
Lincoln County Land Act Groundwater Development and Utility ROW	FEIS issued May 2009 ROD Jan. 2010	Terrestrial habitats, wildlife, groundwater	45 mi (72 km) northeast of the SEZ
Meadow Valley Gypsum Project	EA and FONSI issued 2008	Terrestrial habitats, wildlife, soils, socioeconomics	35 mi (56 km) northeast of the SEZ
Mesquite Nevada General Aviation Replacement Airport	DEIS April 2008	Land use, terrestrial habitats, wildlife, soil, water, air, cultural, visual	40 mi (64 km) northeast of SEZ
NV Energy Microwave and Mobile Radio Project	Preliminary EA March 2010	Terrestrial habitats, wildlife, cultural resources	Two sites within the SEZ, one site 45 mi (72 km) north of SEZ

[a] Projects ongoing or in later stages of agency environmental review and project development.

Nellis Air Force Base Solar. Nellis Air Force Base operates a 13.5-MW solar PV plant consisting of about 72,000 solar panels, using a single-axis solar tracking system that follows the sun throughout the day. The power produced is 400 volts DC, and transformers step up the voltage to 12,470 volts, compatible with the Nellis Air Force Base system. All power is to be used by the Base; it provides up to 30% of the Base requirements. The 140-acre (0.57-km^2) site is located in Area III on the northwest portion of the Base. Nellis Air Force Base is just northeast of Las Vegas, Nevada, and 10 mi (16 km) south of the SEZ. No federal or state threatened or endangered species, protected species, or rare plants exist on the site (U.S. Air Force 2006).

Nevada Solar One. Acciona's Nevada Solar One is a 64-MW thermal-electric plant consisting of 760 parabolic concentrators with more than 182,000 mirrors that raise a heat transfer fluid to 735°F; it is then used to produce steam that drives a conventional turbine. The facility is located on a 280-acre (1.1-km^2) site about 12 mi (19 km) southwest of Boulder City, Nevada, and 40 mi (64 km) south of the SEZ. The plant began operating in 2007 (Acciona 2009).

Sithe Global Flat Top Mesa Solar. Sithe Global is planning to build a 50-MW solar photovoltaic power plant. The 450-acre (1.8-km^2) site is located on private land 5 mi (8 km) west of Mesquite Nevada and 42 mi (67 km) northeast of the SEZ. Approximately 200 workers would be required during the 15-month construction period (Sithe Global 2010a).

Other Ongoing and Foreseeable Energy Projects

Apex Generating Station. The Apex Generating Station is a 600-MW, combined cycle, natural gas–fired power plant, consisting of two combustion turbine generators, two heat recovery steam generators, and one steam turbine generator. The plant is located within the Apex Industrial Park near the intersection of I-15 and State Route 93. The site is within the SEZ (Mirant Las Vegas 2007).

Chuck Lenzie Generating Station. The Chuck Lenzie Generating Station is a 1,102-MW, combined cycle, natural gas–fired power plant located within the SEZ; it consists of four combustion turbines, four heat recovery steam generators, and two steam turbines. The plant, owned by NV Energy, has been operating at full power since 2006. The station utilizes a dry-cooling system. Approximately 30 workers are required to operate the facility (NVE 2009a).

El Dorado Energy Generating Station. The El Dorado Energy Generating Station is a 480-MW, combined cycle, natural gas–fired power plant. The 138-acre (0.56-km^2) site is 17 mi (27 km) southwest of downtown Boulder City, Nevada, and about 45 mi (72 km) south of the SEZ (Sempra Generation 2010).

Edward W. Clark Generating Station. The Edward W. Clark Generating Station is a 1,102-MW natural gas–fired power plant, which includes a total of 19 generating units with in-service dates ranging from 1973 to 2008. Four are combined cycle turbine generators and 12 are peaking units with capacity of 600 MW. The site is located a few miles south of the Las Vegas Strip and about 25 mi (40 km) southwest of the SEZ. The plant includes a 75-kW high-concentration PV system. Approximately 30 workers are required to operate the facility (NVE 2009d).

Goodsprings Waste Heat Recovery Generation Facility. NV Energy proposes to construct and operate a 6-MW waste heat recovery generation facility near Goodsprings, Nevada. The source of the waste heat would be three Kern River Station gas compressor turbines' exhaust. The 5-acre (0.02-km^2) site is located 50 mi (80 km) southwest of the SEZ (BLM 2009d).

Harry Allen Generating Station. The Harry Allen Generating Station is a two-unit, 144-MW, combined cycle gas-fired power plant. It was originally built as a "simple" cycle plant operating only during the hot summer months. The first combined cycle unit (60 MW) began operating in 1995 and the second unit (84 MW) went online in 2006. The plant is located north of the intersection of I-15 and U.S. 93. The site is within the SEZ. Approximately 30 workers are required to operate the facility (NVE 2009c).

Harry Allen Generating Station Expansion. The Harry Allen Generating Station is a 484-MW, combined cycle, natural gas–fired power plant that consists of two combustion turbine generators, two heat recovery steam generators, and one steam turbine generator. The heat rejection system will utilize a cooling system comprised of natural draft dry-cooling towers. The plant is located on the site of the existing plant north of I-15 and State Route 93, within the SEZ (NVE 2009c).

Reid Gardner Generating Station. The Reid Gardner Generating Station is a four-unit, 557-MW, coal-fired electric generation facility owned by NV Energy. The first unit went online in 1965. All four units have been operating since 1983. The 480-acre (1.9-km^2) site is located near the town of Moapa, about 20 mi (32 km) northeast of the SEZ. The facility includes evaporation ponds and fly ash, bottom ash, and solids landfills. Pollution control includes wet scrubbers. The heat rejection system consists of wet-cooling towers. Coal is delivered by rail (BLM 2008a).

Reid Gardner Expansion Project. The Reid Gardner Expansion Project will consist of the construction of a 240-acre (0.97-km^2) fly ash landfill and a 315-acre (1.27-km^2) evaporation pond to support the existing Reid Gardner Power Plant. The proposed expansion is adjacent to the southern boundary of the existing site near the town of Moapa, about 20 mi (32 km) southeast of the SEZ (BLM 2008a).

Saguaro Power Company. Saguaro Power Company operates two 35-MW natural gas combustion turbine generators with heat recovery steam generators, a 23.1-MW extraction/condensing steam turbine generator, and two waste heat recovery steam generators. There are two auxiliary boilers that provide steam to manufacturing facilities. The power plant, located 20 mi (32 km) south of the SEZ, is cooled by a wet mechanical draft cooling tower. (Saguaro Power Company 2009).

Silverhawk Generating Station. The Silverhawk Generating Station is a 520-MW, combined cycle, natural gas–fired power plant, consisting of two combustion turbine generators, two heat recovery steam generators, and one steam turbine generator. The plant is located within the Apex Industrial Park near the intersection of I-15 and State Route 93. The site is within the SEZ. The station utilizes a dry-cooling system. The plant began operating in 2004. Approximately 30 workers are required to operate the facility (NVE 2009b).

Sunrise Generating Station. Sunrise Generating Station is a 150-MW natural gas–fired power plant. One unit is a steam boiler and the other is a combustion turbine. The plant also has three peaking units with a capacity of 73 MW. The site is about 20 mi (32 km) southwest of the SEZ (NVE 2009e).

Toquop Energy Project. The Toquop Energy Project, originally proposed as a 750-MW coal-fired electric generation facility, is now planned as a 1,100-MW natural gas-fired combined-cycle power plant, located on a 640-acre (2.6-km^2) site 12 mi (19 km) northwest of the town of Mesquite, Nevada, 50 mi (80 km) northeast of the SEZ. The project will be built in phases. Phase I will be a nominal 550- to 600 MW combined-cycle plant. A water supply system, a gas pipeline connecting the power plant to the Kern River pipeline, connection to the existing Navajo-McCullogh transmission line, and road access to I-15 would also be required. The heat rejection system will utilize a hybrid cooling system comprised of natural draft dry-cooling towers with the ability to apply water overspray on the heating surfaces to provide additional cooling at ambient air temperatures greater than about 80°F (27ºC). The proposed project would require 600 workers during construction, scheduled to begin in 2012 with commercial operation in 2015 (BLM 2009e, Sithe Global 2010b).

Ongoing and Foreseeable Distribution Systems

Kern River Gas Transmission System. The Kern River Gas Transmission system transports 1.7 billion ft^3 of natural gas per day (4.8 million m^3 per day) from Wyoming to the Las Vegas area and then southwest as far as San Bernardino California. A two-pipeline delivery system exists along most of the pipeline route. The pipeline passes through the SEZ (FERC 2010).

UNEV Pipeline Project. Holly Energy Partners proposes to construct and operate a 399-mi (640-km) long, 12-in. (0.3-m) petroleum products pipeline that will originate at the Holly Corporation's Woods Cross, Utah, refinery near Salt Lake City and terminate near the Apex Industrial Park near the intersection of I-15 and State Route 93. The pipeline would generally follow the Kern River ROW within Nevada and pass just south of the SEZ (BLM 2010e).

Other Ongoing and Foreseeable Projects

Arizona Nevada Tower Corporation Communication Sites. Arizona Nevada Tower Corporation has constructed seven cellular telephone signal relay towers in Lincoln County along the U.S. 93 corridor between Coyote Springs Valley and the town of Pioche. Four of the seven sites are 100 ft × 100 ft (30.5 m × 30.5 m) parcels. The remaining three are 50 ft × 100 ft (15.7 m × 30.5 m), 50 ft × 120 ft (15.7 m × 36.6 m), and 100 ft × 200 ft (30.5 m × 61.0 m). Utility corridors were extended to six of the sites to supply electricity. Solar cells are the primary source of power for the Alamo Peak site, with wind generation as the backup. The towers are steel lattice, three-sided, and free standing, and each tower base is a 30 ft^2 (9.1 m^2) concrete slab. The towers at Alamo Peak and Highland Peak are 125 ft (38.1 m) high, and the other five are 195 ft (59.4 m) high (BLM 2007c).

Clark, Lincoln, and White Pine Counties Groundwater Development Project. The Southern Nevada Water Authority (SNWA) proposes to construct a groundwater development project that would transport approximately 122,755 ac-ft/yr (151 million m^3/yr) of groundwater under existing water rights and applications from several hydrographic basins in eastern Nevada and western Utah. The proposed facilities include production wells, 306 mi (490 km) of buried water pipelines, 5 pumping stations, 6 regulating tanks, 3 pressure reducing stations, a buried storage reservoir, a water treatment facility, and about 323 mi (517 km) of 230-kV overhead power lines, 2 primary and 5 secondary substations. The project would develop groundwater in the following amounts in two hydraulically connected valleys that are up-gradient of the Dry Lake SEZ: Dry Lake Valley (11,584 ac-ft/yr [14.3 million m^3/yr]) and Delamar Valley (2,493 ac-ft/yr [3.1 million m^3/yr]). In addition, an undetermined amount of water could be developed and transferred from Coyote Spring Valley, which is north of the SEZ and down-gradient of the other two basins (SNWA 2010)

Coyote Springs Investment (CSI) Development Project. CSI intends to develop a new town in southern Lincoln County at the junction of U.S. 93 and State Route 168. The town would be a master-planned community on 21,454 acres (86.8 km^2), and would include residential, commercial, and industrial land uses. Plans call for more than 111,000 residential dwelling units at a density of 5 units per acre (0.004047 km^2). Also included in the community would be public buildings, hotels, resorts, casinos, commercial and light industrial areas, roads, bridges, and a heliport. Utilities and other infrastructure would be developed to serve the town, including power facilities, sanitary sewer and wastewater treatment facilities, stormwater facilities, solid waste disposal transfer stations, and telecommunications facilities. Water supply treatment facilities, monitoring wells, production wells, storage facilities, and transmission and distribution facilities would also be built. Approximately 70,000 ac-ft/yr (86 million m^3/yr) of water would be needed for the community at full build-out, which may occur over a period of about 40 years. Currently, CSI and its affiliates hold approximately 36,000 ac-ft/yr (44.0 million m^3/yr) in certificated groundwater rights in various basins within Lincoln County. CSI currently owns the 21,454-acre (86.8-km^2) development area and holds leases on an additional 7,548 acres (30.6 km^2) of BLM land in Lincoln County and 6,219 acres (25.2 km^2) of BLM land in Clark County within or next to the privately held land. These adjacent areas would be managed by BLM for the protection of federally-listed threatened or endangered species; activities would be limited to non-motorized recreation or scientific research. The development is 15 mi (24 km) north of the SEZ (USFWS 2008).

Dry Lake Groundwater Testing/Monitoring Wells. The SNWA intends to construct two to four groundwater wells within two 2.5-acre (0.01-km^2) (1.0-acre [0.004-km^2] long-term) locations and a 1.5-acre [0.006-km^2] short-term) location in Dry Lake. The dimensions for the long-term ROW would be 168 ft × 260 ft (51 m × 79 m), and the dimensions for the short-term ROW would be 330 ft × 330 ft (100 m × 100 m) for each site. Two 12-in. (0.3-m) and two 20-in. (0.5-m) wells would be drilled to between 2,200 and 2,400 ft (670 and 730 m) in depth. Access to the well sites would be from both existing roads and a new 809-ft (246-m) long access road. Water generated during the tests would be discharged into the natural drainage network around the sites. At the completion of hydraulic testing, the SNWA will continue to record data to establish baseline ranges of the groundwater levels in the area.

Lincoln County Land Act (LCLA) Groundwater Development and Utility ROW. This project involves the construction of the infrastructure required to pump and convey groundwater resources in the Clover Valley and Tule Desert Hydrographic Areas. The construction includes 75 mi (122 km) of collection and transmission pipeline, 30 wells, 5 storage tanks, water pipeline booster stations, transmission lines and substations, and a natural gas pipeline. A total of 240 acres (0.97 km^2) will be permanently disturbed, and 1,878 acres (7.6 km^2) will be temporarily disturbed. The site is 45 mi (72 km) northeast of the SEZ (USFWS 2009c).

Meadow Valley Gypsum Project. Meadow Valley Gypsum was issued a Finding of No Significant Impact (BLM 2008b) following an Environmental Assessment of proposed mining, processing, and transporting gypsum on public lands. The project would be located 50 mi (80 km) south of Caliente in Lincoln County, Nevada. The project would disturb 46.7 acres (0.2 km^2) and would consist of an open pit, processing plant, and 1.5-mi (2.4-km) long access road.

Mesquite Nevada General Aviation Replacement Airport. The City of Mesquite, Nevada, is proposing to replace its existing airport with a new airport on Mormon Mesa, adjacent to I-15 near Riverside, Nevada, and about 40 mi (64 km) northeast of the SEZ. The airport would require BLM to release 2,560 acres (10.36 km^2) of BLM land for acquisition by the City of

Mesquite. The airport would include a new runway with associated parallel taxiway, general aviation support, and maintenance facilities. The existing airport would be decommissioned and the site would be released for nonaeronautical uses (FAA 2008).

NV Energy Microwave and Mobile Radio Project. NV Energy is proposing to install a new microwave and radio communications network at 13 sites. Two sites are located within the SEZ and one is located 45 mi (72 km) north of the SEZ. The two closest sites are small, about 0.1 acres (0.0004 km^2). The further site is 0.6 acres (0.0024 km^2), but requires 57 acres (0.23 km^2) of land disturbance for access and power-line ROW. Each site would include a communication shelter, two propane tanks, and a generator. Two of the sites have a 160-ft (50-m) self-supporting lattice tower, and one, an 80-ft (25-m) tower (BLM 2010f).

Grazing

There are no active grazing allotments in the immediate vicinity of the SEZ.

Mining

The Meadow Valley Gypsum Project is proposing to mine gypsum on public land, approximately 35 mi (56 km) northeast of the SEZ, as noted above. A total of 46.7 acres (0.189 km^2) would be disturbed during the 10-year lifetime of the project. A 1.5-mi (2.5-km) access road and a 1.8-acre (0.0073-km^2) railroad siding would be constructed (BLM 2007d).

11.3.22.3 General Trends

General trends of population growth, energy demand, water availability, and climate change for the proposed Dry Lake SEZ are presented in this section. Table 11.3.22.3-1 lists the relevant impacting factors for the trends.

11.3.22.3.1 Population Growth

Over the period 2000 to 2008, the population grew annually by 4.0% in Clark County, the ROI for the Dry Lake SEZ (Section 11.3.19.1.5). The population of the ROI in 2008 was 1,879,093. The annual growth rate for the state of Nevada as a whole was 3.4%. The ROI population is projected to increase to 2,710,303 by 2021 and to 2,791,161 by 2023.

11.3.22.3.2 Energy Demand

The growth in energy demand is related to population growth through increases in housing, commercial floor space, transportation, manufacturing, and services. Given that

TABLE 11.3.22.3-1 General Trends Relevant to the Proposed SEZs in Nevada

General Trend	Impacting Factors
Population growth	Urbanization Increased use of roads and traffic Land use modification Employment Education and training Increased resource use (e.g., water and energy) Tax revenue
Energy demand	Increased resource use Energy development (including alternative energy sources) Energy transmission and distribution
Water availability	Drought conditions and water loss Conservation practices Changes in water distribution
Climate change	Water cycle changes Increased wildland fires Habitat changes Changes in farming production and costs

population growth is expected in seven SEZ areas in Nevada between 2006 and 2016, an increase in energy demand is also expected. However, the EIA projects a decline in per-capita energy use through 2030, mainly because of improvements in energy efficiency and 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, with the fastest growth projected for the commercial sector (at 1.1% each year). Transportation, residential, and industrial energy consumption are expected to grow by about 0.5, 0.4, and 0.1% each year, respectively (EIA 2009).

11.3.22.3.3 Water Availability

As described in Section 11.3.9.1.2, the proposed Dry Lake SEZ is located within the Garnet Valley groundwater basin. Groundwater depths in the basin have been recorded at between 230 and 760 ft (70 and 230 m) below ground surface. Groundwater discharge through evapotranspiration is minimal, while recharge from precipitation on the valley floor and the surrounding mountains is estimated to be 400 ac-ft/yr (490,000 m^3/yr). Inflows from the adjacent Hidden Valley groundwater basin are estimated to be 400 ac-ft/yr (490,000 m^3/yr), while estimated discharge from the basin to the California Wash groundwater basin to the west is 800 ac-ft/yr (990,000 m^3/yr).

In 2005, water withdrawals from surface waters and groundwater in Clark County were 680,000 ac-ft/yr (839 million m^3/yr), of which 83% came from surface waters and 17% came from groundwater. The largest water use was public supply at 526,000 ac-ft/yr (649 million m^3/yr), while thermoelectric water use was 28,000 ac-ft/yr (34 million m^3/yr), and irrigation use was about 17,000 ac-ft/yr (21 million m^3/yr). Annual groundwater withdrawals in Garnet Valley are permitted up to 3,400 ac-ft/yr (4.2 million m^3/yr); withdrawals ranged from 797 to 1,558 ac-ft/yr (980,000 to 1.9 million m^3/yr) between 2001 and 2009. Most of the withdrawals were for mining and industrial uses. The Las Vegas Valley Water District has leased the majority of the SNWA's rights to 2,200 ac-ft/yr (2.7 million m^3/yr) of Garnet Valley groundwater to dry-cooled power plants in the area (Section 11.3.9.1.3).

In 1990, Garnet Valley was designated as a groundwater basin by the State Engineer. The preferred uses of groundwater were specified to exclude irrigation and to include municipal, quasi-municipal, industrial, commercial, mining, stockwater, and wildlife purposes. In 2002, the State Engineer suspended new applications for water in the carbonate-rock aquifer systems within Garnet Valley to allow further study of the system. Applications for 44,500 ac-ft/yr (55 million m^3/yr) of water rights are currently being held in abeyance (Section 11.3.9.1.3).

11.3.22.3.4 Climate Change

Governor Jim Gibbons' Nevada Climate Change Advisory committee (NCCAC) conducted a study of climate change and its effects on Nevada (NCCAC 2008). The report summarized the current scientific understanding of climate change and its potential impacts on Nevada. A report on global climate change in the United States prepared by the U.S. Global Change Research Program (GCRP 2009) documents current temperature and precipitation conditions and historic trends. Excerpts of the conclusions from these reports indicate the following:

- Decreased precipitation with a greater percentage of that precipitation coming from rain, which will result in a greater likelihood of winter and spring flooding, and decreased stream flow in the summer;

- The average temperature in the southwest has already increased by about 1.5ºF compared to a 1960 to 1979 baseline, and the average annual temperature is projected to rise 4ºF to 10ºF by the end of the century;

- Warming climate and related reduction in spring snowpack and soil moisture have increased the length of the wildfire season and intensity of forest fires;

- Later snow and less snow coverage in ski resort areas could force ski areas to shut down before the season would otherwise end;

- Much of the southwest has experienced drought conditions since 1999. This represents the most severe drought in the last 110 years. Projections indicate an increasing probability of drought in the region;

- As temperatures rise, landscape will be altered as species shift their ranges northward and upward to cooler climates;

- Temperature increases, when combined with urban heat island effects for major cities such as Las Vegas, present significant stress to health, electricity, and water supply; and

- Increased minimum temperatures and warmer springs extend the range and lifetime of many pests that stress trees and crops, and lead to northward migration of weed species.

11.3.22.4 Cumulative Impacts on Resources

This section addresses potential cumulative impacts in the proposed Dry Lake SEZ on the basis of the following assumptions: (1) because of the moderate size of the proposed SEZ (10,000 to 30,000 acres [40.5 to 121 km^2]), up to two projects could be constructed at a time, and (2) maximum total disturbance over 20 years would be about 12,519 acres (50.7 km^2) (80% of the entire proposed SEZ). For purposes of 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. Since an existing 500-kV transmission line runs through the SEZ, no analysis of impacts has been conducted for the construction of a new transmission line outside of the SEZ that might be needed to connect solar facilities to the regional grid (see Section 11.3.1.2). Regarding site access, the nearest major roads are I-15 and U.S. 93, which lie along the southeast and southwest sides of the SEZ, respectively. It is assumed that no new access roads would be constructed to support solar development in the SEZ.

Cumulative impacts 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 in each resource area are discussed below. At this stage of development, because of the uncertain nature of future projects in terms of size, number, location within the proposed SEZ, 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.

11.3.22.4.1 Lands and Realty

The southern portion of the proposed Dry Lake SEZ is highly developed with many types of energy, water, and transportation infrastructure facilities present. Three designated transmission corridors that pass through the area, including a 368 corridor, are heavily developed with transmission lines, natural gas and refined petroleum product lines, and water lines. A natural gas power plant is being expanded within the boundary of the SEZ, and two additional natural gas power plants are located just southwest of the SEZ on private land. The northern portion of the SEZ is relatively undeveloped. Dirt roads provide access to the interior of the SEZ (Section 11.3.2.1).

Development of the SEZ for utility-scale solar energy production would establish a large industrial area that would exclude many existing and potential uses of the land, perhaps in perpetuity. Access to such areas by both the general public and much wildlife would be eliminated. Traditional uses of public lands would no longer be allowed. While there are numerous energy-related developments in and around the SEZ, solar energy facilities would become a dominating visual presence in the area because of their large size.

As shown in Table 11.3.22.2-2 and Figure 11.3.22.2-1, there are four foreseeable and 16 pending solar development applications and 1 foreseeable and 9 pending wind site testing applications within a 50-mi (80-km) radius of the proposed Dry Lake SEZ. Five of the 16 pending solar applications are partially or totally within the SEZ, as is one of the wind site testing applications. The large number of applications along with the identified foreseeable renewable energy projects indicates strong interest in the renewable energy development within 50 mi (80 km) of the proposed SEZ.

Several foreseeable projects of other types are of note within this distance, including proposed groundwater development and associated utility projects and several proposed transmission line and pipeline projects that would lie on or near the SEZ, and a planned community development on 21,454 acres (86.8 km^2) that would lie about 15 mi (24 km) north of the SEZ. Proposed projects are described in Section 11.3.22.2.2.

The development of utility-scale solar projects in the proposed Dry Lake SEZ in combination with other ongoing, foreseeable, and potential actions within the geographic extent of effects, nominally 50 mi (80 km), could have cumulative effects on land use in the vicinity of the proposed SEZ. Ongoing and foreseeable actions on or near the SEZ would add to impacts from the SEZ and result in cumulative impacts on accessibility of land for other purposes and on groundwater and visual resources, among other resource impacts, depending in part on where and how many potential renewable energy projects are actually built.

11.3.22.4.2 Specially Designated Areas and Lands with Wilderness Characteristics

There are nine specially designated areas within 25 mi (40 km) of the proposed Dry Lake SEZ in Nevada (Section 11.3.3.1). Potential exists for there to be cumulative visual impacts on these areas from the construction of utility-scale solar energy facilities within the SEZ and the construction of transmission lines outside the SEZ. The exact nature of cumulative visual impacts on the users of these areas would depend on the specific solar technologies employed in the SEZ and the locations selected within the SEZ for solar facilities. Currently proposed solar and wind projects on the SEZ and within the geographic extent of effects could cumulatively affect sensitive areas. Renewable energy facilities and associated roads and transmission lines and other future projects would add to the visual clutter of the area and could affect wilderness characteristics, would produce fugitive dust emissions, and could strain water resources and reduce access to specially designated areas.

11.3.22.4.3 Rangeland Resources

Because the Dry Lake SEZ does not contain any grazing allotments, solar energy development within the SEZ would have no impact on livestock and grazing or contributions to cumulative impacts on grazing (Section 11.3.4.1.1).

Because the Dry Lake SEZ is about 8 mi (13 km) or more from any wild horse and burro HMA managed by BLM and about 33 mi (53 km) from any wild horse and burro territory administered by the USFS, solar energy development within the SEZ would not directly or indirectly affect wild horses and burros that are managed by these agencies and would not contribute to cumulative impacts on these species.

11.3.22.4.4 Recreation

Limited outdoor recreation (e.g., backcountry driving, OHV use, and some camping and hunting) occurs on or in the immediate vicinity of the SEZ. Construction of utility-scale solar projects on the SEZ would preclude recreational use of the affected lands for the duration of the projects. Road closures and access restrictions within the proposed SEZ would affect OHV use in particular. Foreseeable and potential future actions would similarly affect areas of low recreational use and would have minimal effects on recreation. Thus, cumulative impacts on recreation within the geographic extent of effects are not expected.

11.3.22.4.5 Military and Civilian Aviation

The proposed Dry Lake SEZ is not located under any military airspace. Nellis Air Force Base has indicated that their operations may be impacted by solar towers or other tall structures that could be located in the SEZ. In addition, structures higher than 50 ft (15 m) may present unacceptable electromagnetic concerns for the National Test and Training Range located to the west and north of the SEZ (Section 11.3.6.2). Foreseeable and potential solar facilities, proposed communication towers, and proposed new transmission lines within and outside the SEZ could present additional concerns for military aviation and could result in cumulative impacts on military aviation. The North Las Vegas and McCarran International airports are located far enough away from the SEZ that there would be no effect on their operations and thus no cumulative effects on civilian aviation.

11.3.22.4.6 Soil Resources

Ground-disturbing activities (e.g., grading, excavating, and drilling) during the construction phase of a solar project, including the construction of any associated transmission line connections and new roads, would contribute to soil loss due to wind erosion. Road use during construction, operations, and decommissioning of the solar facilities would further contribute to soil loss. Programmatic design features would be employed to minimize erosion and loss. Residual soil losses with mitigations in place would be in addition to losses from construction of other foreseeable and potential renewable energy facilities, proposed transmission lines, proposed water, oil, and gas pipelines, proposed residential development, and from recreational uses. Overall, the cumulative impacts on soil resources could be small to moderate from several large foreseeable solar projects and other types of projects within the geographic extent of effects.

In addition to soil loss from erosion, landscaping of solar energy facilities and other future projects within and outside the SEZ could alter drainage patterns and lead to increased siltation of surface water streambeds. However, as for erosion, programmatic design features would be in place to minimize such impacts.

11.3.22.4.7 Minerals (Fluids, Solids, and Geothermal Resources)

As discussed in Section 11.3.8, a number of active mining claims and a mineral processing plant lie in the southern tip of the proposed Dry Lake SEZ, but no active oil and gas leases or proposals for geothermal energy development are pending in the SEZ. Because of the generally low level of mineral production in the area, because the impact of other foreseeable actions on mineral accessibility within the geographic extent of effects is expected to be low, and because the existing mineral rights in the southern tip of the proposed SEZ would not be affected, no cumulative impacts on mineral resources are expected.

11.3.22.4.8 Water Resources

Section 11.3.9.2 describes the water requirements for various technologies if they were to be employed on the proposed SEZ to develop utility-scale solar energy facilities. The amount of water needed during the peak construction year for all evaluated solar technologies would be 2,408 to 3,480 ac-ft (3.0 million to 4.3 million m^3). During operations, with full development of the SEZ over 80% of its available land area, the amount of water needed for all evaluated solar technologies would range from 71 to 37,593 ac-ft/yr (88 thousand to 46 million m^3). The amount of water needed during decommissioning would be similar to or less than the amount used during construction. As discussed in Section 11.3.22.2.3, water withdrawals in 2005 in Clark County were 680,000 ac-ft/yr (839 million m^3/yr), of which 83% came from surface waters and 17% came from groundwater. The largest water use category was public supply, at 526,000 ac-ft/yr (649 million m^3/yr). Cumulatively, therefore, the additional water resources needed for solar facilities in the SEZ during operations would constitute a very small (0.01%) to moderate (5.5%) increment (the ratio of the annual operations water requirement to the annual amount withdrawn in Clark County) depending on the solar technology used (PV technology at the low end and the wet-cooled parabolic trough technology at the high end). However, as discussed in Section 11.3.9.1.3, withdrawals from the Garnet Valley ranged from 797 to 1,558 ac-ft/yr (980,000 to 1.9 million m^3/yr) between 2001 and 2009. Annual withdrawals are permitted up to 3,400 ac-ft/yr (4.2 million m^3/yr), of which 2,200 ac-ft/yr (2.7 million m^3/yr) is currently leased by Las Vegas Valley Water District, mainly to supply dry-cooled power plants. Thus, solar developments on the SEZ would have the capacity to far exceed the permitted groundwater withdrawal levels in the Garnet Valley basin using wet-cooling. Full development with dry-cooled solar trough technologies would require up to 3,791 ac-ft/yr, or more than currently permitted levels (Section 11.3.9.2.2). As discussed in Section 11.3.9.1, the Garnet Valley basin-fill aquifer has an estimated perennial yield of 400 ac-ft/yr (490,000 m^3/yr). Thus, the current withdrawals in the basin are 2 to 4 times higher than the estimated perennial yield of the basin-fill materials. Groundwater may be available within the carbonate aquifer, but further study is needed to determine the connectivity of the system within Nevada and the potential impacts from large-scale groundwater withdrawals.

While solar development of the proposed SEZ with water-intensive technologies would likely be infeasible due to impacts on groundwater supplies and existing demands on water rights, excessive groundwater withdrawals could disrupt the existing groundwater supplies in the Garnet Valley and in hydraulically connected basins. In addition, land disturbance for solar facility construction could cause localized soil erosion and sedimentation of ephemeral washes and the dry lake, degrade associated habitats, and alter groundwater recharge and discharge processes (Section 11.3.9.2.4). Thus, a significant increase in withdrawals from solar development within the proposed SEZ could result in a major impact on groundwater, while further cumulative impacts could occur when combined with other current and future uses in the region, including from foreseeable and potential solar developments on public and private lands nearby, as described in Section 11.3.22.2. Groundwater level declines could also affect flow in the White River Groundwater Flow System and impact groundwater discharge to the Muddy River Springs or the Virgin River. This section notes that several natural gas power plants are already located near to or within the boundaries of the proposed SEZ. While a number of these plants use dry cooling, all such plants require water for a variety of other operational purposes.

Small quantities of sanitary wastewater would be generated during the construction and operation of the potential utility-scale solar energy facilities. The amount generated from solar facilities would be in the range of 19 to 148 ac-ft (23,000 to 183,000 m^3) during the peak construction year and would range from less than 2 up to 35 ac-ft/yr (up to 43,000 m^3/yr) during operations. Because of the small quantity, the sanitary wastewater generated by the solar energy facilities would not be expected to put undue strain on available sanitary wastewater treatment facilities in the general area of the SEZ. For technologies that rely on conventional wet-cooling systems, there would also be from 395 to 711 ac-ft/yr (0.49 to 0.88 million m^3) of blowdown water from cooling towers. Blowdown water would need to be either treated on-site or sent to an off-site facility. Any on-site treatment of wastewater would have to ensure that treatment ponds are effectively lined in order to prevent any groundwater contamination. Thus, blowdown water would not contribute to cumulative effects on treatment systems or on groundwater.

11.3.22.4.9 Vegetation

The proposed Dry Lake SEZ is located within the Creosotebush-Dominated Basins ecoregion, which is characterized by sparse creosotebush, white bursage, and big galleta grass, with cacti, yucca, ephedra, and Indian ricegrass also common. Sonora-Mojave Creosote–White Bursage Desert Scrub is the predominant cover type within the proposed SEZ. Areas surrounding the SEZ include the Creosotebush-Dominated Basins and Arid Footslopes ecoregions. The dominant cover type in the 5-mi (8-km) area of indirect effects is Sonora-Mojave Creosote–

White Bursage Desert Scrub. 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. Full development of the SEZ over 80% of its area would result in moderate impacts on the North American Warm Desert Pavement cover type and small impacts on all other cover types in the affected area (Section 11.3.10.2.1). Dry Lake playa habitats, riparian habitats, or dry wash communities within or downgradient from solar projects could be affected by ground-disturbing activities, while increased runoff from facilities could affect the hydrology of these areas. Dry Lake playa contains 3,310.5 acres (13.4 km^2) of wetlands, 1,022 acres (4.1 km^2) within the SEZ. In addition, groundwater drawdown by solar facilities could affect mesquite or other communities supported by shallow groundwater, including those in Moapa Warm Springs or Corn Creek Springs. A further concern in disturbed areas is the establishment and spread of noxious weeds and invasive species.

The fugitive dust generated during the construction of the solar facilities could increase the dust loading in habitats outside a solar project area, in combination with that from other construction, agriculture, recreation, and transportation. The cumulative dust loading could result in reduced productivity or changes in plant community composition. Similarly, surface runoff from project areas after heavy rains could increase sedimentation and siltation in areas downstream. Programmatic design features would be used to reduce the impacts from solar energy projects and thus reduce the overall cumulative impacts on plant communities and habitats.

Solar facilities within the SEZ in combination with other ongoing and reasonably foreseeable future actions would have a cumulative effect on both common and uncommon cover types within the 50-mi (80-km) geographic extent of effects. Sensitive habitats, including wetlands, would be of particular concern. Numerous ongoing, foreseeable and potential projects lie within this range, including three solar facilities under development and 13 potential facilities with applications covering over 75,000 acres (304 km^2) (Section 11.3.22.2). Many other large-acreage developments exist or are proposed within this area, including several large power plants, transmission line and pipeline projects, the 21,454-acre (86.8-km^2) Coyote Springs Investment residential development, and a community airport. In addition, the city of Las Vegas lies about 20 mi (32 km) southwest of the proposed SEZ, and the proposed East Mormon Mountain SEZ lies about 43 mi (69 km) to the northeast. Taken together, current and future projects could have moderate to large cumulative effects on vegetation in the region. The degree of such impacts would depend to a large extent on the level of actual solar development in the region. Other future developments, including the Coyote Springs residential project, would also contribute significantly to cumulative effects. The Dry Lake SEZ would make a relatively small contribution to cumulative effects, however, given its modest size in comparison to other developments.

11.3.22.4.10 Wildlife and Aquatic Biota

Wildlife species that could potentially be affected by the development of utility-scale solar energy facilities in the proposed SEZ include amphibians, reptiles, birds, and mammals. The construction of utility-scale solar energy projects in the SEZ and any associated transmission lines and roads in or near the SEZ would have an impact on wildlife through habitat disturbance (i.e., habitat reduction, fragmentation, and alteration), wildlife disturbance, and wildlife injury or mortality. In general, impacted species with broad distributions and a variety of habitats would be less affected than species with a narrowly defined habitat within a restricted area. The use of programmatic design features would reduce the severity of impacts on wildlife. These design features may include pre-disturbance biological surveys to identify key habitat areas used by wildlife, followed by avoidance or minimization of disturbance to those habitats.

As noted in Section 11.3.22.2, other ongoing, reasonably foreseeable and potential future actions within 50 mi (80 km) of the proposed SEZ include three solar facilities under development and 13 potential facilities with applications covering over 75,000 acres (304 km^2) on public land, two foreseeable large solar facilities on private land, several existing large power plants, several proposed transmission line and pipeline projects, the proposed 21,454-acre (86.8-km^2) Coyote Springs Investment residential development, and a proposed new community airport (Section 11.3.22.2). While impacts from full build-out over 80% of the proposed SEZ would result in small impacts on amphibian, reptile, bird, and mammal species (Section 11.3.11), impacts from foreseeable development within the 50-mi (80-km) geographic extent of effects could be moderate to large. However, many of the wildlife species present within the proposed SEZ that could be affected by other actions would still have extensive available habitat within the region, while contributions to cumulative impacts from solar facilities within the proposed SEZ would be relatively small.

There are no perennial or intermittent streams within the proposed Dry Lake SEZ or in the 5-mi (8-km) area of indirect effects. Ephemeral washes in the SEZ contain water only following rainfall and typically do not support wetland or riparian habitats. Dry Lake, 981 acres (4 km^2) of which are located within the SEZ, similarly has standing water mainly after rainfall. Such areas may contain biota adapted to such conditions, as described in Section 11.3.11.4.1. Thus, no standing aquatic communities are likely to be present in the proposed SEZ. The area of indirect effects holds 6,185 acres (25 km^2) of dry lakes and associated wetlands and 7 mi (11 km) of two intermittent streams. Both streams are typically dry and are not expected to contain permanent aquatic habitat or communities, but drain into perennial streams or Lake Mead within the 50-mi (80-km) geographic extent of effects, which do contain aquatic species, including federally endangered fish species (Section 11.3.11.2). Soil disturbance from construction of solar facilities in the SEZ could result in soil transport to surface streams via water and airborne routes, but this is expected to be low with mitigations in place. Groundwater drawdown by operating solar facilities within the SEZ could affect aquatic habitats in springs supported by groundwater. Cumulative impacts on aquatic biota from all ongoing and foreseeable development within the geographic extent of effects could be significant given the high level of foreseen development. However, contributions to such impacts from solar development within the proposed SEZ would be relatively small. The magnitude of overall cumulative impacts on aquatic species would depend on the extent of eventual solar and other development in the region.

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

On the basis of recorded occurrences or suitable habitat, as many as 63 special status species could occur within the Dry Lake SEZ or could be affected by groundwater use there. The following seven special status species are known to occur within the affected area of the Dry Lake SEZ: Las Vegas bearpoppy, Meadow Valley sandwort, rosy two-tone beardtongue, threecorner milkvetch, yellow two-tone beardtongue, desert tortoise, and Nelson's bighorn sheep. In addition, there are 13 groundwater-dependent species or species with habitats that may be dependent on groundwater discharge from the Garnet Valley groundwater basin. Occurrences of the desert tortoise have been recorded near the SEZ, while critical habitat for the desert tortoise lies with the 5-mi (8-km) area of indirect affects outside the SEZ. Numerous species that occur on or in the vicinity of the SEZ are listed as threatened or endangered by the state of Nevada or listed as a sensitive species by the BLM (Section 11.3.12.1). Avoidance of habitat and minimization of erosion, sedimentation, and dust deposition are all design features to be used to reduce or eliminate the potential for these species to be affected by the construction and operation of utility-scale solar energy projects in the SEZs and related developments (e.g., access roads and transmission line connections) outside the SEZ. Special-status species are also affected by ongoing actions within the geographic extent of effects; these include impacts from urban areas, roads, transmission lines, and power plants in the area. Future developments, including as many as five large solar facilities under development, 13 potential facilities with applications covering over 75,000 acres on public land, several proposed transmission line and pipeline projects, the proposed 21,454-acre (86.8-km^2) Coyote Springs Investment residential development, and a proposed new community airport (Section 11.3.22.2), will add further effects. Potential developments cover large areas and long linear distances and are likely to affect special status species. Total cumulative impacts could be moderate to large. However, contributions to cumulative impacts from solar development with the proposed SEZ would be relatively small. Actual impacts would depend on the number, location, and technologies of projects that are actually built. Future projects would employ mitigation measures to limit effects.

11.3.22.4.12 Air Quality and Climate

While solar energy generates minimal emissions compared with fossil fuels, the site preparation and construction activities associated with solar energy facilities would be responsible for some amount of air pollutants. Most of the emissions would be particulate matter (fugitive dust) and emissions from vehicles and construction equipment. When these emissions are combined with those from other nearby projects outside the proposed SEZ or when they are added to natural dust generation from winds and windstorms, the air quality in the general vicinity of the projects could be temporarily degraded. For example, the maximum 24-hour PM_{10} concentration at or near the SEZ boundaries could at times exceed the applicable standard of 150 μg/m^3. The dust generation from construction activities can be controlled by implementing aggressive dust control measures, such as increased watering frequency or road paving or treatment.

Operation of solar facilities within the area proposed for the SEZ would contribute minimal air emissions from combustion to those from operation of existing and future industrial sources in the area, mainly gas-fired power plants, so the only type of air pollutant of concern is dust generated during construction of new facilities in addition to that produced by winds. Because there are a fair number of other foreseeable and potential actions that could produce fugitive dust emissions, it is possible that construction of two or more projects could overlap in both time and affected area and produce small cumulative air quality effects due to dust emissions.

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 by offsetting the need for energy production that results in higher levels of emissions, such as coal, oil, and natural gas. As discussed in Section 11.3.13.2.2, 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 significant. For example, if the Dry Lake SEZ were fully developed (80% of its acreage) with solar facilities, the quantity of pollutants avoided could be as large as 12% of all emissions from the current electric power systems in Nevada.

11.3.22.4.13 Visual Resources

The proposed Dry Lake SEZ is located in the Dry Lake Valley east of the Arrow Canyon Range and west of the Dry Lake Range. The valley is bounded by mountain ranges to the east, southeast, and west (Section 11.3.14.1). The area is a combination of rural and industrial in character, with a high level of cultural disturbance; disturbances include power plants, roads, railroads, transmission lines, mining, and industrial facilities. The VRI values for the SEZ and immediate surroundings are VRI Class IV, indicating low visual values.

Construction of utility-scale solar facilities in the SEZ would further alter the natural scenic quality of the area. Because of the large size of utility-scale solar energy facilities 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 facilities. Potential impacts would include night sky pollution, including increased skyglow, light spillage, and glare. Other foreseeable and potential solar and wind projects and related roads and transmission lines outside the proposed SEZ would cumulatively affect the visual resources in the area.

Visual impacts resulting from solar energy development within the SEZ would be in addition to impacts caused by other potential projects in the area. There currently are four foreseeable and 16 pending solar development applications and one foreseeable and 9 pending wind site testing applications within a 50-mi (80-km) radius of the proposed Dry Lake SEZ (Figure 11.3.22.2-1). In addition, several proposed transmission projects and pipeline projects would pass through or near the proposed SEZ as discussed in Section 11.3.22.2. While the contribution these potential projects would make to cumulative impacts in the area depends on the location of facilities that are actually built, it may be concluded that the general visual character of the landscape within this distance would be further altered from a natural state by the presence of these developments. Because of the topography of the region, such developments, located in basin flats, would be visible at great distances from surrounding mountains, which include sensitive viewsheds. Given the proximity of some current proposals, it is possible that two or more facilities would be viewable from a single location. In addition, facilities would be located near major roads and thus would be viewable by motorists, who would also be viewing transmission lines, towns, and other infrastructure, as well as the road system itself.

As additional facilities are added, several projects might become visible from one location, or in succession, as viewers move through the landscape, as by driving on local roads. In general, the new developments would not be expected to be consistent in terms of their 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. Considering the above, moderate cumulative visual impacts could occur within the geographic extent of effects from future solar, wind, and other existing and future developments.

11.3.22.4.14 Acoustic Environment

Numerous industrial, road, and aircraft noise sources lie around the proposed Dry Lake SEZ, particularly the southern portion. The existing noise sources around the SEZ include road traffic, railroad traffic, aircraft flyover, industrial activities, and recreational activities. The construction of solar energy facilities could increase the noise levels periodically for up to 3 years per facility, but there would be little or minimal noise impacts on nearby residences during operation of solar facilities, including from solar dish engine facilities and from parabolic trough or power tower facilities using TES, which could affect nearby residences.

Other ongoing and reasonably foreseeable and potential future activities in the general vicinity of the SEZs are described in Section 11.3.22.2. Because nearest residents are relatively far from the SEZ and from other foreseeable projects with respect to noise impacts, cumulative noise effects during the construction or operation of solar facilities are unlikely.

11.3.22.4.15 Paleontological Resources

The proposed Dry Lake SEZ has low potential for the occurrence of significant fossil material in about 90% of its area, mainly alluvial deposits, and unknown potential in about 10% of its area, mainly playa deposits and residual materials (Section 11.3.16.1). While impacts on significant paleontological resources are unlikely to occur in the SEZ, a review of the geological deposits in the specific sites selected for future projects would be needed to determine whether a paleontological survey was warranted. Any paleontological resources encountered would be mitigated to the extent possible as determined through consultation with the BLM. No significant contributions to cumulative impacts on paleontological resources are expected.

11.3.22.4.16 Cultural Resources

The area around Dry Lake is rich in cultural history, with settlements dating as far back as 12,000 years. The area covered by the proposed Dry Lake SEZ has the potential to contain significant cultural resources. Areas with potential for significant sites within the proposed SEZ include dune areas within the valley floor. At least 22 sites have been recorded within the SEZ, one of which, the Old Spanish Trail/Mormon Road, is listed in the NRHP; six additional sites have been determined to be eligible for inclusion in the NRHP (Section 11.3.17.1). It is possible that the development of utility-scale solar energy projects in the SEZ would contribute to cumulative impacts on cultural resources in the region, such as visual effects on the Old Spanish National Historic Trail. Such contributions on the trail would be relatively small compared to those from other ongoing, foreseeable, and potential development within the 25-mi (40-km) geographic extent of effects (Section 11.3.22.2) because of the intervening topography that helps mask some of the impact from the SEZ. While any future solar projects would disturb large areas, the specific sites selected for future projects would be surveyed; historic properties encountered would be avoided or mitigated to the extent possible. Through ongoing consultation with the Nevada SHPO and appropriate Native American governments, it is likely that most adverse effects on significant resources in the region could be mitigated to some degree. It is unlikely that any sites recorded in the SEZ would be of such individual significance that, if properly mitigated, development would cumulatively cause an irretrievable loss of information about a significant resource type, but this would depend on the results of the future surveys and evaluations.

11.3.22.4.17 Native American Concerns

The Moapa River Valley adjacent to Dry Lake Valley is a core area of Southern Paiute population and culture and is the location of several proposed solar projects within and outside the Dry Lake SEZ (Figure 11.3.22.2-1). While to date, no specific concerns have been raised to the BLM regarding the proposed Dry Lake SEZ, it is possible that the development of utility-scale solar energy projects in the SEZ would contribute to cumulative impacts on resources important to Native Americans, including traditional plant and animal species; and water. When commenting on past projects in the region, the Southern Paiute have expressed concern over adverse effects on a wide range of resources (Section 11.3.18.2). The extent of potential impacts can only be determined through consultation. The Paiute Indian Tribe of Utah has asked to be kept informed of PEIS developments. Government-to-government consultation is under way with federally recognized Native American Tribes with possible traditional ties to the Dry Lake area. All federally recognized Tribes with Southern Paiute roots have been contacted and provided an opportunity to comment or consult regarding this PEIS. Continued discussion with the area Tribes through government-to-government consultation is necessary to effectively consider and address the Tribes' concerns about solar energy development in the Dry Lake SEZ.

11.3.22.4.18 Socioeconomics

Solar energy development projects in the proposed Dry Lake SEZ could cumulatively contribute to socioeconomic effects in the immediate vicinity of the SEZs and in the surrounding

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, police protection, and health care facilities). Impacts from solar development would be most intense during facility construction, but of greatest duration during operations. Construction would temporarily increase the number of workers in the area needing housing and services. Temporary workers involved in other new developments in the area, including other renewable energy development would also contribute to these effects. The number of workers involved in the construction of solar projects in the peak construction year (including the transmission lines) could range from about 260 to 3,500, 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 440 (solar PV) to as high as 5,800 (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 at the same time. It is a reasonable expectation that this condition would occasionally occur within a 50-mi (80-km) radius of the SEZ over the 20-year or more solar development period.

Annual impacts during the operation of solar facilities would be less, but of 20- to 30-year duration, and could combine with those from other new developments in the area, including numerous foreseeable and potential solar and wind energy projects and several proposed transmission line and pipeline projects (Section 11.3.22.2). The number of workers needed at the SEZ solar facilities would be in the range of 30 to 550, with approximately 40 to 800 total jobs created in the region, assuming full build-out of the SEZ (Section 11.3.19.2.2). Population increases would contribute to general upward trends seen in the region in recent years. The socioeconomic impacts overall 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.

11.3.22.4.19 Environmental Justice

Any impacts from solar development could have cumulative impacts on minority and low-income populations within 50 mi (80 km) of the proposed SEZ in combination with other development in the area. Such impacts could be both positive, such as from increased economic activity, and negative, such as from visual impacts, noise, and exposure to fugitive dust. Actual impacts would depend on the geographic range of effects and on where low-income populations are located relative to solar and other proposed facilities. Overall, effects from facilities within the SEZ are expected to be small, while other foreseeable and potential actions could contribute additional small effects on minority and low-income populations, given the relatively high level of development possible. While no minority or low-income populations are currently present within the 50-mi (80-km) ROI (Section 11.3.20.1), any future minority and low-income populations could experience small cumulative effects of some types; these could include effects on visual resources or from fugitive dust, from all actions within the geographic extent of effects, but contributions from solar development in the proposed Dry Lake SEZ would be small. If needed, mitigation measures can be employed to reduce the impacts on these populations in the vicinity of the SEZ.

11.3.22.4.20 Transportation

I-15 runs along and through the southeast edge of the proposed Dry Lake SEZ and U.S. 93 runs along the southwest border of the SEZ. The Las Vegas metropolitan area lies approximately 15 mi (24 km) to the southwest of the SEZ along I-15. The closest public airport is the North Las Vegas Airport 21 mi (34 km) to the southwest. Nellis Air Force Base is located 13 mi (21 km) to the southwest. The closest railroad access is in Las Vegas and in Moapa, about 24 mi (39 km) to the northeast of the SEZ. During construction of utility-scale solar energy facilities, there could be up to 1,000 workers commuting to the construction site at the SEZ, which could increase the AADT on these roads by 2,000 vehicle trips for each facility under construction. With as many as two facilities assumed to be under construction at the same time, traffic on I-15 and U.S. 93 could experience slowdowns in the area of the SEZ (Section 11.3.21.2). This increase in highway traffic caused by construction workers could likewise have small to moderate cumulative impacts on traffic flow in combination with existing traffic levels and increases from additional future developments in the area; this could include impacts from any of several proposed solar projects near the proposed SEZ, should construction schedules overlap. Local road improvements may be necessary on portions of I-15 near the SEZ. Any impacts during construction activities would be temporary. The impacts can also be mitigated to some degree by staggered work schedules and ride-sharing programs. Traffic increases during operation would have little contribution to cumulative impacts and would be relatively small because of the low number of workers needed to operate the solar facilities.

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11.3.23 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.

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