11.4 DRY LAKE VALLEY NORTH

11.4.1 Background and Summary of Impacts

11.4.1.1 General Information

The proposed Dry Lake Valley North SEZ is located in Lincoln County in southeastern Nevada (Figure 11.4.1.1-1). The SEZ has a total area of 76,874 acres (311 km^2). In 2008, the county population was 4,643, while adjacent Clark County to the south had a population of 1,879,093. The closest population centers to the SEZ are Pioche, located about 15 mi (24 km) to the east, and Caliente, located about 15 mi (24 km) to the southeast; both communities have populations of about 1,000. The smaller communities of Caselton and Prince are located about 13 mi (21 km) to the east of the SEZ. Las Vegas is located about 110 mi (180 km) to the south.

The nearest major road to the Dry Lake Valley North SEZ is State Route 318, which is about 7 mi (11 km) to the west of the SEZ, while U.S. 93 is about 8 mi (13 km) to the south. Access to the interior of the SEZ is by dirt roads. The nearest railroad access is approximately 25 mi (40 km) away, while nearby airports include Lincoln County Airport in Panaca and Alamo Landing Field in Alamo, which are located about 13 mi (21 km) south–southeast of and 35 mi (56 km) southwest of the SEZ, respectively. The proposed Delamar Valley SEZ lies about 23 mi (37 km) to the south of the proposed Dry Lake Valley North SEZ.

A 69-kV transmission line intersects the southeast corner of the SEZ. It is assumed that this existing transmission line could potentially provide access from the SEZ to the transmission grid (see Section 11.4.1.1.2).

There are one pending solar development ROW application, six authorized and one pending wind site testing applications, and one pending wind development application on BLM-administered land within a 50-mi (80-km) radius of the proposed Dry Lake Valley North SEZ. There are currently no solar applications within the SEZ. These applications are discussed in Section 11.4.22.2.1.

The proposed Dry Lake Valley North SEZ is undeveloped and remote. The overall character of the surrounding land is rural. The SEZ is located in the Dry Lake Valley and is framed by mountain ranges on the east and west. The North Pahroc Range rises about 6 mi (10 km) west of the SEZ, and the West Range, Bristol Range, Highland Range, Ely Springs Range, Black Canyon Range, and Burnt Springs Range occur east of the SEZ. No permanent surface water sources occur in the proposed SEZ. Vegetation is generally sparse, with large areas of low grasses and low-height scrubland.

The proposed Dry Lake Valley North SEZ in Nevada and other relevant information are shown in Figure 11.4.1.1-1. The criteria used to identify the proposed Dry Lake Valley North SEZ in Nevada 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

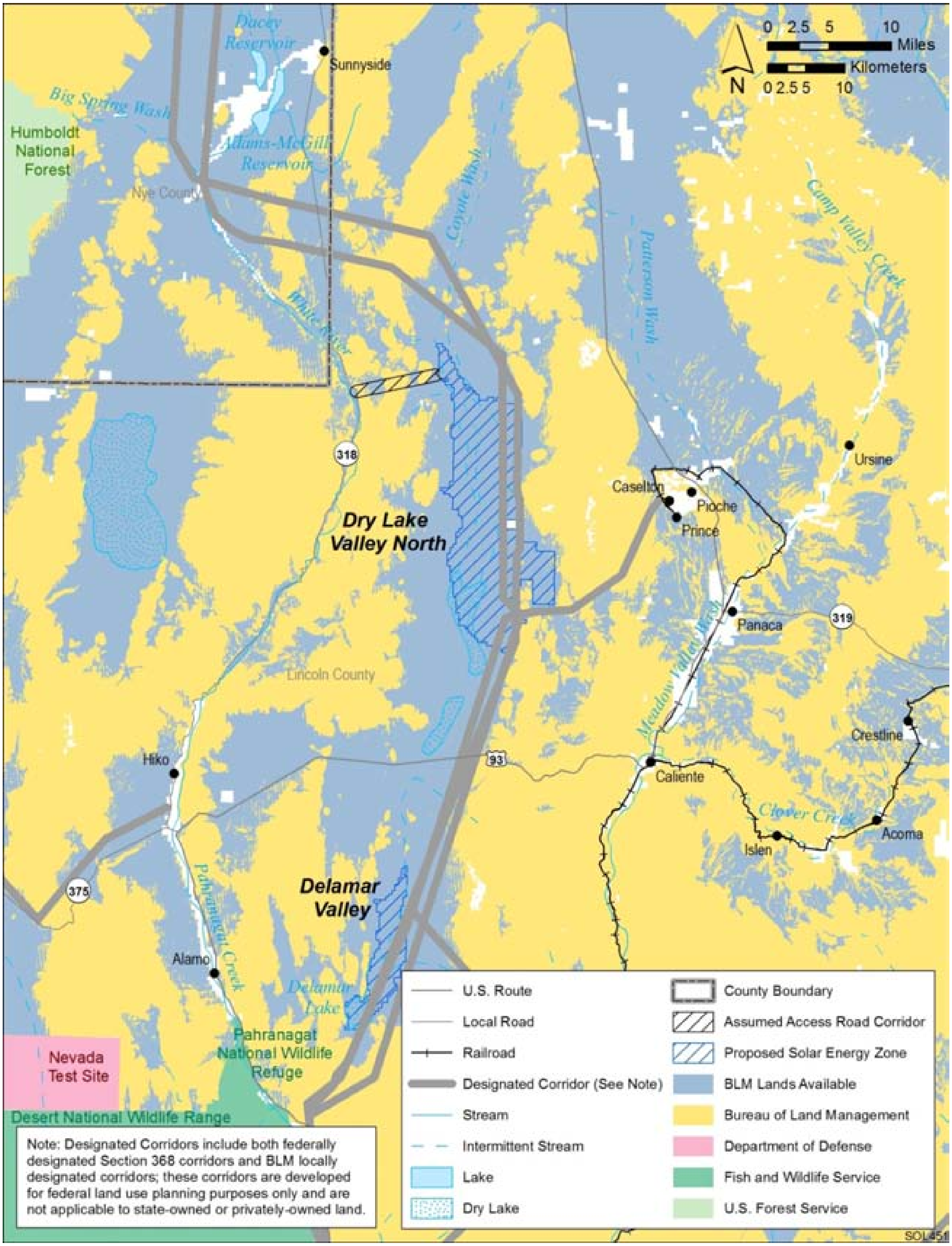

FIGURE 11.4.1.1-1 Proposed Dry Lake Valley North SEZ

critical habitat for threatened and endangered species, ACECs, SRMAs, and NLCS lands (see Section 2.2.4.1 for the complete list of exclusions). Although these classes of restricted lands were excluded from the proposed Dry Lake Valley North SEZ, other restrictions might be appropriate. The analyses in the following sections address the affected environment and potential impacts associated with utility-scale solar energy development in the proposed SEZ for important environmental, cultural, and socioeconomic resources.

As initially announced in the *Federal Register* on June 30, 2009, the proposed Dry Lake Valley North SEZ encompassed 49,775 acres (201 km^2). Subsequent to the study area scoping period, the boundaries of the proposed Dry Lake Valley North SEZ were altered substantially after further observations by the BLM District Office indicating that the additional area met all criteria for solar development. The revised SEZ is approximately 27,100 acres (110 km^2), or about 54%, larger than the original SEZ as published in June 2009.

11.4.1.2 Development Assumptions for the Impact Analysis

Maximum solar development of the proposed Dry Lake Valley North SEZ is assumed to be 80% of the SEZ area over a period of 20 years; these values are shown in Table 11.4.1.2-1, along with other development assumptions. Full development of the Dry Lake Valley North SEZ would allow development of facilities with an estimated total of 6,833 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 12,300 MW of power if solar trough technologies were used, assuming 5 acres/MW (0.02 km^2/MW) of land required.

Availability of transmission from SEZs to load centers will be an important consideration for future development in SEZs. The nearest existing transmission line is a 69-kV line that runs through the SEZ. It is possible that this existing line could be used to provide access from the SEZ to the transmission grid, but the 69-kV capacity of that line would be inadequate for 6,833 to 12,300 MW of new capacity (note: a 500- kV line can accommodate approximately the load of one 700-MW facility). At full build-out capacity, it is clear that substantial new transmission and/or upgrades of existing transmission lines would be required to bring electricity from the proposed Dry Lake Valley North 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 an existing 69-kV transmission line that intersects the SEZ could provide initial access to the transmission grid; thus, no additional acreage disturbance for transmission line access was assessed. Access to the existing 69-kV 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 are needed.

TABLE 11.4.1.2-1 Proposed Dry Lake Valley North SEZ—Assumed Development Acreages, Maximum 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	Area of Assumed Transmission Line ROW and Road ROW	Distance to Nearest Designated Transmission Corridor[e]
76,874 acres and 61,499 acres[a]	6,833 MW[b] and 12,300 MW[c]	NV 318 7 mi[d]	0 mi and 69 kV	0 acres and 51 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] To convert mi to km, multiply by 1.609.

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

An additional 51 acres (0.2 km^2) would be needed for new road access to support solar development in the Dry Lake Valley North SEZ, as summarized in Table 11.4.1.2-1. This estimate was based on the assumption that a new 7-mi (11-km) access road to the nearest major road, State Route 318, would support construction and operation of solar facilities. While there are dirt/ranch roads within the SEZ, additional internal road construction would likely be required to support solar facility construction.

11.4.1.3 Summary of Major Impacts and SEZ-Specific Design Features

In this section, the impacts and SEZ-specific design features assessed in Sections 11.4.2 through 11.4.21 for the proposed Dry Lake Valley North SEZ are summarized in tabular form. Table 11.4.1.3-1 is a comprehensive list of the impacts discussed in these sections; the reader may reference the applicable sections for detailed support of the impact assessment. Section 11.4.22 discusses potential cumulative impacts from solar energy development in the proposed SEZ.

Only those design features specific to the proposed Dry Lake Valley North SEZ are included in Sections 11.4.2 through 11.4.21 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 11.4.1.3-1 Summary of Impacts of Solar Energy Development within the Proposed Dry Lake Valley North SEZ and SEZ-Specific Design Features[a]

Resource Area	Environmental Impacts—Proposed Dry Lake Valley North SEZ	SEZ-Specific Design Features
Lands and Realty	Full development of the SEZ (80% of the total area) could disturb up to 61,499 acres (102 km^2). Solar development would introduce a new and discordant land use into the area.	None.
	Construction of a new access road from State Route 318 could disturb up to 51 acres (0.2 km^2) of public land.	Priority consideration should be given to utilizing existing county roads to provide construction and operational access to the SEZ.
	Because of the extended length of the SEZ, east–west travel across the valley could be cut off, requiring extensive detours for public land users.	None.
	Solar development would require coordination with existing ROWs for two transmission lines, the pending Southern Nevada Water Authority pipeline ROW, and a short segment of road ROW.	None.
Specially Designated Areas and Lands with Wilderness Characteristics	There would be a small adverse impact on wilderness characteristics in the Weepah Spring and Big Rocks WAs. Silver State Off-Highway Vehicle Trail/Byway users seeking a scenic drive experience would be adversely affected.	None.
Rangeland Resources: Livestock Grazing	The Simpson allotment would likely be closed, displacing the permittees. Sixty-five % of the Ely Springs Cattle allotment would be lost. All of the winter range for the permittees in the Dry Lake Valley and Thorley areas of use in the Wilson Creek allotment and the Simpson allotment would be lost. A total of 12,163 AUMs would be lost, and operations of six permittees would suffer major impacts.	Within the Ely Springs cattle allotment, solar development should be sited to minimize the number of pastures affected.

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TABLE 11.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake Valley North SEZ	SEZ-Specific Design Features
Rangeland Resources: Wild Horses and Burros	Loss of 5.4% of the Silver King HMA.	Installation of fencing and access control, provision for wild horse movement corridors, delineation of open range, traffic management, compensatory habitat restoration, and access to or development of water sources should be coordinated with the BLM.
Recreation	Developed portions of the SEZ would become excluded from recreational use.	If solar development would obstruct the route used for desert racing, alternative locations for that use should be considered at the time specific solar development proposals are analyzed.
Military and Civilian Aviation	Portions of the proposed Dry Valley Lake North SEZ are covered by two MTRs with 200-ft (61-m) AGL operating limits and a major SUA. There could be potentially adverse impacts on military training and testing missions.	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 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). Portions of the dry lake may not be a suitable location for construction.	None.
Minerals (fluids, solids, and geothermal resources)	Existing oil and gas leases represent a prior existing right that could affect solar energy development of the SEZ.	None.

TABLE 11.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake Valley North SEZ	SEZ-Specific Design Features
Water Resources	Ground-disturbance activities (affecting up to 12% 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 4,220 ac-ft (5.2 million m^3) of water during peak construction year. Construction activities would generate as much as 222 ac-ft (274,000 m^3) of sanitary wastewater. Assuming full development of the SEZ, operations would use the following amounts of water: • For parabolic trough facilities (12,296-MW capacity), 8,779 to 18,616 ac-ft/yr (11 million to 23 million m^3/yr) for dry-cooled systems; 61,650 to 184,605 ac-ft/yr (76 million to 228 million m^3/yr) for wet-cooled systems. • For power tower facilities (6,831-MW capacity), 4,858 to 10,323 ac-ft/yr (6 million to 13 million m^3/yr) for dry-cooled systems; 34,231 to 102,539 ac-ft/yr (42 million to 126 million m^3/yr) for wet-cooled systems. • For dish engine facilities (6,831-MW capacity), 3,492 ac-ft/yr (4.3 million m^3/yr). • For PV facilities (6,831-MW capacity), 349 ac-ft/yr (430,000 m^3/yr). Assuming full development of the SEZ, operations would generate up to 172 ac-ft/yr (212,000 m^3/yr) of sanitary wastewater and up to 3,493 ac-ft/yr (4.3 million m^3/yr) of blowdown water.	Water resource analysis indicates that wet-cooling options would not be feasible for full build-out of the SEZ; other technologies should incorporate water conservation measures. Land disturbance activities should avoid impacts to the extent possible in the vicinity of the ephemeral stream washes and the dry lake present on the site. Siting of solar facilities and construction activities should avoid any areas identified as within a 100-year floodplain or jurisdictional waters. 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*.

TABLE 11.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake Valley North SEZ	SEZ-Specific Design Features
Vegetation[b]	Up to 80% (61,499 acres [249 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. 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. Playa habitats, such as those on the SEZ and the playas southwest of the SEZ, greasewood flats communities, or other intermittently flooded areas downgradient from solar projects in the SEZ or the assumed access road could be affected by ground disturbing activities.	An Integrated Vegetation Management Plan, addressing invasive species control, and an Ecological Resources Mitigation and Monitoring Plan addressing habitat restoration should be approved and implemented to increase the potential for successful restoration of affected habitats and minimize the potential for the spread of invasive species, such as cheatgrass or halogeton. Invasive species control should focus on biological and mechanical methods where possible to reduce the use of herbicides. Dry washes, playas, and wetlands within the SEZ, and dry washes within the access road corridor, should be avoided to the extent practicable, and any impacts minimized and mitigated. A buffer area should be maintained around wetlands, playas, and dry washes to reduce the potential for impacts. Appropriate engineering controls should be used to minimize impacts on dry wash, playa, marsh, scrub-shrub wetland, riparian, and greasewood flat habitats, including occurrences downstream of solar projects or assumed access road, resulting from surface water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition to these habitats. Appropriate buffers and engineering controls would be determined through agency consultation.

TABLE 11.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake Valley North SEZ	SEZ-Specific Design Features
Vegetation[b] *(Cont.)*		Groundwater withdrawals should be limited to reduce the potential for indirect impacts on habitats dependent on springs associated with the Dry lake Valley basin, Delamar Valley Basin, or other hydrologically connected basins. Potential impacts on springs should be determined through hydrological studies.
Wildlife: Amphibians and Reptiles[a]	Direct impacts from SEZ development would be moderate (i.e., loss of >1 to ≤10% of potentially suitable habitats within the SEZ region) for all representative amphibian species; and several reptile species. Direct impacts on other representative reptile species would be small (i.e., loss of ≤1% of potentially suitable habitats). With implementation of design features, indirect impacts would be expected to be negligible.	The unnamed dry lake and wash habitats should be avoided.
Wildlife: Birds[b]	Direct impacts on about one-third of the representative bird species would be small (i.e., loss of ≤1% of potentially suitable habitats) to moderate (i.e., loss of >1 to ≤10% of potentially suitable habitats within the SEZ region) for the other representative bird species.	The requirements contained within the 2010 Memorandum of Understanding between the BLM and USFWS to promote the conservation of migratory birds will be followed.
	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.	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.
		The unnamed dry lake and wash habitats should be avoided.

TABLE 11.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake Valley North SEZ	SEZ-Specific Design Features
Wildlife: Mammals[b]	Based on land cover analyses, direct impacts on cougar and mule deer would be moderate (i.e., loss of >1 to ≤10% of potentially suitable habitats within the SEZ region); while direct impacts on elk and pronghorn would be small (i.e., loss of ≤1% of potentially suitable habitats). Direct impacts on all other representative mammal species would be small (6 species) to moderate (24 species). Based on mapped ranges for big game; direct impacts would be small for elk and mule deer and moderate for pronghorn. 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. These 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. Playa and wash habitats should be avoided.
Aquatic Biota[b]	No permanent water bodies or streams are present within the boundaries of the Dry Lake Valley North SEZ, assumed new access road, or the areas of indirect effects. The nearest perennial surface water (White River) is about 7 mi (11 km) from the SEZ and less than 1 mi (1.6 km) from the area of direct disturbance for the presumed new access road. Also, the intermittent streams in the SEZ do not drain into any permanent surface waters. Therefore, no direct or indirect impacts on perennial surface water features are expected.	Appropriate engineering controls should be implemented to minimize the amount of contaminants and sediment entering Coyote Wash and the unnamed washes and dry lakes within the SEZ.

TABLE 11.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake Valley North SEZ	SEZ-Specific Design Features
Special Status Species[b]	Potentially suitable habitat for 22 special status species occurs in the affected area of the Dry Lake Valley North SEZ. For special status species, between 0 and 15% of the potentially suitable habitat in the region occurs in the area of direct effects.	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 on 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 may be needed to address the potential for impacts on the desert tortoise. 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. Avoiding or minimizing disturbance to playa habitat on the SEZ could reduce or eliminate impacts on 5 special status species.

TABLE 11.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake Valley North 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*: Predicted 24-hour and annual PM_{10} concentration levels could exceed the AAQS levels at the SEZ boundaries and in the immediate surrounding areas during the construction of solar facilities. Higher concentrations would be limited to the immediate area surrounding the SEZ boundary and would decrease quickly with distance. Modeling indicates that emissions from construction activities are not anticipated to exceed Class I PSD PM_{10} increments at the nearest federal Class I area. Construction emissions from the engine exhaust of heavy equipment and vehicles could cause some short-term impacts on AQRVs (e.g., visibility and acid deposition) at the nearest federal Class I areas. *Operations*: Positive impact due to avoided emission of air pollutants from combustion-related power generation: 32 to 57% of total emissions of SO_2, NO_x, Hg, and CO_2 from electric power systems in the state of Nevada avoided (up to 30,404 tons/yr SO_2, 26,078 tons/yr NO_x, 0.17 ton/yr Hg, and 16,737,000 tons/yr CO_2).	None.
Visual Resources	The SEZ is in an area of low scenic quality, with cultural disturbances already present. 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 11.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake Valley North SEZ	SEZ-Specific Design Features
Visual Resources *(Cont.)*	Solar development could produce 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 8.2 mi (13.2 km) from the Big Rocks WA. Because of the open views of the SEZ and elevated viewpoints, weak to strong visual contrasts could be observed by WA visitors. The SEZ is located 8.4 mi (13.5 km) from the Weepah Spring WA. Because of the open views of the SEZ and elevated viewpoints, very weak to strong visual contrasts could be observed by WA visitors. Approximately 9.5 mi (15.3 km) of U.S. 93 (a state-designated scenic byway) is within the SEZ viewshed. Moderate visual contrasts could be observed within the SEZ by travelers on U.S. 93. Approximately 100 mi (160 km) of the Silver State Trail scenic byway is within the SEZ viewshed. Because of the close proximity of the byway to the SEZ and the elevated viewpoints from some locations along the byway, strong visual contrasts could be observed by travelers on the Silver State Trail. The SEZ is adjacent to the Chief Mountain SRMA. Because of the open views of the SEZ and elevated viewpoints, strong visual contrasts could be observed by SRMA visitors.	

TABLE 11.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake Valley North SEZ	SEZ-Specific Design Features
Acoustic Environment	*Construction*. For construction activities occurring near the southeastern SEZ boundary (the boundary closest to the nearest residence), estimated noise levels at the nearest residence (about 10 mi [16 km]) from the SEZ boundary) would be about 16 dBA, which is well below a 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*. Noise levels at the nearest residences from a parabolic trough or power tower facility would be about 22 dBA, which is much lower than the typical daytime mean rural background level of 40 dBA. For 12-hour daytime operation, 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. In the case of 6-hour TES, the estimated nighttime noise level at the nearest residences would be would be 32 dBA, which is a little higher than 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 well below the EPA guideline of 55 dBA L_{dn} for residential areas. If 80% of the SEZ were developed with dish engine facilities, the estimated noise level at the nearest residences, about 10 mi (16 km) from the SEZ boundary, would be about 39 dBA, which is below the typical daytime mean rural background level of 40 dBA. Assuming 12-hour daytime operation, the estimated 41 dBA L_{dn} at these residences would be well below the EPA guideline of 55 dBA L_{dn} for residential areas.	None.

TABLE 11.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake Valley North SEZ	SEZ-Specific Design Features
Paleontological Resources	Few, if any, impacts on significant paleontological resources are likely to occur in 91% of the proposed Dry Lake Valley North 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 9% of the SEZ is unknown. A more detailed investigation of the playa deposits is needed prior to project approval.	The need for and the nature of any SEZ-specific design features would depend on the results of future paleontological investigations.
Cultural Resources	The Dry Lake Valley North SEZ has a high potential for containing prehistoric sites, especially in the dry lake and dune areas at the southern end of the SEZ; potential for historic sites also exists in the area but to a lesser degree. Thus, direct impacts on significant cultural resources could occur; however, further investigation is needed at the project-specific level. A cultural resource survey of the entire area of potential effect, including consultation with affected Native American Tribes, would first need to be conducted to identify archaeological sites, historic structures and features, and traditional cultural properties, and an evaluation would need to follow to determine if any are eligible for listing in the NRHP as historic properties. Impacts on cultural resources also are possible in areas related to the access ROW, as new areas of potential cultural significance could be directly affected by construction or opened to increased access from road use.	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 11.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake Valley North SEZ	SEZ-Specific Design Features
Native American Concerns	While no comments specific to the proposed Dry Lake Valley North 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. In the area, the Southern Paiute have expressed concern over adverse effects of other energy projects on a wide range of resources. As consultation with the Tribes continues and project-specific analyses are undertaken, it is also possible that Native American concerns will be expressed over potential visual and other effects on specific resources and culturally important landscapes within or adjacent to the SEZ.	The need for and nature of SEZ-specific design features would be determined during government-to-government consultation with the affected Tribes.
Socioeconomics	*Livestock grazing:* Construction and operation of solar facilities could decrease the amount of land available for livestock grazing in the SEZ, resulting in the loss of three jobs (total) and $0.1 million (total) in income in the ROI. *Construction:* 685 to 9,071 total jobs; $41.9 million to $554.2 million income in ROI for solar facilities. *Operations:* 182 to 4,126 annual total jobs; $6.3 million to $155.3 million annual income in the ROI for solar facilities. *Construction of new access road*: 148 total jobs, $5.8 million income	None.
Environmental Justice	Because low-income populations, as defined by CEQ guidelines, are located within the 50-mi (80-km) radius around the SEZ, impacts, although small, could disproportionately affect low-income populations. No minority populations occur within the 50-mi (80-km) radius; thus any adverse impacts of solar projects could not disproportionately affect minority populations.	None.

TABLE 11.4.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Dry Lake Valley North SEZ	SEZ-Specific Design Features
Transportation	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 6,000 vehicle trips per day if three larger projects were to be developed at the same time. The volume of traffic on either State Route 318 or U.S. 93 would increase by a factor of about 2, 4, or 6 maximum in the area of the SEZ for one, two, or three projects, respectively. Because higher traffic volumes would be experienced during shift changes, traffic on either highway could experience moderate slowdowns during these time periods in the general area of the SEZ.	None.

Abbreviations: AAQS = ambient air quality standards; AGL = above ground level; AQRV = air quality–related value; AUM = animal unit months; BLM = Bureau of Land Management; 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; NRHP = *National Register of Historic Places*; PEIS = programmatic environmental impact statement; PFYC = potential fossil yield classification; PM = particulate matter; 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; SO_2 = sulfur dioxide; SRMA = Special Recreation Management Area; SUA = special use airspace; TES = thermal energy storage; USFWS = U.S. Fish and Wildlife Service; WA = Wilderness Area.

[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 Valley North SEZ.

[b] The scientific names of all plants, wildlife, aquatic biota, and special status species are provided in Sections 11.4.10 through 11.4.12.

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11.4.2 Lands and Realty

11.4.2.1 Affected Environment

The proposed Dry Lake Valley North SEZ is a very large and very well blocked area of BLM-administered public land with only one 600-acre (2-km^2) parcel of private land on the east side of the SEZ. The private land has a few ranch buildings on it and is completely surrounded by the SEZ. The overall character of the land in and around the SEZ area is isolated and undeveloped. The southwestern portion of the SEZ includes part of a playa lake. State Route 318 provides access to the northern end of the SEZ via a 10-mi (16-km) connecting dirt road. U.S. 93 provides good access to the southern portion of the SEZ via a dirt road that connects to the highway and provides access to the eastern side of the SEZ from the south. This road on the east side of Dry Lake Valley is about 9 mi (14 km) from U.S. 95 before it enters the SEZ and then passes through most of the east side of the area. Numerous dirt roads cross the SEZ or access livestock facilities in the area.

There are three designated transmission corridors in the proposed SEZ (see Figure 11.4.1.1-1). The eastern corridor is a designated Section 368 (of the Energy Policy Act of 2005) energy corridor. There are two transmission ROWs in the eastern corridor, but no facilities have yet been constructed. A 69-kV transmission line is located in the most southeasterly designated corridor and crosses the very southeastern end of the SEZ. There is a ROW for a short segment of road located in the southern portion of the SEZ.

The SNWA has a ROW application for a pipeline that would pass through the middle of the proposed SEZ. The pipeline has been proposed to convey water from northern Nevada to the Las Vegas area.

As of February 2010, there were no ROW applications for solar energy facility development on the proposed Dry Lake Valley North SEZ.

11.4.2.2 Impacts

11.4.2.2.1 Construction and Operations

Full development of the proposed Dry Lake Valley North SEZ could disturb up to 61,499 acres (102 km^2) (Table 11.4.1.2-1). 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. Since the SEZ is undeveloped and isolated, utility-scale solar energy development would be a new and discordant land use to 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 issued for solar energy development. Because the area currently has so few ROWs present, it is not anticipated that approval of solar energy development would have a significant impact on ROW availability in the area.

The three designated transmission corridors occupy a portion of the SEZ and could limit future solar development in these corridors. To avoid technical or operational interference between transmission and solar energy facilities, solar energy facilities cannot be constructed under transmission lines or over pipelines. The corridors could be relocated outside the SEZ to allow full solar development within the SEZ. Alternatively, capacity of the corridors could be restricted to allow solar development. Transmission capacity is becoming a more critical factor, and reducing corridor capacity in this SEZ may have future, but currently unknown, consequences. This is an administrative conflict that the BLM can address through its planning process, but there would be implications either for the amount of potential solar energy development or for the amount of transmission capacity that can be accommodated.

The existing dirt roads located in the SEZ would be closed wherever solar energy facilities are developed. Because of the 25-mi (40-km) length of the SEZ, if east–west travel across the SEZ is prevented by solar energy development, a long detour around the site could be required. This would adversely affect a wide range of public land users.

11.4.2.2.2 Transmission Facilities and Other Off-Site Infrastructure

Because a 69-kV transmission line crosses the SEZ, no new transmission line construction was assessed, assuming that additional project-specific analysis would be done for new transmission construction or line upgrades.

Because State Route 318 is the closest highway to the SEZ, it is assumed that a new 7-mi (11-km) road would be constructed to connect the SEZ to that highway. This would result in the surface disturbance of about 51 acres (0.2 km^2) of public land. Alternative or additional access to the SEZ could be provided from U.S. 93, which passes near the southern end of the SEZ. In this case, improvement of existing roads could be undertaken. Roads and transmission lines would be constructed within the SEZ as part of the development of the area.

11.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

Implementing the programmatic design features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program would provide adequate mitigation for some identified impacts. The exceptions would be the establishment of a large industrial area that would exclude many existing and potential uses of the land and would be a new and discordant land use to the area.

Proposed design features specific to the proposed Dry Lake Valley North SEZ include:

- Priority consideration should be given to utilizing existing roads to provide construction and operational access to the SEZ.

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11.4.3 Specially Designated Areas and Lands with Wilderness Characteristics

11.4.3.1 Affected Environment

Fourteen specially designated areas occur within 25 mi (40 km) of the proposed Dry Lake Valley North SEZ that potentially could be affected by solar energy development within the SEZ. These include six designated WAs, the Chief Mountain SRMA, four Utah State Park Units, the Mount Wilson Backcountry Byway, the Silver State Off-Highway Vehicle Trail and Backcountry Byway, and the Highway 93 State-designated Scenic Byway. The boundaries of the Weepah Spring and Big Rocks WAs are within about 8 mi (13 km) of the SEZ, while the boundaries of the South Pahroc Range, Far South Egans, Parsnip Peak, and Clover Mountains WA, and the Mount Wilson Backcountry Byway are between 15 mi (24 km) and 25 mi (40 km) from the SEZ. The Highway 93 Scenic Byway is located within 15 mi (24 km) of the SEZ (see Figure 11.4.3.1-1). Viewshed analysis shows that the Mount Wilson Back Country Byway and the four Utah State Park Units would have no visibility of solar development within the SEZ; thus they are not considered further.

There are no areas with wilderness characteristics outside of designated wilderness areas within 25 mi (40 km) of the SEZ.

11.4.3.2 Impacts

11.4.3.2.1 Construction and Operations

The primary potential impact on the nine remaining 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 an important visual component in the viewshed from limited portions of these specially designated areas, as summarized in Table 11.4.3.2-1. The data provided in the table assume the use of the power tower solar energy technology, which because of the potential height of these facilities, could be visible from the largest amount of land of the technologies being considered in the PEIS. 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 (See Section 11.4.14 for more detail on all viewshed analyses 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

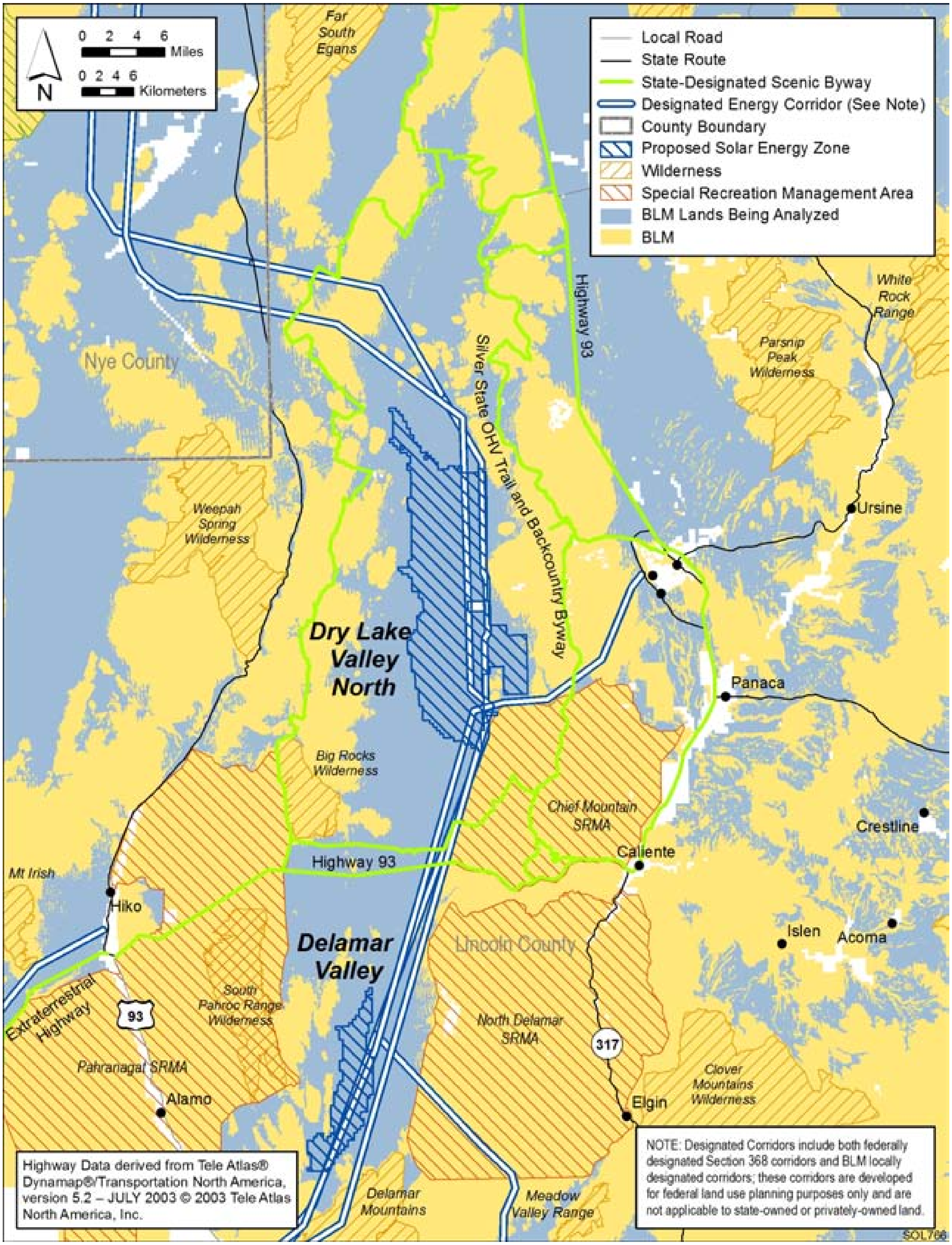

FIGURE 11.4.3.1-1 Specially Designated Areas in the Vicinity of the Proposed Dry Lake Valley North SEZ

TABLE 11.4.3.2-1 Potentially Affected Specially Designated Areas within a 25-mi (40-km) Viewshed of the Proposed Dry Lake Valley North SEZ[a]

		Feature Area or Linear Distance[b]	
Feature Type	Feature Name (Total Acreage/ Linear Distance)	Visible within 15 mi	Visible within 25 mi
Byway	Highway 93 State Scenic Byway (149 mi)	41 mi (5.6%)[c]	41 mi (5.6%)
	Silver State OHV Trail and Backcountry Byway (240 mi)	–[d]	–
SRMA	Chief Mountain SRMA (111,151 acres)	39,076 (35%)	–
Wilderness Area	Big Rocks (12,929 acres)	1,590 acres (12.3%)	1,590 acres (12.3%)
	Clover Mountains (85,621 acres)		26 acres (0.03%)
	Far South Egans (36,297 acres)		454 acres (1.3%)
	Parsnip Peak (43,485 acres)		1,833 acres (4.2%)
	South Pahroc Range (25,674 acres)		2,391 acres (9.3%)
	Weepah Spring (51,309 acres)	13,468 acres (26.3%)	13,600 acres (26.5%)

[a] Assuming power tower technology with a height of 650 ft (198.1 m).

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

[c] Percentage of total feature acreage or road length viewable.

[d] A dash indicates data not available.

area is 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 the highway with another destination in mind. In the case of the Dry Valley Lake North SEZ, the low-lying location of the SEZ in relation to surrounding specially designated areas would highlight the industrial-like development in the SEZ. In addition because of the generally undeveloped nature of the whole area, and the potentially very large area of solar development, impacts on wilderness characteristics may be more significant than in other areas that are less pristine.

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.

Weepah Spring and Big Rocks Wilderness Areas

Solar development within the SEZ, especially full development, would be readily visible from portions of these two areas. Because of the topography, essentially all of the area that would be visible from these areas is located within 15 mi (24 km) of the SEZ. The nearest boundaries of both WAs are about 8 mi (13 km) distant from the SEZ, beyond the most sensitive visual zone of 0 to 5 mi (0 to 8 km), and solar development would not likely be a dominating factor in the viewshed of the areas. However, because of the clear line of sight and the potential size of the solar development in the SEZ, there likely would be a small adverse impact on wilderness characteristics in both areas. On the basis of the percentage of the area of each wilderness within the viewshed of the SEZ, Weepah Spring would be affected to a greater extent than would Big Rocks.

Highway 93 State Scenic Byway

Viewshed analysis of the scenic byway shows that the views travelers on Highway 93 would have of the SEZ would be from the south and at a distance of about 8 to 10 mi (13 to 16 km) distance. The highway is elevated above the level of the SEZ by about 500 ft (152 m), and travelers would have a clear view of development within the SEZ for about 10 mi (16 km). Because of the distance to the SEZ and the nature of highway travel, however, it is not anticipated that there would be any adverse impact on the use of the scenic highway. It is possible that some highway travelers might find the solar energy development a point of interest.

Silver State OHV Trail and Backcountry Byway

The trail/byway encircles the SEZ and is within 1 to 5 mi (0.6 to 3 km) of the SEZ through much of its route. While some portions of the trail are screened by topography, much of it is in clear view of the SEZ. About one-quarter of the trail/byway is north of the SEZ and is completely screened by intervening mountains. While it is difficult to judge the impact of solar development on users of the trail/byway, it is assumed that any visitors seeking a scenic drive would be adversely affected by the presence of solar energy facilities so close to their route of travel. Users of the trail/byway that are more interested in the motorized or OHV experience may be less adversely affected by the presence of solar development.

Chief Mountain SRMA

The SRMA is managed primarily for motorized OHV recreation, and there are more than 400 mi (643 km) of trails in the area. Portions of the SRMA are adjacent to the SEZ, and about 35% of the SRMA is within the viewshed of the SEZ. While many OHV users have an interest in the visual character of the areas in which they recreate, overall it is anticipated that because of the nature of the activity, distance to the SEZ, and limited visibility of development in the SEZ, there would be no adverse impact on use of the SRMA.

Clover Mountains, Far South Egans, Parsnip Peak, and South Pahroc Range Wilderness Areas

The nearest of these units is about 18 mi (29 km) from the SEZ, and although portions of the areas will have views of development in the SEZ, the distance from the SEZ reduces the impact of development on wilderness characteristics. The percentage of these areas that is in the viewshed of the SEZ is also small, and the overall effect on wilderness characteristics in these areas is expected to be minimal.

11.4.3.2.2 Transmission Facilities and Other Off-Site Infrastructure

Because of the availability of an existing transmission line, no additional construction of transmission facilities was assessed. Should additional transmission lines be required outside of the SEZ, there may be additional impacts on specially designated areas. See Section 11.4.1.2 for the development assumptions underlying this analysis.

Construction of an access road to State Route 318 would add about 51 acres (0.2 km^2) of surface disturbance to the impact associated with the SEZ facilities. The disturbance caused by the road construction would not likely cause additional adverse impacts on specially designated areas.

11.4.3.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features to protect wilderness, recreation, or scenic values of specially designated areas 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 the adverse impacts on wilderness characteristics in two WAs

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11.4.4 Rangeland Resources

Rangelands resources include livestock grazing and wild horses and burros, both of which are managed by the BLM. These resources and possible impacts on them from solar development within the proposed Dry Lake Valley North SEZ are discussed in Sections 11.4.4.1 and 11.4.4.2.

11.4.4.1 Livestock Grazing

11.4.4.1.1 Affected Environment

The proposed Dry Lake Valley North SEZ contains portions of three perennial grazing allotments. Four other allotments have very small amounts of land within the SEZ and because there are no anticipated impacts on these allotments, they are not considered further. The low-lying and flat lands included in the SEZ are used primarily as winter range. There are water developments within the area that support grazing use.

11.4.4.1.2 Impacts

Construction and Operations

Should utility-scale solar development occur in the SEZ, grazing would be excluded from the areas developed as provided for in the BLM grazing regulations (43 CFR Part 4100). This would include reimbursement of permittees for their portion of the value for any range improvements in the area removed from the grazing allotment. The impact of this change in the grazing permits would depend on several factors, including (1) how much of an allotment each permittee might lose to development, (2) how important the specific land lost is to each permittee's overall operation, and (3) the amount of actual forage production that would be lost by each permittee.

The public lands in this SEZ make up the majority of the lands in the Ely Springs Cattle and Simpson allotments as shown in Table 11.4.4.1-1. If full solar development were to occur in the SEZ, the federal grazing permit for the Simpson allotment likely would be cancelled. This would be a major impact and would result in displacing the four permittees who use the area and the loss of the 747 AUMs.

In the case of the Ely Springs Cattle allotment, by applying a simplified assumption that the grazing capacity of the allotment would be reduced by the same percentage as the reduction in acreage, grazing capacity would be reduced by 2,761 AUMs, or 65% of the available AUMs. This would be a major impact on the permittee. Depending on the area utilized for solar development, it might be possible to continue to graze on the remaining acreage in the allotment. This also would be dependent upon water availability in the remaining portion of the allotment and/or the ability to relocate water from existing points of use to the remaining area.

TABLE 11.4.4.1-1 Grazing Allotments within the Proposed Dry Valley Lake North SEZ

Allotment	Total Acres[a]	% of Acres in SEZ[b]	Active BLM AUMs	No. of Permittees
Ely Springs Cattle	56,128	65	4,248	1
Wilson Creek	848,000[c]	3	46,374[d]	8
Simpson	8,379	91	747	4

[a] Included public, private, and state lands included in the allotment based on the Allotment Master Report in BLM's Rangeland Administration System (BLM 2009e).

[b] Percentage of the total allotment acreage of public lands located in the SEZ.

[c] Four use areas were recently removed from the Wilson Creek allotment, reducing the acreage below that shown in the Rangeland Administration System.

[d] This number predates the removal of four areas of use from the allotment. Actual number still to be calculated.

The Wilson Creek allotment is very large, but it is divided into specific areas of use that are utilized by 11 permittees. Permittees generally operate within their own areas of use, but five permittees (four cattle and one sheep) operate in the Dry Lake Valley Use Area and utilize 10,149 AUMs. One permittee (cattle) operates in the Thorley use area and utilizes 1,267 AUMs. Four of the permittees in the two Wilson Creek use areas also are permittees in the Simpson allotment. The two use areas plus the Simpson allotment compose almost the total winter range available to these six permittees. The total forage in these three areas that would be lost is 12,163 AUMs. This is the only winter range available to these permittees, and its loss would have a major impact on their operations. There is no additional winter range available within the area as a replacement to the lands within the SEZ; thus the winter grazing capacity lost would have to be replaced through feeding of hay and/or reductions in cattle numbers. In addition, the water developments that support grazing in this portion of the allotment are reservoirs that would also be lost. Because the impact falls solely on the winter range portion of the operations, the economic impact of replacing the lost natural winter forage with hay would have a disproportionate and major impact on the six permittees (Johnson 2010).

The loss of 12,163 AUMs would constitute a moderate impact on the total livestock use authorized within the Caliente Field Office. This conclusion was derived from comparing the loss of the 12,163 AUMs with the total of 43,255 BLM-authorized AUMs in the Caliente Field Office in grazing year 2009. The loss would be about 28%.

Defining the impacts on individual grazing permits and permittees requires a specific analysis of each case on the basis of at a minimum, the three factors identified above. The loss of the AUMs from all three affected allotments would have a significant impact on six permittees. The final degree of impact would depend on how important the public lands in these allotments are to their overall livestock operation.

Although the degree of impact on the permittees in these three allotments would vary with their individual situations, there would be an adverse economic impact on them from the loss of use of all or important portions of their respective use areas. There may also be an adverse social impact, since for many permittees, operating on public lands has been a longstanding tradition, and their operations are important to them. It is possible that solar developers could acquire the preference for BLM grazing permits in the affected allotments through transfer from willing permittees; developers could agree to compensate permittees for their interest through range improvements on public lands used in conjunction with that preference in order to minimize the impact on existing permittees; however, such agreements are not required as part of BLM regulations.

Transmission Facilities and Other Off-Site Infrastructure

Because of the availability of a transmission line in the SEZ, and assuming that additional project-specific analysis would be done for construction of such infrastructure, no assessment of the impacts of transmission line construction outside of the SEZ was conducted (see Section 11.4.1.2).

The 51-acre (0.2-km^2) disturbance associated with construction of the new access road to the northern end of the SEZ would not have a significant impact on livestock grazing.

11.4.4.1.3 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 mitigation for some identified impacts. The exception would be the adverse impacts on the grazing permittees in the three affected grazing allotments.

Proposed design features specific to the proposed Dry Lake Valley North SEZ include the following:

- Within the Ely Springs Cattle allotment, solar development should be sited to minimize the number of pastures affected.

11.4.4.2 Wild Horses and Burros

11.4.4.2.1 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 2009g). Two HMAs in Nevada are located within the 50-mi (80-km) SEZ region for the proposed Dry Lake Valley North SEZ. Five HMAs in Utah also occur wholly or partially within the SEZ region (BLM 2010e) (Figure 11.4.4.2-1). A portion of the Silver King HMA occurs within the SEZ, and within the indirect impact area of the SEZ. The Silver King HMA has an estimated population of 505 wild horses, with an appropriate management level of only 60 to 128 wild horses (BLM 2010b). The BLM conducted a gather from September 26 through October 14, 2010, and removed 448 excess wild horses from within and outside the Silver King HMA (BLM 2010i).

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 Valley North SEZ is the Quinn Territory, located within a portion of the Humboldt National Forest. The closest portion of this territory is located on the western edge of the 50-mi (80-km) SEZ region (Figure 11.4.4.2-1). Information on the management of this territory for wild horses and burros was not available.

11.4.4.2.2 Impacts

The Silver King HMA is 606,000 acres (2,452.4 km^2) in size (BLM 2010i). About 32,440 acres (131.3 km^2) would be in the area of direct impact for the proposed Dry Lake Valley North SEZ. This would result in the loss of about 5.4% of the HMA. The acreage of the HMA within the indirect impact area for the SEZ is 210,266 acres (850.9 km^2) or 34.7% of the HMA.

Construction and operation of solar energy facilities within the proposed Dry Lake Valley North SEZ would stress resources capable of supporting wild horses in the Silver King HMA. Based on criteria used to evaluate direct impacts on wildlife species (see Appendix M), the loss of 5.4% of the Silver King HMA would be considered a moderate impact on the wild horse population within the HMA (i.e., >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). However, as more than 88% of the wild horse population has been recently gathered (BLM 2010g), the remaining population should not be compromised by the loss of up to 5.4% of the HMA. Because the closest portion of the Quinn Territory is located at the edge of the 50-mi (80-km) SEZ region, no horses or burros in the territory would be affected by construction or operations of a solar facility in the proposed Dry Lake Valley North SEZ.

11.4.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

Solar energy development on BLM lands would be subject to the conditions of the Wild Free-Roaming Horses and Burros Act of 1971. The recently completed gather of wild horses from the Silver King HMA (BLM 2010i) would help to minimize impacts on wild horses caused

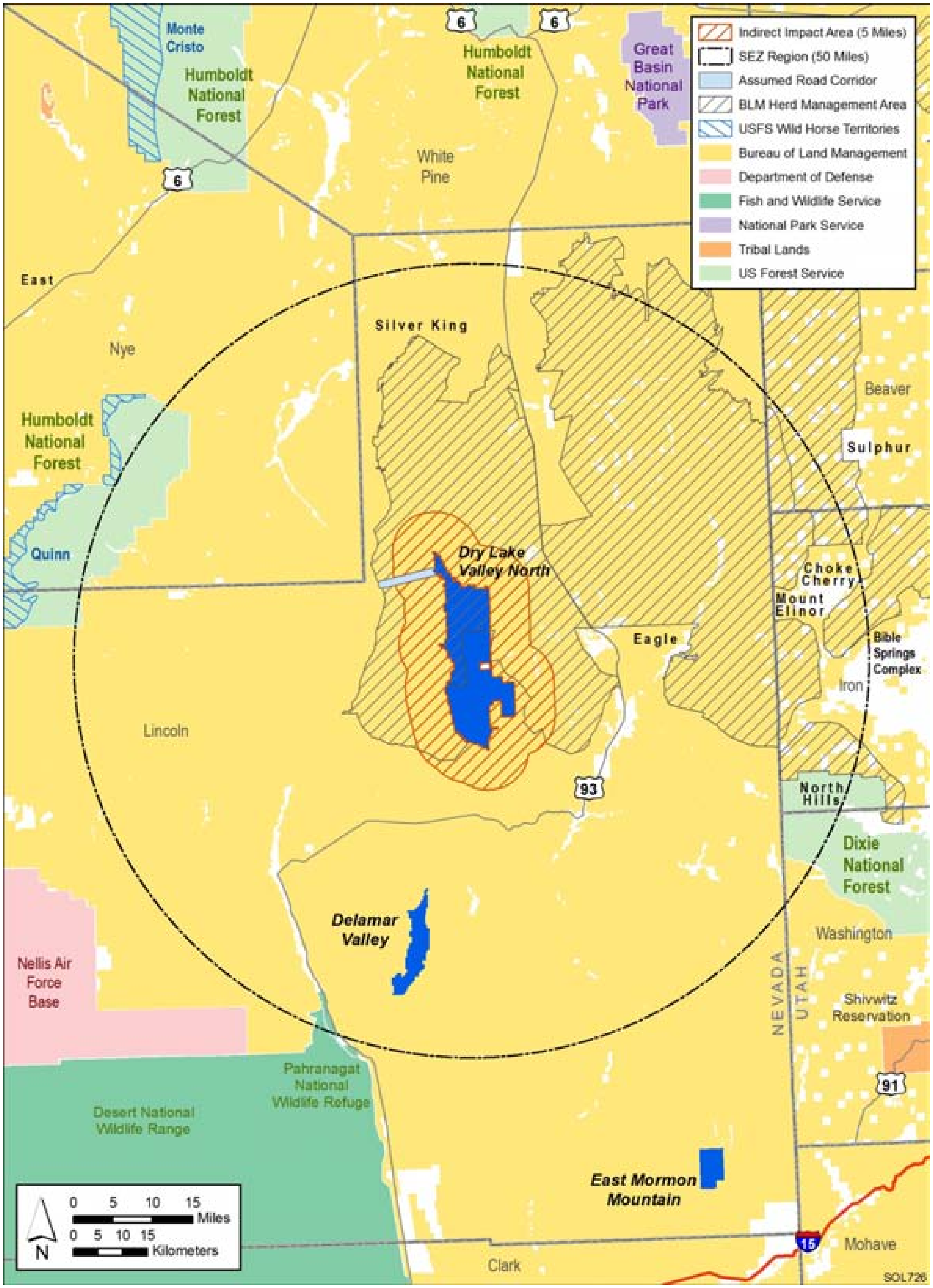

FIGURE 11.4.4.2-1 Wild Horse and Burro Herd Management Areas and Territories within the Analysis Area for the Proposed Dry Lake Valley North SEZ (Sources: BLM 2009g; USFS 2007)

by construction and operations of solar energy development in the proposed Dry Lake Valley North SEZ. In addition, the following SEZ-specific design feature is recommended:

- Installation of fencing and access control, provision for movement corridors, delineation of open range, traffic management (e.g., vehicle speeds), compensatory habitat restoration, and access to or development of water sources should be coordinated with the BLM.

11.4.5 Recreation

11.4.5.1 Affected Environment

The site of the proposed Dry Lake Valley North SEZ is flat with numerous roads and trails that provide access into the area. Backcountry driving and OHV use of the roads and trails are the major recreation activities in the area, although there are also camping and hunting opportunities in and around the area. Wild horses can be seen in the area. Some of the use in the SEZ is related to the 111,181-acre (450-km^2) Chief Mountain SRMA, which is located south and east of the SEZ. The SRMA is the focus for OHV use in the area and contains about 400 mi (640 km) of roads, OHV routes, and trails. There are about three motorcycle races and one to two truck and buggy races in the area per year. Three trailheads serve the area; two have bathroom facilities (Boyce 2010). About 31 mi (50 km) of the 260-mi (418-km) congressionally designated Silver State Off-Highway Vehicle Trail[1] is within the SRMA. Designated portions of the OHV trail encircle the SEZ. There are two access points to the trail near the boundary of the SEZ. In recent years, two desert race events have been held annually that use the Silver State Trail in the vicinity of the SEZ. The SEZ area and surrounding area have been designated as limited to travel on existing roads and trails.

11.4.5.2 Impacts

11.4.5.2.1 Construction and Operations

Recreational use would be eliminated from portions of the SEZ developed for solar energy production. Since the area contains numerous roads and trails, closure of the SEZ to recreational use would have an undetermined impact on the existing OHV use in the area. The Chief Mountain SRMA with more than 400 mi (643 km) of OHV trails and the Silver State Trail and Backcountry Byway would not be directly affected by development of the SEZ. Because of the 25-mi (40-km) length of the SEZ, if east–west travel across the SEZ were prevented by solar energy development, a long detour around the site would be required. This would adversely affect recreation and other public land users. Whether recreational visitors would continue to use any remaining undeveloped portions of the SEZ is unknown. .

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, these routes would be redesignated as closed (see Section 5.5.1 for more details on how routes coinciding with proposed solar facilities would be treated).

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[1] The trail was initially designated in Section 401(b) of the Lincoln County Conservation, Recreation, and Development Act of 2004 (16 U.S.C. 1244; Public Law 108-424).

11.4.5.2.2 Transmission Facilities and Other Off-Site Infrastructure

Because of the availability of an existing transmission line, no additional construction of transmission facilities was assessed. Should additional transmission lines be required outside of the SEZ, there may be additional recreational impacts. See Section 11.4.1.2 for the development assumptions underlying this analysis.

Construction of an access road to State Route 318 would add about 51 acres (0.2 km^2) of surface disturbance to the impact associated with the SEZ facilities. The disturbance caused by the road construction would not likely cause additional adverse impacts on recreation.

11.4.5.3 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 mitigation for some identified impacts. The exception would be that recreational use of the area developed for solar energy production would be lost and would not be mitigatable.

A design feature specific to the proposed Dry Lake Valley North SEZ is:

- Because of the length of the SEZ and the potential for solar development severing current east–west travel, legal vehicular access through the area should be maintained. If the solar development would obstruct the route used for desert racing, alternative locations for that use should be considered at the time specific solar development proposals are analyzed.

11.4.6 Military and Civilian Aviation

11.4.6.1 Affected Environment

Portions of the proposed Dry Valley Lake North SEZ are covered by two MTRs with 200-ft (61-m) AGL operating limits and a major SUA. The area is completely included within the airspace use boundary of the NTTR. Supersonic speeds are authorized at and above 5,000 ft AGL (1,524 m) in the NTTR in this area. The closest military installations to the proposed SEZ are the NTTR, which is located about 60 mi (97 km) southwest of the SEZ, and Nellis Air Force Base, which is located about 100 mi (160 km) south of the area.

There are no civilian municipal aviation facilities that would be affected by solar facilities located within the SEZ.

11.4.6.2 Impacts

The military has expressed serious concern over solar energy facilities being constructed within the SEZ, and Nellis Air Force Base has indicated that any facilities more than 50 ft (15 m) high may be incompatible with low-level aircraft use of the MTR. Further, the NTTR 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 maintains that a pristine testing environment is required for the unique national security missions conducted on the NTTR. The potential electromagnetic interference impacts from solar facilities on testing activities at the NTTR, coupled with potential training route obstructions created by taller structures, make it likely solar facilities exceeding 50 ft (15 m) would significantly affect military operations.

There would be no impact on civilian municipal aviation facilities.

11.4.6.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features have been proposed. 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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11.4.7 Geologic Setting and Soil Resources

11.4.7.1 Affected Environment

11.4.7.1.1 Geologic Setting

Regional Setting

The proposed Dry Lake Valley North SEZ is located in Dry Lake Valley, a north-trending closed basin within the Basin and Range physiographic province in southern Nevada. The valley lies to the south of Muleshoe Valley, at the southern ends of the Schnell Creek and Fairview Ranges (Figure 11.4.7.1-1). It extends southward about 40 mi (64 km), bounded by the North Pahroc Range to the west and the Bristol, Highland, and Burnt Springs Ranges to the east, and ends at a series of low bedrock hills that also mark the southern end of the North Pahroc Range. 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 (Figure 11.4.7.1-2). Fan deposits along the valley margins are made up of poorly sorted gravel, gravelly sand, and sand. Playa lake sediments (Qp) occur in the valley center to the south and cover about 10% of the SEZ. The surrounding mountains are composed mainly of Late Proterozoic and Cambrian metamorphic rocks overlain by Paleozoic carbonate and shale and capped by late-Tertiary ash-flow tuffs from the Caliente caldera complex, one of a series of Tertiary caldera complexes in the valley. The oldest rocks in the region are the Precambrian metamorphic rocks (CZq) exposed in the Highland Range to the east and the Delamar Mountains to the southeast.

Semiconsolidated to unconsolidated basin-fill deposits are estimated to be about 3-mi (5-km) thick across most of Dry Lake Valley (Mankinen et al. 2008); estimates of the basin's maximum depth range from 3 to 4 mi (6.5 to 8.2 km) in the valley center, below Dry Lake (Mankinen et al. 2008; Scheirer 2005). Shallow basin-fill aquifers occur in the sand and gravel deposits. Most of these aquifers are hydraulically isolated from similar aquifers in adjacent valleys, but some are connected by flow through the underlying carbonate-rock aquifer (Mankinen et al. 2008).

Topography

The Dry Lake Valley is an elongated basin; it is about 40 mi (64 km) long and 8 mi (13 km) wide. It lies to the north of Delamar Valley (Figure 11.4.7.1-1). Elevations along the valley axis range from about 5,100 ft (1,550 m) at its northern end and along the valley sides to about 4,750 ft (1,450 m) at Point of Rock Reservoir at its southern end. Alluvial fan deposits occur along the mountain fronts on both sides of the valley and have coalesced into continuous

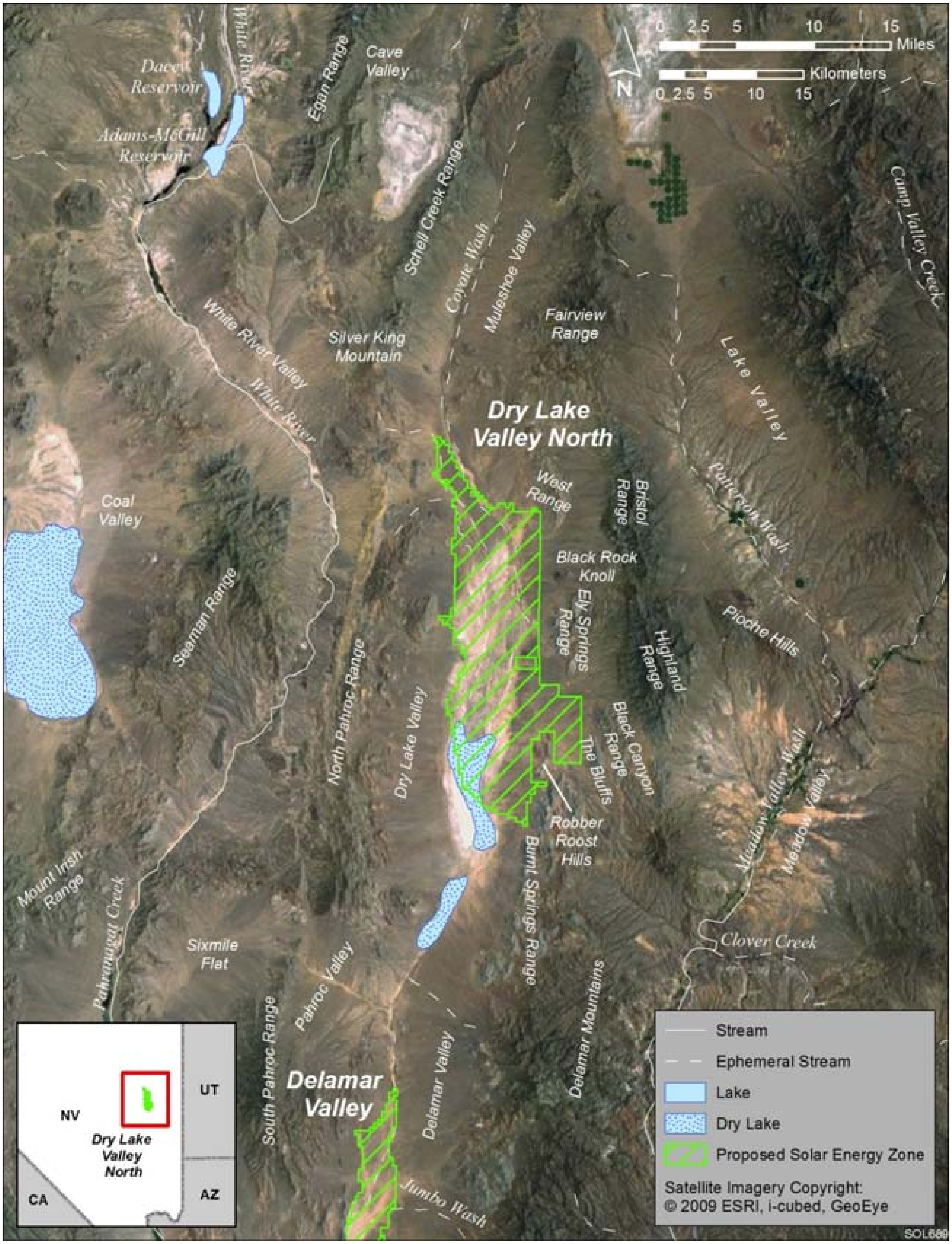

FIGURE 11.4.7.1-1 Physiographic Features of the Dry Lake Valley North Region

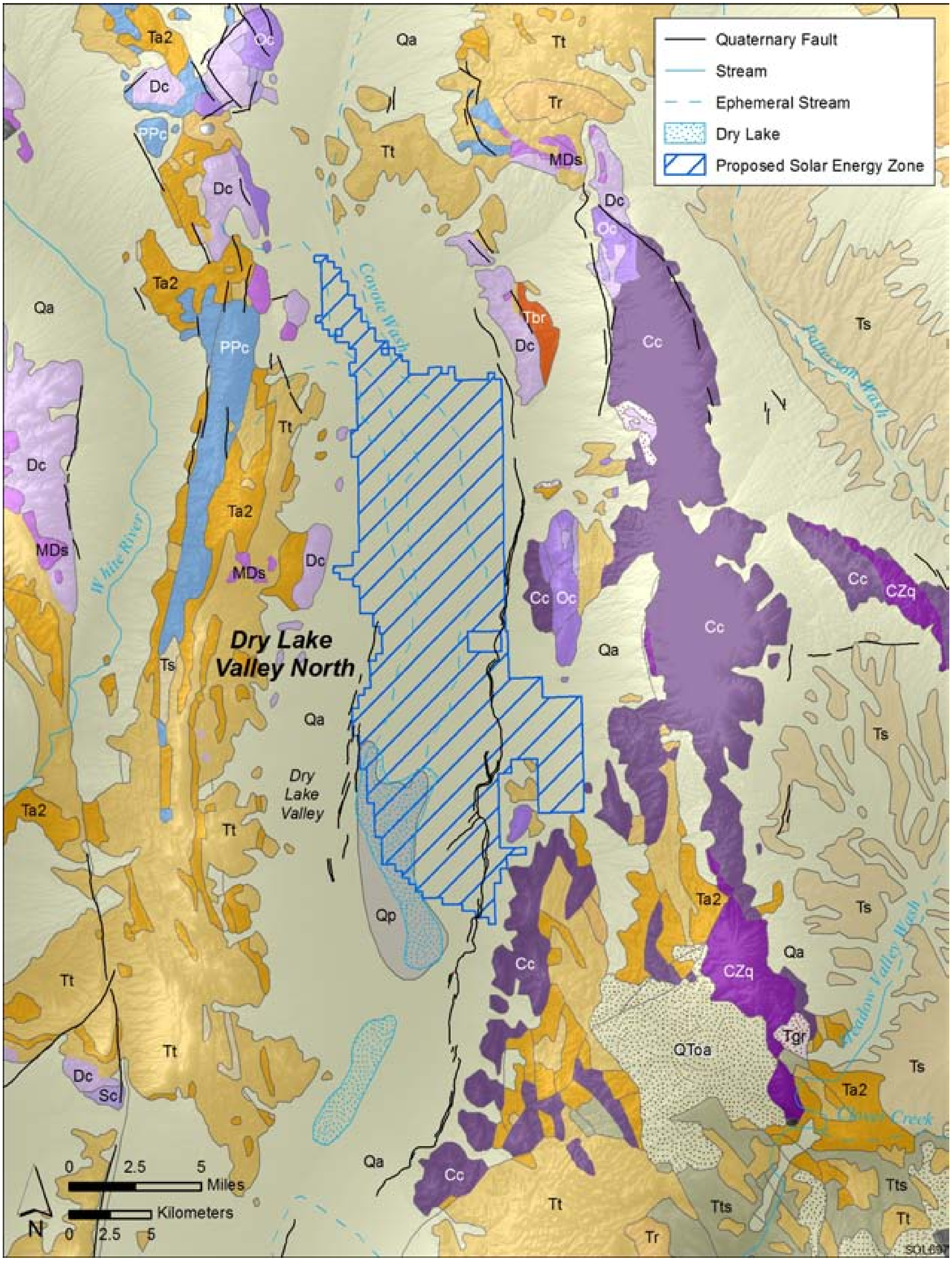

FIGURE 11.4.7.1-2 Geologic Map of the Dry Lake Valley North Region (Sources: Ludington et al. 2007; Stewart and Carlson 1978)

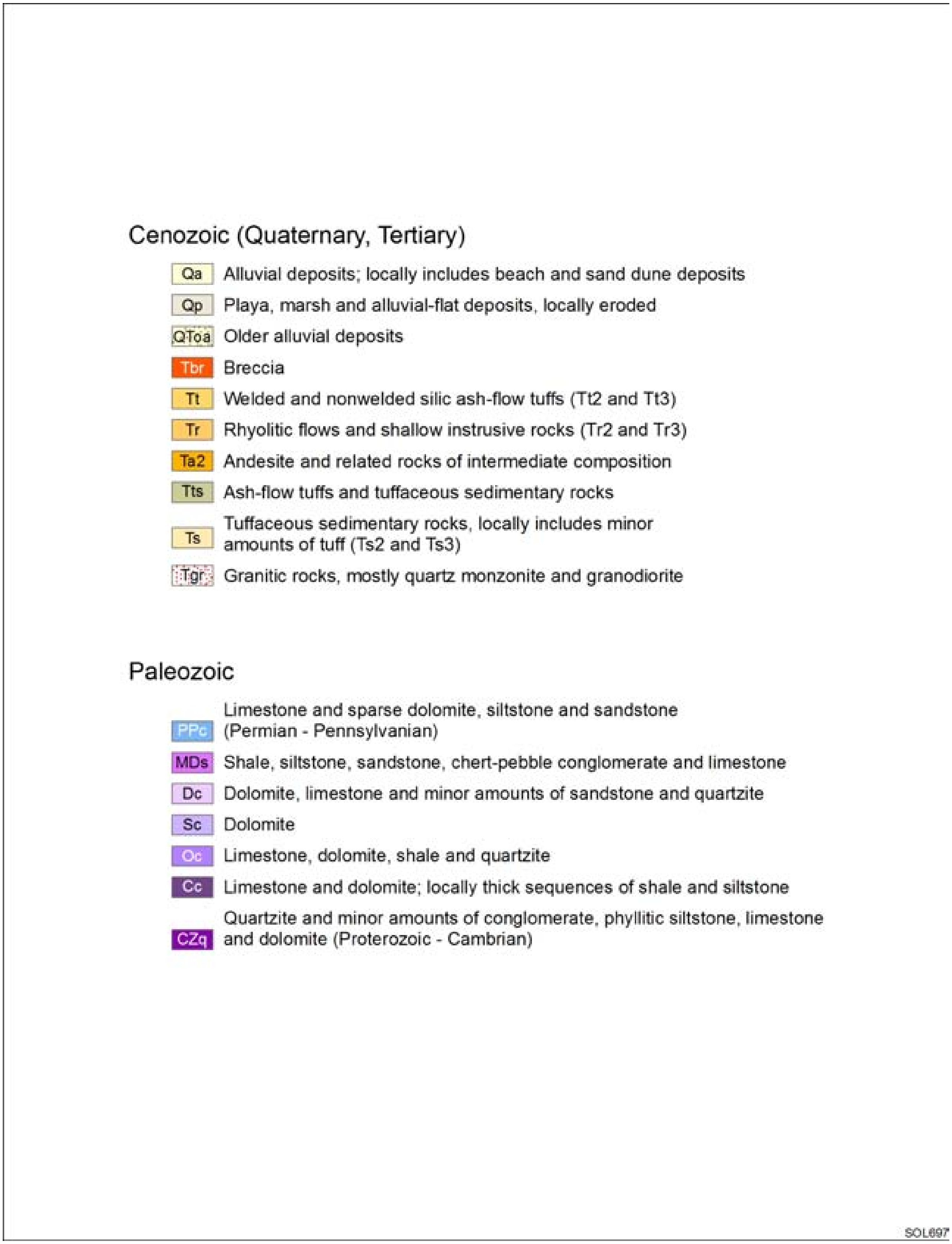

FIGURE 11.4.7.1-2 (Cont.)

fan aprons with widths of about 1 to 4 mi (2 to 6 km) (Swadley et al. 1992). Fan aprons on the east side of the valley are steeper and more deeply dissected than those along the west side. The valley is drained by the Coyote Wash, an ephemeral stream that originates in the Muleshoe Valley to the north and terminates at Dry Lake, a playa in the central part of the valley. The valley floor is broad and flat; its main topographic features are the range front alluvial fans.

The proposed Dry Lake Valley North SEZ is located in the northern part of Dry Lake Valley, between the North Pahroc Range to the west and the Bristol and Highland Ranges to the east. Its terrain slopes gently to the southwest and south. Elevations range from about 5,080 ft (1,550 m) in the northwest corner to 4,580 ft (1,400 m) near the SEZ's southwest corner at Dry Lake (Figure 11.4.7.1-3).

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 Valley North SEZ. Solar project developers 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. Dry Lake Valley is located within 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). The seismic zone is not well understood because it does not follow the dominant strike (north–south) of faulting in southern Nevada, but is thought to accommodate strain between an area of extension to the south (Mojave Desert) and the much more rigid area of the central Great Basin to the north (Kreemer et al. 2010). Faults within the Pahranagat Shear Zone are estimated to exhibit as much as 10 to 12 mi (16 to19 km) of left-lateral movement (Tschanz and Pampeyan 1970).The proposed Dry Lake Valley North SEZ lies between two north-trending extensional (normal) faults: the Dry Lake fault to the east, and the West Dry Lake and White River Faults to the west (Figure 11.4.7.1-4).

The Dry Lake fault extends about 30 mi (50 km) along the eastern edge of Dry Lake Valley, from the western flank of the Burnt Springs Range northward to the West Range, and crossing portions of the Dry Lake Valley North SEZ (Figure 11.4.7.1-4). The fault is not well studied, and displacement is largely inferred from mapped scarps and lineaments. Displacement along its northern length is down to the west; its length forms the eastern boundary of the structural basin (graben) occupied by Dry Lake Valley. Scarp morphology and the estimated age of offset sediments (Late Pleistocene) place the most recent movement along the fault at less than 130,000 years ago. The slip rate along this fault is estimated to be less than 0.2 mm/yr. Recurrence intervals have not been estimated (Sawyer and Anderson 1999).

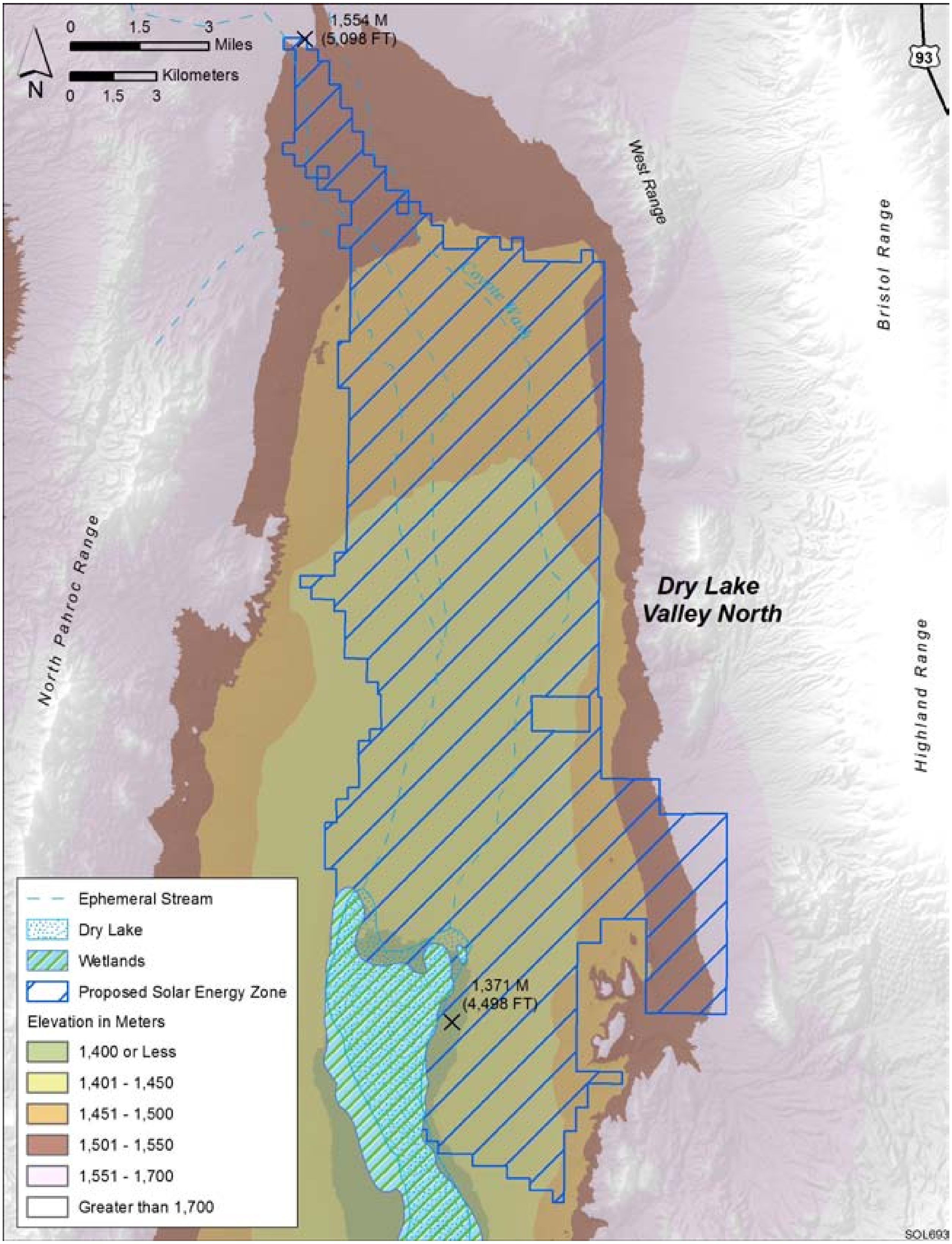

FIGURE 11.4.7.1-3 General Terrain of the Proposed Dry Lake Valley North SEZ

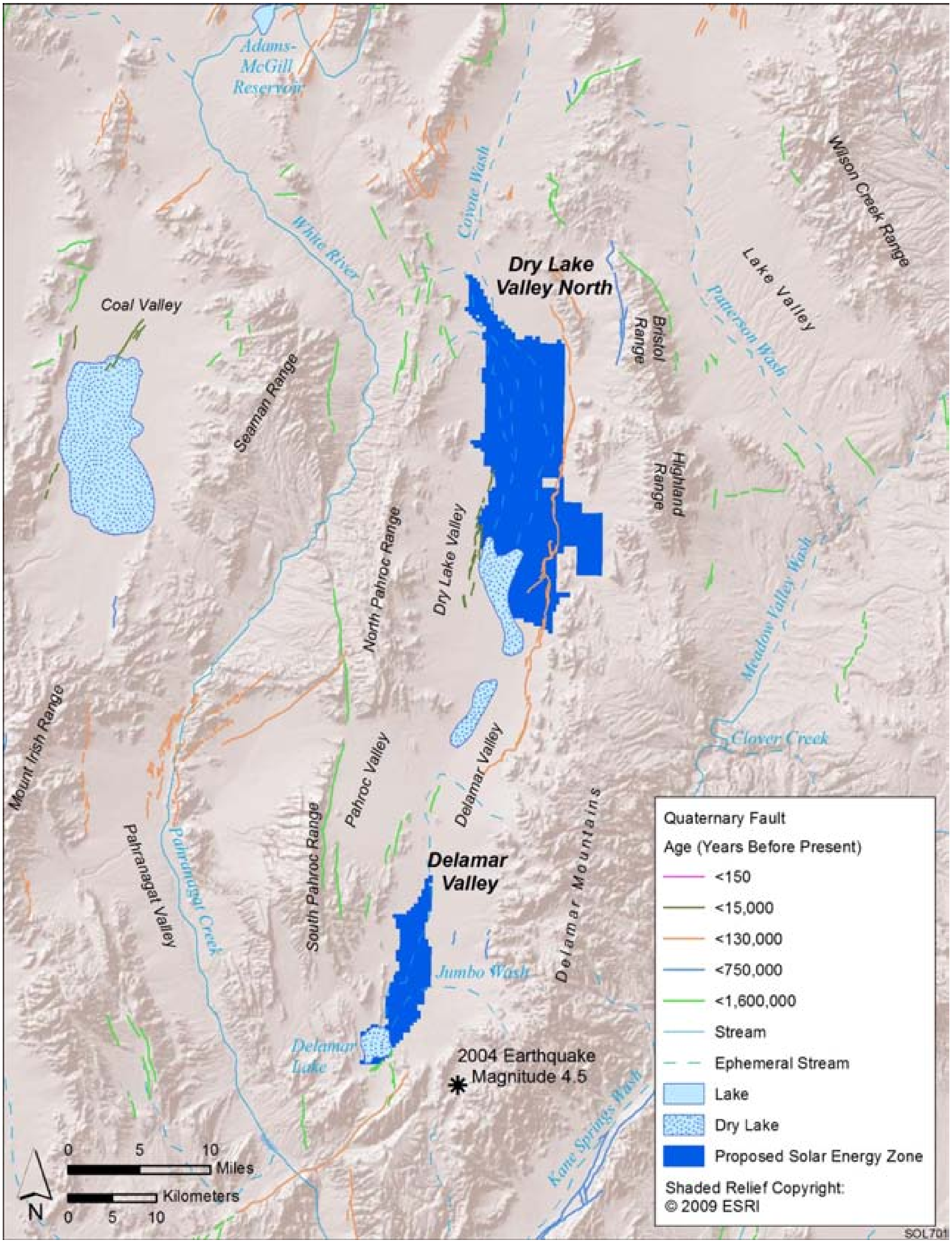

FIGURE 11.4.7.1-4 Quaternary Faults in the Dry Lake Valley North Region (Sources: USGS and NBMG 2010; USGS 2010c)

West Dry Lake fault is composed of a group of discontinuous faults extending north–northeast along the western edge of Dry Lake in the central part of Dry Lake Valley. Fault traces are marked by east-facing, low scarps (less than 3 ft [1 m]). The faults either mark the western boundary of the structural basin underlying Dry Lake Valley or a mid-basin structure. Offsets of late Holocene alluvium place the most recent activity at less than 15,000 years ago. The slip rates along these faults are estimated to be less than 0.2 mm/yr. Recurrence intervals have not been estimated (Anderson 1999).

The discontinuous group of normal faults making up the White River fault bound the North Pahroc Range and low hills dividing the White River Valley and Dry Lake Valley, just to the northwest of the Dry Lake Valley North SEZ. Photogeologic interpretation places the most recent activity along these faults as Late Tertiary to Early Quaternary (about 1.6 million years ago). The slip rates along these faults are estimated to be less than 0.2 mm/yr. Recurrence intervals have not been estimated (Sawyer 1998).

From June 1, 2000, to May 31, 2010, 44 earthquakes were recorded within a 61-mi (100-km) radius of the proposed Dry Lake Valley North SEZ. The largest earthquake during that period occurred on May 16, 2004. It was located about 40 mi (64 km) south of the SEZ in the Gregerson Basin (near the Delamar Mountains) and registered a Richter scale magnitude (ML[2]) of 4.5 (Figure 11.4.7.1-4). During this period, 28 (64%) 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 2010c).

Liquefaction. The proposed Dry Lake Valley North SEZ lies within an area where the peak horizontal acceleration with a 10% probability of exceedance in 50 years is between 0.08 and 0.10 g. Shaking associated with this level of acceleration is generally perceived as strong; however, potential damage to structures is light (USGS 2008). Given the deep water table (from 200 to 600 ft [61 and 201 m] below the surface [USGS 2010b]) and the low intensity of ground shaking estimated for Dry Lake Valley, the potential for liquefaction in valley sediments is also likely to be low.

Volcanic Hazards. Several calderas in southern Nevada are the sources of voluminous and widespread Tertiary volcanic deposits throughout the region. These include the Indian Peak caldera complex to the east of Dry Lake Valley, between the Highland Range and the Nevada-Utah border; the Caliente caldera complex, also to the east, in the northern Delamar and Clover Mountains and extending into western Utah; the smaller Kane Springs Wash caldera in the southern Delamar Mountains; and the Central Nevada caldera complex to the northwest of Dry Lake Valley (Scott et al. 1992). Tertiary volcanism overlaps periods of extension in southern

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2 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 2010d).

Nevada and occurred as recently as 2.6 million years ago (late Pliocene) (Noble 1972); however, there is no evidence of more recent volcanic activity associated with these complexes.

Dry Lake Valley is located about 100 mi (161 km) to the northeast 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 (Section 11.1.7.1; Figure 11.1.7.1-4). The area has been studied extensively because of its proximity to the Nevada Test Site 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 (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 silicic volcanism is negligible. Perry (2002) cites geologic data that could increase the recurrence rate (and thus the probability of disruption). These include hypothesized episodes of an anomalously high strain rate, the hypothesized presence of a regional mantle hot spot, and new aeromagnetic data that suggest that 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 and can present a hazard to facilities on the relatively flat terrain of valley floors such as the 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.

There has been no land subsidence monitoring within Dry Lake Valley to date; the potential for subsidence is not currently known.

Other Hazards. Other potential hazards at the proposed Dry Lake Valley North 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 the 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) will depend on specific morphology of the fan (National Research Council 1996). Section 11.4.9.1.1 provides further discussion of flood risks within the Dry Lake Valley North SEZ.

11.4.7.1.2 Soil Resources

Soils within the proposed Dry Lake Valley North SEZ are predominantly a mix of sandy loams, silt loams, loamy sands, and loams (Figure 11.4.7.1-5). Soil map units within the Dry Lake Valley North SEZ are described in Table 11.4.7.1-1. These level to nearly level soils are derived from alluvium and eolian deposits from mixed sources, typical of soils on alluvial fans and basin floors. They are characterized as very deep (though a few have are shallow to a duripan) and well drained. Most soils on the site have moderate surface runoff potential and moderately rapid permeability. The natural soil surface is moderately well suitable for roads with a slight to moderate erosion hazard when used as roads or trails. The Penoyer-Geer soils along Coyote wash in the north part of the site and some of the dry lake soils (Ewelac-Playas and Saltydog-Geer associations) are not suitable for roads because of a severe rutting hazard. The water erosion potential is low to moderate for most soils (except for the Penoyer-Geer soils along Coyote wash). Except for the Koyan-Slaw-Penoyer soils near the center of the site which are highly susceptible to wind erosion, most of the soils have a moderate susceptibility to wind erosion, with as much as 86 tons (78 metric tons) of soil eroded by wind per acre (4,000 m^2) each year (NRCS 2010). Biological soil crusts and desert pavement have not been documented within the SEZ, but may be present.

Only the playa soils (Ewelac-Playas and Ambush-Panacker-Playas associations) within the proposed Dry Lake Valley North SEZ are rated as partially hydric.[3] Flooding is rare for most soils at the site. Soils throughout the SEZ, covering a total of about 37,000 ac (150 km^2) or 49% are classified as prime farmland, if irrigated and reclaimed of excess salts and sodium (NRCS 2010).

11.4.7.2 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

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

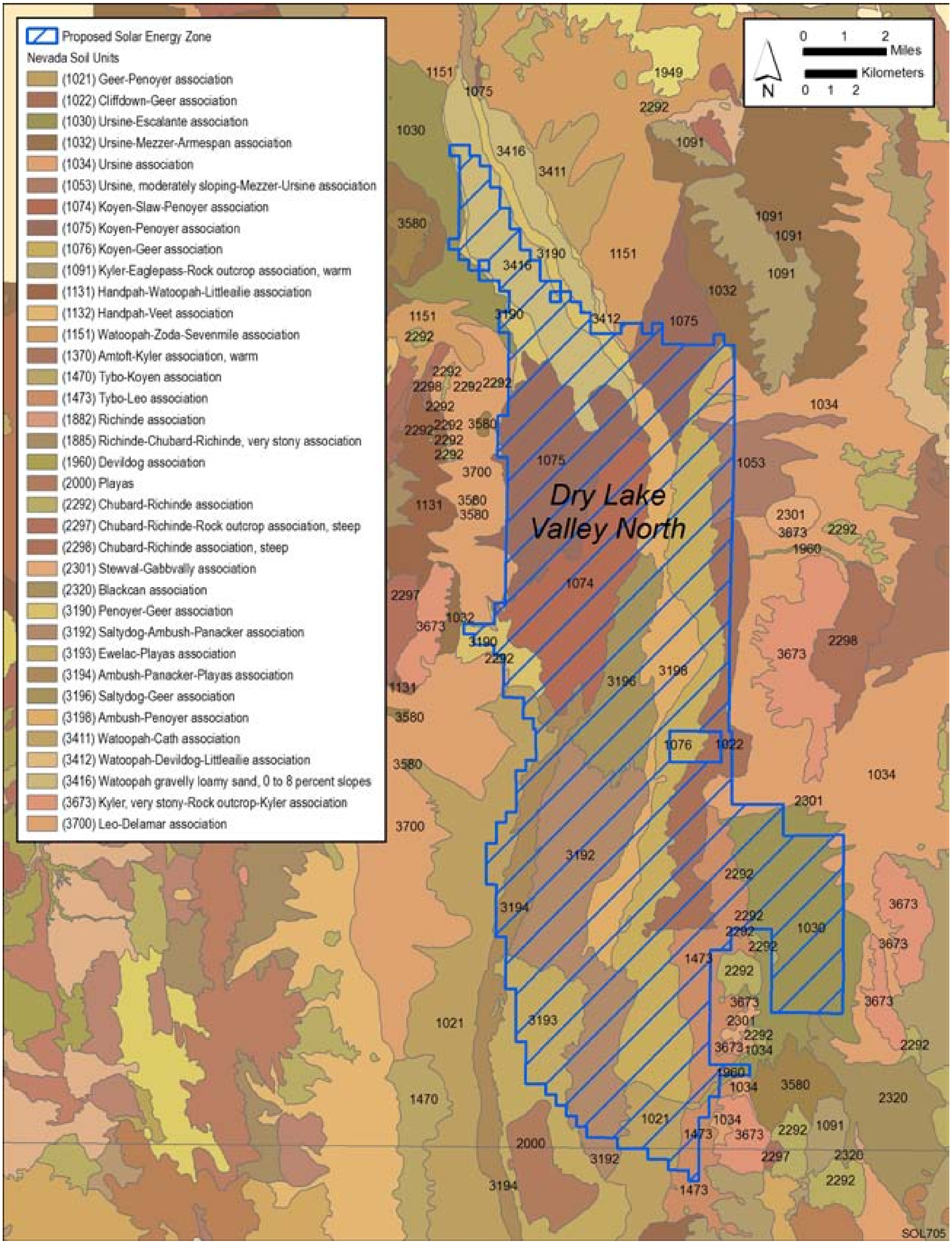

FIGURE 11.4.7.1-5 Soil Map for the Proposed Dry Lake Valley North SEZ (Source: NRCS 2008)

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TABLE 11.4.7.1-1 Summary of Soil Map Units within the Proposed Dry Lake Valley North SEZ

Map Unit Symbol	Map Unit Name	Water Erosion Potential[a]	Wind Erosion Potential[b]	Description	Area in Acres[c] (% of SEZ)
1076	Koyen-Geer association	Low	Moderate (WEG 4)[d]	Consists of about 60% Koyen loamy sand and 30% Geer sandy loam. Level to nearly level soils on alluvial fan skirts, alluvial flats, and drainageways. Parent material is alluvium from volcanic rocks with a high component of loess (Koyen) and welded tuff and limestone with a minor component of volcanic ash (Geer). Very deep and well drained, with moderate surface runoff potential and moderate to moderately rapid permeability. Available water capacity is moderate. Moderate rutting hazard. Used mainly for livestock grazing, wildlife habitat, and cultivated crops of alfalfa and small grains (Geer). Prime farmland[e] if irrigated and reclaimed of excess salts and sodium.	10,396 (14)
3192	Saltydog-Ambush-Panacker association	Moderate	Moderate (WEG 3)	Consists of 40% Saltydog loam, 30% Ambush fine sandy loam, and 20% Panacker fine sandy loam. Level to nearly level soils on alluvial flats. Parent material is alluvium and lacustrine deposits from limestone and welded tuff (Saltydog) and eolian deposits over lacustrine deposits. Very deep and well drained, with moderate surface runoff potential and moderate to moderately rapid permeability. Available water capacity is moderate to high. Moderate rutting hazard. Used mainly for livestock grazing and wildlife habitat. Prime farmland if irrigated and reclaimed of excess salts and sodium.	9,627 (13)
1075	Koyen-Penoyer association	Low	Moderate (WEG 4)	Consists of 50% Koyan gravelly sandy loam and 35% Penoyer silt loam. Level to nearly level soils on basin floors and inset fans. Parent material is alluvium from volcanic rocks with a high loess component and alluvium over lacustrine deposits. Very deep and well drained, with moderate surface runoff potential and moderate to moderately rapid permeability. Available water capacity is moderate to high. Moderate rutting hazard. Used mainly for livestock grazing; some irrigated cropland (alfalfa, small grains, potatoes, and sugar beets). Prime farmland if irrigated and reclaimed of excess salts and sodium.	8,793 (11)

TABLE 11.4.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential[a]	Wind Erosion Potential[b]	Description	Area in Acres[c] (% of SEZ)
1074	Koyan-Slaw-Penoyer association	Low	High (WEG 1)	Consists of 55% Kenoyan loamy fine sand, 20% Slaw silt loam, and 15% Penoyer very fine sandy loam. Level to nearly level soils on basin floors, basin floor remnants, and fan skirts. Parent material is alluvium from volcanic rocks with a high loess component. Very deep and well drained, with moderate surface runoff potential and slow (Slaw) to moderately rapid permeability. Available water capacity is moderate to high. Moderate rutting hazard. Used mainly for livestock grazing, wildlife habitat, and limited irrigated cropland.	7,016 (9)
1030	Ursine-Escalante association	Moderate	Moderate (WEG 5)	Consists of 55% Ursine gravelly loam and 30% Escalante fine sandy loam. Nearly level to gently sloping soils formed on inset fans, fan remnants, and drainageways. Parent material is alluvium from rhyolite and some limestone. Shallow to a duripan (Ursine) to very deep and well drained, with high surface runoff potential (very slow infiltration rate) and moderate to moderately rapid permeability. Moderately to strongly saline. Available water capacity is very low to low. Moderate rutting hazard. Used mainly for livestock grazing, wildlife habitat, and limited irrigated cropland.	6,370 (8)
3198	Ambush-Penoyer association	Moderate	Moderate (WEG 3)	Consists of 50% Ambush fine sandy loam and 40% Penoyer very fine sandy loam. Level to nearly level soils on alluvial flats. Parent material is eolian deposits over lacustrine deposits. Very deep and well drained, with moderate surface runoff potential and moderate to moderately rapid permeability. Available water capacity is moderate to high. Moderate rutting hazard. Used mainly for livestock grazing and wildlife habitat.	5,435 (7)
3416	Watoopah gravelly loamy sand (0 to 8% slopes)	Low	Moderate (WEG 3)	Nearly level to gently sloping soils on alluvial fan remnants. Parent material is alluvium from volcanic ash, welded tuff, and rhyolite. Very deep and well drained, with moderate surface runoff potential and moderately rapid permeability. Available water capacity is low. Moderate rutting hazard. Used mainly for livestock grazing and wildlife habitat.	4,634 (6)

TABLE 11.4.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential[a]	Wind Erosion Potential[b]	Description	Area in Acres[c] (% of SEZ)
1473	Tybo-Leo association	Moderate	Moderate (WEG 4)	Consists of 60% Tybo gravelly coarse sandy loam and 25% Leo very gravelly sandy loam. Nearly level soils on inset fans and fan remnants. Parent material is alluvium from mixed sources, including volcanic rocks. Shallow to a duripan (Tybo) to very deep and well to excessively drained, with high surface runoff potential (very slow infiltration rate) and moderately rapid to rapid permeability. Available water capacity is very low to low. Moderate rutting hazard. Used mainly for livestock grazing, wildlife habitat, and irrigated cropland.	4,015 (5)
3196	Saltydog-Geer association	Moderate	Moderate (WEG 4L)	Consists of about 60% Saltydog loam and 30% Geer fine sandy loam. Level to nearly level soils on alluvial flats. Parent material is alluvium from welded tuff and limestone with a minor component of volcanic ash. Very deep and well drained, with moderate surface runoff potential and moderate to moderately rapid permeability. Available water capacity is moderate to high. Severe rutting hazard. Used mainly for livestock grazing and wildlife habitat. Prime farmland if irrigated and reclaimed of excess salts and sodium.	3,990 (5)
1022	Cliffdown-Geer association	Low	Moderate (WEG 5)	Consists of about 60% Cliffdown very gravelly sandy loam and 30% Geer fine sandy loam. Nearly level to gently sloping soils on fan remnants and fan skirts. Parent material is alluvium from welded tuff and limestone with a minor component of volcanic ash. Very deep and well to somewhat excessively drained, with moderate surface runoff potential and moderately rapid permeability. Available water capacity is low to moderate. Slight rutting hazard. Used mainly for grazing and wildlife habitat.	3,755 (5)

TABLE 11.4.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential[a]	Wind Erosion Potential[b]	Description	Area in Acres[c] (% of SEZ)
3193	Ewelac-Playas association	Moderate	Moderate (WEG 4)	Consists of 50% Ewelac silt loam and 40% Playas (silty clay loam). Level to nearly level soils on basin floors and alluvial flats. Parent material is lacustrine deposits from mixed sources. Very deep and somewhat poorly (playas) to moderately well drained, with high surface runoff potential (very slow infiltration) and moderately rapid permeability. Available water capacity is very low (playas) to high. Severe rutting hazard. Used mainly for livestock grazing and wildlife habitat.	2,821 (4)
1021	Geer-Penoyer association	Moderate	Moderate (WEG 3)	Consists of about 65% Geer fine sandy loam and 30% Penoyer silt loam. Level to nearly level soils on alluvial fan skirts and alluvial flats. Parent material is alluvium from welded tuff and limestone with a minor component of volcanic ash. Very deep and well drained, with moderate surface runoff potential and moderate permeability. Available water capacity is high. Severe rutting hazard. Used mainly for livestock grazing and wildlife habitat.	2,679 (4)
3194	Ambush-Panacker-Playas association	Moderate	Moderate (WEG 3)	Consists of about 45% Ambush fine sandy loam, 30% Panacker fine sandy loam, and 15% Playas (silty clay loam). Level to nearly level soils on alluvial flats and basin floors. Parent material is eolian deposits and alluvium from mixed sources over lacustrine deposits. Very deep and somewhat poorly (playas) to well drained, with moderate surface runoff potential and moderate to moderately rapid permeability. Available water capacity is very low (playas) to high. Moderate rutting hazard. Used mainly for livestock grazing and wildlife habitat. Prime farmland if irrigated and reclaimed of excess salts and sodium.	2,288 (3)

TABLE 11.4.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential[a]	Wind Erosion Potential[b]	Description	Area in Acres[c] (% of SEZ)
3190	Penoyer-Geer association	High	Moderate (WEG 4L)	Consists of 45% Penoyer silt loam and 40% Geer fine sandy loam. Level to nearly level soils formed on inset fans and drainageways. Parent material is alluvium from welded tuff and limestone (with a minor component of volcanic ash). Very deep and well drained, with moderate surface runoff potential and moderate rapid permeability. Moderately to strongly saline. Available water capacity is high. Severe rutting hazard. Used mainly for livestock grazing and wildlife habitat.	2,267 (3)
1034	Ursine association	Moderate	Moderate (WEG 6)	Moderately sloping very gravelly loam on fan remnants. Parent material is alluvium from mixed sources. Shallow to a duripan and well drained, with high surface runoff potential (very slow infiltration rate) and moderately rapid permeability. Available water capacity is very low. Moderate rutting hazard. Used mainly for livestock grazing and wildlife habitat.	1,271 (2)
1053	Ursine, moderately sloping-Mezzer-Ursine association	Moderate	Moderate (WEG 6)	Consists of about 60% Ursine very gravelly loam and 25% Mezzer very gravelly fine sandy loam. Moderately sloping soils on inset fans, fan remnants, and drainageways. Parent material is alluvium from mixed sources. Shallow to a durian (Ursine) to very deep and well drained, with high surface runoff potential (very slow infiltration rate) and moderately rapid permeability. Available water capacity is very low to low. Moderate rutting hazard. Used mainly for livestock grazing and wildlife habitat.	797 (1)

TABLE 11.4.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential[a]	Wind Erosion Potential[b]	Description	Area in Acres[c] (% of SEZ)
3700	Leo-Delamar association	Moderate	Moderate (WEG 3)	Consists of about 55% Leo gravelly sandy loam and 30% Delamar gravelly sandy loam. Level to nearly level soils on alluvial fan remnants and drainageways. Parent material is alluvium from mixed sources, including welded tuff and minor amounts of limestone. Moderately to very deep and well to excessively drained, with low surface runoff potential (high infiltration rate) and moderately slow to rapid permeability. Available water capacity is low. Moderate rutting hazard. Used mainly for livestock grazing and wildlife habitat.	327 (<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: WEGs 3 and 4, 86 tons (78 metric tons) per acre (4,000 m^2) per year; and WEG 5, 56 tons (51 metric tons) per acre (4,000 m^2) per year.

[e] Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses.

Source: NRCS (2010).

project. These include soil compaction, soil horizon mixing, soil erosion and deposition by wind, soil erosion by water and surface runoff, sedimentation, and soil contamination. Such impacts are common to all utility-scale solar energy 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.

Portions of the dry lake may not be a suitable location for construction, because lakebed sediments are often saturated with shallow groundwater and likely collapsible. The lake sits within the lowest elevation area of Dry Lake Valley and serves as a sump for drainage in the valley.

11.4.7.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features were identified for soil resources at the proposed Dry Valley North SEZ. Implementing the programmatic design features described under both Soils and Air Quality 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.

11.4.8 Minerals (Fluids, Solids, and Geothermal Resources)

11.4.8.1 Affected Environment

There were no locatable mining claims within the proposed Dry Lake Valley North SEZ as of June 14, 2010 (BLM and USFS 2010a), and the public land within the SEZ was closed to locatable mineral entry in June 2009, pending the outcome of this solar energy PEIS. All of the area has been previously leased for oil and gas development, and there are currently six existing leases within the SEZ that are classified as nonproducing (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 geothermal leasing or development in or near the SEZ (BLM and USFS 2010b).

11.4.8.2 Impacts

The existing, nonproducing oil and gas leases within the SEZ are prior existing rights and represent a potential conflict with future solar development. As long as these leases remain in effect, solar development would require the cooperation of the oil and gas lessees. Such cooperation might be possible, since oil and gas development generally requires fewer than 5 acres (0.02 km^2) per well, but it would depend on accommodating the oil and gas lease holders' need for continued access to develop, maintain, and service any wells developed on the leases.

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 was assumed that future development of oil and gas resources would continue to be possible, since such development could occur under the existing leases or from directional drilling from new leases. Since the SEZ does not contain existing mining claims, it was 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.

The SEZ has had no history of development of geothermal resources or of leasing interest. For that reason, it is not anticipated that solar development would adversely affect the development of geothermal resources.

11.4.8.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ specific design features have been proposed. 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 mineral resources.

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11.4.9 Water Resources

11.4.9.1 Affected Environment

The proposed Dry Lake Valley North SEZ is located within the Central Nevada Desert Basins subbasin of the Great Basin Region (USGS 2010a) 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 4,580 and 5,080 ft (1,400 and 1,550 m). The Dry Lake Valley North SEZ is located within Dry Lake Valley, a basin characterized by a flat valley floor surrounded by uplifted volcanic and carbonate rock mountain ranges (Figure 11.4.9.1-1). Annual precipitation is estimated to be between 7 and 16 in./yr (18 and 41 cm/yr) depending on the elevation, with the lower rainfall expected on the valley floor and higher rainfall at higher elevations (WRCC 2010a). Pan evaporation rates are estimated to be 80 in./yr (203 cm/yr) (Cowherd et al. 1988; WRCC 2010b). Reference crop evapotranspiration has been estimated at 59 in./yr (150 cm/yr) in nearby Caliente (Huntington and Allen 2010).

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

There are no perennial surface water features within Dry Lake Valley. The primary surface water features within the proposed Dry Lake Valley North SEZ include several ephemeral washes and a dry lake (Figure 11.4.9.1-1; the area shown as wetland is the approximate location of the dry lake). The area encompassed by the dry lake is approximately 12.6 mi^2 (33 km^2). Coyote Wash and Cherry Creek flow from north to south into the dry lake through the central part of the Dry Lake Valley basin. Fairview Wash is a tributary to Coyote Wash that flows from the adjacent West Range. Evidence of braided streams and alluvial outwash plains (fans) are present throughout the SEZ, specifically in the area north of the dry lake and in the eastern part of the SEZ, likely caused by spring runoff from the hills to the east. The Dry Lake Valley Tributary is an ephemeral wash in the southern part of the Dry Lake Valley basin that flows north toward the dry lake, peak flows of which have been measured by the USGS to be up to 150 ft^3/s (4.2 m^3/s) (USGS 2010b; gauge 10245270). A shallow drainage divide separates Dry Lake Valley and Delamar Valley to the south. Surface water runoff from the surrounding mountains is estimated to be 9,000 ac-ft/yr (11 million m^3/yr) between both Dry Lake Valley and the adjacent Delamar Valley (NDWR 1971). Surface water evaporation is estimated to be minor and there are no surface water inflows to or outflows from the basin (NDWR 1971).

Flood hazards have not been identified (Zone D) for the region surrounding the proposed Dry Lake Valley North SEZ (FEMA 2009). Intermittent flooding may occur with temporary ponding and erosion along the ephemeral washes, from the hills on the sides of the basin, and within the lake area. Two wetlands have been identified by the NWI in the vicinity of the dry lake (USFWS 2009a). Within this area, 9,341 acres (38 km^2) have been identified as "lake" and 44 acres (0.18 km^2) have been identified as "freshwater forested/shrub wetland" area (USFWS 2009a). Further information regarding the small wetlands within the SEZ can be found in Section 11.4.10.1.

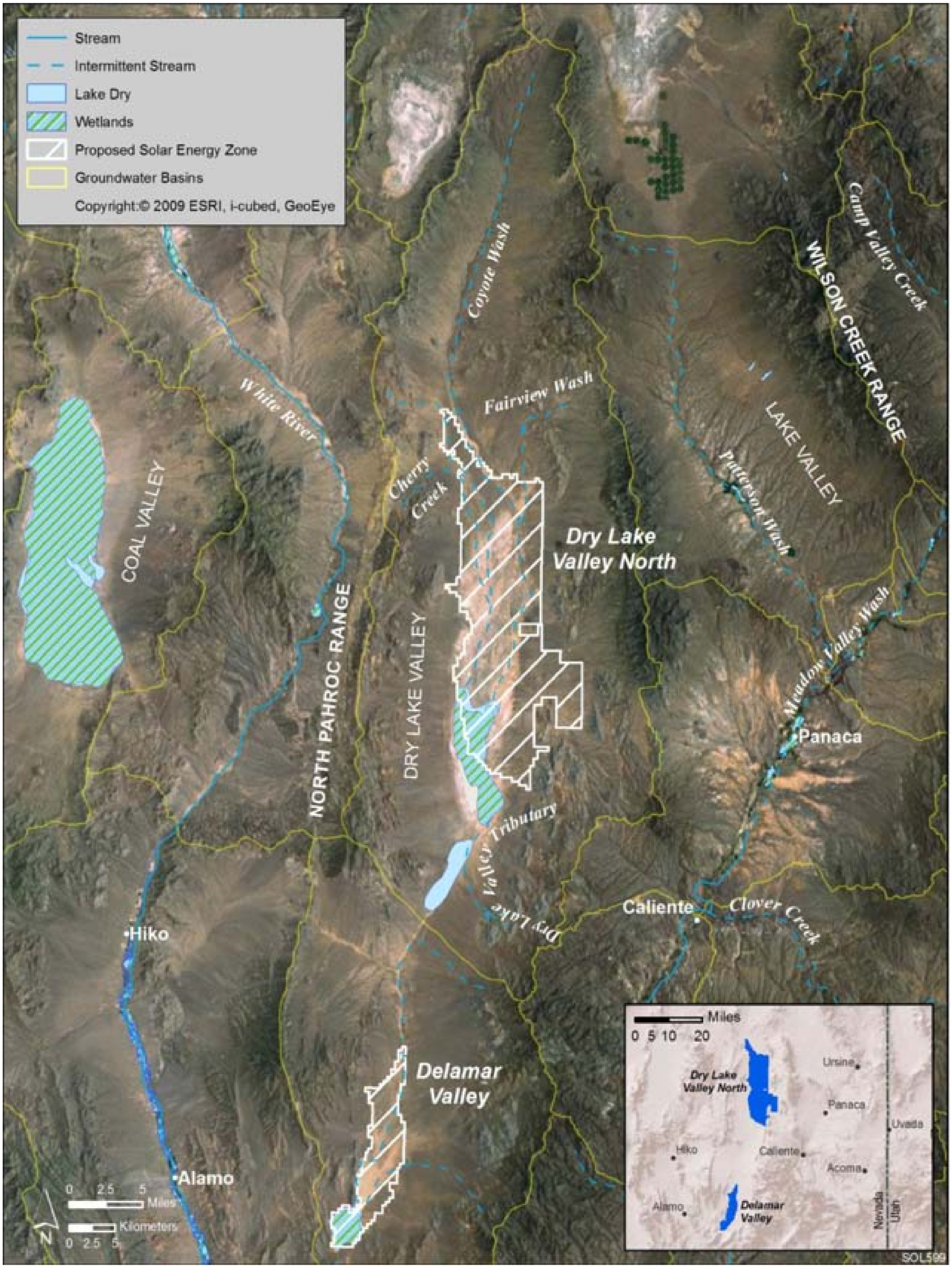

FIGURE 11.4.9.1-1 Surface Water Features near the Proposed Dry Lake Valley North SEZ

11.4.9.1.2 Groundwater

The proposed Dry Lake Valley North SEZ is located within the Dry Lake Valley groundwater basin (NDWR 2010b). Basin-fill deposits are estimated to be up to 4 mi (6.5 km) thick in the center of the basin, with an average thickness of 3 mi (5 km), and are underlain by and hydraulically connected to thick sequences of Paleozoic carbonate rocks (Dettinger 1989; Mankinen et al. 2008). Carbonate rocks have been found to be closer to the surface in the northern part of Dry Lake Valley (SNWA and BLM 2008). Volcanic rocks occur at the margins of the basin, underneath basin-fill in some areas of the basin, and are also underlain by the Paleozoic carbonate rock sequences (Dettinger 1989; Mankinen et al. 2008). No occurrence of evapotranspiration of groundwater is estimated to occur in Dry Lake Valley (NDWR 2008). The Paleozoic carbonate rocks that underlay the Dry Lake 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 (Eakin 1966). 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 rocks that underlay Dry Lake Valley to the White River Groundwater Flow System is not well understood, and has yet to be studied in detail in this area (Harrill and Prudic 1998; NDWR 2008).

Estimates of recharge in the basin have varied significantly, depending up on the study. Recharge to the basin-fill aquifer was estimated to be 5,000 ac-ft/yr (6.2 million m^3/yr) by the Maxie-Eakin method (i.e., recharge is a percentage of precipitation), with 5,000 ac-ft/yr (6.2 million m^3/yr) estimated to flow out of the groundwater basin and into Delamar Valley groundwater basin to the south (NDWR 1971). The NDWR (1971) also estimated that there were no inflows to the Dry Lake Valley groundwater basin. Using a recharge model specifically designed to estimate recharge in the Great Basin Aquifer system, Flint et al. (2004) estimated average recharge in the basin to be between 10,600 ac-ft/yr and 11,300 ac-ft/yr (13 million and 14 million m^3/yr) using a 30-year climate record, geologic information, soil types, and other data input into a model. The study by Flint et al. (2004) also indicated that Dry Lake Valley is dominated by in-place recharge processes instead of by runoff processes. Other estimates of basin-scale recharge range from 13,000 ac-ft/year (16 million m^3/yr) to 15,667 ac-ft/year (19 million m^3/yr) (NDWR 2008).

Groundwater flows from the basin margins, where infiltration occurs along mountain front areas, south to Delamar Valley. Water levels in wells located within or adjacent to the proposed Dry Lake Valley North SEZ are generally between 200 and 660 ft (61 and 201 m) below ground surface, with the majority of the measurements of groundwater at deeper than 400 ft (122 m) below ground surface (USGS 2010b; wells 375624114444501, 380336114473501, and 374536114443001; SNWA and BLM 2008). The hydraulic gradient has been estimated to be 13 ft/mi (0.0025 ft/ft) (2.5 m/km [0.0025 m/m]) between Dry Lake Valley and Delamar Valley to the south (SNWA and BLM 2008). Unconfined conditions are thought to occur in the northern part of the Dry Lake Valley basin, and semiconfined to confined conditions are thought to occur in the southern part of the basin (SNWA and BLM 2008). An aquifer test performed within the valley fill in the basin indicated a transmissivity of 5,200 ft^2/day (483 m^2/day) for a shallow aquifer and 6,500 ft^2/day (604 m^2/day) for a deep aquifer (STINET 2010).

The SNWA and BLM (2008) identified a total of 98 springs within the basin. Four of the springs, all occurring in the northern portion of the basin, were monitored by the SNWA and BLM (2008) and the following flow rates were measured: two had flow rates of between 1 and 10 gpm (3.8 and 38 L/min) and two had flow rates of between 10 and 100 gpm (38 and 380 L/min). The NDWR (2008) has found that the springs of environmental concern within the basin (listed as Meloy Spring, Fence Spring, Bailey Spring, and Coyote Spring) are not directly connected to the principal groundwater aquifer in the basin.

The chemical quality of water in the Dry Lake Valley basin is varied. Groundwater sampling in the basin has indicated that some constituents exceed water quality standards (SNWA and BLM 2008). In some samples, concentrations of arsenic have been found to exceed the EPA MCL for arsenic and thallium, three of four samples exceeded secondary MCL for iron, and a high pH has been measured in waters within the basin (SNWA and BLM 2008; EPA 2009d). TDS concentrations have been found to range between 210 and 400 mg/L (SNWA and BLM 2008).

11.4.9.1.3 Water Use and Water Rights Management

In 2005, water withdrawals from surface waters and groundwater in Lincoln County were 57,100 ac-ft/yr (70 million m^3/yr), of which 11% came from surface waters and 89% came from groundwater. The largest water use category was irrigation, at 55,100 ac-ft/yr (68 million m^3/yr). Public supply/domestic water uses accounted for 1,300 ac-ft/yr (1.6 million m^3/yr), with livestock and mining water uses on the order of 230 ac-ft/yr (280,000 m^3/yr) and 450 ac-ft/yr (560,000 m^3/yr), respectively (Kenny et al. 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 the 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, a 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).

Dry Lake Valley is not a designated groundwater basin, meaning that there are no specifically designated beneficial uses for the water within the 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 NDWR (2010b) states that the perennial yield of the Dry Lake Valley basin is equal to 12,700 ac-ft/yr (15.7 million m^3/yr). Approximately 1,009 ac-ft/yr (1.2 million m^3/yr) (for irrigation) of water rights are permitted in the basin, and an additional 57 ac-ft/yr (70,000 m^3/yr) (18 ac-ft/yr [22,000 m^3/yr] for mining, rest for stock watering) of water rights are certified. Through Ruling 5875 in July 2008, the NDWR (2008) granted 11,584 ac-ft/yr (14 million m^3/yr) of water rights in the Dry Lake Valley groundwater basin to the SNWA for use in a project that would convey water to Las Vegas (SNWA 2008). This amount of water represents the remaining amount of unappropriated water within the Dry Lake Valley Basin, less 50 ac-ft/yr that would be reserved for future use within the basin (NDWR 2008). The SNWA would commit 1,500 ac-ft/yr (1.9 million m^3/yr) of those water rights to Lincoln County for use, but the rest would be transferred to Las Vegas (SNWA 2008). While the water rights were initially granted by the NDWR, the Seventh Judicial District Court of Nevada (Lincoln County) ordered that NDWR Ruling 5875 be remanded in October 2009 (BLM 2010c). In November 2009, the SNWA filed an appeal to the Nevada Supreme Court to fight this decision (BLM 2010c). In June 2010, the Nevada Supreme Court issued a ruling related to SNWA water rights applications in Dry Lake Valley: the NDWR was ordered to reconsider the SNWA water rights applications and reopen the protest period related to the applications (*Great Basin Water Network v. State Engineer* 2010).

11.4.9.2 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).

11.4.9.2.1 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 ephemeral stream washes and the dry lake present on the site. Alterations to these systems could enhance erosion processes, disrupt groundwater recharge, and negatively affect plant and animal habitats associated with the ephemeral channels.

11.4.9.2.2 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 Valley North SEZ include the following:

- On the basis of a total area of 76,874 acres (311 km^2), it is assumed that three solar projects would be constructed during the peak construction year;

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

- The maximum land 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, results in the potential to disturb up to 12% 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 Valley North SEZ, the water requirements for construction activities could be met by either trucking water to the sites or by using on-site groundwater resources. The variable quality of water in the Dry Lake Valley basin could be an issue for potable water supply. Some groundwater samples taken in the basin have been found to have high arsenic, thallium, iron, and pH. If the groundwater supply used for a project does not meet drinking water quality standards, potable water would need to be brought in from off-site.

Water requirements for dust suppression and potable water supply during construction are shown in Table 11.4.9.2-1 and could be as high as 4,220 ac-ft (5.2 million m^3). The assumptions underlying these estimates for each solar energy technology are described in Appendix M. Groundwater wells would have to yield an estimated 1,700 to 2,600 gpm (6,400 to 9,800 L/min) to meet the estimated construction water requirements. These yields are on the order of a small to medium farm in Nevada (USDA 2009c), so multiple wells may be needed in order to obtain the water requirements. In addition, up to 222 ac-ft (274,000 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 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.

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 11.4.9.2-2). Water needs for cooling are a function of the type of cooling used (dry, hybrid, wet). Further

TABLE 11.4.9.2-1 Estimated Water Requirements during the Peak Construction Year for the Proposed Dry Lake Valley North SEZ

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Water use requirements[a]				
Fugitive dust control (ac-ft)[b,c]	2,724	4,086	4,086	4,086
Potable supply for workforce (ac-ft)	222	135	56	28
Total water use requirements (ac-ft)	2,946	4,220	4,142	4,114
Wastewater generated				
Sanitary wastewater (ac-ft)	222	135	56	28

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

[b] Fugitive dust control estimation assumes a local pan evaporation rate of 80 in./yr (203 cm/yr) (Cowherd et al. 1988; WRCC 2010b).

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

TABLE 11.4.9.2-2 Estimated Water Requirements during Operations at the Proposed Dry Lake Valley North SEZ

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Full build-out capacity (MW)[a,b]	12,296	6,831	6,831	6,831
Water use requirements				
Mirror/panel washing (ac-ft/yr)[c,d]	6,148	3,415	3,415	342
Potable supply for workforce (ac-ft/yr)	172	77	77	7.7
Dry cooling (ac-ft/yr)[e]	2,459–12,296	1,366–6,831	NA[f]	NA
Wet cooling (ac-ft/yr)[e]	55,330–178,285	30,739–99,047	NA	NA
Total water use requirements				
Non-cooled technologies (ac-ft/yr)	NA	NA	3,492	349
Dry-cooled technologies (ac-ft/yr)	8,779–18,616	4,858–10,323	NA	NA
Wet-cooled technologies (ac-ft/yr)	61,650–184,605	34,231–102,539	NA	NA
Wastewater generated				
Blowdown (ac-ft/yr)[g]	3,493	1,940	NA	NA
Sanitary wastewater (ac-ft/yr)	172	77	77	7.7

a Land area for the parabolic trough technology 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 the 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.

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 11.4.9.2-2 for the parabolic trough and power tower technologies are attributable to the assumptions of acreage per MW. As a result, the water usage for the more energy-dense parabolic trough technology is estimated to be almost twice as large as that for the power tower technology.

At full build-out capacity, water needs for mirror/panel washing are estimated to range from 342 to 6,148 ac-ft/yr (422,000 to 7.6 million m^3/yr), and the workforce potable water supply is estimated to range from 7.7 to 172 ac-ft/yr (9,500 to 212,000 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 184,605 ac-ft/yr (228 million m^3/yr). Water usage for dry-cooling systems would be as high as 18,616 ac-ft/yr (23 million m^3/yr), approximately a factor of 10 times less that the wet-cooling option. Non-cooled technologies, dish engine and PV systems, require substantially less water at full build-out capacity at 3,492 ac-ft/yr (4.3 million m^3/yr) for dish engine and 349 ac-ft/yr (430,000 m^3/yr) for PV (Table 11.4.9.2-2). Operations would produce up to 172 ac-ft/yr (212,000 m^3/yr) of sanitary wastewater; in addition, for wet-cooled technologies, 1,940 to 3.493 ac-ft/yr (2.4 million to 4.3 million m^3/yr) of cooling system blowdown water would need to be treated either on- or off-site. Any on-site treatment of wastewater would have to ensure that treatment ponds are effectively lined in order to prevent any groundwater contamination.

Groundwater is the primary water resource available for solar energy development at the proposed Dry Lake Valley North SEZ. However, obtaining water from an off-site source could be necessary for solar development projects. Perennial yield in the basin has been estimated to be 12,700 ac-ft/yr (16 million m^3) (NDWR 2008). At the level of full build-out, technologies that use wet cooling would exceed the estimated basin yield, so wet cooling would not be feasible for full build-out of the Dry Lake Valley North SEZ. To the extent possible, facilities using dry cooling should implement water conservation practices to limit water needs.

If groundwater withdrawals exceeded the sustainable yield of the basin, then groundwater levels would decline in the basin and potentially lead to declines the adjacent Delamar Valley, which receives outflow from the Dry Lake Valley groundwater basin. These indirect impacts can disturb regional groundwater flow patterns and recharge patterns, which have implications for ecological habitats (discussed in Section 11.4.10.1).

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.

11.4.9.2.3 Off-Site Impacts: Roads and Transmission Lines

The proposed Dry Lake Valley North SEZ is located approximately 7 mi (11 km) east of State Route 318, and an existing 69-kv transmission line runs through the proposed SEZ, as described in Section 11.4.1.2. 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. Water needed for road modification and transmission line construction activities (e.g., for soil compaction, dust suppression, and potable supply for workers) could be trucked to the construction area from an off-site source. As a result, water use impacts would be negligible. Impacts on surface water and groundwater quality resulting from spills would be minimized by implementing the mitigation measures described in Section 5.9.3 (e.g., cleaning up spills as soon as they occur). Ground-disturbing activities that have the potential to increase sediment and dissolved solid loads in downstream waters would be conducted following the mitigation measures outlined in Section 5.9.3 to minimize impacts associated with alterations to natural drainage pathways and hydrologic processes.

11.4.9.2.4 Summary of Impacts on Water Resources

The impacts on water resources from solar energy development at the proposed Dry Lake Valley North 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 ephemeral stream washes and the dry lake present on the site. Alterations to these systems could enhance erosion processes, disrupt groundwater recharge, and negatively affect plant and animal habitats associated with the ephemeral channels.

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 Valley North SEZ; however, aquifer characteristics and the region's sustainable yield are not fully quantified. The estimates of groundwater recharge, discharge, and underflow from adjacent basins suggest that there may not be available groundwater available to support water-intensive technologies, such as those using wet cooling.

The NDWR (2008) has declared that there are 11,584 ac-ft (14 million m^3/yr) of water available annually in the basin for beneficial uses. However, the allocations are under review by the Nevada Supreme Court and the water rights applications have been opened up by the NDWR to public comment. Concerned parties could present new information about the groundwater basin, and thus the NDWR could alter its previous assessment of water availability in the basin. Based on the information presented here, wet cooling would not be feasible for full build-out of the Dry Lake Valley North SEZ. To the extent possible, facilities using dry cooling should implement water conservation practices to limit water needs.

For the purpose of evaluating a more realistic build-out scenario reflecting the available water supplies, an estimate of the maximum power capacity for each technology was made assuming that groundwater extractions were limited to 11,584 ac-ft/yr (14 million m^3/yr). For solar trough technologies, this quantity of water would allow approximately 2,310 and 12,296 MW to be produced using wet- and dry-cooling options, respectively. For power tower technologies, this quantity of water would allow approximately 2,312 and 6,833 MW to be produced using wet- and dry-cooling options, respectively. This water-limited power capacity represents 19 to 100% of the area-based full build-out capacity for parabolic trough facilities and 34 to 100% of the area-based full build-out capacity for power tower facilities. This analysis of the potential power production capacity based on limited water resources should serve as an estimate only. Dish engine facilities and PV facilities would not be limited by water availability and could generate full area-based build-out capacity, and thus are the preferred technologies for large-scale solar energy production at the proposed Dry Lake Valley North SEZ.

11.4.9.3 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, would 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 proposed Dry Lake Valley North SEZ include the following:

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

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

- Siting of solar facilities and construction activities should avoid any areas identified as within a 100-year floodplain or jurisdictional waters;

- 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 according to *Nevada Administrative Code* (445A.453-445A.455).

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11.4.10 Vegetation

This section addresses vegetation that could occur or is known to occur within the potentially affected area of the proposed Dry Lake Valley North SEZ. The affected area considered in this assessment included the areas of direct and indirect effects. The area of direct effects is defined as the area that would be physically modified during project development (i.e., where ground-disturbing activities would occur) and included the SEZ and a 60-ft (18-m) wide portion of an assumed access road corridor. No new transmission developments are expected to be needed to serve development on the SEZ due to the proximity of existing infrastructure (see Section 11.4.1.2 for development assumptions). The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ boundary and within the 1-mi (1.6-km) wide assumed access road corridor, where ground-disturbing activities would not occur but that could be indirectly affected by activities in the area of direct effect.

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

11.4.10.1 Affected Environment

The proposed Dry Lake Valley North SEZ is located primarily within the Shadscale-Dominated Saline Basins Level IV ecoregion, which supports shadscale (*Atriplex confertifolia*) and black greasewood (*Sarcobatus vermiculatus*) low scrub communities in valley bottoms, and also includes remnant lake terraces and scattered sand dunes (Bryce et al. 2003). This internally drained nearly flat to gently sloping ecoregion includes soils with high salt and alkali content, which are dry for extended periods. Additional commonly occurring species include bud sagebrush (*Picrothamnus desertorum*), fourwing saltbrush (*Atriplex canescens*), rubber rabbitbrush (*Ericameria nauseosa*), alkali sacaton (*Sporobolus airoides*), bottlebrush squirreltail (*Elymus elymoides*), inland saltgrass (*Distichlis spicata*), Indian ricegrass (*Achnatherum hymenoides*), Great Basin wildrye (*Leymus cinereus*), and galleta (*Pleuraphis jamesii*). The southwestern portion of the SEZ is located within the Salt Deserts Level IV ecoregion, which contains nearly level playas, salt flats, mud flats, and saline lakes (Bryce et al. 2003). These habitats are mostly barren and may be salt encrusted in dry periods. Scattered plants are salt tolerant and include pickleweed (*Salicornia* sp.), seepweed (*Suaeda fruticosa*), iodine bush (*Allenrolfea occidentalis*), black greasewood, alkali sacaton, and inland saltgrass. Scattered sand dunes also occur in this ecoregion and perennial and intermittent springs are common. The southeastern portion is located within the Carbonate Sagebrush Valleys Level IV ecoregion, which supports sparse Great Basin sagebrush shrub communities of black sagebrush (*Artemisia nova*) and winterfat (*Krascheninnikovia lanata*), with grasses such as blue grama (*Bouteloua gracilis*) (Bryce et al. 2003). Additional species include Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), rabbitbrush (*Ericameria* sp./*Chrysothamnus* sp.), bottlebrush squirreltail, Indian ricegrass, and cheatgrass (*Bromus tectorum*). Annual precipitation in the vicinity of the SEZ is very low, averaging 8.7 in. (22.2 cm) at Caliente, Nevada (see Section 11.4.13).

The area surrounding the SEZ consists of a mosaic of these ecoregions, as well as the Carbonate Woodland Zone Level IV ecoregion, which contains communities with a pinyon (*Pinus monophylla*)-juniper (*Juniperus osteosperma*) canopy over a sagebrush and mountainbrush shrub layer. These ecoregions lie within the Central Basin and Range Level III ecoregion, described in Appendix I, and are part of the Great Basin desertscrub biome.

Land cover types described and mapped under 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 Valley North SEZ are shown in Figure 11.4.10.1-1. Table 11.4.10.1-1 provides the surface area of each cover type within the potentially affected area.

Lands within the proposed Dry Lake Valley North SEZ are classified primarily as Inter-Mountain Basins Mixed Salt Desert Scrub. Additional cover types within the SEZ are given in Table 11.4.10.1-1. Winterfat (*Krascheninnikovia lanata*), fourwing saltbush (*Atriplex canescens*), rabbitbrush, shadscale, ephedra (*Ephedra* sp.), spiny hopsage (*Grayia spinosa*), buckwheat (*Eriogonum* sp.), globemallow (*Sphaeralcea* sp.), wire lettuce (*Stephanomeria* sp.), cholla (*Cylindropuntia* sp.), Indian rice grass (*Achnatherum hymenoides*), sand dropseed (*Sporobolus cryptandrus*), big galleta (*Pleuraphis rigida*), James' galleta (*Pleuraphis jamesii*), and purple threeawn (*Aristida purpurea*) were observed to be dominant species in various portions of the low scrub communities present in the SEZ in August 2009; the grasses are more common in the northern portion of the SEZ. Sensitive habitats on the SEZ include desert dry washes, playas, and wetlands. The area has had a long history of livestock grazing, and the plant communities present within the SEZ have likely been affected by grazing.

The indirect impact area, including the area surrounding the SEZ within 5 mi (8 km) includes 24 cover types, which are listed in Table 11.4.10.1-1. The predominant cover types are Inter-Mountain Basins Big Sagebrush Shrubland, Inter-Mountain Basins Mixed Salt Desert Scrub, and Great Basin Xeric Mixed Sagebrush Shrubland.

Two wetlands mapped by the NWI are located within the southwestern portion of the SEZ (USFWS 2009a) (Figure 11.4.10.1-2). A palustrine wetland with a scrub-shrub plant community, approximately 44.0 acres (0.2 km^2) in size, is mapped by SWReGAP as Inter-Mountain Basins Mixed Salt Desert Scrub. A large lacustrine wetland is mapped primarily as Inter-Mountain Basins Playa, with Inter-Mountain Basins Greasewood Flat occurring primarily along the margin and small areas of Inter-Mountain Basins Mixed Salt Desert Scrub. Approximately 3,691 acres (14.9 km^2) of this 9,341.0-acre (37.8-km^2) wetland are located within the SEZ. The remaining portion is located entirely within the indirect impact area. Numerous smaller playa areas that are not mapped by the NWI are scattered throughout much of the SEZ, as well as southwest of the SEZ. A small wetland area in the southeast portion of the SEZ, approximately 2 acres (0.1 km^2) in size, is mapped as North American Arid West Emergent Marsh. This area is likely a water development for livestock use. Numerous dry

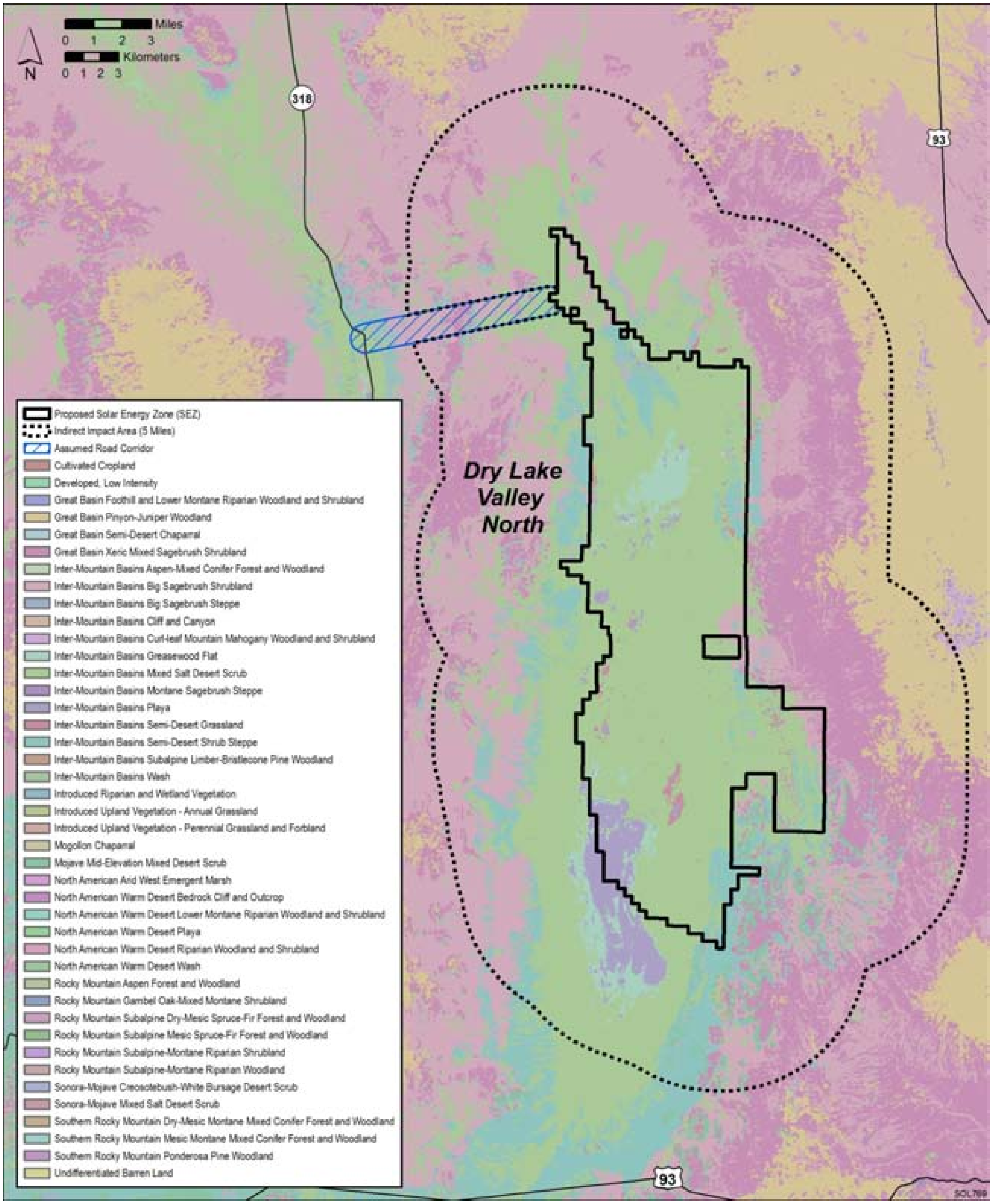

FIGURE 11.4.10.1-1 Land Cover Types within the Proposed Dry Lake Valley North SEZ (Source: USGS 2004)

TABLE 11.4.10.1-1 Land Cover Types within the Potentially Affected Area of the Proposed Dry Lake Valley North SEZ and Potential Impacts

	Area of Cover Type Affected (acres)[b]			
Land Cover Type[a]	Within SEZ (Direct Effects)[c]	Access Road (Direct Effects)[d]	Corridor and Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f]
Inter-Mountain Basins Mixed Salt Desert Scrub: Generally consists of open shrublands that include at least one species of *Atriplex*, along with other shrubs. Perennial grasses dominate a sparse to moderately dense herbaceous layer.	60,489 acres[g] (10.6%, 10.9%)	19 acres (<0.1%)	60,613 acres (10.6%)	Large
Inter-Mountain Basins Semi-Desert Shrub Steppe: Generally consists of perennial grasses with an open shrub and dwarf shrub layer.	5,776 acres (2.2%, 2.2%)	5 acres (<0.1%)	19,839 acres (7.5%)	Moderate
Inter-Mountain Basins Greasewood Flat: Dominated or co-dominated by greasewood (*Sarcobatus vermiculatus*) and generally occurring in areas with saline soils, a shallow water table, and intermittent flooding, although remaining dry for most growing seasons. This community type generally occurs near drainages or around playas. These areas may include, or may be co-dominated by, other shrubs, and may include a graminoid herbaceous layer.	3,430 acres (7.1%, 8.3%)	0 acres	3,235 acres (6.7%)	Moderate
Inter-Mountain Basins Playa: Playa habitats are intermittently flooded and generally barren or sparsely vegetated. Depressions may contain small patches of grass, and sparse shrubs may occur around playa margins.	3,011 acres (16.8%, 16.9%)	0 acres	3,895 acres (21.7%)	Large
Inter-Mountain Basins Big Sagebrush Shrubland: Dominated by basin big sagebrush (*Artemisia tridentata tridentata*), Wyoming big sagebrush (*Artemisia tridentata wyomingensis*), or both. Other shrubs may be present. Perennial herbaceous plants are present but not abundant.	2,504 acres (0.2%, 0.2%)	23 acres (<0.1%)	85,592 acres (6.2%)	Small

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TABLE 11.4.10.1-1 (Cont.)

Land Cover Type[a]	Area of Cover Type Affected (acres)[b] Within SEZ (Direct Effects)[c]	Access Road (Direct Effects)[d]	Corridor and Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f]
Inter-Mountain Basins Semi-Desert Grassland: Consists of perennial bunchgrasses as dominants or co-dominants. Scattered shrubs or dwarf shrubs may also be present.	898 acres (10.5%, 15.6%)	0 acres	240 acres (2.8%)	Large
Great Basin Xeric Mixed Sagebrush Shrubland: Generally occurs on level plains, slopes, and ridges. The dominant shrub species are black sagebrush (*Artemisia nova*) or, at higher elevations, little sagebrush (*Artemisia arbuscula*), and co-dominants may be Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) or yellow rabbitbrush (*Chrysothamnus viscidiflorus*). Other shrub species may also be present as well as sparse perennial bunchgrasses.	479 acres (0.1%, 0.1%)	5 acres (<0.1%)	59,067 acres (11.2%)	Small
Inter-Mountain Basins Big Sagebrush Steppe: Dominated by basin big sagebrush (*Artemisia tridentata tridentata*), Wyoming big sagebrush (*Artemisia tridentata wyomingensis*), big sagebrush (*Artemisia tridentata xericensis*), threetip sagebrush (*Artemisia tripartita tripartita*), or antelope bitterbrush (*Purshia tridentata*), or a combination of these species. Other shrubs may be present. Perennial grasses are often abundant. The distribution of shrubs may be patchy, with grassland predominating.	130 acres (19.3%, 19.9%)	<1 acre (<0.1%)	103 acres (15.3%)	Large
Mojave Mid-Elevation Mixed Desert Scrub: The vegetation composition is quite variable. Dominant species include shrubs forbs, and grasses and may include *Yucca* spp.	95 acres (<0.1%, <0.1%)	<1 acre (<0.1%)	4,527 acres (1.5%)	Small
Undifferentiated Barren Land: Occurs on dry foothills and lower mountain slopes. Gambel oak (*Quercus gambelii*) may be the only dominant species or share dominance with other shrubs.	25 acres (14.8%, 16.0%)	0 acres	12 acres (7.1%)	Large

TABLE 11.4.10.1-1 (Cont.)

Land Cover Type[a]	Area of Cover Type Affected (acres)[b] Within SEZ (Direct Effects)[c]	Access Road (Direct Effects)[d]	Corridor and Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f]
Introduced Upland Vegetation—Annual Grassland: Dominated by non-native annual grass species.	9 acres (0.3%, 0.4%)	<1 acre (<0.1%)	123 acres (4.1%)	Small
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.	5 acres (<0.1%, <0.1%)	0 acres	278 acres (0.4%)	Small
North American Arid West Emergent Marsh: Occurs in natural depressions, such as ponds, or bordering lakes or slow-moving streams or rivers. Alkalinity is highly variable. The plant community is characterized by herbaceous emergent, submergent, and floating leaved species.	2 acres (<0.1%, 0.2%)	0 acres	2 acres (<0.1 %)	Small
Great Basin Pinyon-Juniper Woodland: Occurs on low-elevation slopes and ridges. Singleleaf pinyon (*Pinus monophylla*), Utah juniper (*Juniperus osteosperma*), or both are the dominant species, generally associating with curl-leaf mountain mahogany (*Cercocarpus ledifolius*). Understory species include shrubs and grasses.	0 acres	0 acres	19,141 acres (1.3%)	Small

TABLE 11.4.10.1-1 (Cont.)

	Area of Cover Type Affected (acres)[b]			
Land Cover Type[a]	Within SEZ (Direct Effects)[c]	Access Road (Direct Effects)[d]	Corridor and Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f]
Inter-Mountain Basins Cliff and Canyon: Includes barren and sparsely vegetated (generally <10% plant cover) steep cliff faces, narrow canyons, small rock outcrops, and scree and talus slopes. Composed of widely scattered coniferous trees and a variety of shrubs.	0 acres	0 acres	386 acres (1.6%)	Small
Introduced Upland Vegetation–Perennial Grassland and Forbland: Dominated by non-native perennial grass and forb species.	0 acres	0 acres	155 acres (1.5%)	Small
Inter-Mountain Basins Curl-leaf Mountain Mahogany Woodland and Shrubland: Occurs on rocky outcrops and south-facing hill slopes ranging from canyons and foothills to ridgetops. Curl-leaf mountain mahogany is the dominant species. Trees or other shrubs may be present and scattered. Bunchgrasses are usually present.	0 acres	0 acres	114 acres (0.4%)	Small
Inter-Mountain Basins Montane Sagebrush Steppe: Occurs on flats, ridges, level ridgetops, and mountain slopes. Mountain big sagebrush (*Artemisia tridentata vaseyana*) and related taxa such as big sagebrush (*Artemisia tridentata spiciformis*) are typically the dominant species. Perennial herbaceous species, especially grasses, are usually abundant, although shrublands are also present.	0 acres	0 acres	108 acres (0.2%)	Small

TABLE 11.4.10.1-1 (Cont.)

	Area of Cover Type Affected (acres)[b]			
Land Cover Type[a]	Within SEZ (Direct Effects)[c]	Access Road (Direct Effects)[d]	Corridor and Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f]
Inter-Mountain Basins Subalpine Limber-Bristlecone Pine Woodland: Occurs on dry, rocky, exposed ridges and slopes. Dominants in the open tree canopy include limber pine (*Pinus flexilis*) or Great Basin bristlecone pine (*Pinus longaeva*), or both. Additional tree species are occasionally present. In some stands, an open shrub layer may be present. Sparse grasses may also be present.	0 acres	0 acres	79 acres (2.8%)	Small
Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland: Composed of a mosaic of multiple tree-dominated communities with diverse shrubs. Sedges, rushes, perennial grasses, and mesic forbs are the dominant herbaceous species. Disturbed areas often include non-native grasses.	0 acres	0 acres	13 acres (0.1%)	Small
Southern Rocky Mountain Mesic Montane Mixed Conifer Forest and Woodland: Occurs in cool, moist areas of ravine slopes, stream terraces, and north- or east-facing slopes. A dense layer of diverse deciduous shrubs is often present. A high diversity of herbaceous species, including grasses, sedges, and forbs are present.	0 acres	0 acres	7 acres (0.4%)	Small
Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland: Occurs on montane slopes and plateaus. The tree canopy co-dominants are quaking aspen (*Populus tremuloides*) and conifers. Quaking aspen loses dominance in older stands. Shrubs and herbaceous species are often present.	0 acres	0 acres	2 acres (0.1%)	Small
Southern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland: Occurs on all aspects of mountain slopes, ridges, canyon slopes, and plateaus. Consists of a mix of trees, as well as shrubs and grasses on dry to mesic soils.	0 acres	0 acres	2 acres (0.5%)	Small

TABLE 11.4.10.1-1 (Cont.)

Land Cover Type[a]	Area of Cover Type Affected (acres)[b]: Within SEZ (Direct Effects)[c]	Access Road (Direct Effects)[d]	Corridor and Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f]
North American Warm Desert Lower Montane Riparian Woodland and Shrubland: Occurs along perennial and seasonally intermittent streams in mountain canyons and valleys. Consists of a mix of woodlands and shrublands.	0 acres	0 acres	1 acre (<0.1%)	Small

[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.

[d] For access road development, direct effects were estimated within a 7-mi (11-km) long, 60-ft (18-m) wide road ROW from the SEZ to the nearest state highway. Direct impacts within this area were determined from the proportion of the cover type within the 1-mi (1.6-km) wide road corridor. Impacts are for the area of the cover type within the assumed ROW, and the percentage that area represents of all occurrences of that cover type within the SEZ region.

[e] Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary and within the 1-mi (1.6-km) wide assumed access road corridor, where ground-disturbing activities would not occur. Indirect effects include effects from surface runoff, dust, and other factors from project developments. The potential degree of indirect effects would decrease with increasing distance away from the SEZ. Includes the area of the cover type within the indirect effects area and the percentage that area represents of all occurrences of that cover type within the SEZ region.

[f] 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.

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

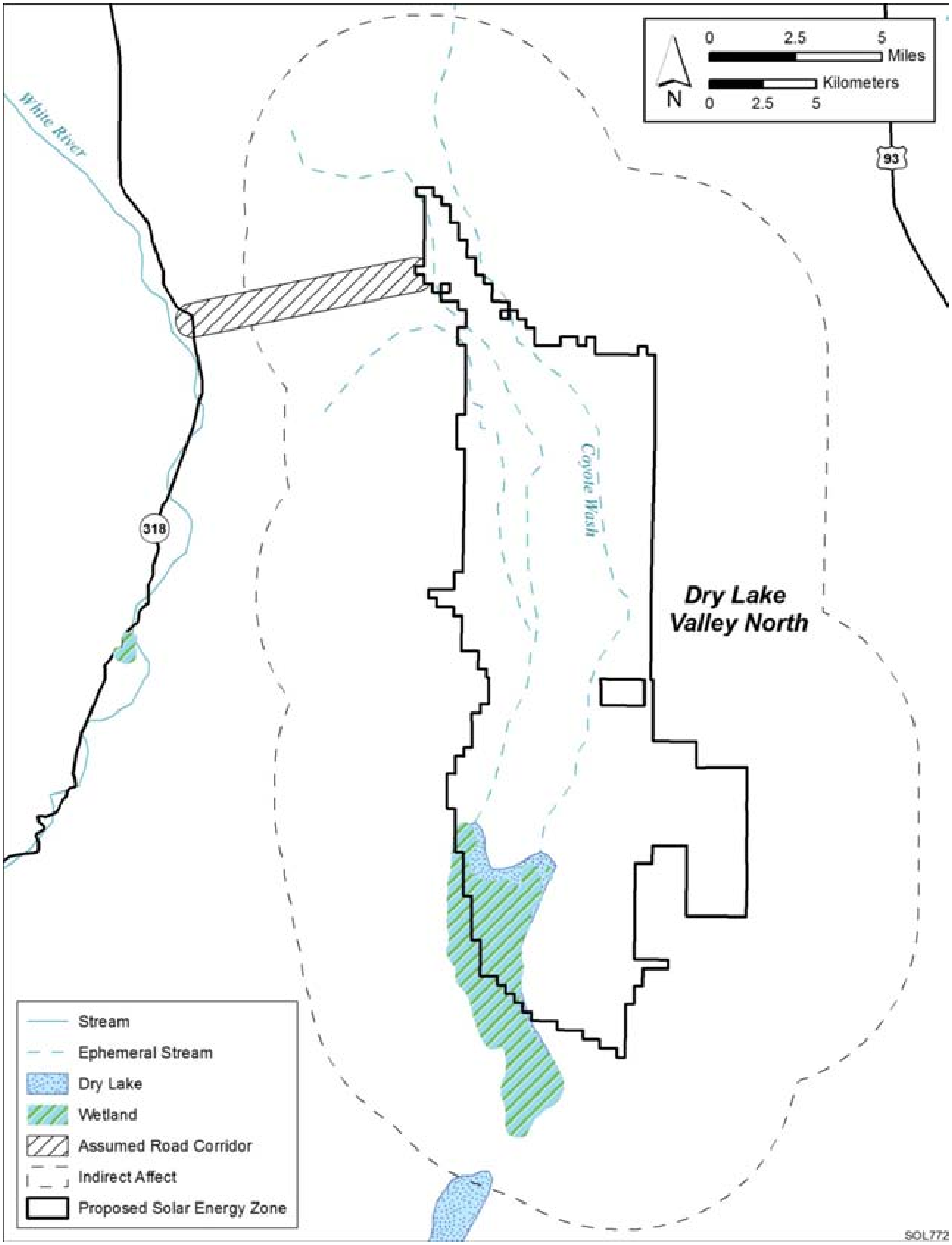

FIGURE 11.4.10.1-2 Wetlands within the Proposed Dry Lake Valley North SEZ (Source: USFWS 2009a)

washes occur within the SEZ, generally flowing to the south and terminating in the large playa. These washes typically do not support wetland or riparian habitats. Coyote Wash is a principal surface drainage on the SEZ. The dry washes and playas typically contain water for short periods during or following precipitation events.

Numerous springs occur in the vicinity of the SEZ, a number of which may support plant communities dependent on discharge from the Dry Lake Valley groundwater basin. Additional springs to the south of the SEZ may be associated with discharge from the Delamar Valley basin or other basins that receive groundwater flows from the Dry Lake Valley basin (see Section 11.4.9 for further discussion of groundwater basins).

The State of Nevada maintains an official list of weed species that are designated noxious species. Table 11.4.10.1-2 summarizes the noxious weed species regulated in Nevada that are known to occur in Lincoln County (USDA 2010; Creech et al. 2010), which includes the proposed Dry Lake Valley North SEZ. No species included in Table 11.4.10.1-2 were observed on the SEZ in August 2009. Cheatgrass (*Bromus tectorum*) and halogeton (*Halogeton glomeratus*), invasive species not regulated by Nevada, were observed on the SEZ in August 2009.

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;

TABLE 11.4.10.1-2 Designated Noxious Weeds of Nevada Occurring in Lincoln County

Common Name	Scientific Name	Category
Black henbane[a]	*Hyoscyamus niger*	A
Dalmatian Toadflax[a,b]	*Linaria dalmatica*	A
Diffuse knapweed[a]	*Centaurea diffusa*	B
Hoary cress[b]	*Cardaria draba*	C
Johnsongrass[a]	*Sorghum halepense*	C
Mayweed chamomile[b]	*Anthemis cotula*	A
Malta star thistle[a]	*Centaurea melitensis*	A
Puncture vine[b]	*Tribulus terrestris*	C
Sahara/African mustard[a]	*Brassica tournefortii*	B
Saltcedar[b]	*Tamarix* spp.	C
Spotted knapweed[a,b]	*Centaurea maculosa*	A
Water hemlock[a]	*Cicuta maculata*	C

[a] Creech et al. (2010).

[b] USDA (2010).

Source: NDA (2005).

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."

11.4.10.2 Impacts

The construction of solar energy facilities within the proposed Dry Lake Valley North 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 (61,499 acres [248.9 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 the purposes of this analysis, all the area of each cover type within the SEZ is considered to be directly affected by removal with full development of the SEZ.

Indirect effects (caused, for example, by surface runoff or dust from the SEZ) have the potential to degrade affected plant communities and may reduce biodiversity by promoting the decline or elimination of species sensitive to disturbance. Indirect effects can also cause an increase in disturbance-tolerant species or invasive species. High impact levels could result in the elimination of a community or the replacement of one community type 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 Appendix A, Section A.2.2 and from any additional mitigation applied. Section 11.4.10.2.3, below, identifies design features of particular relevance to the proposed Dry Lake Valley North SEZ.

11.4.10.2.1 Impacts on Native Species

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

Solar facility construction and operation in the proposed Dry Lake Valley North SEZ would primarily affect communities of the Inter-Mountain Basins Mixed Salt Desert Scrub cover type. Additional cover types that would be affected within the SEZ include Inter-Mountain Basins Semi-Desert Shrub Steppe, Inter-Mountain Basins Greasewood Flat, Inter-Mountain Basins Playa, Inter-Mountain Basins Big Sagebrush Shrubland, Inter-Mountain Basins Semi-Desert Grassland, Great Basin Xeric Mixed Sagebrush Shrubland, Inter-Mountain Basins Big Sagebrush Steppe, Mojave Mid-Elevation Mixed Desert Scrub, Undifferentiated Barren Land, Introduced Upland Vegetation–Annual Grassland, Sonora–Mojave Creosotebush–White Bursage Desert Scrub, and North American Arid West Emergent Marsh. Many of these also occur within the assumed access road corridor. The Undifferentiated Barren Land and Introduced Upland Vegetation–Annual Grassland cover types would likely have relatively minor populations of native species. Table 11.4.10.1-1 summarizes the potential impacts on land cover types resulting from solar energy facilities in the proposed Dry Lake Valley North SEZ. Most of these cover types are relatively common in the SEZ region; however, several cover types are relatively uncommon, representing 1% or less of the land area within the SEZ region: Inter-Mountain Basins Greasewood Flat (1.0%), Inter-Mountain Basins Playa (0.4%), Inter-Mountain Basins Semi-Desert Grassland (0.2%), North American Arid West Emergent Marsh (0.1%), Introduced Upland Vegetation–Annual Grassland (0.06 %), Inter-Mountain Basins Big Sagebrush Steppe (0.01%), and Undifferentiated Barren Land (0.003%). Desert dry washes, playas, and wetlands are important sensitive habitats.

The construction, operation, and decommissioning of solar projects within the proposed Dry Lake Valley North SEZ would result in large impacts on Inter-Mountain Basins Mixed Salt Desert Scrub, Inter-Mountain Basins Playa, Inter-Mountain Basins Semi-Desert Grassland, Inter-Mountain Basins Big Sagebrush Steppe, and Undifferentiated Barren Land cover types. Solar project development within the SEZ would result in moderate impacts on Inter-Mountain Basins Semi-Desert Shrub Steppe and Inter-Mountain Basins Greasewood Flat cover types, and small impacts on the remaining cover types in the affected area.

Because of the arid conditions, reestablishment of shrub, shrub steppe, or grassland 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. Damage to these crusts, as 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 11.4.10.1-1.

Communities associated with playa habitats, greasewood flats communities, riparian habitats, marshes, or other intermittently flooded areas downgradient from solar projects in the

SEZ or assumed access road could be affected by ground-disturbing activities. Approximately 44 acres (0.2 km^2) of a scrub-shrub wetland and 3,691 acres (15 km^2) of lacustrine wetland occur within the SEZ and could be directly affected during project construction. In addition, a 2-acre (0.1-km^2) area mapped as Northern American Arid West Emergent Marsh could be affected in the southeast portion of the SEZ. Site clearing and grading could disrupt surface water flow patterns, resulting in changes in the frequency, duration, depth, or extent of inundation or soil saturation, and could potentially alter playa or greasewood flats plant communities, including occurrences outside the SEZ, and affect community function. Increases in surface runoff from a solar energy project site could also affect hydrologic characteristics of these communities. The introduction of contaminants into these habitats could result from spills of fuels or other materials used on a project site. Soil disturbance could result in sedimentation in these areas, which could degrade or eliminate sensitive plant communities. Grading could also affect dry washes within the SEZ or access road footprint. Alteration of surface drainage patterns or hydrology could adversely affect downstream dry wash communities. Vegetation within these communities could be lost by erosion or desiccation.

Although the use of groundwater within the Dry Lake Valley North SEZ for technologies with high water requirements, such as wet-cooling systems, may be unlikely, groundwater withdrawals for such systems could reduce groundwater elevations in the Dry Lake Valley groundwater basin, Delamar Valley basin, or other hydrologically connected basins. Communities that depend on accessible groundwater, such as habitats associated with springs, could become degraded or lost as a result of lowered groundwater levels. The potential for impacts on springs would need to be evaluated by project-specific hydrological studies.

11.4.10.2.2 Impacts from Noxious Weeds and Invasive Plant Species

E.O. 13112, "Invasive Species," 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 effects of noxious weeds and invasive plant species that could result from solar energy facilities are described in Section 5.10.1. Noxious weeds and invasive species could inadvertently be brought to a project site by equipment previously used in infested areas, or they may be present on or near a project site. Despite required programmatic design features to prevent the spread of noxious weeds, project disturbance could potentially increase the prevalence of noxious weeds and invasive species in the affected area of the proposed Dry Lake Valley North SEZ, and increase the probability that weeds could be transported into areas that were previously relatively weed free. This could result in reduced restoration success and possible widespread habitat degradation.

Invasive species, including cheatgrass and halogeton, occur on the SEZ. Additional species designated as noxious weeds in Nevada and those known to occur in Lincoln County are given in Table 11.4.10.1-2. Approximately 9 acres (0.04 km^2) of Introduced Upland Vegetation–Annual Grassland occur within the SEZ and 121 acres (0.5 km^2) in the indirect impact area; 155 acres (0.6 km^2) of Introduced Upland Vegetation–Perennial Grassland and Forbland occur in the indirect impact area. Disturbance associated with solar project development may promote the establishment and spread of invasive species that are associated with these cover types. Past or present land uses, such as grazing or OHV use, may affect the susceptibility of plant communities to the establishment of noxious weeds and invasive species. Disturbance associated with existing roads and transmission lines within the SEZ area of potential impacts also likely contributes to the susceptibility of plant communities to the establishment and spread of noxious weeds and invasive species.

11.4.10.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

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

- Dry washes, playas, and wetlands within the SEZ, and dry washes within the access road corridor, should be avoided to the extent practicable, and any impacts minimized and mitigated. A buffer area should be maintained around wetlands, playas, and dry washes to reduce the potential for impacts.

- Appropriate engineering controls should be used to minimize impacts on dry wash, playa, marsh, scrub-shrub wetland, riparian, and greasewood flat habitats, including occurrences downstream of solar projects or assumed access road, resulting from surface water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition to these habitats. Appropriate buffers and engineering controls would be determined through agency consultation.

- Groundwater withdrawals should be limited to reduce the potential for indirect impacts on habitats dependent on springs associated with the Dry lake Valley basin, Delamar Valley Basin, or other hydrologically connected basins. Potential impacts on springs should be determined through hydrological studies.

If these SEZ-specific design features are implemented in addition to other program design features, it is anticipated that a high potential for impacts from invasive species and impacts on dry washes, playas, springs, riparian habitats, and wetlands would be reduced to a minimal potential for impact.

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11.4.11 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 Valley North 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 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) and included the SEZ and a 60-ft (18-m) wide portion of an assumed 7.0-mi (11.3-km) long access road corridor. The maximum developed area within the SEZ would be 61,499 acres (248.9 km^2).

The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ boundary and within a 1.0-mi (1.6-km) access road corridor 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 or road construction area). Potentially suitable habitat within the SEZ greater than the maximum of 61,499 acres (248.9 km^2) of direct effect was 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. These 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 Inter-Mountain Basins Mixed Salt Desert Scrub (see Section 11.4.10). Several ephemeral washes, wetlands, and a dry lake occur within the SEZ (see Figure 11.4.9.1-1).

11.4.11.1 Amphibians and Reptiles

11.4.11.1.1 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 Valley North SEZ. The list of amphibian and reptile species potentially present in the SEZ area was determined from species lists available from the NNHP (NDCNR 2002) and range maps and habitat information available from 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.

On the basis of species distributions within the area of the SEZ and habitat preferences of the amphibian species, the Great Basin spadefoot (*Spea intermontana*) and red-spotted toad (*Bufo punctatus*) would be expected to occur within the SEZ (USGS 2007; Stebbins 2003). They would most likely occur in the portion of the SEZ that overlaps the dry lake and washes.

More than 25 reptile species occur within the area that encompasses the proposed Dry Lake Valley North SEZ (USGS 2007; Stebbins 2003). The desert tortoise (*Gopherus agassizii*) is a federal and state listed threatened species. This species is discussed in Section 11.4.12. 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*), glossy snake (*Arizona elegans*), gophersnake (*Pituophis catenifer*), groundsnake (*Sonora semiannulata*), and nightsnake (*Hypsiglena torquata*). The sidewinder (*Crotalus cerastes*) would be the most common poisonous snake species expected to occur on the SEZ.

Table 11.4.11.1-1 provides habitat information for representative amphibian and reptile species that could occur within the proposed Dry Lake Valley North SEZ. Special status amphibian and reptile species are addressed in Section 11.4.12.

11.4.11.1.2 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 11.4.11.1.3 identifies SEZ-specific design features of particular relevance to the proposed Dry Lake Valley North 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 11.4.11.1.1, following the analysis approach described in Appendix M. Additional NEPA assessments and coordination with state natural resource agencies may be needed to address project-specific impacts more thoroughly. These assessments and consultations could result in additional required actions to avoid or mitigate impacts on amphibians and reptiles (see Section 11.4.11.1.3).

In general, impacts on amphibians and reptiles would result from habitat disturbance (i.e., habitat reduction, fragmentation, and alteration) and from disturbance, injury, or mortality to individual amphibians and reptiles. On the basis of the impacts on amphibians and reptiles summarized in Table 11.4.11.1-1, direct impacts on amphibian and reptile species would be moderate for the three amphibian species and for the desert horned lizard, Great Basin collared lizard, long-nosed leopard lizard, western fence lizard, zebra-tailed lizard, and nightsnake. Direct

TABLE 11.4.11.1-1 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 Valley North SEZ

		Maximum Area of Potential Habitat Affected[b]			
Common Name (Scientific Name)	Habitat[a]	Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Amphibians					
Great Basin spadefoot (*Spea intermontana*)	Sagebrush flats, semidesert shrublands, pinyon-juniper woodlands, and spruce-fir forests. Breeds in temporary and permanent waters, including rain pools, pools in intermittent streams, and flooded areas along streams. About 4,110,700 acres[h] of potentially suitable habitat occurs within the SEZ region.	61,499 acres of potentially suitable habitat lost (1.5% of available potentially suitable habitat) during construction and operations	222,567 acres of potentially suitable habitat (5.4% of available potentially suitable habitat)	46 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,041 acres in area of indirect effect	Moderate 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 2,491,600 acres of potentially suitable habitat occurs within the SEZ region.	61,496 acres of potentially suitable habitat lost (2.5% of available potentially suitable habitat) during construction and operations	83,391 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	19 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 1,688 acres in area of indirect effect	Moderate 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 11.4.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
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 3,204,500 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (1.9% of available potentially suitable habitat) during construction and operations	246,792 acres of potentially suitable habitat (7.7% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 4,546 acres in area of indirect effect	Moderate 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 1,775,400 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (3.5% of available potentially suitable habitat) during construction and operations	147,471 acres of potentially suitable habitat (8.3% of available potentially suitable habitat)	30 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 2,585 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.4.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Lizards (Cont.)					
Long-nosed leopard lizard (*Gambelia wislizenii*)	Desert and semidesert areas with scattered shrubs. Prefers sandy or gravelly flats and plains. Also prefer areas with abundant rodent burrows that they occupy when inactive. About 2,060,300 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (2.2% of available potentially suitable habitat) during construction and operations	208,067 acres of potentially suitable habitat (7.3% of available potentially suitable habitat)	47 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 4,083 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
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 1,933,300 acres of potentially suitable habitat occurs within the SEZ region.	998 acres of potentially suitable habitat lost (0.05% of available potentially suitable habitat) during construction and operations	24,530 acres of potentially suitable habitat (1.3% of available potentially suitable habitat)	0.5 acre of potentially suitable habitat lost (<0.0001% of available potentially suitable habitat) and 42.5 acres in area of indirect effect	Small overall impact. Wash habitats should be avoided.

TABLE 11.4.11.1-1 (Cont.)

		Maximum Area of Potential Habitat Affected[b]			
Common Name (Scientific Name)	Habitat[a]	Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Lizards (Cont.)					
Western fence lizard (*Sceloporus occidentalis*)	Disturbed areas, roadsides, gravel beds, rock quarries, lava flows, outcrops, talus slopes, shrublands, riparian areas, and coniferous woodlands. About 4,609,100 acres of potentially suitable habitat occurs within the SEZ region.	61,499 acres of potentially suitable habitat lost (1.3% of available potentially suitable habitat) during construction and operations	248,635 acres of potentially suitable habitat (5.4% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,506 acres in area of indirect effect	Moderate 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 semiarid habitats with sparse plant cover. About 2,889,000 acres of potentially suitable habitat occurs within the SEZ region.	61,499 acres of potentially suitable habitat lost (2.1% of available potentially suitable habitat) during construction and operations	114,922 acres of potentially suitable habitat (4.0% of available potentially suitable habitat)	25 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 2,147 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.4.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Lizards (Cont.)					
Zebra-tailed lizard (*Callisaurus draconoides*)	Open, warm-desert habitats, especially dry washes and canyons with fine gravel and sand. About 1,480,400 acres of potentially suitable habitat occurs in the SEZ region.	61,068 acres of potentially suitable habitat lost (4.1% of available potentially suitable habitat) during construction and operations	122.363 acres of potentially suitable habitat (8.3% of available potentially suitable habitat)	24 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 2,123 acres in area of indirect effect	Moderate 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 3,910.500 acres of potentially suitable habitat occurs within the SEZ region.	13,092 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	185,025 acres of potentially suitable habitat (4.7% of available potentially suitable habitat)	33 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,861 acres in area of indirect effect	Small overall impact.

TABLE 11.4.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
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 1,827,800 acres of potentially suitable habitat occurs within the SEZ region.	12,194 acres of potentially suitable habitat lost (0.7% of available potentially suitable habitat) during construction and operations	107,529 acres of potentially suitable habitat (5.9% of available potentially suitable habitat)	28 acres of potentially suitable habitat lost (<0.002% of available potentially suitable habitat) and 2,423 acres in area of indirect effect	Small overall impact.
Gophersnake (*Pituophis catenifer*)	Plains grasslands, sandhills, riparian areas, marshes, edges of ponds and lakes, rocky canyons, semidesert and mountain shrublands, montane woodlands, rural and suburban areas, and agricultural areas. Likely inhabits pocket gopher burrows in winter. About 4,006,400 acres of potentially suitable habitat occurs in the SEZ region.	6,992 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	170,416 acres of potentially suitable habitat (4.3% of available potentially suitable habitat)	28 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,441 acres in area of indirect effect	Small overall impact.

TABLE 11.4.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Snakes (Cont.)					
Groundsnake (*Sonora semiannulata*)	Arid and semiarid regions with rocky to sandy soils. River bottoms, desert flats, sand hummocks, and rocky hillsides. About 4,076,700 acres of potentially suitable habitat occurs in the SEZ region.	9,887 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	185,882 acres of potentially suitable habitat (4.6% of available potentially suitable habitat)	33 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,907 acres in area of indirect effect	Small overall impact.
Nightsnake (*Hypsiglena torquata*)	Arid and semiarid desert flats, plains, and woodlands; areas with rocky and sandy soils are preferred. During cold periods of the year, it seeks refuge underground, in crevices, or under rocks. About 2,584,400 acres of potentially suitable habitat occurs within the SEZ region.	61,499 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat) during construction and operations	110,968 acres of potentially suitable habitat (4.3% of available potentially suitable habitat)	24 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 2,105 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.4.11.1-1 (Cont.)

		Maximum Area of Potential Habitat Affected[b]			
Common Name (Scientific Name)	Habitat[a]	Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Snakes (Cont.)					
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 376,300 acres of potentially suitable habitat occurs within the SEZ region.	100 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	4,764 acres of potentially suitable habitat (1.2% of available potentially suitable habitat)	0.5 acre of potentially suitable habitat lost (0.0001% of available potentially suitable habitat) and 42.5 acres in area of indirect effect	Small overall impact.

a 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.

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 by using SWReGAP habitat suitability and land cover models. This approach probably overestimated the amount of suitable habitat in the project area. A maximum of 61,499 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 61,499 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 11.4.11.1-1 (Cont.)

[e] For access road development, direct effects were estimated within a 7-mi (11-km) long, 60-ft (18-m) wide access road ROW from the SEZ to the nearest existing highway. Indirect effects were estimated within a 1-mi (1.6-km) wide access road corridor to the existing highway, less the assumed area of direct effects.

[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 acres to km^2, multiply by 0.004047.

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

impacts on these species, based on loss of potentially suitable habitats, would range from 1.3% for the western fence lizard to 4.1% for the zebra-tailed lizard (Table 11.4.11.1-1). Direct impacts on all other representative reptile species would be small, ranging from 0.05% for the side-blotched lizard to 0.7% for the glossy snake (Table 11.4.11.1-1). Larger areas of potentially suitable habitats for the amphibian and reptile species occur within the area of potential indirect effects (e.g., up to 8.3% of available habitat for the Great Basin collared lizard and zebra-tailed lizard). Indirect impacts on amphibians and reptiles could result from surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, 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 desert scrub, playa, and wash habitats.

11.4.11.1.3 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:

- The dry lake 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, as potentially suitable habitats for a number of the amphibian and reptile species occur throughout much of the SEZ, additional species-specific mitigation of direct effects for those species would be difficult or infeasible.

11.4.11.2 Birds

11.4.11.2.1 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

Valley North SEZ. The list of bird species potentially present in the SEZ area was determined from the NNHP (NDCNR 2002) and range maps and habitat information available from the CWHRS (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).

At least eight 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-throated sparrow (*Amphispiza bilineata*), burrowing owl (*Athene cunicularia*), common raven (*Corvus corax*), Costa's hummingbird (*Calypte costae*), ladder-backed woodpecker (*Picoides scalaris*), Le Conte's thrasher (*Toxostoma lecontei*), and verdin (*Auriparus flaviceps*). Habitats for most of these species are described in Table 11.4.11.2-1. Because of its special species status, the burrowing owl is discussed in Section 11.4.12.

Waterfowl, Wading Birds, and Shorebirds

As discussed in Section 4.6.2.2.2, 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 Valley North 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 the perennial stream and reservoir habitats 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 4.6.2.2.3, neotropical migrants represent the most diverse category of birds within the six-state solar energy study area. Species expected to occur within the proposed Dry Lake Valley North SEZ include the ash-throated flycatcher, Bewick's wren (*Thryomanes bewickii*), black-throated sparrow, cactus wren (*Campylorhynchus brunneicapillus*), common poorwill (*Phalaenoptilus nuttallii*), common raven, Costa's hummingbird, greater roadrunner (*Geococcyx californianus*), horned lark (*Eremophila alpestris*), ladder-backed woodpecker, Le Conte's thrasher, lesser nighthawk (*Chordeiles acutipennis*), loggerhead shrike (*Lanius ludovicianus*), northern mockingbird (*Mimus polyglottos*), phainopepla, rock wren (*Salpinctes obsoletus*), sage sparrow (*Amphispiza belli*), Say's phoebe (*Sayornis saya*), verdin, and western kingbird (*Tyrannus verticalis*) (USGS 2007).

TABLE 11.4.11.2-1 Habitats, Potential Impacts, and Potential Mitigation for Representative Bird Species That Could Occur on or in the Affected Area of the Proposed Dry Lake Valley North SEZ

		Maximum Area of Potential Habitat Affected[b]			
Common Name (Scientific Name)	Habitat[a]	Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Shorebirds					
Killdeer (*Charadrius vociferus*)	Open areas such as fields, meadows, lawns, mudflats, and shores. Nests on ground in open dry or gravelly locations. About 35,800 acres[h] of potentially suitable habitat occurs within the SEZ region.	3,013 acres of potentially suitable habitat lost (8.4% of available potentially suitable habitat) during construction and operations	3,897 acres of potentially suitable habitat (10.9% of available potentially suitable habitat)	None	Moderate overall impact. Avoid dry lake and wash habitats. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

1

TABLE 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Neotropical Migrants					
Ash-throated flycatcher (*Myiarchus cinerascens*)	Common in scrub and woodland habitats below 4,500 ft, including desert riparian and desert washes. Requires hole/cavity for nesting. Uses shrubs or small trees for foraging perches. About 4,577,300 acres of potentially suitable habitat occurs within the SEZ region.	61,499 acres of potentially suitable habitat lost (1.3% of available potentially suitable habitat) during construction and operations	233,887 acres of potentially suitable habitat (5.1% of available potentially suitable habitat)	47 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,083 acres in area of indirect effect	Moderate 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 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Neotropical Migrants (Cont.)					
Bewick's wren (*Thryomanes bewickii*)	Generally associated with dense, brushy habitats. It is a permanent resident of lowland deserts and pinyon-juniper forests of southern Utah. 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 4.086,000 acres of potentially suitable habitat occurs within the SEZ region.	15,205 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	188,782 acres of potentially suitable habitat (4.6% of available potentially suitable habitat)	39 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 2,855 acres in area of indirect effect	Small overall impact. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
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 1,922,200 acres of potentially suitable habitat occurs within the SEZ region.	95 acres of potentially suitable habitat lost (<0.01% of available potentially suitable habitat) during construction and operations	23,633 acres of potentially suitable habitat (1.2% of available potentially suitable habitat)	0.5 acre of potentially suitable habitat lost (<0.0001% of available potentially suitable habitat) and 42.5acres in area of indirect effect	Small overall impact. Mojave mid-elevation mixed desert scrub habitat should be avoided. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 11.4.11.2-1 (Cont.)

		Maximum Area of Potential Habitat Affected[b]			
Common Name (Scientific Name)	Habitat[a]	Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
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 414,900 acres of potentially suitable habitat occurs within the SEZ region.	95 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) during construction and operations	4,486 acres of potentially suitable habitat (1.1% of available potentially suitable habitat)	0.5 acre of potentially suitable habitat lost (0.0001% of available potentially suitable habitat) and 42.5 acres in area of indirect effect	Small overall impact. Mojave mid-elevation mixed desert scrub habitat should be avoided. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b] Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Neotropical Migrants (Cont.)					
Common poorwill (*Phalaenoptilus nuttallii*)	Scrubby and brushy areas, prairie, desert, rocky canyons, open woodlands, and broken forests. Mostly in arid and semiarid habitats. Nests in open areas on a bare site. About 4,323,200 acres of potentially suitable habitat occurs within the SEZ region.	61,499 acres of potentially suitable habitat lost (1.4% of available potentially suitable habitat) during construction and operations	229,631 acres of potentially suitable habitat (5.3% of available potentially suitable habitat)	46 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,044 acres in area of indirect effect	Moderate 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 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
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 4,994,900 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (1.2% of available potentially suitable habitat) during construction and operations	261,395 acres of potentially suitable habitat (5.2% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,552 acres in area of indirect effect	Moderate 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 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Neotropical Migrants (Cont.)					
Costa's hummingbird (*Calypte costae*)	Desert and semidesert areas, arid brushy foothills, and chaparral. Main habitats are desert washes, edges of desert riparian and valley foothill riparian areas, coastal shrub, desert scrub, desert succulent shrub, lower-elevation chaparral, and palm oases. 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 389,000 acres of potentially suitable habitat occurs within the SEZ region.	100 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) during construction and operations	4,773 acres of potentially suitable habitat (1.2% of available potentially suitable habitat)	0.5 acre of potentially suitable habitat lost (0.0001% of available potentially suitable habitat) and 42.5 acres in area of indirect effect	Small overall impact. Avoid wash and Mojave mid-elevation mixed desert scrub and creosotebush-white bursage desert scrub habitats should be avoided. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Neotropical Migrants (Cont.)					
Greater roadrunner (*Geococcyx californianus*)	Desert scrub, chaparral, edges of cultivated lands, and arid open areas with scattered brush. Requires thickets, large bushes, or small trees for shade, refuge, and roosting. Usually nests low in trees, shrubs, or clumps of cactus. Rarely nests on ground. About 4,549,700 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (1.4% of available potentially suitable habitat) during construction and operations	227,594 acres of potentially suitable habitat (5.0% of available potentially suitable habitat)	47 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,083 acres in area of indirect effect	Moderate 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 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b] Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Neotropical Migrants (Cont.)					
Horned lark (*Eremophila alpestris*)	Common to abundant resident in a variety of open habitats. Breeds in grasslands, sagebrush, semidesert shrublands, and alpine tundra. During migration and winter, inhabits the same habitats other than tundra, and occurs in agricultural areas. Usually occurs where plant density is low and there are exposed soils. About 3,265,300 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (1.9% of available potentially suitable habitat) during construction and operations	248,304 acres of potentially suitable habitat (7.6% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (<0.002% of available potentially suitable habitat) and 4,549 acres in area of indirect effect	Moderate 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 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Neotropical Migrants (Cont.)					
Ladder-backed woodpecker (*Picoides scalaris*)	Fairly common in Mojave and Colorado Deserts. Variety of habitats, including deserts, arid scrub, riparian woodlands, mesquite, scrub oak, pinyon-juniper woodlands. Digs nest hole in rotted stub or dead or dying branches of various trees. Also nests in saguaro, agave, yucca, fence posts, and utility poles. Nests on ledges; branches of trees, shrubs, and cactus; and holes in trees or walls. About 2,644,900 acres of potentially suitable habitat occurs within the SEZ region.	60,589 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat) during construction and operations	83,275 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	19 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 1,685 acres in area of indirect effect	Moderate 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 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
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 942,900 acres of potentially suitable habitat occurs in the SEZ region.	60,589 acres of potentially suitable habitat lost (6.4% of available potentially suitable habitat) during construction and operations	63,734 acres of potentially suitable habitat (6.8% of available potentially suitable habitat)	19 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,685 acres in area of indirect effect	Moderate 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 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Neotropical Migrants (Cont.)					
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 2,968,900 acres of potentially suitable habitat occurs within the SEZ region.	61,499 acres of potentially suitable habitat lost (2.1% of available potentially suitable habitat) during construction and operations	208,067 acres of potentially suitable habitat (7.0% of available potentially suitable habitat)	47 acres of potentially suitable habitat lost (<0.002% of available potentially suitable habitat) and 4,083 acres in area of indirect effect	Moderate 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 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
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 4,941,600 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (1.2% of available potentially suitable habitat) during construction and operations	260,672 acres of potentially suitable habitat (5.3% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,546 acres in area of indirect effect	Moderate 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 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
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 4,967,800 acres of potentially suitable habitat occurs within the SEZ region.	61,499 acres of potentially suitable habitat lost (1.2% of available potentially suitable habitat) during construction and operations	267,812 acres of potentially suitable habitat (5.4% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,549 acres in area of indirect effect	Moderate 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 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Neotropical Migrants (Cont.)					
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 4,958,500 acres of potentially suitable habitat occurs within the SEZ region.	61,499 acres of potentially suitable habitat lost (1.2% of available potentially suitable habitat) during construction and operations	267,933 acres of potentially suitable habitat (5.4% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,549 acres in area of indirect effect	Moderate 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 11.4.11.2-1 (Cont.)

		Maximum Area of Potential Habitat Affected[b]			
Common Name (Scientific Name)	Habitat[a]	Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
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 4,564,100 acres of potentially suitable habitat occurs within the SEZ region.	61,499 acres of potentially suitable habitat lost (1.3% of available potentially suitable habitat) during construction and operations	256,139 acres of potentially suitable habitat (5.6% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,506 acres in area of indirect effect	Moderate 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 11.4.11.2-1 (Cont.)

		Maximum Area of Potential Habitat Affected[b]			
Common Name (Scientific Name)	Habitat[a]	Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Neotropical Migrants (Cont.)					
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 2,437,600 acres of potentially suitable habitat occurs within the SEZ region.	6,643 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	150,852 acres of potentially suitable habitat (6.2% of available potentially suitable habitat)	28 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 2,444 acres in area of indirect effect	Small overall impact. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 11.4.11.2-1 (Cont.)

		Maximum Area of Potential Habitat Affected[b]			
Common Name (Scientific Name)	Habitat[a]	Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
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 386,400 acres of potentially suitable habitat occurs within the SEZ region.	100 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) during construction and operations	4,764 acres of potentially suitable habitat (1.2% of available potentially suitable habitat)	0.5 acre of potentially suitable habitat lost (0.0001% of available potentially suitable habitat) and 42.5 acres in area of indirect effect	Small overall impact. Mojave mid-elevation mixed desert scrub and creosotebush-white bursage desert scrub habitats should be avoided. Dry lake and wash habitats should also be avoided. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Neotropical Migrants (Cont.)					
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. It migrates to Central America or the southeastern United States for the winter. About 3,346,400 acres of potentially suitable habitat occurs within the SEZ region.	61,499 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat) during construction and operations	233,958 acres of potentially suitable habitat (7.0% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (<0.002% of available potentially suitable habitat) and 4,549 acres in area of indirect effect	Moderate 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 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b] Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
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 4,782,800 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (1.3% of available potentially suitable habitat) during construction and operations	260,707 acres of potentially suitable habitat (5.5% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,549 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Birds of Prey (Cont.)					
Golden eagle (*Aquila chrysaetos*)	Grasslands, shrublands, pinyon-juniper woodlands, and ponderosa pine forests. Occasionally in most other habitats, especially during migration and winter. Nests on cliffs and sometimes trees in rugged areas, with breeding birds ranging widely over surrounding areas. About 4,956,800 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (1.2% of available potentially suitable habitat) during construction and operations	260,913 acres of potentially suitable habitat (5.3% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,549 acres in area of indirect effect	Moderate 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 Bald and Golden Eagle Protection Act.

TABLE 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Birds of Prey (Cont.)					
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 5,024,900 acres of potentially suitable habitat occurs within the SEZ region.	61,499 acres of potentially suitable habitat lost (1.2% of available potentially suitable habitat) during construction and operations	268,338 acres of potentially suitable habitat (5.3% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,552 acres in area of indirect effect	Moderate 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 4,868,300 acres of potentially suitable habitat occurs within the SEZ region.	61,499 acres of potentially suitable habitat lost (1.3% of available potentially suitable habitat) during construction and operations	260,514 acres of potentially suitable habitat (5.4% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,549 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b] Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
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 2,571,100 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat) during construction and operations	175,594 acres of potentially suitable habitat (6.8% of available potentially suitable habitat)	47 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 4,111 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
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 2,534,000 acres of potentially suitable habitat occurs in the SEZ region.	60,589 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat) during construction and operations	83,275 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	19 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 1,685 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Upland Game Birds					
Chukar (*Alectoris chukar*)	Steep, semiarid 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 4,886,100 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (1.3% of available potentially suitable habitat) during construction and operations	254,095 acres of potentially suitable habitat (5.2% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,552 acres in area of indirect effect	Moderate overall impact. Avoid dry lake and wash habitats; otherwise no species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
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 2,791,300 acres of potentially suitable habitat occurs within the SEZ region.	13,187 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat) during construction and operations	170,275 acres of potentially suitable habitat (6.1% of available potentially suitable habitat)	33 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 2,904 acres in area of indirect effect	Small overall impact. Avoid Dry lake and wash habitats.

TABLE 11.4.11.2-1 (Cont.)

		Maximum Area of Potential Habitat Affected[b]			
Common Name (Scientific Name)	Habitat[a]	Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Upland Game Birds (Cont.)					
Mourning dove (*Zenaida macroura*)	Habitat generalist, occurring in grasslands, shrublands, croplands, lowland and foothill riparian forests, ponderosa pine forests, deserts, and urban and suburban areas. Rarely in aspen and other forests, coniferous woodlands, and alpine tundra. Nests on ground or in trees. Winters mostly in lowland riparian forests adjacent to cropland. About 4,409,000 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (1.4% of available potentially suitable habitat) during construction and operations	208,214 acres of 4.7% of available potentially suitable habitat)	47 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,111 acres in area of indirect effect	Moderate 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 380,700 acres of potentially suitable habitat occurs within the SEZ region.	100 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) during construction and operations	4,763 acres of potentially suitable habitat (1.3% of available potentially suitable habitat)	0.5 acre of potentially suitable habitat lost (0.0001% of available potentially suitable habitat) and 42.5 acres in area of indirect effect	Small overall impact. Mojave mid-elevation mixed desert scrub and creosotebush-white bursage desert scrub habitats should be avoided.

TABLE 11.4.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Upland Game Birds (Cont.)					
Wild turkey (*Meleagris gallopavo*)	Lowland riparian forests, foothill shrubs, pinyon-juniper woodlands, foothill riparian forests, and agricultural areas. About 3,954,800 acres of potentially suitable habitat occurs within the SEZ region.	12,668 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	185,500 acres of potentially suitable habitat (4.7% of available potentially suitable habitat)	33 acres of potentially suitable habitat lost (<0.0013% of available potentially suitable habitat) and 2,861 acres in area of indirect effect	Small overall impact.

[a] 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.

[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 by using SWReGAP habitat suitability and land cover models. This approach probably overestimated the amount of suitable habitat in the project area. A maximum of 61,499 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 61,499 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 11.4.11.2-1 (Cont.)

[e] For access road development, direct effects were estimated within a 7-mi (11-km) long, 60-ft (18-m) wide access road ROW from the SEZ to the nearest existing highway. Indirect effects were estimated within a 1-mi (1.6-km) wide access road corridor to the existing highway, less the assumed area of direct effects.

[f] 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.

[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 acres to km^2, multiply by 0.004047.

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

Birds of Prey

Section 4.6.2.2.4 provides an overview of the birds of prey (raptors, owls, and vultures) within the six-state solar study area. Raptor species that could occur within the proposed Dry Lake Valley North 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*) (USGS 2007). Several other special status birds of prey are discussed in Section 11.4.12. These include the ferruginous hawk (*Buteo regalis*), northern goshawk (*Accipiter gentilis*), prairie falcon (*Falco mexicanus*), and burrowing owl.

Upland Game Birds

Section 4.6.2.2.5 provides 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 Valley North 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*) (USGS 2007).

Table 11.4.11.2-1 provides habitat information for representative bird species that could occur within the proposed Dry Lake Valley North SEZ. Special status bird species are discussed in Section 11.4.12.

11.4.11.2.2 Impacts

The types of impacts that birds could incur from construction, operation, and decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any such impacts would be minimized through the implementation of required programmatic design features described in Appendix A, Section A.2.2, and through any additional mitigation applied. Section 11.4.11.2.3 identifies design features of particular relevance to the proposed Dry Lake Valley North 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 11.4.11.2.1, 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 11.4.11.2.3).

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 11.4.11.2-1 summarizes the magnitude of potential impacts on representative bird species resulting from solar energy development in the proposed Dry Lake Valley North SEZ. On the basis of the impacts on birds summarized in Table 11.4.11.2-1, direct impacts on representative bird species would be small (10 species) to moderate (22 species). Direct impacts on these species would range from less than 0.01% for the black-tailed gnatcatcher and black-throated sparrow to 8.4% for the killdeer (Table 11.4.11.2-1). Larger areas of potentially suitable habitats for the bird species occur within the area of potential indirect effects (e.g., up to 10.9% of available habitat for the killdeer). Indirect impacts on birds could result from noise (i.e., behavioral and physiological stresses; Section 5.10.2), surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, 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 bird species would be the restoration of original ground surface contours, soils, and native plant communities associated with desert scrub, playa, and wash habitats.

11.4.11.2.3 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 design features, especially those engineering controls that would reduce runoff, sedimentation, spills, and fugitive dust. While SEZ-specific design features important to reduce 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 lake 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.

11.4.11.3 Mammals

11.4.11.3.1 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 Valley North SEZ. The list of mammal species potentially present in the SEZ area was determined from the NNHP (NDCNR 2002) and range maps and habitat information available from 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.

More than 55 species of mammals have ranges that encompass the area of the proposed Dry Lake Valley North SEZ (NDCNR 2002; USGS 2007); however, suitable habitats for a number of these species are limited or nonexistent within the SEZ (USGS 2007). Similar to the overview of mammals provided for the six-state solar energy study area (Section 4.6.2.3), 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 area of the proposed Dry Lake Valley North SEZ include cougar (*Puma concolor*), elk (*Cervis canadensis*), mule deer (*Odocoileus hemionus*), Nelson's bighorn sheep (*Ovis canadensis nelsoni*), and pronghorn (*Antilocapra americana*) (USGS 2007). Because of its special species status, the Nelson's bighorn sheep is addressed in Section 11.4.12. Figure 11.4.11.3-1 shows the location of the SEZ relative to mapped elk habitat; Figure 11.4.11.3-2 shows the location of the SEZ relative to the mapped range of mule deer habitat; and Figure 11.4.11.3-3 shows the location of the SEZ relative to mapped pronghorn habitat.

Other Mammals

A number of small game and furbearer species occur within the area of the proposed Dry Lake Valley North 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*), desert cottontail (*Sylvilagus audubonii*), gray fox (*Urocyon cinereoargenteus*), kit fox (*Vulpes macrotis*), and red fox (*Vulpes vulpes*) (USGS 2007).

The nongame (small) mammals include rodents, bats, and shrews. Representative species for which potentially suitable habitat occurs within the proposed Dry Lake Valley North SEZ include Botta's pocket gopher (*Thomomys bottae*), cactus mouse (*Peromyscus eremicus*), canyon

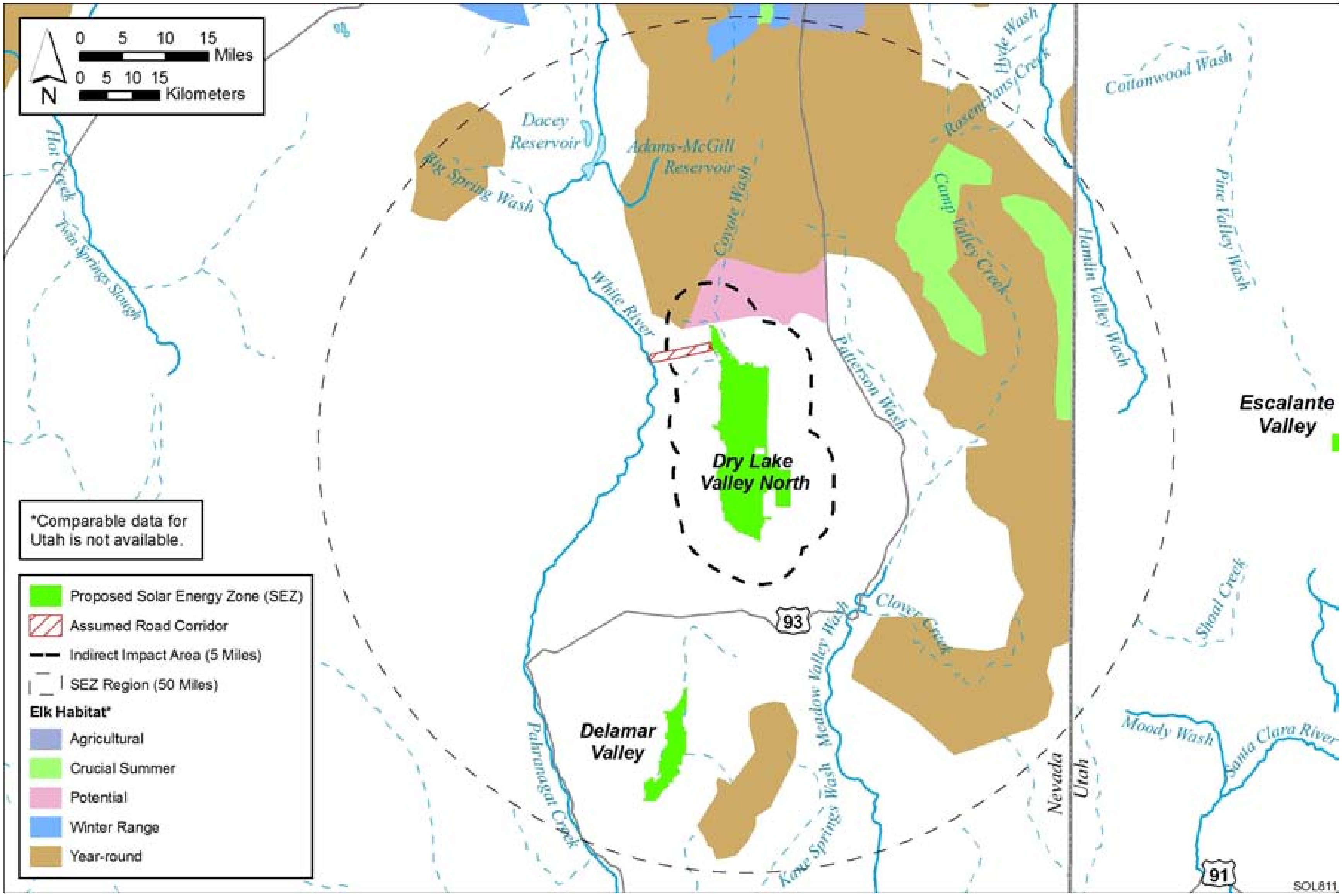

FIGURE 11.4.11.3-1 Location of the Proposed Dry Lake Valley North SEZ Relative to the Mapped Range of Elk (Source: NDOW 2010)

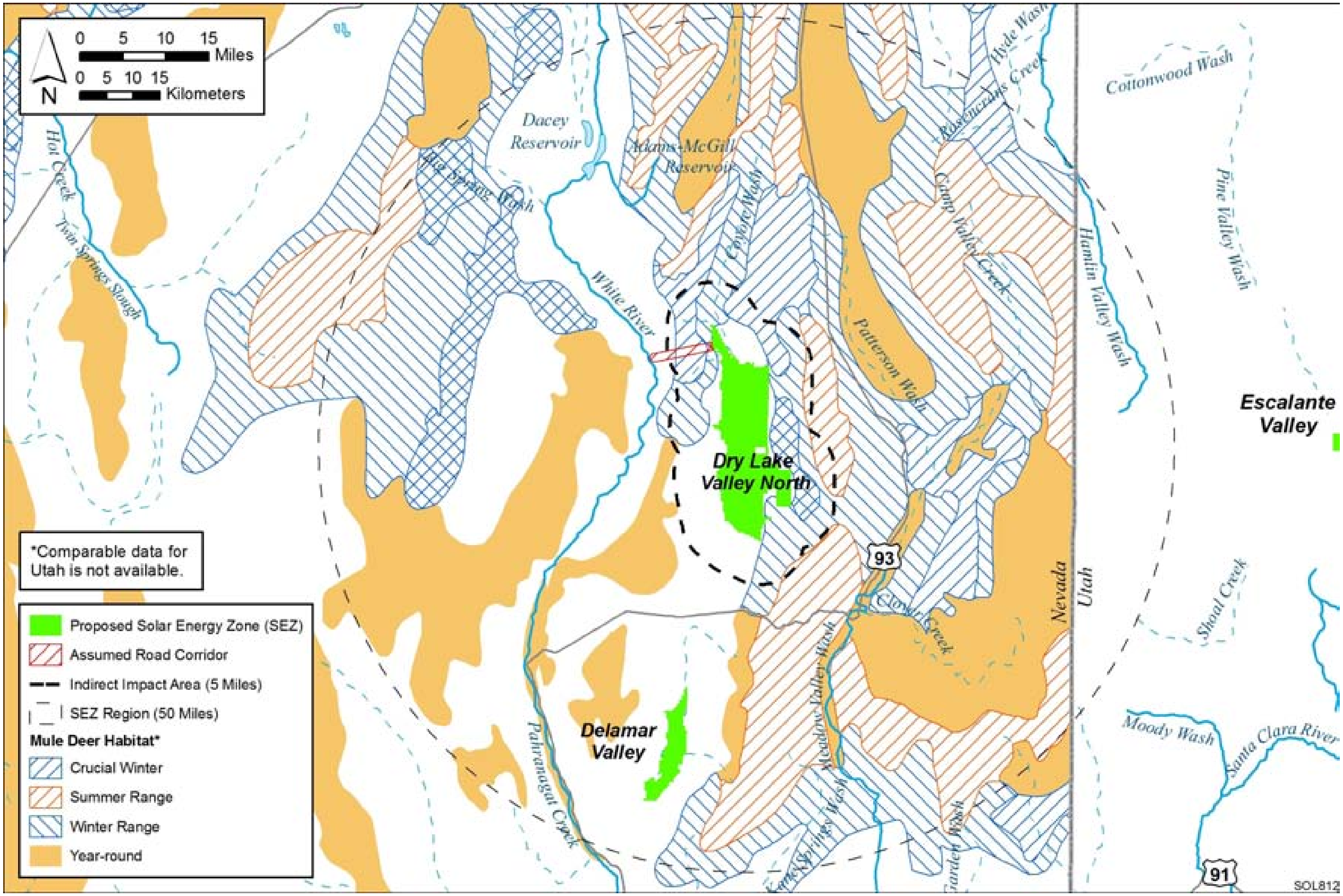

FIGURE 11.4.11.3-2 Location of the Proposed Dry Lake Valley North SEZ Relative to the Mapped Range of Mule Deer (Source: NDOW 2010)

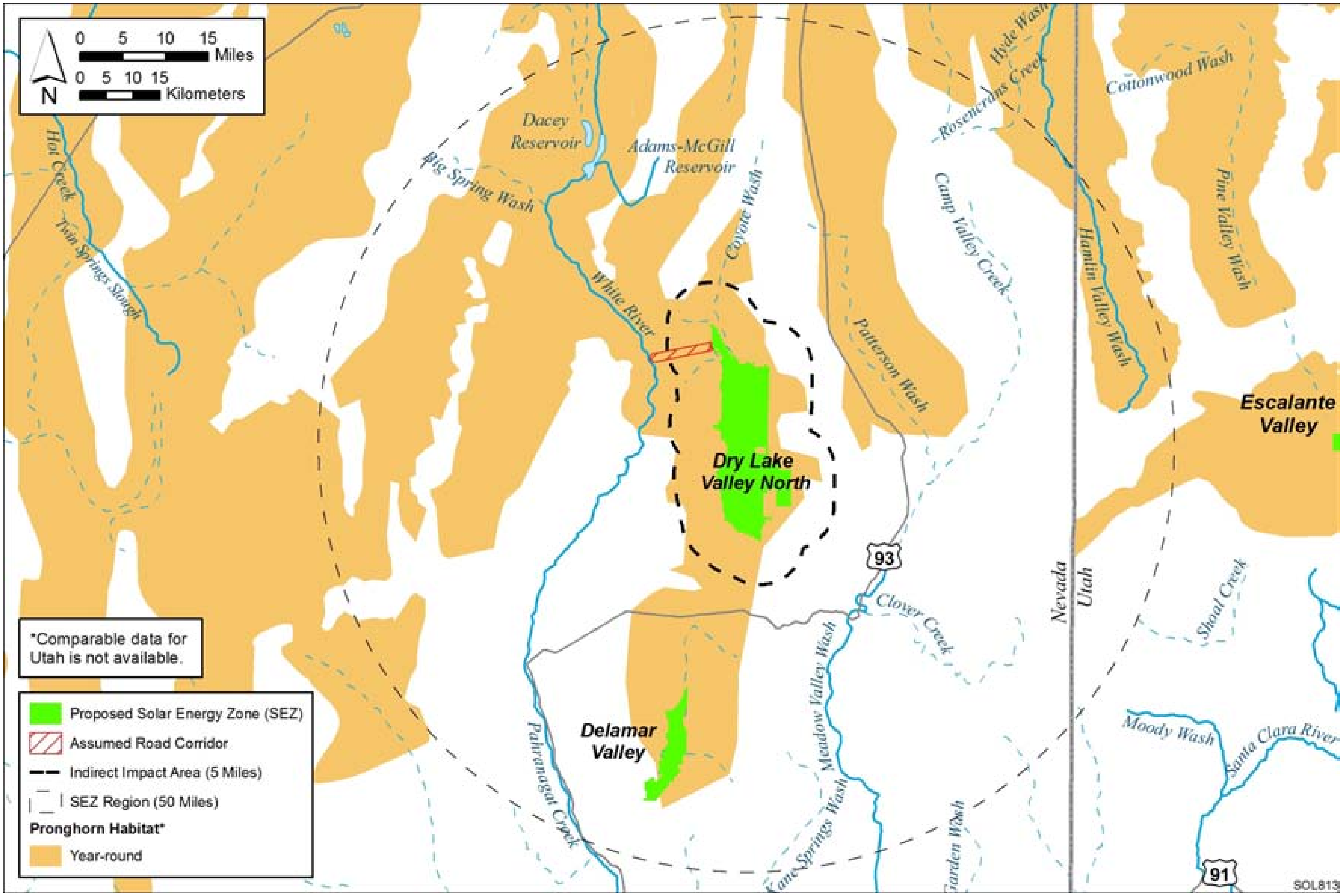

FIGURE 11.4.11.3-3 Location of the Proposed Dry Lake Valley North SEZ Relative to the Mapped Range of Pronghorn (Source: NDOW 2010)

mouse (*P. crinitis*), deer mouse (*P. maniculatus*), 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*) (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*), little brown myotis (*M. lucifugus*), long-legged myotis (*M. volans*), silver-haired bat (*Lasionycteris noctivagans*), and western pipistrelle (*Parastrellus hesperus*) (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 11.4.12.1.

Table 11.4.11.3-1 provides habitat information for representative mammal species that could occur within the proposed Dry Lake Valley North SEZ. Special status mammal species are discussed in Section 11.4.12.

11.4.11.3.2 Impacts

The types of impacts that mammals could incur from construction, operation, and decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any such impacts would be minimized through the implementation of required programmatic design features described in Appendix A, Section A.2.2, and through any additional mitigation applied. Section 11.4.11.3.3 identifies design features of particular relevance to mammals for the proposed Dry Lake Valley North 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 11.4.11.3.1, following the analysis approach described in Appendix M. Additional NEPA assessments and coordination with state natural resource agencies may be needed to address project-specific impacts more thoroughly. These assessments and consultations could result in additional required actions to avoid or mitigate impacts on mammals (see Section 11.4.11.3.3).

Table 11.4.11.3-1 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 Valley North SEZ.

Cougar. Up to 61,499 acres (248.9 km^2) of potentially suitable cougar habitat could be lost by solar energy development within the proposed Dry Lake Valley North SEZ. This represents about 1.2% of potentially suitable cougar habitat within the SEZ region. About 254,440 acres (1029.7 km^2) of potentially suitable cougar habitat occurs within the area of

TABLE 11.4.11.3-1 Habitats, Potential Impacts, and Potential Mitigation for Representative Mammal Species That Could Occur on or in the Affected Area of the Proposed Dry Lake Valley North SEZ

		Maximum Area of Potential Habitat Affected[b]			
Common Name (Scientific Name)	Habitat[a]	Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
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 4,925,100 acres[h] of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (1.2% of available potentially suitable habitat) during construction and operations	254,441 acres of potentially suitable habitat (5.2% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,549 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Elk *(Cervis canadensis)*	Semi-open forest, mountain meadows, foothills, plains, valleys, and alpine tundra. Uses open spaces such as alpine pastures, marshy meadows, river flats, brushy clean cuts, forest edges, and semidesert areas. About 2,117,200 acres of potentially suitable habitat occurs in the SEZ region.	3,113 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	142,569 acres of potentially suitable habitat (6.7% of available potentially suitable habitat)	28 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 2,401 acres in area of indirect effect	Small overall impact.

TABLE 11.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Big Game (Cont.)					
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 3,405,100 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (1.8% of available potentially suitable habitat) during construction and operations	241,469 acres of potentially suitable habitat (7.1% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (<0.002% of available potentially suitable habitat) and 4,549 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Pronghorn *(Antilocapra americana)*	Grasslands and semidesert shrublands on rolling topography that affords good visibility. Most abundant in shortgrass or midgrass prairies and least common in xeric habitats. About 2,395,500 acres of potentially suitable habitat occurs in the SEZ region.	13,087 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat) during construction and operations	165,220 acres of potentially suitable habitat (6.9% of available potentially suitable habitat)	33 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 2,861 acres in area of indirect effect	Small overall impact.

TABLE 11.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
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 4,856,000 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (1.3% of available potentially suitable habitat) during construction and operations	267,902 acres of potentially suitable habitat (5.5% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,549 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
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 4,954,100 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (1.2% of available potentially suitable habitat) during construction and operations	267,807 acres of potentially suitable habitat (5.4% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,549 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Small Game and Furbearers (Cont.)					
Bobcat *(Lynx rufus)*	Most habitats except subalpine coniferous forest and montane meadow grasslands. Most common in rocky country from deserts through ponderosa forests. About 4,330,800 acres of potentially suitable habitat occurs in the SEZ region.	16,330 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	193,231 acres of potentially suitable habitat (4.5% of available potentially suitable habitat)	3 acres of potentially suitable habitat lost (<0.0001% of available potentially suitable habitat) and 2,937 acres in area of indirect effect	Small overall impact.
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 5023,700 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (1.2% of available potentially suitable habitat) during construction and operations	268,338 acres of potentially suitable habitat (5.3% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,552 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
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. Tickets and patches of shrubs, vines, and brush also used as cover. About 4,602,200 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (1.3% of available potentially suitable habitat) during construction and operations	255,742 acres of potentially suitable habitat (5.6% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,503 acres in area of indirect effect	Moderate 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. Prefer wooded areas, broken country, brushlands, and rocky areas. Tolerant of low levels of residential development. About 2,712,200 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat) during construction and operations	117,841 acres of potentially suitable habitat (4.3% of available potentially suitable habitat)	24 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,105 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Small Game and Furbearers (Cont.)					
Kit fox *(Vulpes macrotis)*	Desert and semidesert areas with relatively open vegetative cover and soft soils. Seek shelter in underground burrows. About 3,300,900 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (1.9% of available potentially suitable habitat) during construction and operations	240,464 acres of potentially suitable habitat (7.3% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (<0.002% of available potentially suitable habitat) and 4,549 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Red fox *(Vulpes vulpes)*	Most common in open woodlands, pasturelands, riparian areas, and agricultural lands. About 3,942,700 acres of potentially suitable habitat occurs in the SEZ region.	12,675 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	185,789 acres of potentially suitable habitat (4.7% of available potentially suitable habitat)	33 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,861 acres in area of indirect effect	Small overall impact.

TABLE 11.4.11.3-1 (Cont.)

		Maximum Area of Potential Habitat Affected[b]			
Common Name (Scientific Name)	Habitat[a]	Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
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 2,676,900 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat) during construction and operations	117,721 acres of potentially suitable habitat (4.4% of available potentially suitable habitat)	24 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,105 acres in area of indirect effect	Moderate 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 2,526,200 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat) during construction and operations	184,437 acres of potentially suitable habitat (7.3% of available potentially suitable habitat)	47 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 4,065acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Nongame (small) Mammals (Cont.)					
Brazilian free-tailed bat *(Tadarida brasiliensis)*	Cliffs, deserts, grasslands, old fields, savannas, shrublands, woodlands, and suburban/urban areas. Roosts in buildings, caves, and hollow trees. May roost in rock crevices, bridges, signs, or cliff swallow nests during migration. Large maternity colonies inhabit caves, buildings, culverts, and bridges. About 4,121,300 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (1.5% of available potentially suitable habitat) during construction and operations	203,730 acres of potentially suitable habitat (4.9% of available potentially suitable habitat)	47 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,065 acres in area of indirect effect	Moderate 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, semidesert chaparral, desert wash, semidesert grassland, and cliff and canyon habitats. About 2,257,900 acres of potentially suitable habitat occurs in the SEZ region.	10,206 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat) during construction and operations	47,145 acres of potentially suitable habitat (2.1% of available potentially suitable habitat)	6 acres of potentially suitable habitat lost (0.0002% of available potentially suitable habitat) and 505 acres in area of indirect effect	Small overall impact. Avoid wash habitats.

TABLE 11.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Nongame (small) Mammals (Cont.)					
California myotis *(Myotis californicus)*	Desertscrub, semidesert 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 2,586,900 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat) during construction and operations	184,376 acres of potentially suitable habitat (7.1% of available potentially suitable habitat)	47 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 4,065 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
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 2,420,400 acres of potentially suitable habitat occurs in the SEZ region.	3,083 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	147,140 acres of potentially suitable habitat (6.1% of available potentially suitable habitat)	28 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 2,441 acres in area of indirect effect	Small overall impact.

TABLE 11.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b] Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Nongame (small) Mammals (Cont.)					
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 4,894,000 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (1.3% of available potentially suitable habitat) during construction and operations	260,656 acres of potentially suitable habitat (5.3% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,546 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Desert shrew *(Notiosorex crawfordi)*	Usually in arid areas with adequate cover such as semiarid grasslands, shortgrass plains, desert scrub, chaparral slopes, shortgrass plains, oak savannas and woodlands, and alluvial fans. About 1,406,000 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (4.4% of available potentially suitable habitat) during construction and operations	102,801 acres of potentially suitable habitat (7.3% of available potentially suitable habitat)	25 acres of potentially suitable habitat lost (0.0021% of available potentially suitable habitat) and 2,147 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b] Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Nongame (small) Mammals (Cont.)					
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 4,939,800 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (1.2% of available potentially suitable habitat) during construction and operations	261,016 acres of potentially suitable habitat (5.3% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,549 acres in area of indirect effect	Moderate 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 2,101,600 acres of potentially suitable habitat occurs in the SEZ region.	13,120 acres of potentially suitable habitat lost (0.6% of available potentially suitable habitat) during construction and operations	46,641 acres of potentially suitable habitat (2.2% of available potentially suitable habitat)	5 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 463 acres in area of indirect effect	Small overall impact.

TABLE 11.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Nongame (small) Mammals (Cont.)					
Little brown myotis *(Myotis lucifugus)*	Various habitats, including pinyon-juniper woodlands, montane shrublands, and riparian woodlands. It uses man-made structures for summer roosting, although caves and hollow trees are also utilized. Winter hibernation often occurs in caves or mines, Most foraging activity occurs in woodlands over or near water. About 4,145,400 acres of potentially suitable habitat occurs within the SEZ region.	61,499 acres of potentially suitable habitat lost (1.5% of available potentially suitable habitat) during construction and operations	194,514 acres of potentially suitable habitat (4.7% of available potentially suitable habitat)	47 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,108 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Little pocket mouse *(Perognathus longimembris)*	Mostly sandy and gravelly soils, but also stony soils and rarely rocky sites. About 3,149,700 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (2.0% of available potentially suitable habitat) during construction and operations	233,334 acres of potentially suitable habitat (7.4% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (<0.002% of available potentially suitable habitat) and 4,546 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Nongame (small) Mammals (Cont.)					
Long-legged myotis *(Myotis volans)*	Prefers pine forest, desert, and riparian habitats. Old buildings, rock crevices, and hollow trees are used for daytime roosting and winter hibernation. It forages in open areas, such as forest clearings. About 2,739,600 acres of potentially suitable habitat occurs within the SEZ region.	61,499 acres of potentially suitable habitat lost (2,2% of available potentially suitable habitat) during construction and operations	118,064 acres of potentially suitable habitat (4.3% of available potentially suitable habitat)	24 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 2,108 acres in area of indirect effect	Moderate 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)*	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 3,156,400 acres of potentially suitable habitat occurs within the SEZ region.	61,499 acres of potentially suitable habitat lost (1.9% of available potentially suitable habitat) during construction and operations	233,606 acres of potentially suitable habitat (7.4% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (<0.002% of available potentially suitable habitat) and 4,546 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
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 3,299,100 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (1.9% of available potentially suitable habitat) during construction and operations	248,159 acres of potentially suitable habitat (7.5% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (<0.0021% of available potentially suitable habitat) and 4,549 acres in area of indirect effect	Moderate 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 4,277,200 acres of potentially suitable habitat occurs within the SEZ region.	9,757 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	185,903 acres of potentially suitable habitat (4.3% of available potentially suitable habitat)	33 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,904 acres in area of indirect effect	Small overall impact.

TABLE 11.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Nongame (small) Mammals (Cont.)					
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 4,063,000 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost 1.5% of available potentially suitable habitat) during construction and operations	196,166 acres of potentially suitable habitat (4.8% of available potentially suitable habitat)	47 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,065 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Southern grasshopper mouse *(Onychomys torridus)*	Low, arid, shrub and semiscrub vegetation of deserts. About 1,228,600 acres of potentially suitable habitat occurs within the SEZ region.	61,499 acres of potentially suitable habitat lost (5.0% of available potentially suitable habitat) during construction and operations	99,116 acres of potentially suitable habitat (8.1% of available potentially suitable habitat)	25 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 2,147 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.4.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Nongame (small) Mammals (Cont.)					
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 2,651,900 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat) during construction and operations	117,378 acres of potentially suitable habitat (4.4% of available potentially suitable habitat)	24 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 2,105 acres in area of indirect effect	Moderate 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 2,531,100 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat) during construction and operations	184,395 acres of potentially suitable habitat (7.3% of available potentially suitable habitat)	47 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 4,065 acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 11.4.11.3-1 (Cont.)

		Maximum Area of Potential Habitat Affected[b]			
Common Name (Scientific Name)	Habitat[a]	Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Within Road Corridor (Indirect and Direct Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Nongame (small) Mammals (Cont.)					
White-tailed antelope squirrel *(Ammospermophilus leucurus)*	Low deserts, semidesert and montane shrublands, plateaus, and foothills in areas with sparse vegetation and hard gravelly surfaces. Spends its nights and other periods of inactivity in underground burrows. About 1,917,600 acres of potentially suitable habitat occurs within the SEZ region.	61,499 acres of potentially suitable habitat lost (3.2% of available potentially suitable habitat) during construction and operations	162,024 acres of potentially suitable habitat (8.4% of available potentially suitable habitat)	30 acres of potentially suitable habitat lost (<0.002% of available potentially suitable habitat) and 2,588 acres in area of indirect effect	Moderate 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, semidesert 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 2,590,100 acres of potentially suitable habitat occurs in the SEZ region.	61,499 acres of potentially suitable habitat lost (2.4% of available potentially suitable habitat) during construction and operations	184,454 acres of potentially suitable habitat (7.1% of available potentially suitable habitat)	47 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 4,065acres in area of indirect effect	Moderate overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

Footnotes on next page.

TABLE 11.4.11.3-1 (Cont.)

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[a] 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.

[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 by using SWReGAP habitat suitability and land cover models. This approach probably overestimated the amount of suitable habitat in the project area. A maximum of 61,499 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 61,499 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] For access road development, direct effects were estimated within a 7-mi (11-km) long, 60-ft (18-m) wide access road ROW from the SEZ to the nearest existing highway. Indirect effects were estimated within a 1-mi (1.6-km) wide access road corridor to the existing highway, less the assumed area of direct effects.

[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 acres to km^2, multiply by 0.004047.

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

indirect effect. This is about 5.2% of potentially suitable cougar habitat within the SEZ region. Overall, impacts on the cougar from solar energy development in the SEZ would be moderate.

Elk. Based on land cover analyses, up to 3,113 acres (12.6 km^2) of potentially suitable elk habitat could be lost by solar energy development within the proposed Dry Lake Valley North SEZ. This represents about 0.1% of potentially suitable elk habitat within the SEZ region. About 142,570 acres (577 km^2) of potentially suitable elk habitat occurs within the area of indirect effect. This is about 6.7% of potentially suitable elk habitat within the SEZ region. Based on mapped ranges, the closest year-round elk habitat is about 1.7 mi (2.7 km) from the SEZ, while potential habitat is adjacent to the northern tip of the SEZ (Figure 11.4.11.3-1). About 7,050 acres (28.5 km^2) of mapped year-round elk habitat and 17,645 acres (71.4 km^2) of potential elk range occurs within the area of indirect effect. Crucial summer and winter ranges are 20 mi (32 km) and 30 mi (48 km) from the SEZ, respectively (Figure 11.4.11.3-1). Overall, impacts on elk from solar energy development in the SEZ would be small.

Mule Deer. Based on land cover analyses, up to 61,499 acres (248.9 km^2) of potentially suitable mule deer habitat could be lost by solar energy development within the proposed Dry Lake Valley North SEZ. This represents about 1.8% of potentially suitable mule deer habitat within the SEZ region. About 241,470 acres (977.2 km^2) of potentially suitable mule deer habitat occurs within the area of indirect effect. This is about 7.1% of potentially suitable mule deer habitat within the SEZ region. Based on mapped range, the closest year-round mule deer habitat is about 4.4 mi (7.1 km) from the SEZ (Figure 11.4.11.3-2). About 480 acres (1.9 km^2) of year-round mule deer habitat occurs within the area of indirect effect. This is only about 0.04% of the year-round mule deer habitat within the SEZ region. The closest summer range is 3.2 mi (5.1 km) from the SEZ (Figure 11.4.11.3-2). About 12,415 acres (50.2 km^2) of mule deer summer range occurs within the indirect effect area. About 1,150 acres (4.7 km^2) of winter range and 8 acres (0.03 km^2) of crucial winter range occur within the SEZ (Figure 11.4.11.3-2). These are about 0.09 and 0.002 % of the respective ranges within the SEZ region. These would be considered small direct effects on these mule deer ranges. An additional 4 acres (0.02 km^2) of winter range and 27 acres (0.1 km^2) of crucial winter range would be directly affected by access road development. More than 115,000 acres (465 km^2) of winter range and 57,580 acres (233 km^2) of crucial winter range occurs within the area of indirect effect. Overall, impacts on mule deer from solar energy development in the SEZ would be small (based on mapped range) to moderate (based on land cover).

Pronghorn. Based on land cover analyses, up to 13,087 acres (53.0 km^2) of potentially suitable pronghorn habitat could be lost by solar energy development within the proposed Dry Lake Valley North SEZ. This represents about 0.5% of potentially suitable pronghorn habitat within the SEZ region. About 165,220 acres (688.6 km^2) of potentially suitable pronghorn habitat occurs within the area of indirect effect. This is about 6.9% of potentially suitable pronghorn habitat within the SEZ region. Based on mapped range, up to 61,499 acres (248.9 km^2) year-round pronghorn habitat would be directly impacted by solar energy development within the SEZ (Figure 11.4.11.3-3). This is about 3.2% of the year-round habitat mapped within the SEZ region, which would be considered a moderate impact. An additional 52 acres (0.2 km^2) of year-round habitat could be directly affected by access road development. About 183,100 acres (741 km^2) of year-round pronghorn range occurs within the area of indirect effect (Figure 11.4.11.3-3. Overall, impacts on pronghorn from solar energy development in the SEZ would be small (based on land cover) to moderate (based on mapped range).

Other Mammals

Direct impacts on other representative mammal species would be small (6 species) to moderate (24 species) (Table 11.4.11.3-1). Direct impacts (percent loss of potentially available habitat) for these species would range from 0.1% for the canyon mouse to 5.0% for the southern grasshopper mouse (Table 11.4.11.3-1). Larger areas of potentially suitable habitats for these mammal species occur within the area of potential indirect effects (e.g., up to 8.4% of available habitat for the white-tailed antelope squirrel).

Summary

Overall, impacts on mammal species, based on land cover analyses, would be small to moderate (Table 11.4.11.3-1). Based on mapped ranges for big game, a moderate impact could occur to pronghorn. 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 noise (i.e., behavioral and physiological stresses; Section 5.10.2), surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, accidental spills, collection, and harassment. 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 mammal species would be the restoration of original ground surface contours, soils, and native plant communities associated with desert scrub, playa, and wash habitats.

11.4.11.3.3 SEZ-Specific Design Features and Design Feature Effectiveness

The implementation of required programmatic design features presented 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 specific project details, design features that can be identified at this time are:

- The 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 the programmatic design features, impacts on mammals could be reduced. 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.

11.4.11.4 Aquatic Biota

11.4.11.4.1 Affected Environment

This section addresses aquatic habitats and biota known to occur on the proposed Dry Lake Valley North 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 surface water bodies or perennial streams within the proposed Dry Lake Valley North SEZ or within the assumed new road corridor. As described in Section 11.4.9.1.1, 18 mi (29 km) of the intermittent/ephemeral Coyote Wash and 28 mi (45 km) of unnamed washes cross through the SEZ. These washes are typically dry and flow only after precipitation, at which time they carry water to an unnamed dry lake, 4,472 acres (18 km^2) of which are located within the SEZ. Other ephemeral washes may also cross the SEZ, but they typically do not support wetland or riparian habitats. As described in Section 11.4.9.1.1, the unnamed dry lake is classified as a lacustrine wetland by the NWI. However, wetlands associated with dry lakes in the desert southwest rarely have water (USFS 1998). Although aquatic habitat and communities are not likely to exist in the intermittent and ephemeral surface water features in the SEZ, opportunistic crustaceans and aquatic insect larvae adapted to desert conditions may be present even under dry conditions. More detailed site survey data would be needed to characterize the aquatic biota, if present.

There are no permanent surface water bodies or perennial streams within the area of indirect effects associated with the SEZ or the assumed new road corridor. There are 3,750 acres (15 km^2) of dry lake and associated wetlands and 21 mi (34 km) of intermittent washes located within the area of SEZ indirect effects, but none are within the area of indirect effects associated with the new road corridor. The intermittent/ephemeral nature of these features suggests aquatic habitat and biota are unlikely, although more detailed site survey data would be needed to characterize the aquatic biota, if present.

Outside of the potential indirect effects area, but within 50 mi (80 km) of the SEZ, there are several lakes, covering a total area of 57,748 acres (92,936 km^2). Of this total, 4,212 acres (6,778 km^2) are permanent lake (reservoirs formed from the White River) and 53,546 acres (86,174 km^2) are dry lake. There are 158 mi (254 km) of perennial stream and 378 mi (608 km) of intermittent stream located within 50 mi (80 km) of the SEZ. The White River, its tributaries, and spring-fed pools support populations of native and non-native fishes as well as several endangered fish species, including the White River spinedace (*Lepidomeda albivallis*) and the White River springfish (*Crenichthys baileyi baileyi*). Within the SEZ and the area of potential indirect effects, intermittent streams and dry lakes are the only surface water features present, representing approximately 18% of the amount of intermittent stream and 8% of the dry lake available within the overall analysis area. The proposed new road corridor boundary is less than 1 mi (1.6 km) from the perennial White River.

11.4.11.4.2 Impacts

Section 5.10.3 discusses in detail the types of impacts that could occur on aquatic habitats and biota due to the development of utility-scale solar energy facilities. Effects that are particularly relevant to aquatic habitats and communities include surface water and groundwater 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 proposed Dry Lake Valley North SEZ, the assumed new access road, or the area of indirect effects. The nearest perennial surface water (White River) is located approximately 7 mi (11 km) from the SEZ and more than 1 mi (1.6 km) from the area of direct disturbance for the presumed new access road. In addition, the intermittent streams in the SEZ do not drain into any permanent surface waters. Therefore, no direct or indirect impacts on perennial surface water features are expected. Intermittent stream, wetland, and water body features are present in the area of direct and indirect effects, and ground disturbance for solar energy development within the SEZ could result in air- and waterborne sediment deposition into these habitats. However, these areas are typically dry and aquatic habitat is not likely to be present, although more detailed site surveys of these areas would be necessary to determine whether solar energy development activities would result in direct or indirect impacts to aquatic biota. The implementation of commonly used engineering practices to control water runoff and sediment deposition into intermittent surface waters would further minimize the potential for impacts on aquatic organisms.

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. There is the potential for contaminants within the SEZ to enter washes and the dry lake, especially if heavy machinery is used in or near these areas. Because of the relatively large distance from any permanent surface water features to the SEZ (minimum of 1 mi [1.6 km]), the potential for introducing contaminants into such water bodies would be small.

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 facilities, were developed at the site; the associated impacts would ultimately depend on the water source used (including groundwater from aquifers at various depths). Obtaining cooling water from groundwater or perennial surface water features in the region could affect water levels in surface water features outside of the SEZ and area of indirect effects, (Section 8.1.9.2.2) and, as a consequence, potentially reduce habitat size, connectivity, and create more adverse environmental conditions for aquatic organisms in those habitats. 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.

11.4.11.4.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

- Appropriate engineering controls should be implemented to minimize the amount of contaminants and sediment entering Coyote Wash and the unnamed washes and dry lakes within the SEZ.

If this SEZ-specific design feature is 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 Valley North SEZ would be negligible.

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11.4.12 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 Valley North SEZ. Special status species include the following types of species[4]:

- 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 Nevada5; 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 Valley North SEZ (i.e., the SEZ region) were determined from natural heritage records available through NatureServe Explorer (NatureServe 2010), information provided by the NNHP (NDCNR 2004, 2009a,b; Miskow 2009), SWReGAP (USGS 2004, 2005a, 2007), and the USFWS Environmental Conservation Online System (ECOS) (USFWS 2010a). 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 SWReGAP. The 50-mi (80-km) SEZ region intersects Lincoln and Nye Counties, Nevada, as well as Beaver, Iron, and Washington Counties, Utah; however, the affected area around the SEZ occurs entirely within Lincoln County, Nevada. See Appendix M for additional information on the approach used to identify species that could be affected by development within the SEZ.

11.4.12.1 Affected Environment

The affected area considered in the assessment included the areas of direct and indirect effects. The area of direct effects was defined as the area that would be physically modified during project development (i.e., where ground-disturbing activities would occur). For the Dry Lake Valley North SEZ, the area of direct effects included the SEZ and the portion of the road corridor where ground-disturbing activities are assumed to occur. Due to the proximity of

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[4] 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.

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

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 connect some new solar facilities to load centers, and that additional project-specific analysis would be conducted for new transmission construction or line upgrades (see Section 11.4.1.2 for development assumptions for this SEZ). The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ boundary and portions of the access road corridor 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 included effects from surface runoff, dust, noise, lighting, and accidental spills from the SEZ, but did not include ground-disturbing activities. 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 intermountain basin mixed desert scrub (see Section 11.4.10). Potentially unique habitats in the affected area in which special status species may reside include cliffs and rock outcrops, pinyon-juniper woodlands, and playa habitats. Aquatic habitats that occur in the affected area include Coyote Wash and other small ephemeral streams that drain into an unnamed dry lake, approximately 8,000 acres (32 km^2) in size, in the southwest portion of the SEZ and in the area of indirect effects. The assumed access road corridor for the SEZ is also within 1 mi (1.6 km) east of the White River (Figure 11.4.12.1-1).

All special status species known to occur within the Dry Lake Valley North 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, 22 could be affected by solar energy development on the SEZ, 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 11.4.12.1-1. For many of the species listed in the table, their predicted potential occurrence in the affected area is based only on a general correspondence between mapped SWReGAP 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 km) from the SEZ.

Based on NNHP records and information provided by the USFWS, three special status species are known to occur within the affected area of the Dry Lake Valley North SEZ: Blaine fishhook cactus, Eastwood milkweed, and Desert Valley kangaroo mouse. There are no groundwater-dependent species in the vicinity of the SEZ based upon NNHP records, comments provided by the USFWS (Stout 2009), and the evaluation of groundwater resources in the Dry Lake Valley North SEZ region (Section 11.4.9).

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

In its scoping comments on the proposed Dry Lake Valley North SEZ, the USFWS did not express concern for impacts of project development within the Dry Lake Valley North SEZ

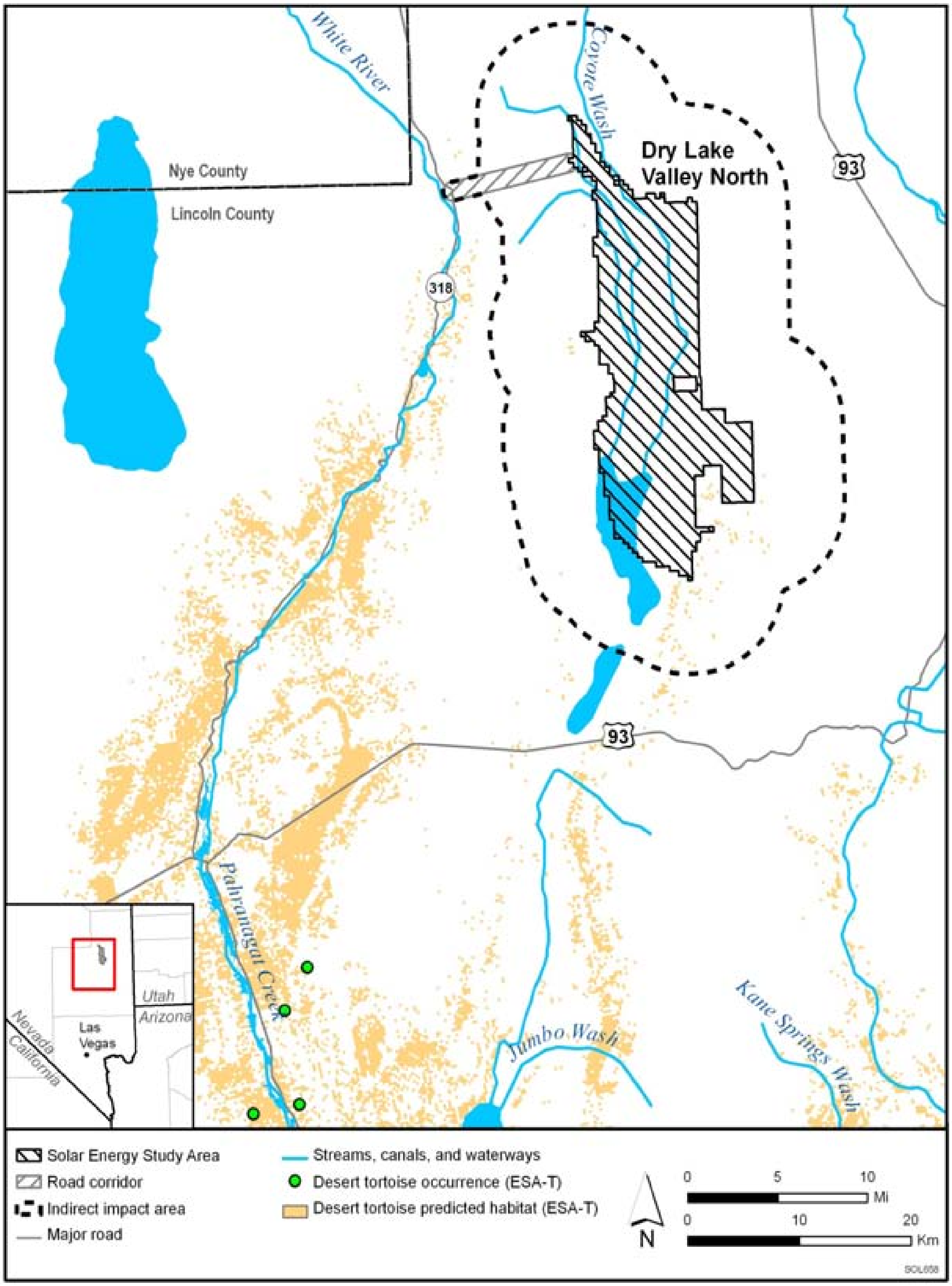

FIGURE 11.4.12.1-1 Known or Potential Occurrences of Species Listed as Endangered or Threatened under the ESA in the Affected Area of the Proposed Dry Lake Valley North SEZ (Sources: Miskow 2009; USFWS 2010a; USGS 2007)

TABLE 11.4.12.1-1 Habitats, Potential Impacts, and Potential Mitigation for Special Status Species That Could Be Affected by Solar Energy Development on the Proposed Dry Lake Valley North SEZ

				Maximum Area of Potential Habitat Affected[c]			Overall Impact Magnitude[g] and Species-Specific Mitigation[h]
Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Within SEZ (Direct Effects)[d]	Access Road (Direct Effects)[e]	Indirect Effects (Outside SEZ)[f]	
Plants							
Blaine fishhook cactus[i]	***Sclerocactus blaneii***	BLM-S; NV-P; FWS-SC; NV-S1	Endemic to southeastern Nevada and southwestern Utah on alkaline substrates and volcanic gravels in valley bottoms. Elevation ranges between 5,100 and 5,300 ft.[j] There are only three known occurrences of this species. One of these occurrences is located in the Dry Lake Valley. About 20,150 acres[k] of potentially suitable habitat occurs within the SEZ region.	3,000 acres of potentially suitable habitat lost (15.0% of available potentially suitable habitat)	0 acres	3,875 acres of potentially suitable habitat (19.2% of available potentially suitable habitat)	Large overall impact. Avoiding or minimizing disturbance to playa habitat could reduce impacts. In addition, pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the area of direct effects; translocation of individuals from the area of direct effects; or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 11.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Access Road (Direct Effects)[e]	Indirect Effects (Outside SEZ)[f]	Overall Impact Magnitude[g] and Species-Specific Mitigation[h]
Plants (Cont.)							
Eastwood milkweed	***Asclepias eastwoodiana***	BLM-S; FWS-SC; NV-S2	Endemic to Nevada on public and private lands in Esmeralda, Lander, Lincoln, and Nye Counties in open areas on a wide variety of basic (pH usually >8) soils, including calcareous clay knolls, sand, carbonate, or basaltic gravels, or shale outcrops, generally barren and lacking competition. Frequently in small washes or other moisture-accumulating microsites at elevations between 4,700 and 7,100 ft. Known to occur on the SEZ. About 413,100 acres of potentially suitable habitat occurs within the SEZ region.	10,250 acres of potentially suitable habitat lost (2.5% of available potentially suitable habitat)	5 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	23,900 acres of potentially suitable habitat (5.8% of available potentially suitable habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the area of direct effects; translocation of individuals from the area 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.

TABLE 11.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Access Road (Direct Effects)[e]	Indirect Effects (Outside SEZ)[f]	Overall Impact Magnitude[g] and Species-Specific Mitigation[h]
Plants (Cont.)							
Long-calyx milkvetch	*Astragalus oophorus var. lonchocalyx*	BLM-S; FWS-SC; NV-S2	Regionally endemic to the Great Basin in western Utah and eastern Nevada in pinyon-juniper woodlands, sagebrush, and mixed shrub communities at elevations between 5,800 and 7,500 ft. Nearest recorded occurrence is 8 mi[l] east of the SEZ. About 4,351,850 acres of potentially suitable habitat occurs within the SEZ region.	63,550 acres of potentially suitable habitat lost (1.5% of available potentially suitable habitat)	40 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	228,650 acres of potentially suitable habitat (5.3% of available potentially suitable habitat)	Moderate overall impact. See Eastwood milkweed for a list of other potential mitigations.
Needle Mountains milkvetch	*Astragalus eurylobus*	BLM-S; FWS-SC; NV-S2	Gravel washes and sandy soils in alkaline desert and arid grasslands at elevations between 4,250 and 6,250 ft. Nearest recorded occurrence is 15 mi southeast of the SEZ. About 39,650 acres of potentially suitable habitat occurs within the SEZ region.	3,900 acres of potentially suitable habitat lost (9.9% of available potentially suitable habitat)	0 acres	4,250 acres of potentially suitable habitat (10.7% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance to playa habitat could reduce impacts. In addition, see the Eastwood milkweed for a list of other potential mitigations.
Nevada willowherb	*Epilobium nevadense*	BLM-S; FWS-SC; NV-S2	Pinyon-juniper woodlands and oak/mountain mahogany communities, on talus slopes and rocky limestone outcrops. Elevation ranges between 5,000 and 8,800 ft. Nearest recorded occurrence is 20 mi south of the SEZ. About 1,578,650 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	0 acres	19,200 acres of potentially suitable habitat (1.2% of available potentially suitable habitat)	Small overall impact; no direct effect. No species-specific mitigation is warranted.

TABLE 11.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Access Road (Direct Effects)[e]	Indirect Effects (Outside SEZ)[f]	Overall Impact Magnitude[g] and Species-Specific Mitigation[h]
Plants (Cont.)							
Pioche blazingstar	*Mentzelia argillicola*	BLM-S; NV-S1	Endemic to Nevada on dry, soft, silty clay soils on knolls and slopes with sparse vegetation consisting mainly of sagebrush. Nearest recorded occurrence is from Patterson Wash, approximately 12 mi east of the SEZ. About 2,869,000 acres of potentially suitable habitat occurs within the SEZ region.	73,700 acres of potentially suitable habitat lost (2.6% of available potentially suitable habitat)	46 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	228,300 acres of potentially suitable habitat (8.0% of available potentially suitable habitat)	Moderate overall impact. See Eastwood milkweed for a list of other potential mitigation.
Rock purpusia	*Ivesia arizonica* var. *saxosa*	BLM-S; NV-S1	Endemic to southern Nevada in crevices of cliffs and boulders on volcanic substrates in pinyon-juniper communities at elevations between 4,900 and 6,900 ft. Nearest recorded occurrence is 15 mi south of the SEZ. About 1,525,250 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	0 acres	19,100 acres of potentially suitable habitat (1.3% of available potentially suitable habitat)	Small overall impact; no direct effect. No species-specific mitigation is warranted.
Tiehm blazingstar	*Mentzelia tiehmii*	BLM-S; NV-S1	Endemic to Nevada on hilltops of white soil, sparsely vegetated white calcareous knolls and bluffs with scattered perennials. Nearest recorded occurrence is from the White River, approximately 7 mi west of the SEZ. About 2,326,100 acres of potentially suitable habitat occurs within the SEZ region.	73,200 acres of potentially suitable habitat lost (3.1% of available potentially suitable habitat)	40 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	169,350 acres of potentially suitable habitat (7.3% of available potentially suitable habitat)	Moderate overall impact. See Eastwood milkweed for a list of other potential mitigations.

TABLE 11.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Access Road (Direct Effects)[e]	Indirect Effects (Outside SEZ)[f]	Overall Impact Magnitude[g] and Species-Specific Mitigation[h]
Plants (Cont.)							
White River cat's-eye	*Cryptantha welshii*	BLM-S; FWS-SC	Endemic to southern Nevada on dry, open, sparsely vegetated outcrops and carbonate substrates at elevations between 4,500 and 6,600 ft. Nearest recorded occurrences are 12 mi east of the SEZ. About 33,100 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	0 acres	385 acres of potentially suitable habitat (1.2% of available potentially suitable habitat)	Small overall impact; no direct effects. No species-specific mitigation is warranted.
Reptiles							
Desert tortoise	*Gopherus agassizii*	ESA-T; NV-P; NV-S2	Mojave and Sonoran Deserts in desert creosote bush communities on firm soils for digging burrows, and often along riverbanks, washes, canyon bottoms, creosote flats, and desert oases. Nearest recorded occurrence is 30 mi southwest of the SEZ. About 227,100 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	0 acres	1,550 acres of potentially suitable habitat (0.7% of available potentially suitable habitat)	Small overall impact; no direct effects. No species-specific mitigation is warranted.
Birds							
Ferruginous hawk	*Buteo regalis*	BLM-S; FWS-SC	Winter resident in grasslands, sagebrush and saltbrush habitats, as well as the periphery of pinyon-juniper woodlands. Nests in tall trees or on rock outcrops along cliff faces. Known to occur in Lincoln County, Nevada. About 2,071,600 acres of potentially suitable habitat occurs within the SEZ region.	6,300 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	25 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	148,900 acres of potentially suitable habitat (7.2% of available potentially suitable habitat)	Small overall impact on foraging habitat only. Avoidance of direct impacts on all foraging habitat is not feasible because suitable foraging habitat is widespread in the area of direct effect.

TABLE 11.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Access Road (Direct Effects)[e]	Indirect Effects (Outside SEZ)[f]	Overall Impact Magnitude[g] and Species-Specific Mitigation[h]
Birds (Cont.)							
Prairie falcon	*Falco mexicanus*	BLM-S	Year-round resident in open habitats in mountainous areas, steppe, grasslands, or cultivated areas. Typically nests in well-sheltered ledges of rocky cliffs and outcrops. Known to occur in Lincoln County, Nevada. About 1,690,150 acres of potentially suitable habitat occurs within the SEZ region.	67,500 acres of potentially suitable habitat lost (4.0% of available potentially suitable habitat)	26 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	139,800 acres of potentially suitable habitat (8.3% of available potentially suitable habitat)	Moderate overall impact on foraging habitat only. Avoidance of direct impacts on all foraging habitat is not feasible because suitable foraging habitat is widespread in the area of direct effect.
Swainson's hawk	*Buteo swainsoni*	BLM-S; NV-P; NV-S2	Summer breeding resident in the SEZ region in savannas, open pine-oak woodlands, grasslands, and cultivated lands. Nests in solitary trees, bushes, or small groves. Known to occur in Lincoln County, Nevada. About 2,114,200 acres of potentially suitable habitat occurs within the SEZ region.	7,100 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	4 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	43,900 acres of potentially suitable habitat (2.1% 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 11.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Access Road (Direct Effects)[e]	Indirect Effects (Outside SEZ)[f]	Overall Impact Magnitude[g] and Species-Specific Mitigation[h]
Birds (Cont.)							
Western burrowing owl	*Athene cunicularia hypugaea*	BLM-S; FWS-SC	Summer breeding resident in open grasslands and prairies, as well as disturbed sites such as golf courses, cemeteries, and airports. Nests in burrows constructed by mammals (especially prairie dogs and badgers). Known to occur in Lincoln County, Nevada. About 3,159,500 acres of potentially suitable habitat occurs within the SEZ region.	73,400 acres of potentially suitable habitat lost (2.3% of available potentially suitable habitat)	46 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	234,250 acres of potentially suitable habitat (7.4% of available potentially suitable habitat)	Moderate overall impact on foraging and nesting habitat. Pre-disturbance surveys and avoiding or minimizing disturbance to occupied burrows in the area of direct effects or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 11.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Access Road (Direct Effects)[e]	Indirect Effects (Outside SEZ)[f]	Overall Impact Magnitude[g] and Species-Specific Mitigation[h]
Birds (Cont.)							
Western snowy plover	*Charadrius alexandrinus nivosus*	BLM-S; NV-P	Summer breeding resident on alkali flats around reservoirs and sandy shorelines. Nearest recorded occurrence is from the Adams-McGill Reservoir, approximately 23 mi northwest of the SEZ. About 66,000 acres of potentially suitable habitat occurs within the SEZ region.	6,950 acres of potentially suitable habitat lost (10.5% of available potentially suitable habitat)	0 acres	8,150 acres of potentially suitable habitat (12.4% of available potentially suitable habitat)	Large overall impact on foraging and nesting habitat. Pre-disturbance surveys and avoiding or minimizing disturbance to playa habitats and other occupied habitats in the area of direct effects (particularly associated with the playa habitat in the southern portion of the SEZ) or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 11.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Access Road (Direct Effects)[e]	Indirect Effects (Outside SEZ)[f]	Overall Impact Magnitude[g] and Species-Specific Mitigation[h]
Mammals							
Desert Valley kangaroo mouse	***Microdipodops megacephalus albiventer***	BLM-S; NV-P; FWS-SC; NV-S2	Endemic to central Nevada in desert areas at playa margins and in dune habitats. Known to occur on the SEZ in association with the dry lake along the southwestern portion of the SEZ. About 1,257,700 acres of potentially suitable habitat occurs within the SEZ region.	64,750 acres of potentially suitable habitat lost (5.1% of available potentially suitable habitat)	17 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	109,900 acres of potentially suitable habitat (8.7% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance to playa habitats within the SEZ could reduce impacts. In addition, pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the areas of direct effects or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 11.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Access Road (Direct Effects)[e]	Indirect Effects (Outside SEZ)[f]	Overall Impact Magnitude[g] and Species-Specific Mitigation[h]
Mammals (Cont.)							
Fringed myotis	*Myotis thysanodes*	BLM-S; NV-P; FWS-SC; NV-S2	Year-round resident in a wide range of habitats including lowland riparian, desert shrub, pinyon-juniper, and sagebrush habitats. Roosts in buildings and caves. Known to occur in Lincoln County, Nevada. About 4,645,300 acres of potentially suitable habitat occurs within the SEZ region.	73,300 of potentially suitable habitat lost (1.6% of available potentially suitable habitat)	42 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	221,700 acres of potentially suitable habitat (4.8% of available potentially suitable habitat)	Moderate 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.
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. Rarely uses desert lowlands, but may use them as corridors for travel between mountain ranges. Known to occur in Lincoln County, Nevada. About 1,771,100 acres of potentially suitable habitat occurs within the SEZ region.	700 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	13 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	65,000 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to habitats within the SEZ and access road corridor could further reduce impacts.

TABLE 11.4.12.1-1 (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]: Access Road (Direct Effects)[e]	Maximum Area of Potential Habitat Affected[c]: Indirect Effects (Outside SEZ)[f]	Overall Impact Magnitude[g] and Species-Specific Mitigation[h]
Mammals (Cont.)							
Pahranagat Valley montane vole	*Microtus montanus fucosus*	BLM-S; NV-P; FWS-SC; NV-S2	Endemic to Lincoln County, Nevada, where it is restricted to springs in the Pahranagat Valley. Within that area, isolated populations utilize mesic montane and desert riparian patches. Nearest recorded occurrence is from Pahranagat Creek, approximately 27 mi southwest of the SEZ. About 23,900 acres of potentially suitable habitat occurs within the SEZ region.	900 acres of potentially suitable habitat lost (3.7% of available potentially suitable habitat)	0 acres	300 acres of potentially suitable habitat (1.3% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance to playas within the SEZ could reduce impacts. In addition, pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the areas of direct effects or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 11.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c] Within SEZ (Direct Effects)[d]	Access Road (Direct Effects)[e]	Indirect Effects (Outside SEZ)[f]	Overall Impact Magnitude[g] and Species-Specific Mitigation[h]
Mammals (Cont.)							
Pygmy rabbit	*Brachylagus idahoensis*	BLM-S; NV-P	Sagebrush-shrubland habitats throughout the SEZ region. Prefers loose soils to dig burrows. Nearest recorded occurrence is from BLM-administered lands approximately 20 mi northwest of the SEZ. About 1,325,950 acres of potentially suitable habitat occurs within the SEZ region.	2,550 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	20 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	82,700 acres of potentially suitable habitat (6.2% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the areas of direct effect; translocation of individuals from areas of direct effects; or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 11.4.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Access Road (Direct Effects)[e]	Indirect Effects (Outside SEZ)[f]	Overall Impact Magnitude[g] and Species-Specific Mitigation[h]
Mammals (Cont.)							
Spotted bat	*Euderma maculatum*	BLM-S; NV-P; FWS-SC; NV-S2	Year-round resident in forests and shrubland habitats. Uses caves and rock crevices for day roosting and winter hibernation. Nearest recorded occurrence is from the vicinity of Panaca, Nevada, approximately 13 mi east of the SEZ. About 3,952,400 acres of potentially suitable habitat occurs within the SEZ region.	66,000 acres of potentially suitable habitat lost (1.7% of available potentially suitable habitat)	37 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	174,200 acres of potentially suitable habitat (4.4% of available potentially suitable habitat)	Moderate 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 small-footed myotis	*Myotis ciliolabrum*	BLM-S; FWS-SC	Year-round resident in a variety of woodlands and riparian habitats at elevations below 9,000 ft. Roosts in caves, buildings, mines, and crevices of cliff faces. Known to occur in Lincoln County, Nevada. About 5,016,400 acres of potentially suitable habitat occurs within the SEZ region.	76,700 acres of potentially suitable habitat lost (1.5% of available potentially suitable habitat)	46 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	257,375 acres of potentially suitable habitat (5.1% of available potentially suitable habitat)	Moderate 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.

Footnotes on next page.

TABLE 11.4.12.1-1 (Cont.)

[a] BLM-S = listed as a sensitive species by the BLM; 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 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] For access road development, direct effects were estimated within a 5-mi (8-km) long, 60-ft (18-m) wide road corridor from the SEZ to the nearest state highway. Direct impacts within this area were determined from the proportion of potentially suitable habitat within the 1-mi (1.6-km) wide road corridor.

[f] Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary and the portions of the road and transmission corridors where ground-disturbing activities would not occur. Indirect effects include effects from 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.

[g] 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.

[h] 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.

[i] Species in bold text have been recorded or have designated critical habitat within 5 mi (8 km) of the SEZ boundary.

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

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

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

on any species listed as threatened or endangered under the ESA (Stout 2009). However, the desert tortoise, listed as threatened under the ESA, may occur in the affected area. This species is discussed below, and information on its habitat is presented in Table 11.4.12.1-1. Additional basic information on life history, habitat needs, and threats to populations of the desert tortoise is provided in Appendix J.

The Mojave population of the desert tortoise is listed as threatened under the ESA and is known to occur in the SEZ region, although the USFWS determined that the species is not likely to occur on the SEZ because of lack of suitable habitat (Stout 2009). According to NNHP records, the desert tortoise occurs about 30 mi (48 km) southwest of the SEZ, and according to the SWReGAP habitat suitability model, approximately 1,500 acres (6 km^2) of potentially suitable habitat for this species occurs in the area of indirect effects and 227,000 acres (919 km^2) occurs in the SEZ region as a whole; no suitable habitat occurs on the SEZ itself or assumed access road corridor. The USGS desert tortoise model (Nussear et al. 2009) identifies the SEZ affected area as having low habitat suitability for desert tortoise (modeled suitability value ≤0.3 out of 1.0). The nearest potentially suitable habitat according to the USGS model is along Pahranagat Creek, approximately 30 mi (48 km) southwest of the SEZ, where the modeled suitability value is greater than or equal to 0.8 (out of 1.0). Designated critical habitat for this species does not occur in the SEZ affected area.

11.4.12.1.2 BLM-Designated Sensitive Species

A total of 21 BLM-designated sensitive species may occur in the affected area of the Dry Lake Valley North SEZ or may be affected by solar energy development on the SEZ (Table 11.4.12.1-1). These BLM-designated sensitive species include the following: (1) plants—Blaine fishhook cactus, Eastwood milkweed, long-calyx milkvetch, Needle Mountains milkvetch, Nevada willowherb, Pioche blazingstar, rock purpusia, Tiehm blazingstar, and White River cat's-eye; (2) birds—ferruginous hawk, prairie falcon, Swainson's hawk, western burrowing owl, and western snowy plover; and (3) mammals—Desert Valley kangaroo mouse, fringed myotis, Nelson's bighorn sheep, Pahranagat Valley montane vole, pygmy rabbit, spotted bat, and western small-footed myotis. Of the BLM-designated sensitive species with potentially suitable habitat in the affected area, only the Blaine fishhook cactus, Eastwood milkweed, and Desert Valley kangaroo mouse have been recorded within 5 mi (8 km) of the SEZ boundary. 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 11.4.12.1-1. 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.

Blaine Fishhook Cactus

The Blaine fishhook cactus is a small cactus endemic to southeastern Nevada and southwestern Utah, where it occurs on alkaline substrates and volcanic gravels in valley bottoms. Only three occurrences of this species are currently known. One of these occurrences is in the

Dry Lake Valley (Stout 2009). Potentially suitable habitat for this species occurs on the Dry Lake Valley North SEZ and in other portions of the affected area (Table 11.4.12.1-1).

Eastwood Milkweed

The Eastwood milkweed is a perennial forb endemic to Nevada from public and private lands in Esmeralda, Lander, Lincoln, and Nye Counties. It occurs in open areas on a wide variety of basic (pH usually >8) soils, including calcareous clay knolls, sand, carbonate or basaltic gravels, washes, or shale outcrops at elevations between 4,700 and 7,100 ft (1,430 and 2,150 m). The species is known to occur on the SEZ. Potentially suitable habitat for this species occurs on the Dry Lake Valley North SEZ and in other portions of the affected area (Table 11.4.12.1-1).

Long-Calyx Milkvetch

The long-calyx milkvetch is a perennial forb regionally endemic to the Great Basin in southwestern Utah and eastern Nevada. It occurs in pinyon-juniper woodlands, sagebrush, and mixed shrub communities at elevations between 5,800 and 7,500 ft (1,760 and 2,290 m). The species is known to occur 8 mi (13 km) east of the SEZ. Potentially suitable habitat for this species occurs on the Dry Lake Valley North SEZ and in other portions of the affected area (Table 11.4.12.1-1).

Needle Mountains Milkvetch

The Needle Mountains milkvetch is a perennial forb that occurs on gravel washes and sandy soils in alkaline desert and arid grasslands at elevations between 4,250 and 6,250 ft (1,295 and 1,900 m). The species is known to occur about 15 mi (24 km) southeast of the SEZ. Potentially suitable habitat for this species occurs on the Dry Lake Valley North SEZ and in other portions of the affected area (Table 11.4.12.1-1).

Nevada Willowherb

The Nevada willowherb is a perennial forb endemic to eastern Nevada and western Utah. It occurs in pinyon-juniper woodlands and oak/mountain mahogany communities and on talus slopes and rocky limestone outcrops at elevations between 5,000 and 8,800 ft (1,525 and 2,680 m). The species occurs about 20 mi (32 km) south of the SEZ. Potentially suitable habitat for this species does not occur on the SEZ but may occur in portions of the area of indirect effects (Table 11.4.12.1-1).

Pioche Blazingstar

The Pioche blazingstar is a perennial forb endemic to Nevada. It occurs on dry, soft, silty clay soils on knolls and slopes with sparse vegetation consisting mainly of sagebrush

(*Artemisia* spp.). Nearest known occurrences are from Patterson Wash, approximately 12 mi (19 km) east of the SEZ. Potentially suitable habitat for this species occurs on the Dry Lake Valley North SEZ and in other portions of the affected area (Table 11.4.12.1-1).

Rock Purpusia

The rock purpusia is a perennial forb endemic to southern Nevada. It inhabits crevices of cliffs and boulders on volcanic substrates in pinyon-juniper communities at elevations between 4,900 and 6,900 ft (1,490 and 2,100 m). The species occurs about 15 mi (24 km) south of the SEZ. Potentially suitable habitat for this species does not occur on the SEZ but may occur in portions of the area of indirect effects (Table 11.4.12.1-1).

Tiehm Blazingstar

The Tiehm blazingstar is a perennial forb endemic to Nevada. It occurs on hilltops, sparsely vegetated white calcareous knolls, and bluffs with other scattered perennial plant species. Nearest recorded occurrences are from the White River, approximately 7 mi (11 km) west of the SEZ. Potentially suitable habitat for this species occurs on the Dry Lake Valley North SEZ and in other portions of the affected area (Table 11.4.12.1-1).

White River Cat's-Eye

The White River cat's-eye is a perennial forb endemic to southern Nevada. It occurs on dry, open, sparsely vegetated outcrops on carbonate substrates at elevations between 4,500 and 6,600 ft (1,370 and 2,010 m). Nearest recorded occurrences are 12 mi (19 km) east of the SEZ. Potentially suitable habitat for this species does not occur on the SEZ but may occur in portions of the area of indirect effects (Table 11.4.12.1-1).

Ferruginous Hawk

The ferruginous hawk occurs as a winter resident in the Dry Lake Valley North SEZ affected area. The species inhabits open grasslands, sagebrush flats, desert scrub, and the edges of pinyon-juniper woodlands. This species occurs in Lincoln County, Nevada, and potentially suitable foraging habitat occurs on the SEZ and in other portions of the affected area (Table 11.4.12.1-1).

Prairie Falcon

The prairie falcon occurs throughout the western United States. According to the SWReGAP habitat suitability model for the prairie falcon, it is a year-round resident throughout the Dry Lake Valley North SEZ region. The species occurs in open habitats in mountainous areas, sagebrush-steppe, grasslands, or cultivated areas. Nests are typically constructed in well-sheltered ledges of rocky cliffs and outcrops. This species occurs in Lincoln County, Nevada, and potentially suitable foraging habitat occurs on the SEZ and in other portions of the affected area (Table 11.4.12.1-1). On the basis of an evaluation of SWReGAP land cover types, potentially suitable nesting habitat (rocky cliffs and outcrops) does not occur on the SEZ or access road corridor; however, approximately 385 acres (1.5 km^2) of this habitat that may be potentially suitable nesting habitat occurs in the area of indirect effects.

Swainson's Hawk

The Swainson's hawk occurs throughout the southwestern United States. According to the SWReGAP habitat suitability model for the Swainson's hawk, only summer breeding habitat occurs in the Dry Lake Valley North SEZ region. This species inhabits desert, savanna, open pine-oak woodland, grassland, and cultivated habitats. Nests are typically constructed in solitary trees, bushes, or small groves. This species occurs in Lincoln County, Nevada, and potentially suitable foraging habitat occurs on the SEZ and in other portions of the affected area (Table 11.4.12.1-1). On the basis of an evaluation of SWReGAP land cover types, potentially suitable nesting habitat (woodlands) does not occur on the SEZ or access road corridor; however, approximately 19,300 acres (78 km^2) of woodland habitat that may be potentially suitable nesting habitat occurs in the area of indirect effects.

Western Burrowing Owl

According to the SWReGAP habitat suitability model for the western burrowing owl, the species is a summer (breeding) resident of open, dry grasslands and desert habitats in the Dry Lake Valley North SEZ region. The species occurs locally in open areas with sparse vegetation, where it forages in grasslands, shrublands, and open disturbed areas and nests in burrows typically constructed by mammals. The species occurs in Lincoln County, Nevada, and potentially suitable summer breeding habitat is expected to occur in the SEZ and in other portions of the affected area (Table 11.4.12.1-1). 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.

Western Snowy Plover

According to the SWReGAP habitat suitability model, the western snowy plover is a summer (breeding) resident throughout the Dry Lake Valley North SEZ region. This species breeds on alkali flats around reservoirs and sandy shorelines. The species is known to occur at Adams-McGill Reservoir, approximately 23 mi (37 km) northwest of the SEZ (Table 11.4.12.1-1). Suitable breeding habitat is expected to occur on the SEZ and in portions of the affected area, particularly associated with the playa habitat along the southwestern border of the SEZ and in the area of indirect effects.

Desert Valley Kangaroo Mouse

The Desert Valley kangaroo mouse is endemic to central Nevada, where it inhabits desert areas at playa margins and in dune habitats. According to the SWReGAP habitat suitability model for the kangaroo mouse, potentially suitable year-round habitat occurs within the SEZ and throughout the affected area, particularly associated with the periphery of the playa habitat in the southwestern portion of the SEZ. This species occurs along the playa habitat in the southwest portion of the SEZ (Table 11.4.12.1-1).

Fringed Myotis

The fringed myotis is a year-round resident in the Dry Lake Valley North SEZ region, where it occurs in a variety of habitats including riparian, shrubland, sagebrush, and pinyon-juniper woodlands. The species roosts in buildings and caves. It is known to occur in Lincoln County, Nevada, and the SWReGAP habitat suitability model for the species indicates that potentially suitable foraging habitat may occur on the SEZ and in other portions of the affected area (Table 11.4.12.1-1). On the basis of an evaluation of SWReGAP land cover types, potentially suitable roosting habitat (rocky cliffs and outcrops) does not occur on the SEZ or access road corridor; however, approximately 385 acres (1.5 km^2) of this potentially suitable roosting habitat occurs in the area of indirect effects.

Nelson’s Bighorn Sheep

The Nelson’s bighorn sheep is a subspecies of bighorn sheep known to occur in the Dry Lake Valley North SEZ region. 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. It occurs in Lincoln County, Nevada, and the SWReGAP habitat suitability model for the species indicates that potentially suitable habitat occurs on the SEZ and in portions of the affected area (Table 11.4.12.1-1).

Pahranagat Valley Montane Vole

The Pahranagat Valley montane vole is endemic to Lincoln County, Nevada, where it is restricted to springs in the Pahranagat Valley. Within that area, isolated populations utilize mesic montane and desert riparian patches of habitat. The species occurs along Pahranagat Creek, approximately 27 mi (43 km) southwest of the SEZ. According to the SWReGAP habitat suitability model, potentially suitable year-round habitat for this species occurs on the SEZ and in other portions of the affected area (Table 11.4.12.1-1).

Pygmy Rabbit

The pygmy rabbit is widespread in western North America where available sagebrush-shrubland habitats are present. The species primarily occurs in areas with loose soils for digging burrows. According to the SWReGAP habitat suitability model, potentially suitable year-round habitat for this species occurs throughout the SEZ region. This species occurs about 20 mi (32 km) north of the SEZ (Table 11.4.12.1-1).

Spotted Bat

The spotted bat is a year-round resident in the Dry Lake Valley North SEZ region, where it occurs in a variety of forested and shrubland habitats. It roosts in caves and rock crevices. The species occurs in the vicinity of Panaca, Nevada, approximately 13 mi (21 km) east of the SEZ. 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 11.4.12.1-1). On the basis of an evaluation of SWReGAP land cover types, potentially suitable roosting habitat (rocky cliffs and outcrops) does not occur on the SEZ or access road corridor; however, approximately 385 acres (1.5 km^2) of this 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. 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 species occurs in Lincoln County, Nevada, and 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 11.4.12.1-1). On the basis of an evaluation of SWReGAP land cover types, potentially suitable roosting habitat (rocky cliffs and outcrops) does not occur on the SEZ or access road corridor; however, approximately 385 acres (1.5 km^2) of this potentially suitable roosting habitat occurs in the area of indirect effects.

11.4.12.1.3 State-Listed Species

There are eight species listed by the State of Nevada that may occur in the Dry Lake Valley North SEZ affected area or may be affected by solar energy development on the SEZ (Table 11.4.12.1-1). These state-listed species include the following: (1) plant—Blaine fishhook cactus; (2) reptile—desert tortoise; (3) bird—Swainson's hawk; and (4) mammals—Desert Valley kangaroo mouse, fringed myotis, Pahranagat Valley montane vole, pygmy rabbit, and spotted bat. All these species are protected in the state of Nevada under NRS 501.110 (animals) or NRS 527 (plants). Each of these species has been previously discussed because of its known status under the ESA (Section 11.4.12.1.1) or the BLM (Section 11.4.12.1.3). Additional life history information for these species is provided in Appendix J.

11.4.12.1.4 Rare Species

A total of 20 rare species (i.e., state rank of S1 or S2 in the state of Nevada or a species of concern by the State of Nevada or USFWS) may be affected by solar energy development on the Dry Lake Valley North SEZ (Table 11.4.12.1-1). All these species have already been discussed as ESA-listed species (Section 11.4.12.1.1) or BLM-designated sensitive (Section 11.4.12.1.2). The habitats and known occurrences of these species relative to the SEZ are shown in Table 11.4.12.1-1. Additional life history information is provided in Appendix J.

11.4.12.2 Impacts

The potential for impacts on special status species from utility-scale solar energy development within the proposed Dry Lake Valley North 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 11.4.12.1 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 11.4.12.3).

Solar energy development within the Dry Lake Valley North SEZ could affect a variety of habitats (see Sections 11.4.9 and 11.4.10). These impacts on habitats could in turn affect special status species dependent on those habitats. Based on NNHP records, three special status species are known to occur within 5 mi (8 km) of the Dry Lake Valley North SEZ boundary: Blaine fishhook cactus, Eastwood milkweed, and Desert Valley kangaroo mouse. These species are listed in bold in Table 11.4.12.1-1. 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 11.4.12.1, 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 11.4.1.2, a 5-mi (8-km) long access road corridor is assumed to be needed to serve solar facilities within this SEZ. Impacts of transmission line construction, upgrade, or operation are not assessed in this evaluation due to the proximity of existing transmission infrastructure to the SEZ.

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

The successful implementation of programmatic design features (discussed in Appendix A) would reduce direct impacts on some special status species, especially those that depend on habitat types that can be easily avoided (e.g., dunes and 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.

11.4.12.2.1 Impacts on Species Listed under the ESA

Impacts on the desert tortoise, the only ESA-listed species that may occur in the Dry Lake Valley North SEZ affected area or that may be affected by solar energy development on the SEZ, are discussed below. This assessment is based on the best information available, but discussions of potential impacts and mitigation options should be held in consultation with the USFWS.

The Mojave population of the desert tortoise is listed as threatened under the ESA and is known to occur about 30 mi (48 km) southwest of the SEZ (Figure 11.4.12.1-1). According to the USFWS (Stout 2009), desert tortoise populations are not likely to occur in the area of direct effects for the Dry Lake Valley North SEZ. The USGS desert tortoise habitat suitability model (Nussear et al. 2009) indicates low habitat suitability in the affected area (modeled suitability value ≤0.3 out of 1.0 throughout the affected area). However, approximately 1,550 acres (6 km^2) of potentially suitable habitat for this species occurs outside of the SEZ in the area of indirect effects (Table 11.4.12.1-1). The overall impact on the desert tortoise from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake Valley North SEZ is considered small, because there is no potentially suitable habitat for this species in the area of direct effects and design features are expected to reduce indirect effects to negligible levels.

Consultation with the UFWS should be conducted to address the potential for direct and indirect impacts and to determine the need for additional mitigation requirements, which may include development of a survey protocol, translocation actions, and compensatory mitigation.

11.4.12.2.2 Impacts on BLM-Designated Sensitive Species

BLM-designated sensitive species that may be affected by solar energy development on the Dry Lake Valley North SEZ and are not previously discussed as ESA-listed in Section 11.4.12.2.1 are discussed below.

Blaine Fishhook Cactus

The Blaine fishhook cactus is known to occur in the Dry Lake Valley. Approximately 3,000 acres (12 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.4.12.1-1). This direct effects area represents about 15% of potentially suitable habitat in the SEZ region. About 3,875 acres (16 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 19% of the potentially suitable habitat in the SEZ region (Table 11.4.12.1-1).

The overall impact on the Blaine fishhook cactus from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake Valley North SEZ is considered large, because the amount of potentially suitable habitat for this species in the area of direct effects represents greater than or equal to 10% 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.

Avoiding or minimizing disturbance to all playa habitat in the area of direct effects may be sufficient to reduce impacts on the Blaine fishhook cactus to small or negligible levels, but this would restrict development on a large portion of the SEZ. For this species and other special status plants, impacts could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats on the SEZ. If avoidance or minimization are not feasible options, plants could be translocated from areas 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 plan could be developed and implemented to mitigate direct effects on occupied habitats. The plan 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.

Eastwood Milkweed

The Eastwood milkweed is known to occur in the Dry Lake Valley. Approximately 10,250 acres (41 km^2) of potentially suitable habitat on the SEZ and 5 acres (<0.1 km^2) of potentially suitable habitat in the road corridor could be directly affected by construction and operations (Table 11.4.12.1-1). This direct effects area represents about 3% of potentially suitable habitat in the SEZ region. About 23,900 acres (97 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 6% of the potentially suitable habitat in the SEZ region (Table 11.4.12.1-1).

The overall impact on the Eastwood milkweed from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake Valley North SEZ is considered moderate, because the amount of potentially suitable habitat for this species in the area of direct effects represents greater than or equal to 1% but less than 10% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts on the Eastwood milkweed because potentially suitable sagebrush and mixed shrubland habitat is widespread throughout the area of direct effects. Impacts could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats on the SEZ. If avoidance or minimization is not a feasible option, plants could be translocated from areas 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 plan could be developed and implemented to mitigate direct effects on occupied habitats. The plan 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.

Long-Calyx Milkvetch

The long-calyx milkvetch is not known to occur in the affected area of the Dry Lake Valley North SEZ; however, approximately 63,550 acres (257 km^2) of potentially suitable habitat on the SEZ and 40 acres (0.2 km^2) of potentially suitable habitat in the road corridor could be directly affected by construction and operations (Table 11.4.12.1-1). This direct effects area represents about 2% of potentially suitable habitat in the SEZ region. About 228,650 acres (925 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 5% of the potentially suitable habitat in the SEZ region (Table 11.4.12.1-1).

The overall impact on the long-calyx milkvetch from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake Valley North SEZ is considered moderate, because the amount of potentially suitable habitat for this species in the area of direct effects represents greater than or equal to 1% but less than 10% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Avoidance of all potentially suitable habitats to mitigate impacts on the long-calyx milkvetch is not feasible, because potentially suitable shrubland habitat is widespread throughout the area of direct effects. However, impacts could be reduced with the implementation of programmatic design features and the mitigation options described previously for the Eastwood milkweed. 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.

Needle Mountains Milkvetch

The Needle Mountains milkvetch is not known to occur in the affected area of the Dry Lake Valley North SEZ; however, approximately 3,900 acres (16 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.4.12.1-1). This direct effects area represents about 10% of potentially suitable habitat in the SEZ region. About 4,250 acres (17 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 11% of the potentially suitable habitat in the SEZ region (Table 11.4.12.1-1).

The overall impact on the Needle Mountains milkvetch from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake Valley North SEZ is considered large, because the amount of potentially suitable habitat for this species in the area of direct effects represents greater than or equal to 1% but less than 10% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Avoiding or minimizing disturbance to playa and arid grassland habitats on the SEZ may be sufficient to reduce impacts on the Needle Mountains milkvetch to small or negligible levels, but this would restrict development on a large portion of the SEZ. In addition, impacts could be reduced with the implementation of programmatic design features and the mitigation options described previously for the Eastwood milkweed. 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.

Nevada Willowherb

The Nevada willowherb is not known to occur in the affected area of the Dry Lake Valley North SEZ, and potentially suitable habitat for the species does not occur in the area of direct effects. However, approximately 19,200 acres (78 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 5% of the potentially suitable habitat in the SEZ region (Table 11.4.12.1-1).

The overall impact on the Nevada willowherb from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake Valley North 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.

Pioche Blazingstar

The Pioche blazingstar is not known to occur in the affected area of the Dry Lake Valley North SEZ; however, approximately 73,700 acres (298 km^2) of potentially suitable habitat on the SEZ and 46 acres (0.2 km^2) of potentially suitable habitat in the road corridor could be directly affected by construction and operations (Table 11.4.12.1-1). This direct effects area represents about 3% of potentially suitable habitat in the SEZ region. About 228,300 acres (924 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 8% of the potentially suitable habitat in the SEZ region (Table 11.4.12.1-1).

The overall impact on the Pioche blazingstar from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake Valley North SEZ is considered moderate, because the amount of potentially suitable habitat for this species in the area of direct effects represents greater than or equal to 1% but less than 10% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Avoidance of all potentially suitable habitats to mitigate impacts on the Pioche blazingstar is not feasible, because potentially suitable shrubland habitat is widespread throughout the area of direct effects. However, impacts could be reduced with the implementation of programmatic design features and the mitigation options described previously for the Eastwood milkweed. 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.

Rock Purpusia

The rock purpusia is not known to occur in the affected area of the Dry Lake Valley North SEZ, and potentially suitable habitat for the species does not occur in the area of direct effects. However, approximately 19,100 acres (77 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 1% of the potentially suitable habitat in the SEZ region (Table 11.4.12.1-1).

The overall impact on the rock purpusia from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake Valley North 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.

Tiehm Blazingstar

The Tiehm blazingstar is not known to occur in the affected area of the Dry Lake Valley North SEZ; however, approximately 73,200 acres (296 km^2) of potentially suitable habitat on the SEZ and 40 acres (0.2 km^2) of potentially suitable habitat in the road corridor could be directly affected by construction and operations (Table 11.4.12.1-1). This direct effects area represents about 3% of potentially suitable habitat in the SEZ region. About 169,350 acres (685 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 7% of the potentially suitable habitat in the SEZ region (Table 11.4.12.1-1).

The overall impact on the Tiehm blazingstar from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake Valley North SEZ is considered moderate, because the amount of potentially suitable habitat for this species in the area of direct effects represents greater than or equal to 1% but less than 10% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Avoidance of all potentially suitable habitats to mitigate impacts on the Tiehm blazingstar is not feasible, because potentially suitable shrubland habitat is widespread throughout the area of direct effects. However, impacts could be reduced with the implementation of programmatic design features and the mitigation options described previously for the Eastwood milkweed. 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 River Cat's-Eye

The White River cat's-eye is not known to occur in the affected area of the Dry Lake Valley North SEZ, and potentially suitable habitat for the species does not occur in the area of direct effects. However, approximately 385 acres (2 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 1% of the potentially suitable habitat in the SEZ region (Table 11.4.12.1-1).

The overall impact on the White River cat's-eye from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake Valley North 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.

Ferruginous Hawk

The ferruginous hawk occurs only as a winter resident in the vicinity of the Dry Lake Valley North SEZ, and potentially suitable foraging habitat is expected to occur in the affected area. Approximately 6,300 acres (25 km^2) of potentially suitable foraging habitat on the SEZ and 25 acres (0.1 km^2) within the road corridor could be directly affected by construction and operations (Table 11.4.12.1-1). This direct effects area represents 0.3% of potentially suitable habitat in the SEZ region. About 148,900 acres (603 km^2) of potentially suitable foraging habitat occurs in the area of indirect effects; this area represents about 7% of the available suitable foraging habitat in the SEZ region (Table 11.4.12.1-1).

The overall impact on the ferruginous hawk from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake Valley North 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. 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.

Prairie Falcon

The prairie falcon is a year-round resident in the Dry Lake Valley North SEZ region, and potentially suitable foraging habitat is expected to occur in the affected area. Approximately 67,500 acres (273 km^2) of potentially suitable habitat on the SEZ and 26 acres (0.1 km^2) of potentially suitable habitat in the road corridor could be directly affected by construction and operations (Table 11.4.12.1-1). This direct effects area represents 4% of potentially suitable habitat in the SEZ region. About 139,800 acres (566 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 8% of the potentially suitable habitat in the SEZ region (Table 11.4.12.1-1). Most of this area could serve as foraging habitat (open shrublands). On the basis of an evaluation of SWReGAP land cover types, potentially suitable nesting habitat (rocky cliffs and outcrops) does not occur on the SEZ or access road corridor; however, approximately 385 acres (1.5 km^2) of this habitat that may be potentially suitable nesting habitat occurs in the area of indirect effects.

The overall impact on the prairie falcon from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake Valley North SEZ is considered moderate, because the amount of potentially suitable foraging habitat for this species in the area of direct effects represents greater than or equal to 1% but less than 10% of potentially suitable foraging habitat in the region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts on this species. Avoidance of all potentially suitable foraging habitats to mitigate impacts on the prairie falcon is not feasible because potentially suitable shrubland habitat is widespread throughout the area of direct effect and in other portions of the SEZ region.

Swainson's Hawk

The Swainson's hawk is considered a summer breeding resident within the Dry Lake Valley North SEZ region, and potentially suitable foraging habitat is expected to occur in the affected area. Approximately 7,100 acres (29 km^2) of potentially suitable habitat on the SEZ and 4 acres (<0.1 km^2) of potentially suitable habitat in the road corridor could be directly affected by construction and operations (Table 11.4.12.1-1). This direct effects area represents 0.3% of potentially suitable habitat in the SEZ region. About 43,900 acres (178 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 2% of the potentially suitable habitat in the SEZ region (Table 11.4.12.1-1). Most of this area could serve as foraging habitat (open shrublands). On the basis of an evaluation of SWReGAP land cover types, potentially suitable nesting habitat (woodlands) does not occur on the SEZ or access road corridor; however, approximately 19,300 acres (78 km^2) of woodland habitat that may be potentially suitable nesting habitat occurs in the area of indirect effects.

The overall impact on the Swainson's hawk from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake Valley North SEZ is considered small, because the amount of potentially suitable foraging and nesting habitat for this species in the area of direct effects represents less than 1% of potentially suitable foraging and nesting habitat in the region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts on this species. Avoidance of all potentially suitable foraging habitats to mitigate impacts on the Swainson's hawk is not feasible because potentially suitable shrubland habitat is widespread throughout the area of direct effect and in other portions of the SEZ region.

Western Burrowing Owl

The western burrowing owl is considered a summer breeding resident within the Dry Lake Valley North SEZ region, and potentially suitable foraging habitat is expected to occur in the affected area. Approximately 73,400 acres (297 km^2) of potentially suitable habitat on the SEZ and 46 acres (0.2 km^2) of potentially suitable habitat in the road corridor could be directly affected by construction and operations (Table 11.4.12.1-1). This direct effects area represents 2% of potentially suitable habitat in the SEZ region. About 234,250 acres (948 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 7% of the potentially suitable habitat in the SEZ region (Table 11.4.12.1-1). Most of this area could serve as foraging and nesting habitat (shrublands). The abundance of burrows suitable for nesting on the SEZ and in the area of indirect effects has not been determined.

The overall impact on the western burrowing owl from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake Valley North SEZ is considered moderate, because the amount of potentially suitable foraging and nesting habitat for this species in the area of direct effects represents greater than or equal to 1% but less than 10% of potentially suitable foraging and nesting habitat in the region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts on this species.

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

Western Snowy Plover

The western snowy plover is considered a summer breeding resident within the Dry Lake Valley North SEZ region, and potentially suitable foraging habitat is expected to occur in the affected area. Approximately 6,950 acres (28 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.4.12.1-1). This direct effects area represents 11% of potentially suitable habitat in the SEZ region. About 8,150 acres (33 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 12% of the potentially suitable habitat in the SEZ region (Table 11.4.12.1-1). Most of this area could serve as foraging and nesting habitat in and along playa margins. On the basis of an evaluation of SWReGAP land cover types, approximately 3,000 acres (12 km^2) of playa habitat exists on the SEZ that may be potentially suitable nesting or foraging habitat for this species. An additional 3,900 acres (16 km^2) of playa habitat that may be potentially suitable nesting or foraging habitat occurs in the area of indirect effects.

The overall impact on the western snowy plover from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake Valley North SEZ is considered large, because the amount of potentially suitable foraging and nesting habitat for this species in the area of direct effects represents greater than or equal to 10% of potentially suitable foraging and nesting habitat in the region.

Impacts on the western snowy plover could be reduced by implementing programmatic design features, conducting pre-disturbance surveys, and avoiding or minimizing disturbance to all playa habitats and other occupied habitats on the SEZ. If avoidance or minimization of playas and all occupied habitats is not a feasible option, a compensatory plan could be developed and implemented to mitigate direct effects. The plan could involve the protection and enhancement of existing occupied or suitable habitats to compensate for habitats lost to development. A comprehensive mitigation strategy using one or both of these options could be designed to completely offset the impacts of development. The need for mitigation, other than programamtic design features, should be determined by conducting pre-disturbance surveys for the species and its habitat on the SEZ.

Desert Valley Kangaroo Mouse

The Desert Valley kangaroo mouse is endemic to Nevada and is known to occur on the Dry Lake Valley North SEZ. Approximately 64,750 acres (262 km^2) of potentially suitable habitat on the SEZ and 17 acres (<0.1 km^2) of potentially suitable habitat in the road corridor could be directly affected by construction and operations (Table 11.4.12.1-1). This direct effects area represents 5% of potentially suitable habitat in the SEZ region. About 109,900 acres

(445 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 9% of the potentially suitable habitat in the SEZ region (Table 11.4.12.1-1).

The overall impact on the Desert Valley kangaroo mouse from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake Valley North SEZ is considered moderate, because the amount of potentially suitable habitat for this species in the area of direct effects represents greater than or equal to 1% but less than 10% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features may be sufficient to reduce indirect impacts on this species to negligible levels.

Despite the apparent widespread availability of potentially suitable habitat in the affected area, the complete avoidance of all playa habitats in the SEZ could reduce impacts on this species. However, this would restrict development on a large portion of the SEZ. Consistent with the mitigation recommendations provided by the USFWS (Stout 2009), pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the area of direct effects could reduce impacts. If avoidance or minimization is not a feasible option, a compensatory plan could be developed and implemented to mitigate direct effects on occupied habitats. The plan 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.

Fringed Myotis

The fringed myotis is a year-round resident within the Dry Lake Valley North SEZ region. Suitable roosting habitats (caves and buildings) are not expected to occur on the SEZ, but the availability of suitable roosting sites in the area of indirect effects has not been determined. Approximately 73,300 acres (297 km^2) of potentially suitable foraging habitat on the SEZ and 42 acres (0.2 km^2) of potentially suitable foraging habitat in the road corridor could be directly affected by construction and operations (Table 11.4.12.1-1). This direct effects area represents about 2% of potentially suitable foraging habitat in the region. About 221,700 acres (897 km^2) of potentially suitable foraging habitat occurs in the area of indirect effects; this area represents about 5% of the available suitable foraging habitat in the region (Table 11.4.12.1-1). On the basis of an evaluation of SWReGAP land cover types, potentially suitable roosting habitat (rocky cliffs and outcrops) does not occur on the SEZ or access road corridor; however, approximately 385 acres (1.5 km^2) of this potentially suitable roosting habitat occurs in the area of indirect effects.

The overall impact on the fringed myotis from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake Valley North SEZ is considered moderate, because the amount of potentially suitable foraging and nesting habitat for this species in the area of direct effects represents greater than or equal to 1% but less than 10% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features may be sufficient to reduce indirect impacts on this species. However, avoidance of all potentially suitable foraging habitats to mitigate impacts on the fringed myotis is not feasible because potentially suitable shrubland habitat is widespread throughout the area of direct effect.

Nelson's Bighorn Sheep

The Nelson's bighorn sheep is not known to occur in the affected area of the Dry Lake Valley North SEZ. However, approximately 700 acres (3 km^2) of potentially suitable habitat within the SEZ and 13 acres (0.1 km^2) of potentially suitable habitat in the road corridor could be directly affected by construction and operations (Table 11.4.12.1-1). This direct effects area represents less than 0.1% of potentially suitable habitat in the region. About 65,000 acres (263 km^2) of potentially suitable foraging habitat occurs in the area of indirect effects; this area represents about 4% of the available suitable foraging habitat in the region (Table 11.4.12.1-1).

The overall impact on the Nelson's bighorn sheep from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake Valley North 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 the potentially suitable habitat in the region. The implementation of programmatic design features are expected to be sufficient to reduce indirect impacts on this species.

Direct impacts on the Nelson's bighorn sheep could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats and important movement corridors on the SEZ. If avoidance or minimization is not a feasible option, a compensatory plan could be developed and implemented to mitigate direct effects on occupied habitats. The plan 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 should first be determined by conducting pre-disturbance surveys for the species and its habitat on the SEZ.

Pahranagat Valley Montane Vole

The Pahranagat Valley montane vole is endemic to Lincoln County, Nevada, near the Pahranagat Creek. The species is not known to occur in the affected area of the Dry Lake Valley North SEZ; however, approximately 900 acres (4 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.4.12.1-1). This direct effects area represents 4% of potentially suitable habitat in the SEZ region. About 300 acres (1 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 1% of the potentially suitable habitat in the SEZ region (Table 11.4.12.1-1).

The overall impact on the Pahranagat Valley montane vole from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake Valley North SEZ is considered moderate, because the amount of potentially suitable foraging and nesting habitat for this species in the area of direct effects represents greater than or equal to 1% but less than 10% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts on this species to negligible levels.

Avoiding or minimizing disturbance to all mesic habitats in the SEZ (e.g., playas) could reduce impacts on this species, but this would restrict development on a large portion of the SEZ. In addition, pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the area of direct effects could reduce impacts. If avoidance or minimization are not feasible options, a compensatory plan could be developed and implemented to mitigate direct effects on occupied habitats. The plan 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.

Pygmy Rabbit

The pygmy rabbit is considered to be a year-round resident within the Dry Lake Valley North SEZ region, where it is known to occur in sagebrush habitats. Approximately 2,550 acres (10 km^2) of potentially suitable habitat on the SEZ and 20 acres (0.1 km^2) of potentially suitable habitat in the road corridor could be directly affected by construction and operations (Table 11.4.12.1-1). This direct effects area represents about 0.2% of available suitable habitat in the SEZ region. About 82,700 acres (335 km^2) of potentially suitable habitat occurs in the area of potential indirect effects; this area represents about 6% of the available suitable habitat in the SEZ region (Table 11.4.12.1-1).

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

The avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts on the pygmy rabbit, because potentially suitable sagebrush habitats are widespread throughout the area of direct effects. However, pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the area of direct effects could reduce impacts. If avoidance or minimization are not feasible options, a compensatory plan could be developed and implemented to mitigate direct effects on occupied habitats. The plan 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.

Spotted Bat

The spotted bat is a year-round resident within the Dry Lake Valley North SEZ region. Suitable roosting habitats (caves and rock outcrops) are not expected to occur on the SEZ, but the availability of suitable roosting sites in the area of indirect effects has not been determined. Approximately 66,000 acres (267 km^2) of potentially suitable foraging habitat on the SEZ and

37 acres (0.1 km^2) of potentially suitable habitat in the road corridor could be directly affected by construction and operations (Table 11.4.12.1-1). This direct effects area represents about 2% of potentially suitable foraging habitat in the region. About 174,200 acres (705 km^2) of potentially suitable foraging habitat occurs in the area of indirect effects; this area represents about 4.4% of the potentially suitable foraging habitat in the region (Table 11.4.12.1-1). On the basis of an evaluation of SWReGAP land cover types, potentially suitable roosting habitat (rocky cliffs and outcrops) does not occur on the SEZ or access road corridor; however, approximately 385 acres (1.5 km^2) of this potentially suitable roosting habitat occurs 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 Valley North SEZ is considered moderate, because the amount of potentially suitable foraging habitat for this species in the area of direct effects represents greater than or equal to 1% but less than 10% of potentially suitable habitat in the region. The implementation of programmatic design features may be sufficient to reduce indirect impacts on this species. Avoidance of all potentially suitable foraging habitats to mitigate impacts on the prairie falcon is not feasible because potentially suitable shrubland habitat is widespread throughout the area of direct effect and in other portions of the SEZ region.

Western Small-Footed Bat

The western small-footed bat is a year-round resident within the Dry Lake Valley North SEZ region. Suitable roosting habitats (caves, rock outcrops, and buildings) are not expected to occur on the SEZ, but the availability of suitable roosting sites in the area of indirect effects has not been determined. Approximately 76,700 acres (310 km^2) of potentially suitable foraging habitat on the SEZ and 46 acres (0.2 km^2) of potentially suitable habitat in the road corridor could be directly affected by construction and operations (Table 11.4.12.1-1). This direct effects area represents about 2% of potentially suitable foraging habitat in the region. About 257,375 acres (1,041 km^2) of potentially suitable foraging habitat occurs in the area of indirect effects; this area represents about 5% of the potentially suitable foraging habitat in the region (Table 11.4.12.1-1). On the basis of an evaluation of SWReGAP land cover types, potentially suitable roosting habitat (rocky cliffs and outcrops) does not occur on the SEZ or access road corridor; however, approximately 385 acres (1.5 km^2) of this potentially suitable roosting habitat occurs in the area of indirect effects.

The overall impact on the western small-footed bat from construction, operation, and decommissioning of utility-scale solar energy facilities within the Dry Lake Valley North SEZ is considered moderate, because the amount of potentially suitable foraging habitat for this species in the area of direct effects represents greater than or equal to 1% but less than 10% of potentially suitable habitat in the region. The implementation of programmatic design features may be sufficient to reduce indirect impacts on this species. However, avoidance of all potentially suitable foraging habitats to mitigate impacts on the prairie falcon is not feasible because potentially suitable shrubland habitat is widespread throughout the area of direct effect and in other portions of the SEZ region.

11.4.12.2.3 Impacts on State-Listed Species

Eight species listed by the State of Nevada may occur in the Dry Lake Valley North SEZ affected area or may be affected by solar energy development on the SEZ (Table 11.4.12.1-1). These state-listed species include the following: (1) plant—Blaine fishhook cactus; (2) reptile—desert tortoise; (3) bird—Swainson's hawk; and (4) mammals—Desert Valley kangaroo mouse, fringed myotis, Pahranagat Valley montane vole, pygmy rabbit, and spotted bat. Impacts on each of these species have been previously discussed because of their known or pending status under the ESA (Section 11.4.12.2.1) or their designation by the BLM as a sensitive species (Section 11.4.12.2.2). State-listed species known to occur within 5 mi (8 km) of the Dry Lake Valley North SEZ include the Blaine fishhook cactus and Desert Valley kangaroo mouse.

11.4.12.2.4 Impacts on Rare Species

A total of 20 rare species (state rank of S1 or S2 in Nevada or a species of concern by the State of Nevada or the USFWS) may be affected by solar energy development on the Dry Lake Valley North SEZ. All these species have already been discussed as ESA-listed (Section 11.4.12.2.1) or BLM-designated sensitive (Section 11.4.12.2.2). Rare species that are known to occur within 5 mi (8 km) of the Dry Lake Valley North SEZ include the Blaine fishhook cactus, Eastwood milkweed, and Desert Valley kangaroo mouse.

11.4.12.3 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 and access road corridor (i.e., area of direct effects) to determine the presence and abundance of special status species, including those identified in Table 11.4.12.1-1; 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.

- Avoiding or minimizing disturbance of playa habitat on the SEZ could reduce or eliminate impacts on the Blaine fishhook cactus, Needle Mountains milkvetch, western snowy plover, Desert Valley kangaroo mouse, and Pahranagat Valley montane vole.

- Consultation with the USFWS should be conducted to address the potential for impacts (primarily indirect impacts) on the desert tortoise, a species listed as threatened under the ESA. 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.

- 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.

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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11.4.13 Air Quality and Climate

11.4.13.1 Affected Environment

11.4.13.1.1 Climate

The proposed Dry Lake Valley North SEZ is located in southeastern Nevada, in the north central portion of Lincoln County. 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 a barrier 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 4,760 ft (1,450 m) in the south-central portion of the Great Basin Desert, which has a high desert climate marked by year-round pleasant weather (mild winters and warm summers), large daily temperature swings due to dry air, scant precipitation, low relative humidity, and abundant sunshine. Meteorological data collected at the Ely Yelland Field, about 82 mi (132 km) north of the Dry Lake Valley North SEZ boundary, and at Caliente, about 14 mi (23 km) southeast, are summarized below.

A wind rose from the Ely Yelland Field, Nevada, for the 5-year period 2005 to 2009, taken at a level of 33 ft (10 m), is presented in Figure 11.4.13.1-1 (NCDC 2010b).[6] During this period, the annual average wind speed at the airport was about 9.2 mph (4.1 m/s); the prevailing wind direction was from the south (about 24.4% of the time) and secondarily from the south–southeast (about 16.0% of the time). Winds blew predominantly from the south every month throughout the year (about 52% in wind directions ranging from south–southeast clockwise to south–southwest inclusive). Wind speeds categorized as calm (less than 1.1 mph [0.5 m/s]) occurred frequently (about 10% of the time) because of the stable conditions caused by strong radiative cooling from late night to sunrise. Average wind speeds by season were relatively uniform; they were highest in spring at 9.7 mph (4.3 m/s), lower in summer and fall at 9.2 mph (4.1 m/s), and lowest in winter at 8.7 mph (3.9 m/s).

For the 1903 to 2009 period, the annual average temperature at Caliente was 53.4°F (11.9°C) (WRCC 2010c).[7] January was the coldest month, with an average minimum temperature of 17.8°F (−7.9°C), and July was the warmest month, with an average maximum of 95.4°F (35.2°C). In summer, daytime maximum temperatures were frequently in the 90s, and minimums were in the 50s. The minimum temperatures recorded were below freezing (≤32°F [0°C]) during the colder months (most days from November through March), but subzero

[6] Although the Ely Yelland Field is rather far from the Dry Lake Valley North SEZ, it was chosen to be representative of the SEZ, considering the similar north–south orientation of valley and mountain ranges.

[7] Pioche is closer (about 12 mi [19 km]) to the Dry Lake Valley North SEZ than Caliente (14 mi [23 km]) but at a higher elevation, about 1,800 ft (550 m) and 1,400 ft (430 m), than Caliente and the SEZ, respectively, Temperatures at Caliente are about few degrees higher than those at Pioche, while precipitation and snowfall at Caliente are about two-thirds and one-third of those at Pioche, respectively.

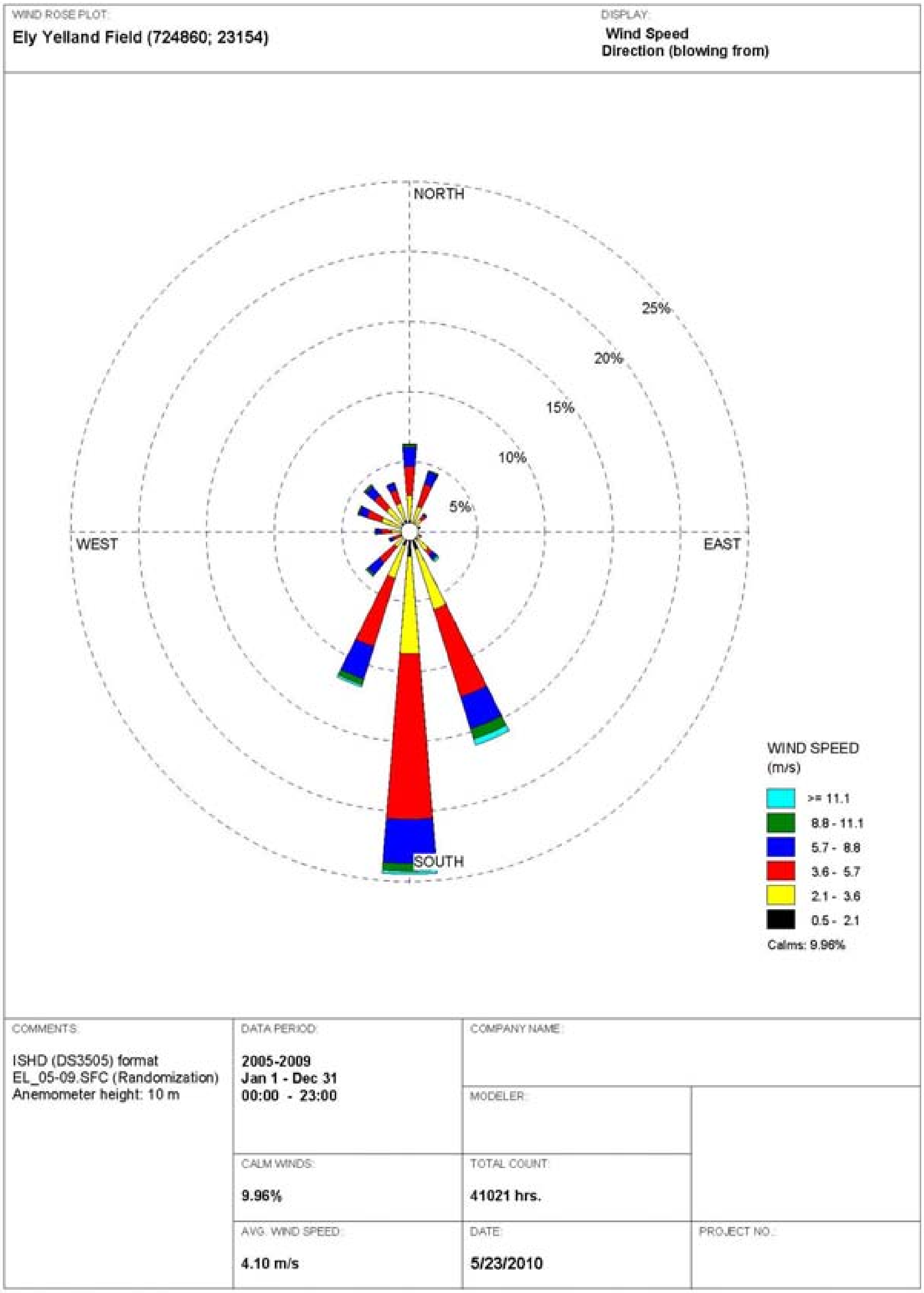

FIGURE 11.4.13.1-1 Wind Rose at 33 ft (10 m) at Ely Yelland Field, Nevada, 2005–2009 (Source: NCDC 2010b)

temperatures were recorded about 3 days per year from December to February. During the same period, the highest temperature, 110°F (43.3°C), was reached in July 1915, and the lowest, −31°F (−35.0°C), in January 1937. In a typical year, about 78 days had a maximum temperature of greater than or equal to 90°F (32.2°C), while about 158 days had minimum temperatures at or below freezing.

For the 1903 to 2009 period, annual precipitation at Caliente averaged about 8.74 in. (22.2 cm) (WRCC 2010c).[2] On average, there are 45 days annually with measurable precipitation (0.01 in. [0.025 cm] or higher). Precipitation is relatively evenly distributed by season. Snow falls as early as October and continues as late as April; most of it falls from December through February. The annual average snowfall at Caliente is about 11.2 in. (28.4 cm); the highest monthly snowfall recorded was 31.0 in (78.7 cm) in January 1930.

Because the area surrounding the proposed Dry Lake Valley North SEZ is far from major water bodies (more than 330 mi [531 km]) and because surrounding mountain ranges block air masses from penetrating into the area, severe weather events, such as thunderstorms and tornadoes, are rare.

In Nevada, flooding can occur from melting of heavy snowpack. On occasion, heavy summer thunderstorms also cause flooding of local streams, usually in sparsely populated mountainous areas, but are seldom destructive (NCDC 2010a). Since 1996, 18 floods (17 flash floods and 1 flood) were reported in Lincoln County, most of which occurred in the nestled mountain communities and some of which caused property damage. In January 2005, heavy rain and rapid snow melt caused extensive flooding in southern Lincoln and northeast Clark Counties, which brought about significant property damage.

In Lincoln County, seven hail events have been reported since 1981, none of which caused property damage (NCDC 2010c). Hail measuring 1.5 in (3.8 cm) in diameter was reported in 1981. In Lincoln County, 22 high wind events have been reported since 1995, which caused some property damage. Such events, with a maximum wind speed of up to 83 mph (37 m/s), have occurred any time of the year with a peak during spring months. In addition, four thunderstorm wind events have been reported since 1964. Thunderstorm winds, with a maximum wind speed of up to 69 mph (31 m/s) occurred mostly during summer months; one of these caused minor property damage.

In Lincoln County, no dust storm event was reported (NCDC 2010c). However, about 71% the SEZ is covered with silty to fine sandy loams, which have moderate dust storm potential. On occasion, high winds and dry soil conditions could result in blowing dust in Lincoln County. Dust storms can deteriorate air quality and visibility and have adverse effects on health.

Hurricanes and tropical storms formed off the coast of Central America and Mexico weaken over the cold waters off the California coast. Accordingly, hurricanes never hit Nevada. Historically, one tropical depression passed within 100 mi (160 km) of the proposed Dry Lake Valley North SEZ (CSC 2010). Tornadoes in Lincoln County, which encompasses the proposed Dry Lake Valley North SEZ, occur infrequently. In the period 1950 to July 2010, a total of six tornadoes (0.1 per year) were reported in Lincoln County (NCDC 2010c). However, all tornadoes occurring in Lincoln County were relatively weak (i.e., one was uncategorized; four were F0; and one was F1 on the Fujita tornado scale). None of these tornadoes caused injuries or deaths, but one of them caused some property damage. All tornadoes in Lincoln County were reported far from the proposed Dry Lake Valley North SEZ.

11.4.13.1.2 Existing Air Emissions

Lincoln County has several industrial emission sources scattered over the county, but their emissions are relatively small. No emission sources are located around the proposed Dry Lake Valley North SEZ. Because of the sparse population, only a handful of major roads exist in Lincoln County, such as U.S. 93 and State Routes 318, 319, and 375. Thus, onroad mobile source emissions are not substantial. Data on annual emissions of criteria pollutants and VOCs in Lincoln County are presented in Table 11.4.13.1-1 for 2002 (WRAP 2009). Emission data are classified into six source categories: point, area, onroad mobile, nonroad mobile, biogenic, and fire (wildfires, prescribed fires, agricultural fires, structural fires). In 2002, nonroad sources were major contributors to total SO_2 and NO_x emissions (about 56% and 57%, respectively). Biogenic sources (i.e., vegetation—including trees, plants, and crops—and soils) that release naturally occurring emissions contributed primarily to CO emissions (about 56%) and secondarily to NO_x emissions (about 22%), and accounted for most of the VOC emissions (about 99%). Fire sources were primary contributors to PM_{10} and $PM_{2.5}$ emissions (about 60% and 83%, respectively) and secondary contributors to SO_2 and CO emissions (41% and 33%, respectively). Area sources accounted for about 37% of PM_{10} and 13% of $PM_{2.5}$. In Lincoln County, point sources were minor contributors to criteria pollutants and VOCs.

TABLE 11.4.13.1-1 Annual Emissions of Criteria Pollutants and VOCs in Lincoln County, Nevada, Encompassing the Proposed Dry Lake Valley North SEZ, 2002[a]

Pollutant	Emissions (tons/yr)
SO_2	230
NO_x	3,453
CO	47,458
VOCs	172,491
PM_{10}	2,586
$PM_{2.5}$	1,604

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

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

Source: WRAP (2009).

In 2005, Nevada produced about 56.3 MMt of *gross*[8] carbon dioxide equivalent (CO_2e)[9] emissions, which is about 0.8% of total U.S. GHG emissions in that year (NDEP 2008). Gross GHG emissions in Nevada increased by about 65% from

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

9 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.

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%).

11.4.13.1.3 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 SAAQS, which are similar to the NAAQS 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 11.4.13.1-2.

Lincoln County is located administratively within the Nevada Intrastate AQCR, along with 10 other counties in Nevada, with the exception of the Las Vegas Intrastate AQCR (Clark County only), which encompasses Las Vegas, and the Northwest Nevada Intrastate AQCR (five northwest counties), which encompasses Reno. Currently, the area surrounding the proposed SEZ is designated as being in unclassifiable/attainment of NAAQS for all criteria pollutants (40 CFR 81.329).

Because of Lincoln County's low population density, it has no significant emission sources of its own and only minor mobile emissions along major highways. Accordingly, ambient air quality in Lincoln County is relatively good. There are no ambient air-monitoring stations in Lincoln County. To characterize ambient air quality around the SEZ, one monitoring station in Clark County was chosen: Apex in the northeast corner of North Las Vegas in Clark County, about 93 mi (150 km) south of the SEZ. The Apex station, which is downwind of the Las Vegas area along with predominant southwesterly winds but upwind of the SEZ, can be considered representative of the proposed SEZ. Ambient concentrations of NO_2, O_3, PM_{10}, and $PM_{2.5}$ are recorded at the Apex station. 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 background concentrations of criteria pollutants at these stations for the period 2004 to 2008 are presented in Table 11.4.13.1-2 (EPA 2010b). Monitored concentration levels were lower than their respective standards (up to 65%), except O_3, which approaches the 1-hour NAAQS/SAAQS but exceeds the 8-hour NAAQS. However, ambient concentrations around the SEZ are anticipated to be lower than those presented in the table, except PM_{10} and $PM_{2.5}$, which can be either higher or lower.

TABLE 11.4.13.1-2 NAAQS, SAAQS, and Background Concentration Levels Representative of the Proposed Dry Lake Valley North SEZ in Lincoln 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]	–[e]	–	–
	3-hour	0.5 ppm	0.5 ppm	0.009 ppm (1.8%)	Las Vegas, Clark County, 2005
	24-hour	0.14 ppm	0.14 ppm	0.008 ppm (5.7%)	Las Vegas, Clark County, 2005
	Annual	0.030 ppm	0.030 ppm	0.006 ppm (20%)	Las Vegas, Clark County, 2005
NO_2	1-hour	100 ppb[f]	–	–	–
	Annual	0.053 ppm	0.053 ppm	0.006 ppm (11%)	North Las Vegas, Clark County, 2007
CO	1-hour	35 ppm	35 ppm	5.7 ppm (16%)	Las Vegas, Clark County, 2004
	8-hour	9 ppm	9 ppm[g]	3.9 ppm (43%)	Las Vegas, Clark County, 2005
O_3	1-hour	0.12 ppm[h]–	0.12 ppm[i]	0.104 ppm (87%)	North Las Vegas, Clark County, 2005
	8-hour	0.075 ppm	–	0.081 ppm (108%)	North Las Vegas, Clark County, 2007
PM_{10}	24-hour	150 $\mu g/m^3$	150 $\mu g/m^3$	97 $\mu g/m^3$ (65%)	North Las Vegas, Clark County, 2006
	Annual	–	50 $\mu g/m^3$	22 $\mu g/m^3$ (44%)	North Las Vegas, Clark County, 2008
$PM_{2.5}$	24-hour	35 $\mu g/m^3$	–	10.2 $\mu g/m^3$ (29%)	North Las Vegas, Clark County, 2005
	Annual	15.0 $\mu g/m^3$	–	4.05 $\mu g/m^3$ (27%)	North Las Vegas, Clark County, 2005
Pb	30-day	–	1.5 $\mu g/m^3$	–	–
	Calendar quarter	1.5 $\mu g/m^3$	–	–	–
	Rolling 3-month	0.15 $\mu g/m^3$ [j]	–	–	–

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. 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 Not applicable or not available.

f Effective April 12, 2010.

g CO standard for the area less than 5,000 ft (1,524 m) above mean sea level. CO standard for the area at or greater than 5,000 ft (1,524 m) above mean sea level is 6 ppm.

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

i O_3 standard for the Lake Tahoe Basin, #90, is 0.10 ppm.

j Effective January 12, 2009.

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

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, EPA recommends that the permitting authority notify the federal land managers when a proposed PSD source would locate within 62 mi (100 km) of a sensitive Class I area. There are several Class I areas around the Dry Lake Valley North SEZ, none of which is situated within the 62-mi (100-km) distance in Arizona, Nevada, and Utah. The nearest Class I area is Zion NP in Utah (40 CFR 81.405), about 81 mi (131 km) east–southeast of the Dry Lake Valley North SEZ. This Class I area is not located downwind of prevailing winds at the Dry Lake Valley North SEZ (Figure 11.4.13.1-1). The next nearest Class I area is Grand Canyon NP in Arizona, which is about 120 mi (193 km) southeast of the SEZ.

11.4.13.2 Impacts

Potential impacts on ambient air quality associated with a solar project would be of most concern during the construction phase. Impacts on ambient air quality from fugitive dust emissions resulting from soil disturbances are anticipated, but they would be of short duration. During the operations phase, only a few sources with generally low-level emissions would exist for any of the four types of solar technologies evaluated. A solar facility would either not burn fossil fuels or burn only small amounts during operation. (For facilities using heat transfer fluids [HTFs], fuel could be used to maintain the temperature of the HTFs for more efficient daily start-up.) Conversely, solar facilities 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 Valley North 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 11.4.13.3 below identifies SEZ-specific design features of particular relevance to the Dry Lake Valley North SEZ.

11.4.13.2.1 Construction

The Dry Lake Valley North SEZ has a relatively flat terrain; thus only a minimum number of site preparation activities, perhaps with no large-scale earthmoving operations, would be required. However, fugitive dust emissions from soil disturbances during the entire construction phase would be a major concern because of the large areas that would be disturbed in a region that experiences windblown dust problems. Fugitive dusts, which are released near ground level, typically have more localized impacts than similar emissions from an elevated stack 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.[10] However, no receptors were modeled for PSD analysis at the nearest Class I area, Zion NP in Utah, because it is about 81 mi (131 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 Zion NP were selected as surrogates for the PSD analysis. For the Dry Lake Valley North 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 9,000 acres (36.4 km^2) in total, in the southeastern portion of the SEZ, close to the nearest communities (Caselton and Prince) and the nearby towns of Caliente, Panaca, and Pioche,

- Surface hourly meteorological data from the Ely Yelland Field[11] 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 11.4.13.2-1. Maximum 24-hour PM_{10} concentration increments modeled to occur at the site boundaries would be an estimated 399 $\mu g/m^3$, which far

[10] 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.

[11] The number of missing hours at the Ely Yelland Field amounts to about 17.7% of the total hours, which may not be acceptable for regulatory applications, because that percentage exceeds the 10% limit defined by the EPA. However, because the wind patterns at Ely Yelland Field are more representative of wind at the Dry Lake Valley North SEZ than the wind patterns at other airports (which have more complete data but are located in different topographic features), the former values were used for the screening analysis.

TABLE 11.4.13.2-1 Maximum Air Quality Impacts from Emissions Associated with Construction Activities for the Proposed Dry Lake Valley North 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	399	97	496	150	266	331
	Annual	–[d]	58.8	22	80.8	50	118	162
$PM_{2.5}$	24 hours	H8H	21.3	10.2	31.5	35	61	90
	Annual	–	5.9	4.1	9.9	15.0	39	66

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 11.4.13.1-2.

d Not applicable.

exceeds the relevant standard level of 150 $\mu g/m^3$. Total 24-hour PM_{10} concentrations of 496 $\mu g/m^3$ 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 15 $\mu g/m^3$ at Caliente and Panaca (about 14 mi [23 km] southeast and east-southeast from the SEZ, respectively) and 3 $\mu g/m^3$ at the nearest communities (Caselton and Prince, about 10 mi [16 km]) east of the SEZ), Pioche, and Hiko. Due to high mountain ranges to the direction of the SEZ, concentration levels at the nearest communities are predicted to be much lower than those at Caliente and Panaca. Annual average modeled concentration increments and total concentrations (increment plus background) for PM_{10} at the SEZ boundary would be about 58.8 $\mu g/m^3$ and 80.8 $\mu g/m^3$, respectively, which are higher than the SAAQS level of 50 $\mu g/m^3$. Annual PM_{10} increments would be much lower, less than 0.1 $\mu g/m^3$, at all nearby towns. Total 24-hour $PM_{2.5}$ concentrations would be 31.5 $\mu g/m^3$ at the SEZ boundary, which is lower than the NAAQS level of 35 $\mu g/m^3$; modeled increments contribute about two times more than background concentration to this total. The total annual average $PM_{2.5}$ concentration would be 9.9 $\mu g/m^3$, which is below the NAAQS level of 15.0 $\mu g/m^3$. At Caliente, predicted maximum 24-hour and annual $PM_{2.5}$ concentration increments would be about 0.3 and less than 0.01 $\mu g/m^3$, respectively.

Predicted 24-hour and annual PM_{10} concentration increments at the surrogate receptors for the nearest Class I Area—Zion NP in Utah—would be about 4.0 and 0.09 $\mu g/m^3$, or 50% and

2.2% of the PSD increments for the Class I area, respectively. These surrogate receptors are more than 42 mi (67 km) from the Zion NP, and thus predicted concentrations in Zion NP would be much lower than the above values (about 25% and 1% of the PSD increments for 24-hour and annual PM_{10}, respectively), considering the same decay ratio with distance.

In conclusion, predicted 24-hour and annual PM_{10} 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. Predicted total concentrations for 24-hour and annual $PM_{2.5}$ would be below the respective standard level. Modeling indicates that emissions from construction activities are not anticipated to exceed Class I PSD PM_{10} increments at the nearest federal Class I area (Zion NP in Utah). Construction activities are not subject to the PSD program, and the comparison provides only a screen for gauging the size of the impact. Accordingly, it is anticipated that impacts of construction activities on ambient air quality would be moderate and temporary.

Construction emissions from the engine exhaust from heavy equipment and vehicles 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 69-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 with solar facility construction and would be temporary in nature.

11.4.13.2.2 Operations

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

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

Potential air emissions displaced by solar project development at the Dry Lake Valley North SEZ are presented in Table 11.4.13.2-2. Total power generation capacity ranging from 6,833 to 12,300 MW is estimated for the Dry Lake Valley North SEZ for various solar technologies (see Section 11.4.2). 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). If the Dry Lake Valley North SEZ were fully developed, it is expected that emissions avoided could be substantial. Development of solar power in the SEZ could result in avoided air emissions ranging from 32 to 57% 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 12% of total emissions from electric power systems in the six-state study area. When compared with all source categories, power production from the same solar facilities could displace up to 46% of SO_2, 17% of NO_x, and 31% of CO_2 emissions in the state of Nevada (EPA 2009a; WRAP 2009). These emissions could be up to

TABLE 11.4.13.2-2 Annual Emissions from Combustion-Related Power Generation Avoided by Full Solar Development of the Proposed Dry Lake Valley North 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
76,874	6,833–12,300	11,972–21,549	16,891–30,404	14,488–26,078	0.096–0.17	9,298–16,737
Percentage of total emissions from electric power systems in Nevada[d]			32–57%	32–57%	32–57%	32–57%
Percentage of total emissions from all source categories in Nevada[e]			26–46%	9.6–17%	–[f]	17–31%
Percentage of total emissions from electric power systems in the six-state study area[d]			6.7–12%	3.9–7.1%	3.3–5.9%	3.5–6.4%
Percentage of total emissions from all source categories in the six-state study area[e]			3.6–6.5%	0.54–1.0%	–	1.1–2.0%

[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] Not estimated.

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

6.5% 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 for which contribution of natural gas and coal combustion is comparable (EPA 2009c). Thus, solar facilities to be built in the Dry Lake Valley North SEZ could be more important than those built in other states in terms of reducing fuel combustion–related emissions.

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 Dry Lake Valley North 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.

11.4.13.2.3 Decommissioning/Reclamation

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

11.4.13.3 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 Valley North 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.

11.4.14 Visual Resources

11.4.14.1 Affected Environment

The proposed Dry Lake Valley North SEZ is located in Lincoln County in eastern Nevada. The SEZ is 33 mi (53 km) west of the Utah border. The SEZ occupies 78,874 acres (319.19 km^2) within the Dry Lake Valley, extending about 8.6 mi (13.8 km) east to west and 25 mi (40 km) north to south.

The proposed SEZ is located within the Central Basin and Range Level III ecoregion (Bryce et al. 2003), typified by northerly trending fault-block ranges and intervening drier basins. Valleys, lower slopes, and alluvial fans within this ecoregion are either shrub and grass covered or shrub covered. Flat basins form broad expanses of barren plains, generally with low scrub and grass vegetation and expansive views. The proposed SEZ encompasses areas within the Carbonate Sagebrush Valleys, Shadscale-Dominated Saline Basins, and the Salt Deserts Level IV ecoregions.

The SEZ ranges in elevation from 4,620 ft (1,408 m) in the central portion to 5,400 ft (1,646 m) in the northern portion. The SEZ and surrounding lands are shown in Figure 11.4.14.1-1.

The SEZ occupies the central portion of the relatively broad and very flat Dry Lake Valley, with the flat valley floor, the strong horizon line, and the forms of surrounding mountain ranges being the dominant visual features. The SEZ is framed by mountain ranges on the east and west, with more open views to the north and south. The North Pahroc range rises about 6 mi (10 km) west of the SEZ. Several mountain ranges occur east of the SEZ: West Range, Bristol Range, Highland Range, Ely Springs Range, Black Canyon Range, and Burnt Springs Range. These ranges include peaks generally between 5,000 and 6,000 ft (1,520 and 1,830 m) in elevation, but with some peaks over 8,000 feet (2,440 m) high. From the northwest to the southeast, the Dry Lake Valley extends more than 34 mi (55 km) and is about 10 mi (16 km) wide.

Vegetation is generally sparse in much of the SEZ, with large areas of low grasses and low scrubland. The adjacent areas support Joshua Tree-sagebrush habitat. During an August 2009 site visit, the sparse, medium-to-fine textured vegetation presented a limited range of light greens, grays, and light browns against a backdrop of fine-textured, very light brown soils.

No permanent surface water occurs within the SEZ; however, the far southwestern portion of the SEZ occupies part of a dry lakebed. A very large wash on the north side of the SEZ provides strong color and texture contrasts due to the lack of vegetative cover and the exposed very light soil color within the wash.

Cultural disturbances visible within the SEZ include roads, fences, livestock ponds, and a transmission line. The land is used primarily for grazing. There is evidence of damage from OHV use. Overall, there is a low level of cultural disturbance; from most locations within the SEZ, the landscape is generally natural in appearance.

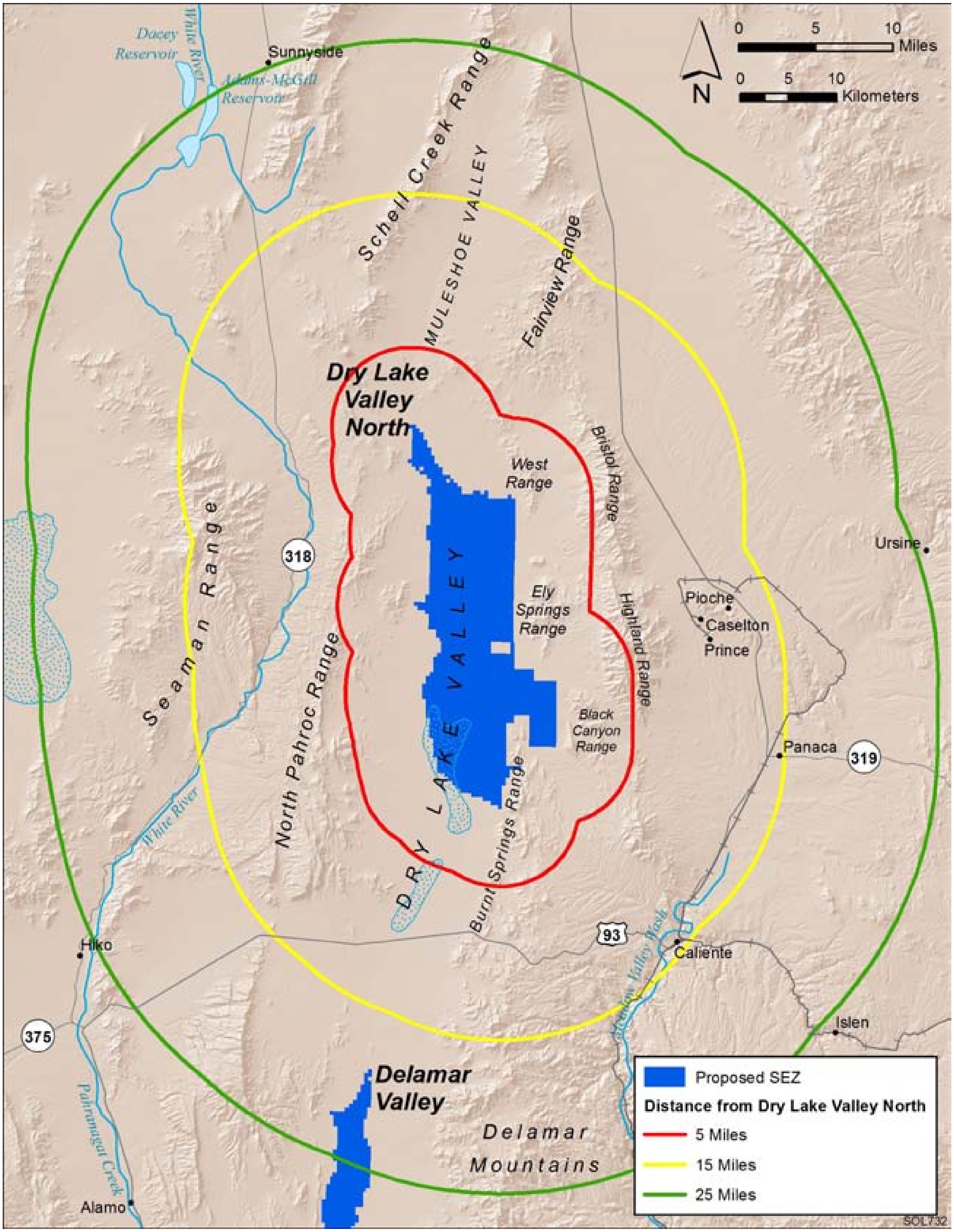

FIGURE 11.4.14.1-1 Proposed Dry Lake Valley North SEZ and Surrounding Lands

The SEZ itself is of low scenic quality because of the general lack of topographic relief, water, variety, or other distinctive visual features. The adjacent mountains add somewhat to the scenic quality, particularly when viewed from nearby locations within the SEZ. The mountain slopes and peaks to the east and west of the SEZ are, in general, visually pristine. Panoramic views of the SEZ are shown in Figures 11.4.14.1-2, 11.4.14.1-3 and 11.4.14.1-4.

The Silver State Trail is a 240-mi (386-km) long multiuse trail that encircles the SEZ and allows visitors access to the mountain ranges that surround Dry Lake Valley. Portions of the Silver State Trail are in the viewshed of the SEZ. No inhabited communities occur within the viewshed of the SEZ, and there are few, if any, residences.

The BLM conducted a VRI for the SEZ and surrounding lands in 2004. 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 4, indicating low relative visual values (BLM 2009f). The BLM conducted a new VRI for the SEZ and surrounding lands in 2010; however, the VRI was not completed in time for the new data to be included in the Draft PEIS. The new VRI data will be incorporated into the analyses presented in the Final PEIS.

The *Ely District Record of Decision and Approved Resource Management Plan* (BLM 2008a) indicate that the SEZ is managed as VRM Class IV, which permits major modification of the existing character of the landscape. More information about the BLM VRM program is presented in Section 5.12 and in *Visual Resource Management*, BLM Manual Handbook 8400 (BLM 1984).

11.4.14.2 Impacts

The potential for impacts from utility-scale solar energy development on visual resources within the proposed Dry Lake Valley North 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 on the location of a project and a relatively complete and accurate description of its major components and their layout, it is

FIGURE 11.4.14.1-2 Approximately 180° Panoramic View of the Proposed Dry Lake Valley North SEZ, from Southern Portion, Looking West toward North Pahroc Range

FIGURE 11.4.14.1-3 Approximately 120° Panoramic View of the Proposed Dry Lake Valley North SEZ, from East–Central Portion, Looking North toward Schell Creek and West Ranges

FIGURE 11.4.14.1-4 Approximately 120° Panoramic View of the Proposed Dry Lake Valley North SEZ, from Far Northwestern Portion, Looking Southeast toward West and Ely Springs Ranges (Foreground) and Bristol and Highland Ranges (Background)

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 used for the visual impact assessment presented 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.

11.4.14.2.1 Impacts on the Proposed Dry Lake Valley North SEZ

Some or all of the SEZ could be developed for one or more utility-scale solar energy projects, utilizing one or more of the solar energy technologies described in Appendix F. Because of the industrial nature and large size of utility-scale solar energy facilities, large visual impacts on the SEZ would occur as a result of the construction, operation, and decommissioning of solar energy projects. In addition, large impacts could occur at solar facilities utilizing highly reflective surfaces or major light-emitting components (solar dish, parabolic trough, and power tower technologies). 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 11.4.22.4.13 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, which permits major modification of the existing character of the landscape. As noted above, the entire SEZ is currently managed as VRM Class IV. 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.

11.4.14.2.2 Impacts on Lands Surrounding the Proposed Dry Lake Valley North 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 is no impact.

Preliminary viewshed analyses were conducted to identify which lands surrounding the proposed SEZ are visible from the SEZ (see Appendix M for important information on assumptions and limitations of the methods used). Four viewshed analyses were run, assuming four different heights representative of project elements associated with potential solar energy technologies: PV and parabolic trough arrays (24.6 ft [7.5 m]), solar dishes and power blocks for 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 11.4.14.2-1 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 in 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 figures and discussed in the text. These heights represent the maximum and minimum landscape visibility for solar energy technologies analyzed in the PEIS. Viewsheds for solar dish and CSP technology power blocks (38 ft [11.6 m]), and transmission towers and short solar power towers (150 ft [45.7 m]) are presented in Appendix N. The visibility of these facilities would fall between that for tall power towers and PV and parabolic trough arrays.

Impacts on Selected Federal-, State-, and BLM-Designated Sensitive Visual Resource Areas. Figure 11.4.14.2-2 shows the results of a GIS analysis that overlays selected federal, state, and BLM-designated sensitive visual resource areas onto the combined tall solar power tower (650 ft [198.1 m]) and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds in order to illustrate which of these sensitive visual resource areas would have views of (and potentially be subject to visual impacts from) solar facilities within the SEZ. 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 to indicate the effect of distance from the SEZ on impact levels. The scenic resources included in the analysis 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;

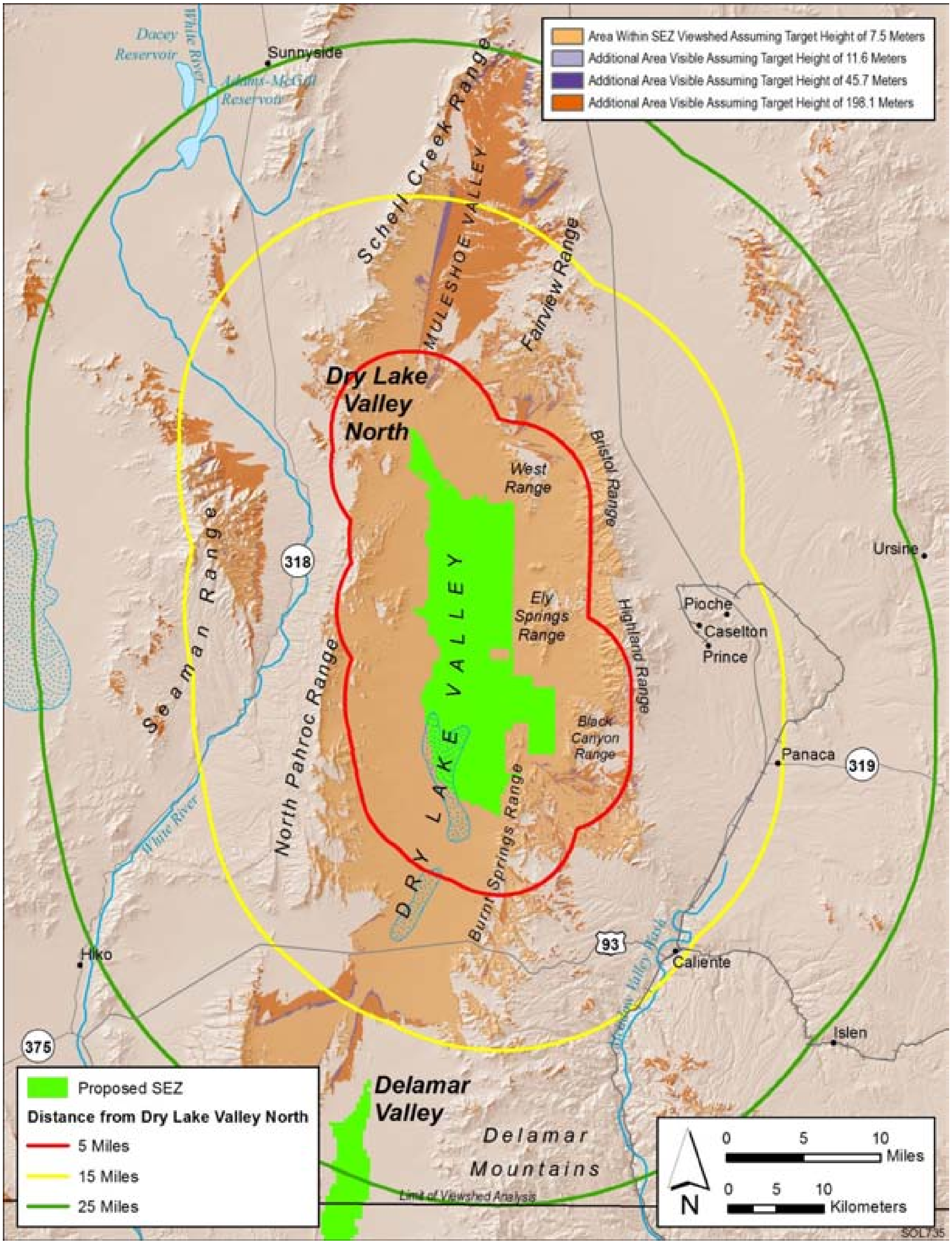

FIGURE 11.4.14.2-1 Viewshed Analyses for the Proposed Dry Lake Valley North SEZ and Surrounding Lands, Assuming Solar Technology Heights of 24.6 ft (7.5 m), 38 ft (11.6 m), 150 ft (45.7 m), and 650 ft (198.1 m) (shaded areas indicate lands from which solar development within the SEZ could be visible)

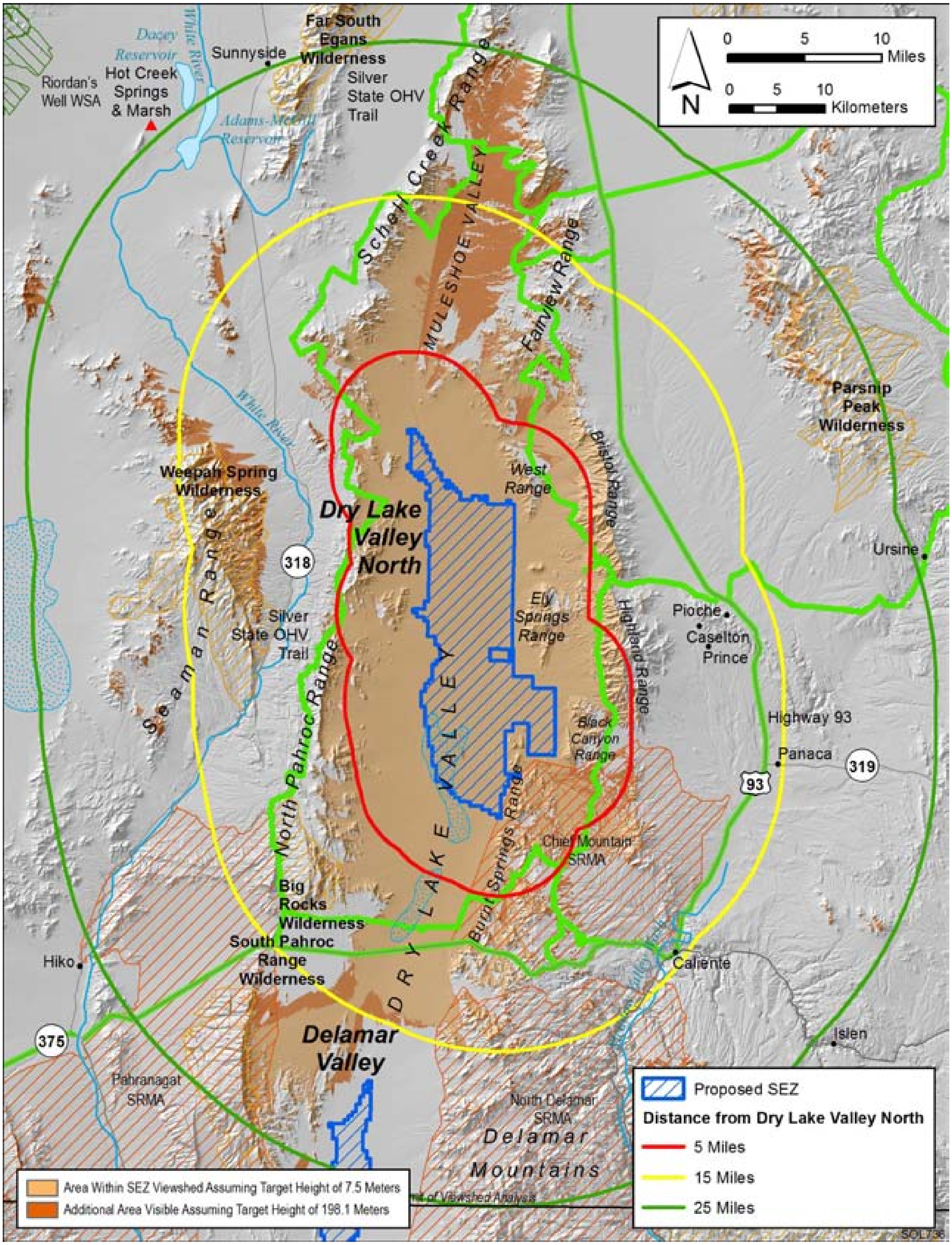

FIGURE 11.4.14.2-2 Overlay of Selected Sensitive Visual Resource Areas onto Combined 650-ft (198.1-m) and 24.6-ft (7.5-m) Viewsheds for the Proposed Dry Lake Valley North SEZ

- 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 Valley North SEZ are discussed below. The results of this analysis are also summarized in Table 11.4.14.2-1. Further discussion of impacts on these areas is presented in Sections 11.4.3 (Specially Designated Areas and Lands with Wilderness Characteristics) and 11.4.17 (Cultural Resources) of this PEIS. The following visual impact analysis describes *visual contrast levels* rather than *visual impact levels*. *Visual contrasts* are changes in the seen landscape, including changes in the forms, lines, colors, and textures of objects seen in the landscape. A measure of *visual impact* includes potential human reactions to the visual contrasts arising from a development activity, based on viewer characteristics, including attitudes and values, expectations, and other characteristics that 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.

TABLE 11.4.14.2-1 Selected Potentially Affected Sensitive Visual Resources within the 25-mi (40-km) Viewshed of the Proposed Dry Lake Valley North SEZ, Assuming a Target Height of 650 ft (198.1 m)[a]

		Feature Area or Linear Distance[b]		
			Visible between	
Feature Type	Feature Name (Total Acreage/ Linear Distance)[a]	Visible within 5 mi	5 mi and 15 mi	15 mi and 25 mi
WA	Big Rocks (12,929 acres)	0 acres	1,590 acres (12%)	0
	Clover Mountains (85,621 acres)	0 acres	0 acres	26 acres (0.03%)
	Far South Egans (36,297 acres)	0 acres	0 acres	454 acres (1%)
	Parsnip Peak (43,485 acres)	0 acres	0 acres	1,833 acres (4%)
	South Pahroc Range (25,674 acres)	0 acres	0 acres	2,391 acres (9%)
	Weepah Spring (51,309 acres)	0 acres	13,468 acres (26%)	132 acres (0.3%)
Scenic Highway	U.S. 93	0 acres	10 mi	0
	Silver State	35 mi	(50 mi)	(15 mi)
SRMA	Chief Mountain (111,151 acres)	23,387 acres (21%)	15,689 acres (14%)	0
	Delamar North (202,839 acres)	0 acres	4,009 acres (2%)	2,377 acres (1%)
	Pahranagat (298,567 acres)	0 acres	0 acres	8,403 acres (3%)

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.

Wilderness Areas

- *Big Rocks*—Big Rocks is a 12,929-acre (52.322-km^2), congressionally designated WA located 8.2 mi (13.2 km) southwest of the SEZ. Recreational opportunities include climbing, bouldering, camping, hiking, backpacking, hunting, and horseback riding. Little Boulder Spring hiking trail is 2 mi (3 km) long and begins on the east side of the wilderness area. This trail winds its way up to a peak with views of the South Pahroc Range and the SEZ.

As shown in Figure 11.4.14.2-2, solar energy facilities within the SEZ could be visible from the southeastern portion of the WA (approximately 1,590 acres [6.435 km^2] in the 650-ft [198.1-m] viewshed, and 1,397 acres [5.654 km^2] in the 24.6-ft [7.5-m] viewshed, or 11% of the total WA acreage). The visible area of the WA extends from approximately 9.1 mi (14.6 km) to 12 mi (19 km) from the southwestern boundary of the SEZ.

Figure 11.4.14.2-3 is a Google Earth visualization of the SEZ (highlighted in orange) as seen from an unnamed peak in the southeastern portion of the WA, approximately 9.6 mi (15.5 km) from the nearest point on the southwest boundary 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 aide for assessing the approximate size and viewing angle of utility-scale solar facilities.

The receiver towers depicted in the visualization are properly scaled models of a 459-ft (139.9-m) power tower with an 867-acre (3.5-km^2) field of 12-ft (3.7-m) heliostats, each representing approximately 100 MW of electric generating capacity. Three groups of four models were placed in the SEZ for this and other visualizations shown in this section of the PEIS. In the visualization, the SEZ area is depicted in orange, the heliostat fields in blue.

The viewpoint is from an unnamed peak in the North Pahroc Range, at an elevation of approximately 6,980 ft (2,130 m), 9.6 mi (15.5 km) from the nearest point in the SEZ. The viewpoint is approximately 2,400 ft (730 m) higher in elevation than the nearest point in the SEZ, and from this height and view orientation, the SEZ occupies most of the horizontal field of view. At the 80% development scenario analyzed in this PEIS, solar facilities within the SEZ would likely appear as a moderately wide band of contrasting forms, textures, and colors beneath the mountain ranges that border the eastern side of the SEZ.

Despite the nearly 10-mi (16-km) distance from the viewpoint to the SEZ, the elevation difference between the viewpoint and the SEZ is great enough that the tops of collector/reflector arrays for solar facilities in the southern portions of the SEZ would be visible, which would increase the visible surface area of the facilities, and make their strong regular geometry more apparent, tending to increase visual contrast.

Taller ancillary facilities, such as buildings, transmission structures, and cooling towers; and plumes (if present) would likely be visible projecting

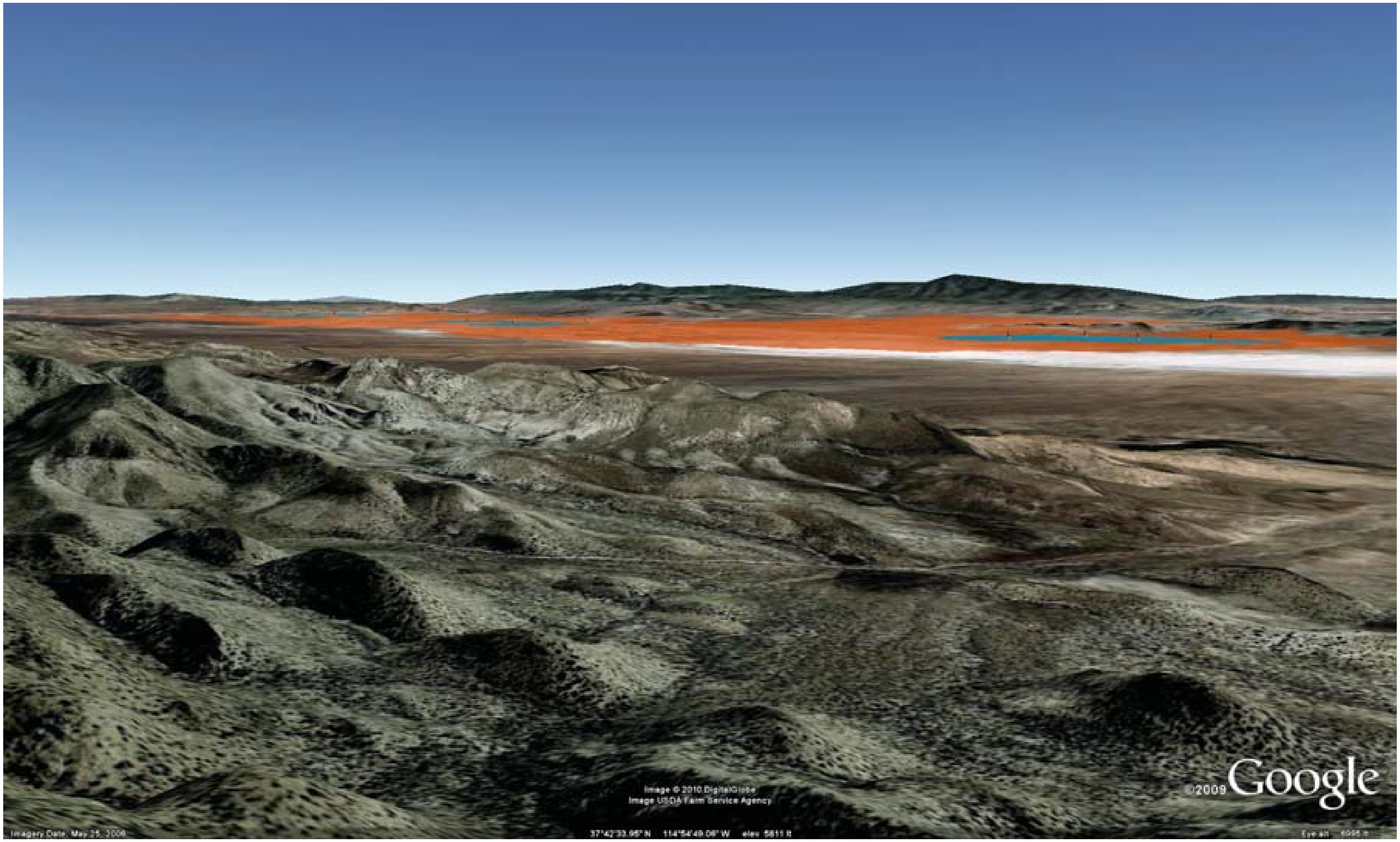

FIGURE 11.4.14.2-3 Google Earth Visualization of the Proposed Dry Lake Valley North SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Unnamed Peak in Big Rocks WA

above the collector/reflector arrays. The ancillary facilities could create form and line contrasts with the strongly horizontal, regular, and repeating forms and lines of the collector/reflector arrays.

If power tower facilities were located in the SEZ, when operating, the receivers would likely be visible as bright points of light atop discernable tower structures, against a backdrop of the valley floor. At night, if more than 200 ft (61 m) tall, power towers would have hazard navigation lights that could potentially be visible from this location. The lights could be red flashing lights or red or white strobe lights, and the light could be visible for long distances. Other lighting associated with solar facilities 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. From this viewpoint, under the 80% development scenario analyzed in this PEIS, solar development within the SEZ would be expected to dominate views from this location, and strong visual contrasts would be expected to result.

From some lower elevation viewpoints in portions of the WA within the SEZ viewshed, partial topographic screening of the SEZ would occur because the mountains within and outside the WA block views of portions of the SEZ. However, the vertical angle of view is great enough that in most of these partially screened areas, at least weak levels of visual contrast would be expected, and where views of the SEZ are unobstructed, moderate levels of visual contrast would be expected. Overall, under the 80% development scenario, weak to strong visual contrasts would be expected from solar energy facilities within the SEZ, as viewed from portions of the Big Rocks WA within the SEZ viewshed.

- *Clover Mountains*—Clover Mountains is an 85,621-acre (346.50-km^2) congressionally designated WA located 24 mi (39 km) at the point of closest approach southeast of the SEZ. Hiking, camping, climbing, and rock scrambling, as well as horseback riding opportunities are, outstanding because of the variety of scenic topography in the WA.

  As shown in Figure 11.4.14.2-2, within 25 mi (40 km) of the SEZ, solar energy facilities within the SEZ could be visible from a very small area at the northernmost tip of the WA. Visible areas of the WA within the 25-mi (40-km) radius of analysis total approximately 26 acres (0.11 km^2) in the 650-ft (198.1-m) viewshed, or 0.03% of the total WA acreage, and 16 acres [0.07 km^2] in the 24.6-ft (7.5-m) viewshed, or 0.02% of the total WA acreage. The visible area of the WA extends close to 25 mi (40 km) from the southern boundary of the SEZ.

The area of the WA within the SEZ viewshed is near the summit of a 7,272-ft (2,217-m) peak near Ella Mountain, close to 25 mi (40 km) from the SEZ. The area is partially wooded, and vegetation may screen some views from within the area. Mountains between the viewpoint and the SEZ screen most of the SEZ from view. Because of the very long distance to the SEZ, the angle of view is very low, and except for power towers, solar facilities within the Dry Lake Valley North SEZ would likely not be visible from the WA. The upper portions of sufficiently tall power towers placed within certain portions of the SEZ might be visible as distant points of light on the northwestern horizon during the day and, if more than 200 ft (61 m) tall, would have navigation warning lights at night that could potentially be visible from the WA. Under the 80% development scenario analyzed in this PEIS, minimal levels of visual contrast would be expected.

- *Far South Egans*—Far South Egans is a 36,297-acre (146.89-km^2) congressionally designated WA located 21 mi (34 km) at the point of closest approach north to northwest of the SEZ. Hiking, camping, and backpacking are demanding because of the terrain. Technical rock climbers may find challenges all along the western side of the wilderness area.

  As shown in Figure 11.4.14.2-2, within 25 mi (40 km) of the SEZ, solar energy facilities within the SEZ could be visible from the highest elevations on southeast facing ridges and from some peak sat the far southern end of the Egan Range within the WA. Visible areas of the WA within the 25-mi (40-km) radius of analysis total about 454 acres (1.84 km^2) in the 650-ft (198.1-m) viewshed, or 1% of the total WA acreage, and 292 acres [1.18 km^2] in the 24.6-ft (7.5-m) viewshed, or 0.8% of the total WA acreage. The visible area of the WA is about 24 mi (39 km) from the northern boundary of the SEZ.

  Figure 11.4.14.2-4 is a Google Earth visualization of the SEZ (highlighted in orange) as seen from Whipple Peak (elevation 8,828 ft [2,690 m]) near the south end of the Egan Range, about 23 mi (38 km) from the northernmost point of the SEZ. The visualization suggests that even though intervening mountains partially screen the view of the SEZ, because of the 3,700-ft (1,130-m) elevation difference between the viewpoint and the SEZ, a substantial portion of the SEZ is visible. However, the SEZ is so distant that it occupies a small portion of the horizontal field of view, and the angle of view is low. Solar facilities within the SEZ would be seen nearly on edge, tending to repeat the line of the horizon, which would reduce visual contrast. The receivers of power towers within the SEZ could be visible as distant points of light just under the southwest horizon, against the backdrop of the distant valley floor. At night, if more than 200 ft (61 m) tall, power towers would have navigation warning lights that could potentially be visible from this location. Under the 80% development scenario analyzed in this PEIS, weak levels of visual contrast would be expected.

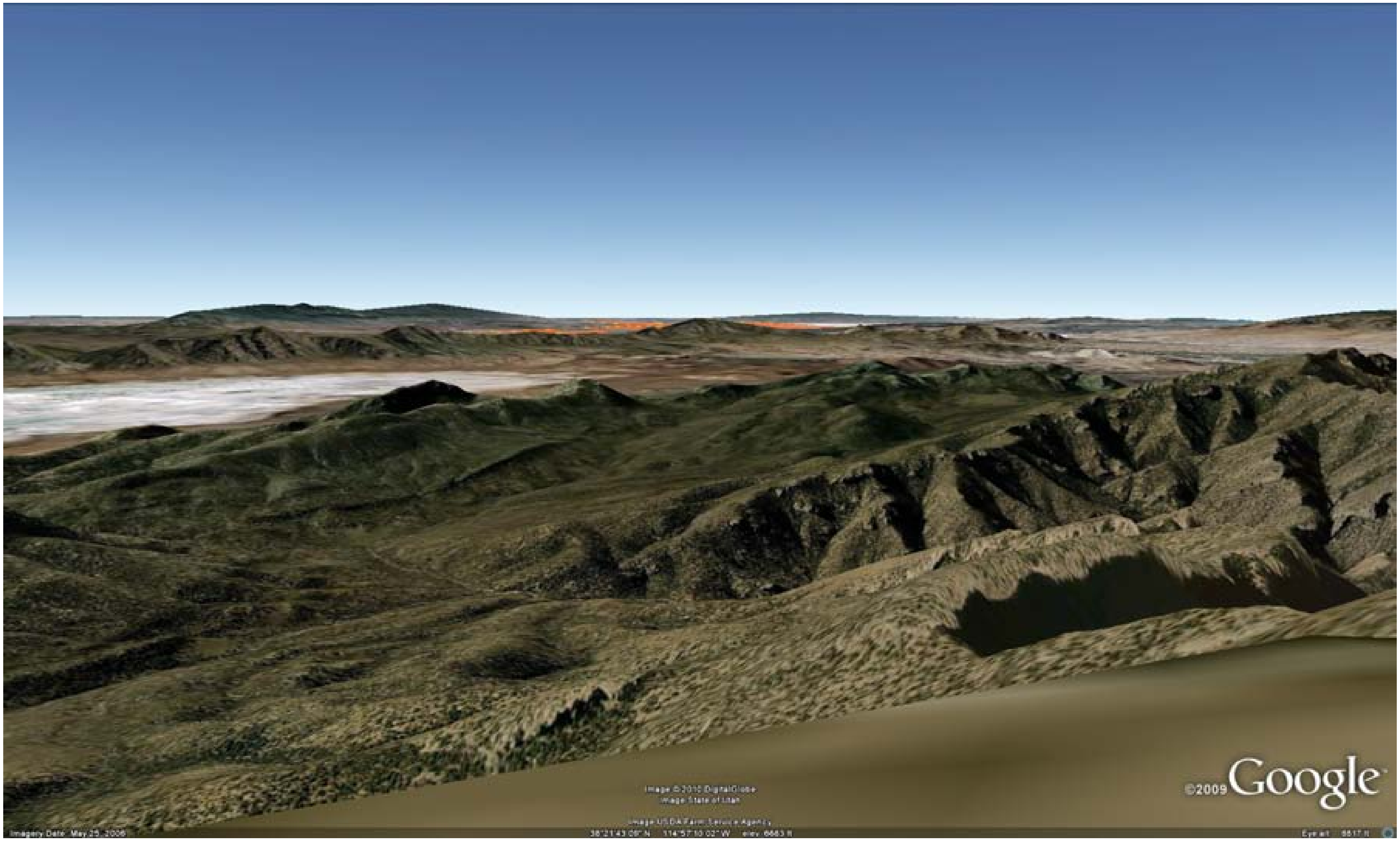

FIGURE 11.4.14.2-4 Google Earth Visualization of the Proposed Dry Lake Valley North SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Whipple Peak in Far South Egans WA

In general, visual contrasts associated with solar facilities within the SEZ would depend on viewer location within the WA, 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, where there were unobstructed views, contrasts would be expected to be minimal to weak.

- *Parsnip Peak*—Parsnip Peak is a 43,485-acre (175.98 km^2) congressionally designated WA located 19 mi (31 km) at the point of closest approach northeast of the SEZ. Parsnip Peak WA is good for hiking, camping, backpacking, horseback riding, rock climbing, hunting and trapping, plus the study of archaeology and geology. The wilderness area provides excellent opportunities for solitude, particularly in the thick stands of aspen along the eastern side of Parsnip Peak (8,916 feet [2,718 m]).

  As shown in Figure 11.4.14.2-2, within 25 mi (40 km), solar energy facilities within the SEZ could be visible from the far northwestern portion of the WA. Visible areas of the WA within the 25-mi (40-km) radius of analysis total approximately 1,833 acres (7.418 km^2) in the 650-ft (198.1-m) viewshed, or 4% of the total WA acreage, and 505 acres (2.04 km^2) in the 24.6-ft (7.5-m) viewshed, or 1% of the total WA acreage. The visible area of the WA extends to about 23 mi (37 km) from the eastern boundary of the SEZ.

  The Bristol and Highland ranges screen most of the Dry Lake Valley North SEZ from view from within the WA. Only the relatively small, far northern part of the SEZ would be visible from within the WA. The visible portion of the SEZ would occupy a small portion of the horizontal field of view. Despite the elevated viewpoints within the WA, because of the long distance to the SEZ the angle of view is low, and the collector/reflector arrays of solar facilities within the SEZ would be seen edge on. This would reduce their apparent size, conceal their strong regular geometry, and cause them to appear to repeat the strong horizon line, thereby reducing potential levels of visual contrast. The receivers of power towers placed within the visible portion of the SEZ might be visible as distant points of light on the western horizon, and could be visible at night if tall enough to require hazard navigation lighting.

  In general, visual contrasts associated with solar facilities within the SEZ would depend on viewer location within the WA, 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, where there were unobstructed views, contrasts would be expected to be minimal to weak.

- *South Pahroc Range*—The South Pahroc Range is a 25,674-acre (103.90-km^2) congressionally designated WA located 18 mi (29 km) southwest of the SEZ. Hiking, backpacking, horseback riding, and camping opportunities are good throughout the South Pahroc Range Wilderness. Climbers and rock scramblers will find challenging routes that culminate in scenic overlooks atop gargantuan geologic features. Vantage points for hikers provide views of vast desert valleys, interrupted by intervening chains of more distant mountains.

As shown in Figure 11.4.14.2-2, within 25 mi (40 km) of the SEZ, solar energy facilities within the SEZ could be visible from the eastern edge of the South Pahroc Range, including Hyko Peak, which at an elevation of 7,950 ft (2,423 m) is the high point within the WA. A few small, isolated areas with SEZ visibility occur farther west at high elevations within the WA. The viewshed encompasses about 2,391 acres (9.676 km^2) in the 650-ft (198.1-m) viewshed, or 9% of the total WA acreage, and 2,209 acres (8.940 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 from the point of closest approach to beyond 25 mi (40 km) from the southwestern boundary of the SEZ.

Figure 11.4.14.2-5 is a Google Earth visual of the SEZ (highlighted in orange) as seen from Hyko Peak in the south–central portion of the South Pahroc Range, approximately 23 mi (38 km) from the southern boundary of the SEZ. The visualization suggests that even though intervening mountains partially screen the view of the northern end of the SEZ, most of the SEZ is visible, and it would occupy a substantial portion of the horizontal field of view. However, the SEZ is so distant that the angle of view is low. Under the 80% development scenario analyzed in this PEIS, solar facilities within the SEZ would likely appear as a narrow band of contrasting form and color beneath the mountain ranges that border the eastern side of the SEZ. Solar facilities within the SEZ would be seen nearly on edge. This would reduce their apparent size, conceal their strong regular geometry, and cause them to appear to repeat the strong horizon line, thereby reducing potential levels of visual contrast. The receivers of power towers placed within the visible portion of the SEZ might be visible as distant points of light against the backdrop of the distant valley floor, and could be visible at night if tall enough to require hazard navigation lighting. Under the 80% development scenario analyzed in the PEIS, weak levels of visual contrast would be expected.

From lower elevations within the WA, intervening terrain screens more of the SEZ, and in some areas very little of the SEZ is visible. The angle of view is lower as well, so that the SEZ would be seen as a very narrow band of contrasting line and color. In these areas, weak visual contrasts would be expected from solar energy development within the SEZ.

- *Weepah Spring*—Weepah Spring is a 51,309-acre (207.64-km^2) congressionally designated WA located 8.4 mi (13.5 km) at the point of closest approach west of the SEZ. The Weepah Spring WA provides excellent opportunities for solitude among the forested slopes or in one of the many

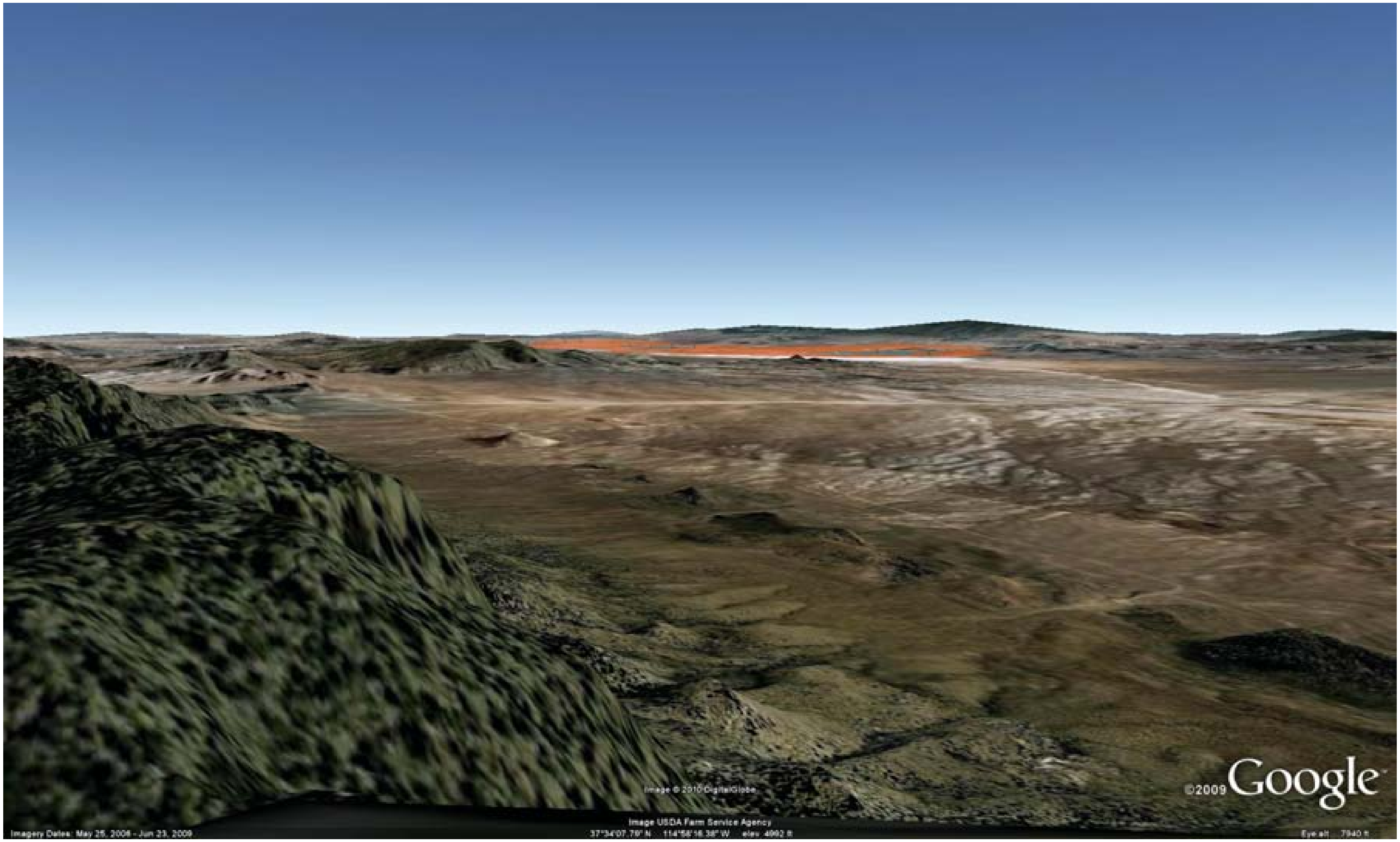

FIGURE 11.4.14.2-5 Google Earth Visualization of the Proposed Dry Lake Valley North SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Hyko Peak in South Pahroc WA

meandering washes and canyons. Recreational pursuits include camping, hiking, backpacking, hunting, and horseback riding.

As shown in Figure 11.4.14.2-2, within 25 mi (40 km) of the SEZ, solar energy facilities within the SEZ could be visible from much of the eastern half of the WA. Visible areas of the WA within the 25-mi (40-km) radius of analysis total approximately 13,600 acres (55.037 km^2) in the 650-ft (198.1-m) viewshed, or 27% of the total WA acreage, and 8,105 acres (32.800 km^2) in the 24.6-ft (7.5-m) viewshed, or 16% of the total WA acreage. The visible area of the WA extends to approximately 15 mi (24 km) from the western boundary of the SEZ.

Figure 11.4.14.2-6 is a Google Earth visualization of the SEZ (highlighted in orange) as seen from an unnamed peak on Timber Mountain in the central portion of the Seaman Range, about 14 mi (23 km) from the nearest point on the western boundary of the SEZ. The viewpoint elevation is about 8,100 ft (2,470 m), 3,240 ft (990 m) above the nearest point in the SEZ. The viewpoint area contains some open stands of trees, which could provide partial screening of views of the SEZ. From this height and view orientation directly west of the SEZ, the SEZ occupies most of the horizontal field of view. At the 80% development scenario analyzed in the PEIS, solar facilities within the SEZ would likely appear as a thin band of contrasting forms, textures, and colors beneath the mountain ranges that border the eastern side of the SEZ. The elevation difference between the viewpoint and the SEZ is great enough that the tops of collector/reflector arrays for solar facilities in the SEZ would be visible, which would increase the visible surface area of the facilities, and make their strong regular geometry more apparent, tending to increase visual contrast.

Taller ancillary facilities, such as buildings, transmission structures, and cooling towers; and plumes (if present) would likely be visible projecting above the collector/reflector arrays, and could create visual contrasts with the strongly horizontal and regular geometry of the arrays.

If power tower facilities were located in the SEZ, when operating, the receivers would likely be visible as bright points of light atop discernable tower structures, against a backdrop of the valley floor. At night, if more than 200 ft (61 m) tall, power towers would have hazard navigation lights that could potentially be visible from this location.

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. From this viewpoint, under the 80% development scenario analyzed in this PEIS, strong visual contrasts would be expected from solar energy facilities within the SEZ.

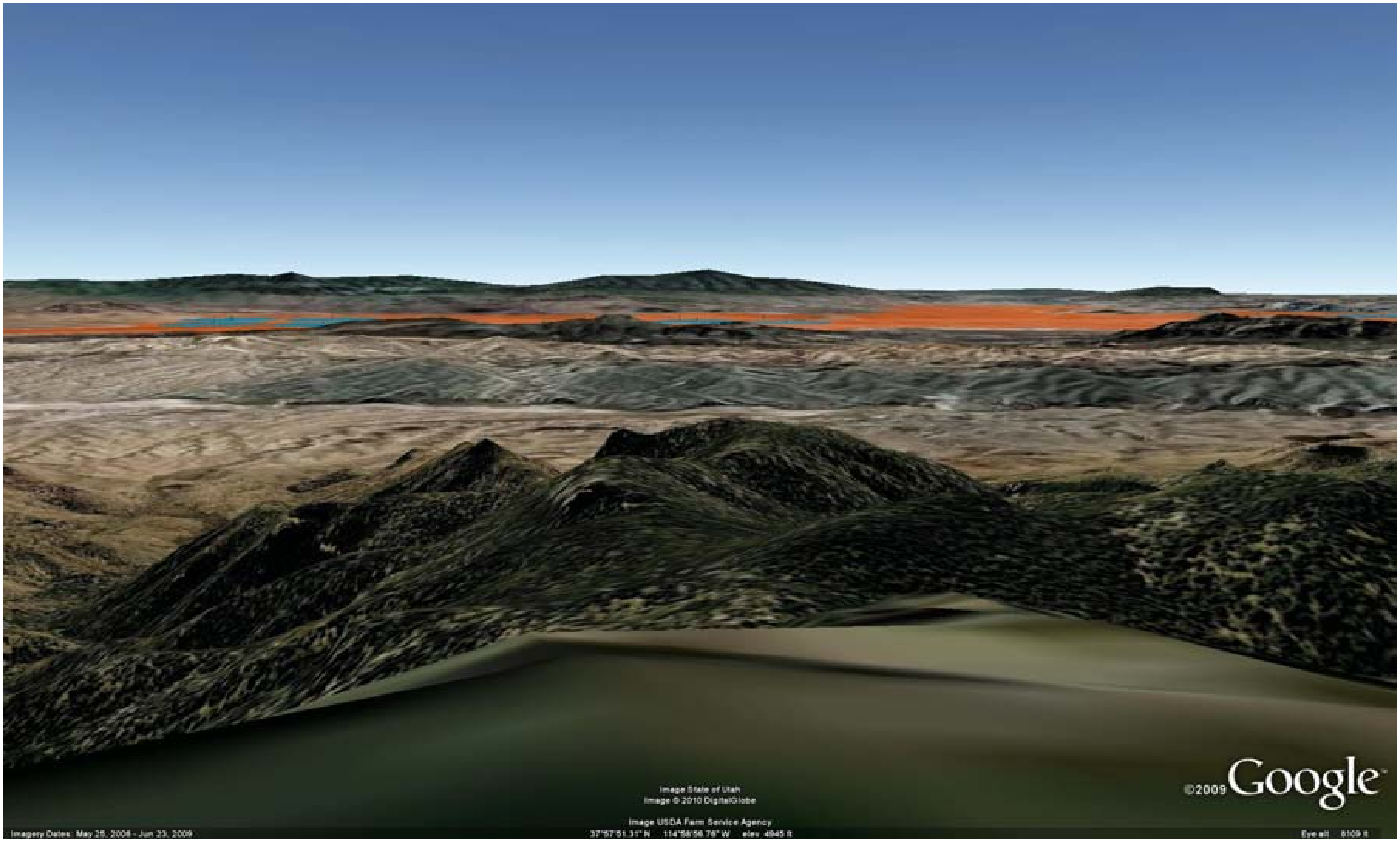

FIGURE 11.4.14.2-6 Google Earth Visualization of the Proposed Dry Lake Valley North SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Viewpoint within Weepah Spring WA

From some lower elevation viewpoints in portions of the WA within the SEZ viewshed, partial topographic screening of the SEZ would occur because the mountains between the WA and the SEZ block views of portions of the SEZ. In some locations, screening would block most of the SEZ from view, and weak levels of visual contrast would be expected; however, there are areas where gaps in the intervening mountain ranges are sufficient that moderate levels of visual contrast might result. Overall, under the 80% development scenario, weak to strong visual contrasts would be expected from solar energy facilities within the SEZ, as viewed from portions of the Weepah Spring WA within the SEZ viewshed. The highest contrast levels would be expected at the highest elevations in the central portion of the WA, with lower levels of contrast expected for lower elevations, particularly in the eastern and southern portions of the WA, where the low elevations and proximity of intervening mountains would decrease visibility of the SEZ.

BLM-Designated Special Recreation Management Areas

- *Chief Mountain*—The 111,151-acre (449.812-km^2) Chief Mountain SRMA is located adjacent to portions of the southeast boundary of the SEZ. The area of the SRMA within the 650-ft (198.1-m) viewshed of the SEZ includes 39,076 acres (158.135 km^2), or 35% of the total SRMA acreage. The area of the SRMA within the 24.6-ft (7.5-m) viewshed of the SEZ includes 73 acres (0.30 km^2), or 0.07% of the total SRMA acreage. The visible area extends from the point of closest approach adjacent to the SEZ boundary to 10 mi (16 km) into the SRMA from the southeast boundary of the SEZ.

  As shown in Figure 11.4.14.2-2, the northwest portion of the SRMA is within the SEZ viewshed. Figure 11.4.14.2-7 is a Google Earth visualization of the SEZ (highlighted in orange) as seen from a jeep trail near the western boundary of the SRMA, about 1.3 mi (2.1 km) southeast of the southernmost tip of the SEZ. The viewpoint is less than 100 ft (30 m) higher in elevation than the nearest point in the SEZ.

  Under the 80% development scenario analyzed in this PEIS, solar facilities within the SEZ would stretch across most of the horizontal field of view. Because the viewpoint is so close in elevation to the nearby SEZ, the vertical angle of view between the viewpoint and the SEZ is very low, and the collector/reflector arrays of solar facilities within the SEZ would be seen edge on, which would reduce their apparent size, conceal their strong regular geometry, and cause them to appear to repeat the strong horizon line, all of which would tend to decrease visual contrasts. If facilities were located in the closest parts of the SEZ, however, the array components could be so close to the viewer that their individual forms could be apparent, and they might not appear as a line against the horizon.

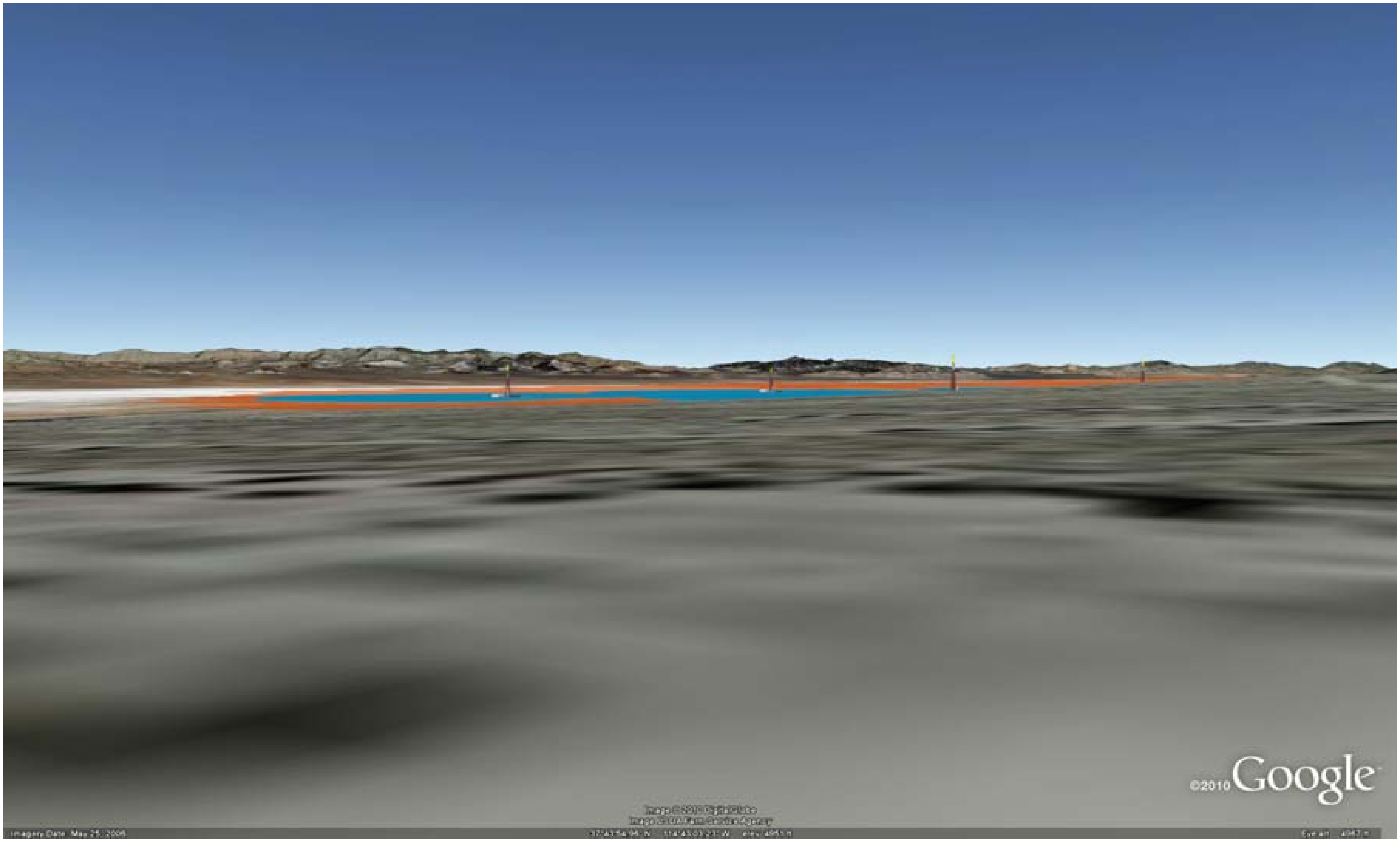

FIGURE 11.4.14.2-7 Google Earth Visualization of the Proposed Dry Lake Valley North SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Jeep Road in Western Portion of Chief Mountain SRMA

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 nearby facilities could be evident. The ancillary facilities could create form and line contrasts with the strongly horizontal, regular, and repeating forms and lines of the collector/reflector arrays. Color and texture contrasts would also be 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, given the dark night skies of this remote valley. Other light sources associated with the solar facilities within the SEZ would likely be visible as well.

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.

Figure 11.4.14.2-8 is a Google Earth visualization of the SEZ (highlighted in orange) as seen from the summit of Chief Mountain, in the interior of the SRMA, about 7.6 mi (12.2 km) southeast of the southern portion of the SEZ. The viewpoint is 2,600 ft (790 m) higher in elevation than the SEZ.

Despite the greatly increased distance, under the 80% development scenario analyzed in this PEIS, solar facilities within the SEZ would still stretch across most of the horizontal field of view. Because the viewpoint is so much higher in elevation than the SEZ, the vertical angle of view between the viewpoint and the SEZ is high enough that the tops of collector/reflector arrays of solar facilities within the SEZ would be visible, which would make their large areal extent and strong regular geometry more apparent, which would tend to increase visual contrasts.

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 nearby facilities could be evident. The ancillary facilities could create form and line contrasts

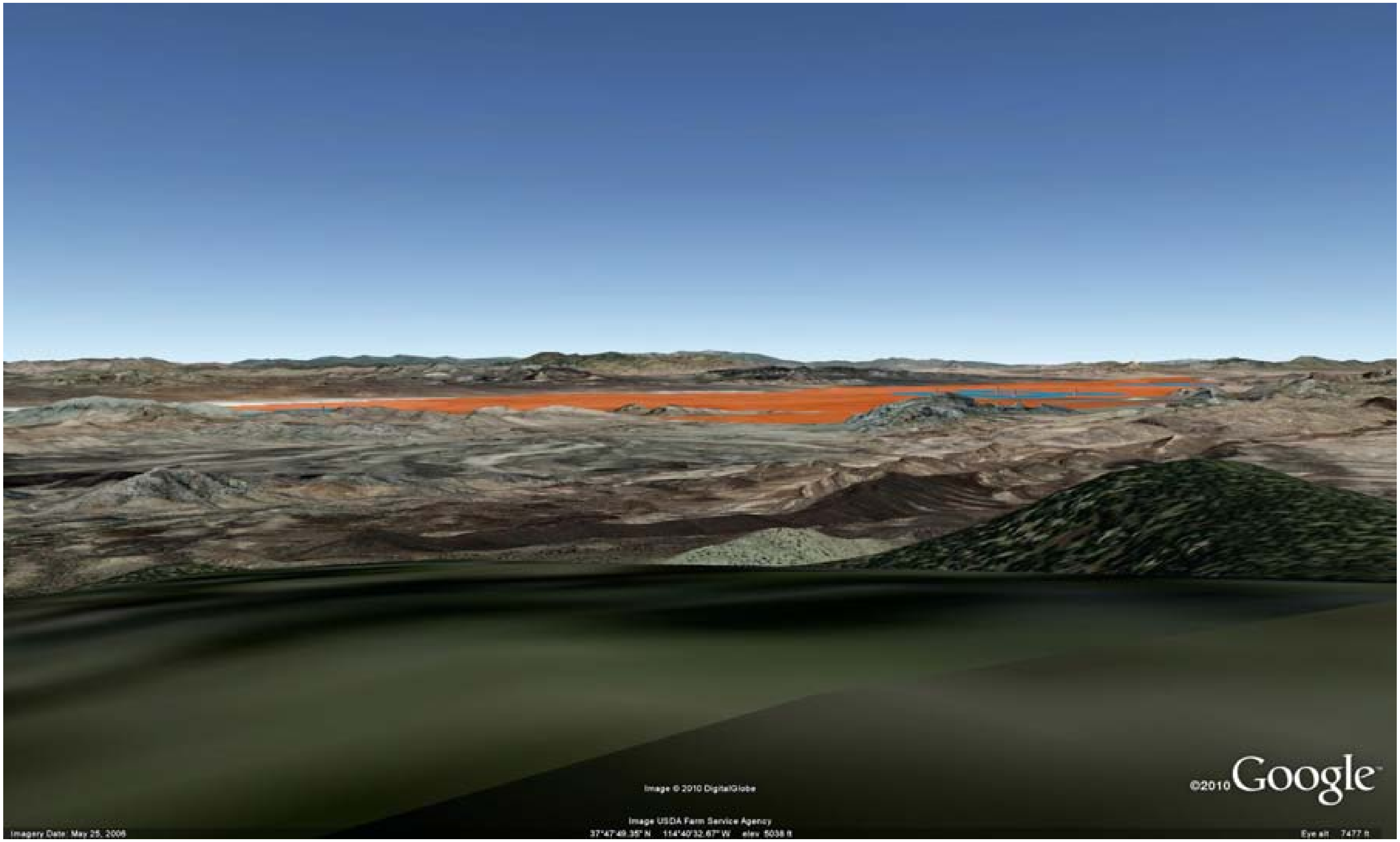

FIGURE 11.4.14.2-8 Google Earth Visualization of the Proposed Dry Lake Valley North SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Summit of Chief Mountain in Chief Mountain SRMA

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 points of light atop barely discernable tower structures, while those farther from the viewpoint would have diminished brightness and less detail visible. At night, sufficiently tall power towers could have flashing red or white hazard lighting that would likely be visible from this viewpoint, and could be conspicuous, given the dark night skies of this remote valley.

Because the SEZ would occupy so much of the horizontal field of view and because of the elevated viewpoint, 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.

At lower elevations in the interior of the SRMA screening would block most or all of the SEZ from view, and much weak levels of visual contrast would be expected; however, there are areas where gaps in the intervening mountain ranges are sufficient that moderate levels of visual contrast might result. Overall, under the 80% development scenario, weak to strong visual contrasts would be expected from solar energy facilities within the SEZ, as viewed from portions of the Chief Mountain SRMA within the SEZ viewshed. The highest contrast levels would be expected at higher elevations in the western portion of the SRMA, with lower levels of contrast expected for lower elevations, particularly in the eastern and southern portions of the SRMA, where the low elevations and proximity of intervening mountains would decrease visibility of the SEZ.

- *North Delamar*—The 202,839 acre (820.860 km^2) North Delamar SRMA is located about 11 mi (18 km) south of the SEZ, and the far northwestern portion of the SRMA is within the SEZ viewshed. The area of the SRMA within the 650-ft (198.1-m) viewshed of the SEZ includes 6,386 acres (25.84 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 3,983 acres (16.12 km^2), or 2% of the total SRMA acreage. The visible area extends from the point of closest approach to 22 mi (35 km) into the SRMA from the southern boundary of the SEZ.

  As shown in Figure 11.4.14.2-2, scattered areas across the northern portion of the SRMA are within the SEZ viewshed, with the main area having potential visibility of solar facilities within the SEZ being the far northwest corner of the SRMA, at a distance of about 11 mi (18 km). Views of the SEZ are nearly completely screened by mountains in the Burnt Springs Range north of the SRMA, but a very small portion of the southwest corner of the SEZ could be seen from the SRMA. Because of the extensive screening of views toward the SEZ, the SEZ would occupy a very small portion of the horizontal field of view, and visual contrasts from solar facilities within the SEZ would be expected to be weak for viewpoints within the North Delamar SRMA.

- *Pahranagat*—The 298,567-acre (1,208.26-km^2) Pahranagat SRMA is located approximately 11 mi (18 km) southwest of the SEZ at the point of closest approach. The primary recreational values for Pahranagat SRMA include heritage tourism and motorized recreation (BLM 2007e).

  Approximately 8,403 acres (34.01 km^2), or 3% of the SRMA, are within the 650-ft (198.1-m) viewshed of the SEZ, and 6,397 acres (25.89 km2), 2% of the SRMA, are within the 24.6-ft (7.5-m) viewshed. The portions of the SRMA within the viewshed extend from 17 mi (27 km) southwest of the SEZ to beyond 25 mi (40 km) of the SEZ.

  As shown in Figure 11.4.14.2-2, the eastern slopes and bajada of the South Pahroc Range within the SRMA are within the SEZ viewshed. Lower elevation views of the SEZ are largely screened by intervening hills; however, the highest elevations in the South Pahroc Range have more open views of the southern end of the SEZ, and from some locations, the SEZ would occupy a moderate amount of the field of view. The distance to the SEZ is far enough that despite elevated viewpoints, the vertical angle of view to the SEZ is quite low, and collector/reflector arrays of solar facilities in the SEZ would be seen edge-on which would reduce their apparent size, conceal their strong regular geometry, and cause them to appear to repeat the strong line of the horizon, substantially reducing visual contrasts. In general, visual contrasts associated with solar facilities within the SEZ would depend on viewer location, 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, because of the long distance to the SEZ, low angle of view and partial screening of the SEZ, contrasts would be expected to be minimal to weak for viewpoints in the Pahranagat SRMA.

Scenic Highways

- *Highway 93*—U.S. 93 is a Nevada State Scenic Byway that is within 8.1 mi (13 km) east and south of the SEZ. It is 149 mi (240 km) long, with some of the highlights located between Caliente and Crystal Springs.

  Approximately 9.5 mi (15.3 km) of the byway are within the 650-ft (198.1-m) viewshed of the SEZ, and 9.3 mi (15.0 km) are within the 24.6-ft (7.5-m) viewshed. Solar facilities within the SEZ would be in full view from U.S. 93

as travelers approached from both directions. For travelers approaching the SEZ from Caliente, southeast of the SEZ, the SEZ would come into view briefly about 13 mi (21 km) west of Caliente, and about 9 mi (14 km) from the SEZ, disappear from view briefly, then become visible again about 1 minute later, at 10 mi (17 km) from Caliente, and would remain in view for about 10 minutes as travelers moved westward.

Figure 11.4.14.2-9 is a Google Earth visualization of the SEZ (highlighted in orange) as seen from U.S. 93 at about 9.2 mi (14.8 km) south-southwest of the southernmost point in the SEZ. Within the viewshed, U.S. 93 is at the same or slightly higher elevation than the southern end of the SEZ, so the angle of view between the highway and the SEZ is very low. The visualization suggests that the SEZ would occupy a substantial portion of the horizontal field of view, but because of the low viewing angle, the SEZ would appear as a very narrow band just under the line of mountains north and east of the SEZ. Solar facilities located within the SEZ would be seen edge on and would repeat the line of the horizon, which would tend to reduce visual contrast.

Facilities utilizing STGs might have plumes and other infrastructure projecting above the arrays, and transmission lines and associated infrastructure would be visible above the array as well. If power tower facilities were located within the southern portion of the SEZ, the tower structures and light sources atop the towers would be visible. The light from the power tower receivers would likely appear as bright starlike points of light against the backdrop of the distant mountain slopes. At night, if more than 200 ft (61 m) tall, power towers would have navigation warning lights that would likely be visible from the roadway. Other lighting associated with solar facilities could be visible as well.

Travelers approaching the SEZ from the west would have similar visual experiences to those just described for westbound travelers; however, the SEZ would come into view about 19 mi (31 km) east of the intersection of U.S. 93 and State Route 375 south of Hiko, 12 mi (19 km) southwest of the SEZ. Under the 80% development scenario, up to moderate levels of visual contrast would be expected from solar facilities within the SEZ, as seen from U.S. 93.

- *Silver State Trail*—Silver State Trail is a congressionally and BLM-designated scenic byway that encircles much of the SEZ, in some areas at less than 3 mi (5 km) from the SEZ. Approximately 100 mi (160 km) of the byway are within the 650-ft (198.1-m) viewshed of the SEZ, and about 75 mi (120 km) are within the 24.6-ft (7.5-m) viewshed. About 35 mi of the trail are within 5 mi (8 km) of the SEZ, while the farthest point on the trail within the SEZ 25 mi (40 km) viewshed are about 20 mi (32 km) from the SEZ, thus contrast levels associated with solar facilities in the SEZ would vary widely, with strong contrasts at the closest distances, especially where the trail was

FIGURE 11.4.14.2-9 Google Earth Visualization of the Proposed Dry Lake Valley North SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Viewpoint on U.S. 93, 9.2 mi South of the SEZ

elevated with respect to the SEZ, and minimal to weak contrasts at the longest distances.

Under the 80% development scenario analyzed in this PEIS, at or near the points on the trail closest to the SEZ, solar facilities within the SEZ would stretch across most or all of the horizontal field of view. In many places, the SEZ would be too large to be encompassed in one view, and viewers would need to turn their heads to scan across the whole SEZ. Because the viewpoints would be close in elevation to the nearby SEZ, the vertical angle of view between the viewpoint and the SEZ would be low, and the collector/reflector arrays of solar facilities within the SEZ would be seen edge on, which would reduce their apparent size, conceal their strong regular geometry, and cause them to appear to repeat the strong horizon line, all of which would tend to decrease visual contrasts. In some locations, however, if facilities were located in the closest parts of the SEZ, however, the array components could be so close to the viewer that their individual forms could be apparent, and they might not appear as a line against the horizon.

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

From many points on the trail, 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 very conspicuous from many points on the trail, given the dark night skies of this remote valley. Other light sources associated with the solar facilities within the SEZ would likely be visible as well.

Because the SEZ would occupy most or all of the horizontal field of view, and because of the potentially very close proximity of solar facilities to the trail, strong visual contrasts from solar energy development within the SEZ would be expected for many locations in the portions of the trail closest to the SEZ. 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.

> For those portions of the trail much farther from the SEZ (especially north of the SEZ) the SEZ would occupy less of the horizontal field of view, but in general, only for those portions of the trail north of the SEZ would contrasts fall to weak levels, and for much of the trail, contrasts would not be expected to fall to even moderate levels.

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 nonfederal sensitive visual resources, and communities close enough to the proposed project to be affected by visual impacts. Selected nonfederal lands and resources are included in the discussion below.

In addition to impacts associated with the solar energy facilities themselves, sensitive visual resources could be affected by facilities that would be built and operated in conjunction with the solar facilities. With respect to visual impacts, the most important associated facilities would be access roads and transmission lines, the precise location of which cannot be determined until a specific solar energy project is proposed. Currently a 69-kV transmission line is located within the proposed SEZ, so construction and operation of a transmission line outside the proposed SEZ would not be required; however, within the SEZ, transmission lines would have to be constructed to connect facilities to the existing line. For this analysis, the impacts of construction and operation of transmission lines outside of the SEZ were not assessed, assuming that the existing 69-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.

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.

11.4.14.2.3 Summary of Visual Resource Impacts for the Proposed Dry Lake Valley North 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 because of major modification of the character of the existing landscape. There is the potential for additional impacts from construction and operation of transmission lines and access roads within the SEZ.

The SEZ is in an area of low scenic quality, with some cultural disturbances already present. Local 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.

Large segments of the Silver State Trail Scenic Byway are within the viewshed of the SEZ at distances less than 5 mi (8 km), and therefore would be subject to strong visual contrasts associated with the development of solar facilities in the SEZ under the 80% development scenario analyzed in this PEIS. No other highly sensitive visual resource areas are located within 5 mi (8 km) of the SEZ. However, utility-scale solar energy development within the proposed Dry Lake Valley North SEZ is likely to result in strong visual contrasts for some viewpoints within the Big Rocks and Weepah Spring WAs and the Chief Mountain SRMA. Moderate visual contrasts would be expected for some viewpoints along U.S. 93, a state-designated scenic byway. Weak visual contrasts would be expected for other highly sensitive visual resource areas within 25 mi (40 km) of the SEZ.

11.4.14.3 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 Valley North 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 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.

11.4.15 Acoustic Environment

11.4.15.1 Affected Environment

The proposed Dry Lake Valley North SEZ is located in southeastern Nevada, in the north central portion of Lincoln County. Neither the State of Nevada nor Lincoln County has established quantitative noise-limit regulations.

U.S. 93 runs east–west as close as about 8 mi (13 km) to the south and runs south–north as close as about 8 mi (13 km) to the east of the proposed Dry Lake Valley North SEZ. State Route 318 runs south–north as close as 8 mi (13 km) to the west of the SEZ. Numerous dirt roads cross the SEZ or access livestock facilities in the area. The nearest railroad runs about 14 mi (23 km) southeast of the SEZ. Nearby airports include Lincoln County Airport in Panaca and Alamo Landing Field in Alamo, which are about 13 mi (21 km) south–southeast of and 35 mi (56 km) southwest of the SEZ. No industrial activities except grazing are located around the SEZ. Large-scale irrigated agricultural lands are situated around the SEZ but more than 12 mi (19 km) from the SEZ boundary. Private land on the east central side of the SEZ has a few ranch buildings. No sensitive receptors (e.g., hospitals, schools, or nursing homes) exist around the proposed Dry Lake Valley North SEZ. No human receptors are located around the SEZ. The closest communities include Caselton and Prince, about 10 mi (16 km) east of the SEZ. The nearby population centers with schools are Pioche, about 12 mi (19 km) east of the SEZ; Panaca, about 14 mi (23 km) east–southeast; and Caliente, about 14 mi (23 km) southeast. Accordingly, noise sources around the SEZ include road traffic, aircraft flyover, and cattle grazing. Other noise sources are associated with current land use around the SEZ, including outdoor recreation and OHV use. The proposed Dry Lake Valley North SEZ is isolated and undeveloped, the overall character of which is considered wilderness to rural. To date, no environmental noise survey has been conducted around the proposed Dry Lake Valley North SEZ. On the basis of the population density, the day-night average noise level (L_{dn} or DNL) is estimated to be 18 dBA for Lincoln County, well below the range of 33 to 47 dBA L_{dn} typical of a rural area (Eldred 1982; Miller 2002).[12]

11.4.15.2 Impacts

Potential noise impacts associated with solar projects in the Dry Lake Valley North SEZ would occur during all phases of the projects. During the construction phase, potential noise impacts associated with operation of heavy equipment on the nearest residences at Caselton and Prince (about 10 mi [16 km] to the east of the SEZ boundary) would be anticipated to be minimal because of considerable separation distances. During the operations phase, potential noise impacts on the nearest residences would be anticipated to be minimal as well. However, if the Dry Lake Valley North SEZ were fully developed, potential noise impacts on residences along

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

the roads would likely be due to commuter, visitor, support, and delivery vehicular traffic to and from the SEZ. 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 Valley North 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 11.4.15.3). 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.

11.4.15.2.1 Construction

The proposed Dry Lake Valley North 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 southeastern SEZ boundary, estimated noise levels at the nearest residences would be about 16 dBA,[13] which is well below the typical daytime mean rural background level of 40 dBA. In addition, an estimated 40-dBA L_{dn}[14] at these residences (i.e., no contribution from construction activities) is well below the EPA guidance of 55 dBA L_{dn} for residential areas.

[13] Although high mountain ranges are located between the SEZ and the nearest residences, it is conservatively assumed that these are located on a flat terrain.

[14] 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.

It is assumed that a maximum of three projects would be developed at any one time for SEZs greater than 30,000 acres (121.4 km^2), such as the Dry Lake Valley North SEZ. If three projects were to be built in the eastern portion of the SEZ near the closest residences, noise levels would be about 5 dBA higher than the above-mentioned values. These levels would still be well below the typical daytime mean rural background level, and thus their contribution to the existing L_{dn} would be minimal.

There is one specially designated area within a 5-mi (8-km) range from the Dry Lake Valley North, which is the farthest distance that noise, except extremely loud noise, would be discernable. The Chief Mountains SRMA, adjacent to the southern SEZ, is managed primarily for motorized OHV recreation, and thus noise is not likely to be an issue at this SRMA. No noise impact analysis for other specially designated areas farther than 5 mi (8 km) was made.

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 sued at large-scale construction sites. Potential impacts on the nearest residences would be anticipated to be negligible, considering the distance (about 10 mi [16 km] from the SEZ boundary).

It is assumed that most construction activities would occur during the day, when noise is better tolerated than at night because of the masking effects of background noise. In addition, construction activities for a utility-scale facility are temporary in nature (typically a few years). Construction within the proposed Dry Lake Valley North SEZ would cause minimal unavoidable but localized short-term noise impacts on neighboring communities, even when construction activities would occur near the southeastern SEZ boundary, close to the nearest residences.

Construction activities could result in various degrees of ground vibration, depending on the equipment used and construction methods employed. All construction equipment causes ground vibration to some degree, but activities that typically generate the most severe vibrations are high-explosive detonations and impact pile driving. As 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 close. 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 69-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 negligible component of construction impacts and would be temporary in nature.

11.4.15.2.2 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 southeastern SEZ boundary, the predicted noise level would be about 22 dBA at the nearest residences, about 10 mi (16 km) from the SEZ boundary, which is much lower than 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[15]), the EPA guideline level of 55 dBA (as L_{dn} for residential areas) would occur at about 1,370 ft (420 m) from the power block area and thus would not be exceeded outside of the proposed SEZ boundary. At the nearest residences, about 40 dBA L_{dn} (i.e., no contribution from facility operation) would be estimated, which is well below the EPA guideline of 55 dBA L_{dn} for residential areas. As for construction, if three parabolic trough and/or power tower facilities were operating around the nearest residences, combined noise levels would be about 5 dBA higher than the above-mentioned values. These levels are still well below the typical daytime mean rural background level of 40 dBA, and their contribution to existing L_{dn} level 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 Valley North 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[16] 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

[15] Maximum possible operating hours at the summer solstice, but limited to 7 to 8 hours at the winter solstice.

[16] A shadow zone is defined as the region in which direct sound does not penetrate because of upward diffraction.

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 10 mi [16 km] from the SEZ boundary) would be 32 dBA, which is a little higher than the typical nighttime mean rural background level of 30 dBA. However, the noise level would be much lower than this value if an air absorption algorithm, among other attenuation mechanisms, were considered. The day-night average noise level is estimated to be about 41 dBA L_{dn}, which is 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 southeastern SEZ boundary could result in minimal adverse noise impacts on the nearest residences, depending on background noise levels and meteorological conditions.

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 Valley North SEZ, on the basis of the assumption of dish engine facilities of up to 6,833-MW total capacity (covering 80% of the total area, or 61,499 acres [248.9 km^2]), up to 273,330 25-kW dish engines could be employed. For a large dish engine facility, several 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 hundreds of thousands of dish engines operating simultaneously would be high in the immediate vicinity of the facility, for example, about 52 dBA at 1.0 mi (1.6 km) and 50 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 Valley North SEZ at intervals of 98 ft (30 m). Under these assumptions, the estimated noise level at the nearest residences, about 10 mi (16 km) from the SEZ boundary, would be about 39 dBA, which is below the typical daytime mean rural background level of 40 dBA. On the basis of 12-hr daytime operation, the estimated 41 dBA L_{dn} at these residences 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, and thus potential impacts on nearby residences would be anticipated to be minimal.

During operations, no major ground-vibrating equipment would be used. In addition, no sensitive structures are located close enough to the proposed Dry Lake Valley North 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 10.5-mi (16.8-km) distance (at least 0.5 mi [0.8 km] to the facility boundary and 10 mi [16 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 (discussed in Section 5.13.1.5), the noise level at 50 ft (15 m) and 300 ft (91 m) from the center of 230-kV transmission line towers would be about 39 and 31 dBA (Lee et al. 1996), respectively, typical of daytime and nighttime mean background noise levels in rural environments. Corona noise includes high-frequency components, considered to be more annoying than low-frequency environmental noise. However, corona noise would not likely cause impacts unless a residence was close to it (e.g., within 500 ft [152 m] of a 230-kV transmission line). The proposed Dry Lake Valley North SEZ is located in an arid desert environment, and incidents of corona discharge are infrequent. Therefore, potential impacts on nearby residences from corona noise along transmission lines within the SEZ would be negligible.

11.4.15.2.3 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.

11.4.15.3 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 Valley North SEZ during construction and operation would be anticipated to cause only minimal increases in noise levels at the nearest residences and specially designated areas. Accordingly, SEZ-specific design features are not required.

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11.4.16 Paleontological Resources

11.4.16.1 Affected Environment

The surface geology of the proposed Dry Lake Valley North SEZ is predominantly composed of thick alluvial deposits (more than 100 ft [30 m] thick) ranging in age from the Pliocene to Holocene with some playa deposits of similar age in the southern portion of the SEZ. The total acreage of the alluvial deposits within the SEZ is 69,760 acres (282 km^2), or nearly 91% of the SEZ; 9% of the SEZ is composed of 7,114 acres (29 km^2) playa deposits. In the absence of a PFYC map for Nevada, a preliminary classification of PFYC Class 3b is assumed for the playa deposits. Class 3b indicates that the potential for the occurrence of significant fossil materials is unknown and needs to be investigated further (see Section 4.8 for a discussion of the PFYC system). 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.

11.4.16.2 Impacts

Few, if any, impacts on significant paleontological resources are likely to occur in 91% of the proposed Dry Lake Valley North 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 9% of the SEZ is unknown. A more detailed investigation of the playa 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 2007d, 2008b). Section 5.14 discusses the types of impacts that could occur on any significant paleontological resources found to be present within the Dry Lake Valley North 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.

Approximately 8 mi (13 km) of access road is anticipated to connect to U.S. 93, south of the SEZ resulting in approximately 58 acres (0.23 km^2) of disturbance in areas predominantly composed of alluvial sediments (preliminarily classified as PFYC Class 2). Direct impacts during construction are not anticipated in PFYC Class 2 areas. Although it is assumed elsewhere in this PEIS that 7 mi (11.3 km) of access road is assumed to connect to State Route 318 instead of U.S. 93, this alternative route would result in a greater potential for impacts on paleontological resources. The amount of disturbance is less (51 acres [0.21 km^2]), but the disturbance would occur in both alluvial sediments (PFYC Class 2) and areas of residual deposits in carbonate rocks (preliminarily classified as PFYC Class 3b areas). Direct impacts during construction are not anticipated in PFYC Class 2 areas, but could occur in PFYC Class 3b areas. A more detailed investigation of residual deposits would be needed prior to project approval. No new transmission lines are currently anticipated for the proposed Dry Lake Valley North SEZ, assuming existing lines would be used. 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.

11.4.16.3 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 91% of the proposed Dry Lake Valley North SEZ would not likely be necessary. The need for and the nature of any SEZ-specific design features for the remaining 9% of the SEZ would depend on the results of future paleontological investigations.

11.4.17 Cultural Resources

11.4.17.1 Affected Environment

11.4.17.1.1 Prehistory

The proposed Dry Lake Valley North SEZ is located in the Great Basin region. The earliest known use of the area was likely during the Paleoindian Period, sometime between 12,000 and 10,000 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 ambiguity of Paleoindian occupation in the Great Basin has given rise to the assumption that the people of this time period 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; consequently, these sites are difficult to find because they have been buried by the ebb and flow of the pluvial lakes. The cultural material associated with the pluvial lake habitations is referred to as the Western Pluvial Lakes Tradition. It is likely that these people did not rely entirely on the marshland habitats, but were nomadic hunters and gatherers who relied on both the wetland resources and those resources located away from the pluvial lakes. The archaeological assemblage associated with this cultural tradition is characterized by stemmed projectile points, leaf-shaped bifaces, scrapers, crescents, and in some cases ground stone tools for milling plant material. Often, projectile points and tools were made from locally procured obsidian, sources of which are not far from the proposed Dry Lake Valley North SEZ, and include Kane Springs Wash and Meadow Valley Wash about 30 mi (48 km) to the southeast, South Pahroc about 10 mi (16 km) to the southwest, Modena about 40 mi (64 km) east, and Pierson Summit about 35 mi (56 km) northeast. Exploiting these sources of obsidian and collecting raw materials for tool manufacture were a part of a larger resource exploitation system, in which groups moved in seasonal rounds to take advantage of resources in different localities (Haarklau et al. 2005; Fowler and Madsen 1986; Hockett et al. 2008).

The 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 extended to 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 located on the margins of their territory to exploit resources that were not in the immediate vicinity of the base camp. Some of the key Archaic Period sites in the area located near the proposed Dry Lake Valley North SEZ are Stuart Rockshelter in the lower Meadow Valley Wash area, and Etna Cave, Conway Shelter, and O'Malley Shelter in the upper portions of the Meadow Valley Wash area just east of the SEZ. The Lake Lahontan Basin, a large Pleistocene pluvial lake that was located northeast of the SEZ, was also a place where several early Archaic period sites have been documented; the Archaic archaeological assemblage from these sites maintains some cultural continuity with the previous period, consisting of large notched points, leaf-shaped bifaces, scrapers, drills, gravers, and manos and metates (Fowler and Madsen 1986; Neusius and Gross 2007).

During the Middle Archaic Period, 4,000 to 1,500 B.P., there was a climatic 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 the Early Archaic, with an increased concentration of milling stones, mortars and pestles, and the appearance of normally perishable items that become well preserved in the arid Great Basin climate, such as wicker baskets, split-twig figurines, duck decoys, and woven sandals (Neusius and Gross 2007).

In the vicinity of the proposed Dry Lake Valley North SEZ, the Late Archaic period began around 1,500 B.P., and extended until about 800 B.P. 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 dart technology, and changes in subsistence techniques, particularly in the use of horticulture. In some areas, the Formative Era began around 1,500 B.P., and the proposed SEZ is situated in an area that borders both the formative Fremont and Virgin Anasazi cultures. In areas where these Formative cultures were not present, the Late Archaic lifeways persisted. A temporary camp, a resource procurement and workshop site (Site LN2698) from the Middle to Late Archaic Period, was documented associated with the dry lake in the southern portion of the SEZ. The Fremont culture was located in most of Utah, north of the Colorado, Escalante, and Virgin Rivers, and in portions of eastern Nevada and western Colorado. The culture is characterized by the use of agricultural and hunting and gathering subsistence practices, distinctive gray ware pottery, rod-and-bundle basketry, anthropomorphic rock art, and leather moccasins. A site with diagnostic Fremont-style pottery of the Sevier Fremont branch was documented at a site in the southern portion of the proposed Dry Lake Valley North SEZ related to dry lake resource procurement and processing (Site LN2691). The Virgin Anasazi culture was an extension of the Puebloan groups from the American 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, located south of the SEZ near Overton, Nevada, is a prime example of the extensive settlements of the Virgin Anasazi culture in the vicinity. Characteristic of this period are gray ware ceramics (sometimes decorated), rock art and intaglios, bedrock milling features, and turquoise mining. Both the Fremont and Virgin Anasazi groups had left the region by about 800 to 1000 B.P., at which time the Numic-speaking groups migrated into the region; however, the exact timing of these events is unclear and is a subject for further research in the region. These Numic-speaking people were the descendents of the Southern Pauite, and the archaeological assemblage associated with this time period consists of Desert Series projectile points, brown ware ceramics, unshaped manos and millingstones, incised stones, mortars, pestles, and shell beads. The following section describes the cultural history of the time period in greater detail.

11.4.17.1.2 Ethnohistory

The proposed Dry Lake Valley North SEZ is located within the traditional use area of the Southern Paiute. Southern Paiute groups tended to be wide ranging and often shared resources. The SEZ lies at the western edge of the core area of the Panaca Band, which stretched from the

Indian Peaks Range, northwest of Cedar City, Utah, to the Pahroc Range in Nevada (Kelly 1934; Kelly and Fowler 1986). Near the northern limits of Southern Paiute territory, the SEZ may have been known to Western Shoshone, who reportedly camped in the Pioche Hills (Stoffle and Dobyns 1983).

Southern Paiute

The Southern Paiute appear to have moved into southern Nevada and southwestern Utah about A.D. 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 Southern Paiute 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 Valley North SEZ falls within *Paranayi*, the western subdivision of the Southern Paiute Nation (Stoffle et al. 1997).

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 Panaca Band is reported to have maintained gardens on the margins of seasonal lakes (Kelly and Fowler 1986) and along Meadow Valley Wash (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 houses or in caves. It was not until the late 19th 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. The annual cycle of seasonal plant exploitation required great mobility on the part of the Southern Paiute, and consequently gatherers often used lightweight burden baskets. The Panaca also made conical, sun-dried pottery vessels (Kelly and Fowler 1986).

The Southern Paiute were not a warlike 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; they 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 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 that the Southern Paiute relied on. Dependence on wild plant resources increased during this time, as the Southern Paiute withdrew into more remote areas away from the intruding Euro-Americans. The Southern Paiute traditionally farmed along Meadow Valley Wash just over the mountains east of the SEZ. In the 1860s, there was an influx of miners. Communities such as Panaca were established to supply the mines, most notably at Pioche. They deprived the Paiutes of their traditional water sources and reduced the game and other wild foods they depended on. As Euro-American settlements grew, the Southern Paiute were drawn into the new economy, often serving as transient wage labor. Tribal settlements or colonies of laborers grew up around Euro-American settlements, farms, and mines, often including individuals from across the Southern Paiute homeland (Kelly and Fowler 1986). A community of Paiute wage laborers referred to as the Panaca Band formed around the town of Panaca (Stoffle and Dobyns 1983).

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. The Moapa River Reservation was established in 1875. Initially, it was intended for all Southern Paiutes from across their range, but the original reservation as authorized by President Ulysses S. Grant was severely reduced by Congress to 1,000 acres (4 km^2) of mostly un-irrigable land, and many Southern Paiutes preferred to remain in their home ranges or to seek wage labor employment elsewhere. Some of the Panaca Band eventually settled on the Indian Peaks Reservation, established in Utah in 1915, while others migrated to Cedar City or the Moapa River Reservation. On the Indian Peaks Reservation they subsisted on gardens and a few cattle, becoming part of the Indian Peaks Band. By 1935 the reservation had been largely abandoned and it, along with the other Southern Paiute Reservations in Utah, was terminated from federal control in 1954. The Indian Peaks Band sold their lands to establish themselves at Cedar City and other locations. In 1965, the Southern Paiutes were awarded a judgment by the Indian Claims Commission of over $8,000,000 in compensation for the loss of their aboriginal lands. In 1980, the Paiute Indian Tribe of Utah, including the Indian Peaks Band, was restored to a federal trust relationship. By 1984, the Indian Peaks Band had begun to reacquire a land base (Kelly and Fowler 1986; Stoffle and Dobyns 1983).

Western Shoshone

The Western Shoshone are ethnically similar Central Numic speakers who traditionally occupied the northwestern flank of Southern Paiute territory—stretching from eastern California through central Nevada into northwestern Utah and southern Idaho (Thomas et al. 1986).

Moving primarily in small groups, depending on the abundance of resources available, they pursued a mobile subsistence strategy following a seasonal round, gathering a wide variety of plant resources (Stoffle et al. 1990) supplemented by hunting. Pinenuts, available in the mountains of eastern Nevada and western Utah, were a storable staple, which may have attracted them to Meadow Valley. Pronghorn antelope and bighorn sheep were among the large game animals they hunted, but smaller game, including rodents, birds, and, where available, fish, provided more protein. Groups, often identified by their home territory, varied in size and composition with the seasons. The largest groups gathered for the pine nut harvest, which may have included a rabbit or antelope drive as well. Winter villages, consisting of conical structures overlaid with juniper bark, were usually close to stores of pine nuts. They interacted peacefully with the Southern Paiutes, with whom they were on good terms (Thomas et al. 1986) and camped with them in Meadow Valley just across the Highland Range from the SEZ (Stoffle and Dobyns 1983). Any of the Western Shoshone bands in the southeastern part of their range could have and probably did interact with the Southern Paiutes in Meadow Valley.

Their first recorded contact with Euro-Americans was with the trapper Jedediah Smith in 1827. The Western Shoshone were heavily affected by the Mormon migration to the Valley of the Great Salt Lake beginning in 1847 and the onslaught of prospectors seeking gold and other mineral wealth in California and Nevada beginning in 1849. The Shoshone were occasionally hostile to miners and those traveling trails to the west, and attempts were made to negotiate treaties and set up reservations beginning in 1860 (Rusco 1992). Never actually surrendering their lands (the Western Shoshone were not willing to give up their mobile lifestyle), the Treaty of Ruby Valley, in eastern Nevada, and the Treaty of Tooele Valley, in western Utah, were signed in 1863. Reserves or “farms” were set aside for the Western Shoshone beginning in the late 1850s; however, it was not until after 1900 that federal lands were set aside for Western Shoshone “colonies.” The Ely Colony and Duckwater Reservation are the closest to the proposed Dry Lake Valley North SEZ (Thomas et al. 1986).

11.4.17.1.3 History

The Great Basin was one of the last areas of the continental United States to be fully explored. The harsh and rugged landscape deterred most European and American explorers until the late 18th century. The earliest documented European presence in the Great Basin region was the Dominguez-Escalante Expedition that began in July of 1776. 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 end up completing their intended journey due to poor weather, but their maps and journals describing their travels and encounters would prove valuable to later explorers who 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).

Further exploration of the Great Basin occurred in 1826 with fur-trapping expeditions, one conducted by Peter Ogden of the Hudson Bay Company, the other by Jedediah Smith of the Rocky Mountain Fur Company. Both men were seeking new beaver fields; Ogden took a more northerly route through Elko, Pershing, and Humbolt Counties, and Smith entered near the proposed Dry Lake Valley North SEZ at Mesquite and traveled into California. When Smith entered California he was detained by Mexican authorities and ordered to go back the way he came; however, he decided instead to travel farther north in California and cut across central Nevada, further exploring the Nevada region. Fur trapping never became a lucrative enterprise in Nevada; however, these trailblazers paved the way for later explorers and mappers, such as John C. Frémont. Frémont was a member of the Topographical Engineers, and was commissioned to map and report on the Great Basin area in 1843 and 1844. The results of his work gained wide circulation and were of great importance in understanding the topography of the Great Basin, both for official use and by those moving westward to seek new homes and fortunes (Elliott 1973).

Nevada and the larger Great Basin region have provided a corridor of travel for those seeking to emigrate west. Several heavily traveled trails crossed the region, although none were particularly close to the proposed Dry Lake Valley North SEZ. The Old Spanish Trail was an evolving trail system generally established in the early 19th century, but it tended to follow earlier established paths used by earlier explorers and Native Americans. The 2,700-mi (4,345-km) network of trails passes through six states, beginning in Santa Fe, New Mexico, and ending in Los Angeles, California. The closest portion of the congressionally designated Old Spanish National Historic Trail to the proposed SEZ is where it follows the Virgin River, about 70 mi (113 km) to the southeast. Mormons also frequently used the Old Spanish Trail in emigrating farther west to Nevada, Arizona, and California, and often the trail is referred to as the Old Spanish Trail/Mormon Road. Other notable trails that crossed Nevada were the California Trail, a trail that followed portions of the notable Oregon Trail farther east of Nevada, and then broke off from that trail and continued through the northern portion of Nevada along the Humbolt River until it reached California. The Pony Express Trail, a mail route that connected Saint Joseph, Missouri, to Sacramento, California, entered Nevada northeast of Ely and exited just south of Lake Tahoe (von Till Warren 1980).

With the ratification of the Treaty of Guadalupe Hidalgo in 1848 closing 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. Mormon settlements near the proposed Dry Lake Valley North SEZ were located at Crystal Springs, about 20 mi (32 km) to the west, and Clover Valley, about 40 mi (64 km) to the southeast (Paher 1970; Fehner and Gosling 2000).

Nevada’s nickname is the “Silver State,” so named for the Comstock Lode strike in 1859 in Virginia City about 400 mi (640 km) to the west of the proposed Dry Lake Valley North 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 due to mining was so dramatic that in the 1850 census there were less than a dozen non-native persons in the territory of Nevada; by 1860 there were 6,857, and by 1875 an estimated 75,000 people had settled within the boundaries of the Nevada territory. The Comstock Lode strike is important to the history of Nevada, not just because of the population growth and significant amount of money that was consequently brought into the area, but also because of the technological innovations that were created and employed in the mines, such as the use of square-set timbering. This technique kept loose soil from collapsing on miners, a concept that was eventually employed in other mines around the world (Paher 1970).

Mining for valuable deposits occurred in all regions of the state of Nevada, including in the vicinity of the proposed Dry Lake Valley North SEZ. The most notorious mining district in Lincoln County was Pioche, located on the east side of the Highland Range, 15 mi (24 km) from the SEZ. Pioche was a violent, Wild West town that was one of the most prosperous districts in the county. The closest mining district to the proposed SEZ was the Highland Mine, a short-lived silver mine that operated from 1868 to 1870. The still-producing mine of Bristol is located just north of the proposed Dry Lake Valley North SEZ. Originally opened in 1870, this mine produced silver that was smelted in large charcoal kilns at a location just west of Bristol, named Bristol Wells. The charcoal kilns are still standing and are located about 5 mi (8 km) to the northeast of the SEZ. Other mines close to the proposed SEZ are Jackrabbit Mine, just northeast of the SEZ; Silverhorn Mine, a short-lived silver mine north of the SEZ; Delamar Mine, a prosperous gold mine 25 mi (40 km) south of the SEZ; and Bullionville, a site with 5 mills that crushed the ore from Pioche that arrived via a railroad. Native Americans in the area were often aware of the location of mineral deposits and informed the prospective miners as to the location of the deposits. The Native Americans themselves did some mining, mainly for turquoise and garnet, minerals used for decorative, pottery-tempering, or healing purposes, although occasionally their services were enlisted in the mines or in processing the material for the white miners too (Pogue 1912; Paher 1970). A cinder cone, said to be a source of garnets, was observed to the west of the SEZ during a preliminary site visit.

The construction of railroads in Nevada was often directly related to the mining activities. It was necessary to construct intrastate rail lines to move ore from mines to mills; the Pioche to Bullionville Railroad is the closest line to the proposed SEZ, but interstate railroads were also critical to the development of the economy. The San Pedro–Los Angeles–Salt Lake Railroad was constructed in 1905, connecting two of the most populous cities in the American West. This still-used rail line is located to the east of the proposed Dry Lake Valley North SEZ, a spur of which passes within 2 mi (3 km) north of Pioche, and continues on to Caliente, on its way south towards Las Vegas. The infamous Transcontinental Railroad was constructed between 1863 and 1869, connecting Sacramento, California, and Omaha, Nebraska, passing through the Nevada towns of Reno, Wadsworth, Winnemucca, Battle Mountain, Elko, and Wells on its way to changing the manner in which people traversed the United States.

Nevada’s desert-mountain landscape has made it a prime region for use by the U.S. military for several decades. Beginning in October of 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 WWII the gunnery range was closed. It was reopened at the start of the Cold War in 1948 and was re-commissioned as the Las Vegas Air Force Base, and 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, at the White Sands Missile Range, 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 due to logistical constraints, financial expenditures, and security reasons, a test site for nuclear weapons was needed in a more convenient region. Project Nutmeg was 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 due to the public relations issues and radiological safety and security issues, a continental test site should only be pursued in the event of a national emergency. In 1949, that emergency occurred when the Soviet Union conducted their 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 when 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 of 1950.

Covering 1,375 mi^2 (3,561 km^2), the NTS is a part of the Las Vegas–Tonopah Bombing and Gunnery Range, and it stretches from Mercury, Nevada, in the southeast to Pahute Mesa in the northwest. The first set of nuclear tests was conducted in January of 1951. Originally named FAUST (First American Drop United States Test) and later renamed Ranger, these bombs were detonated over Frenchman Flat, an area about 90 mi (145 km) southwest of the proposed Dry Lake Valley North SEZ. Tests were also later conducted at Yucca Flat, an area located northwest of Frenchman Flat, in an effort to minimize the effect of the blasts on the population in Las Vegas, which reported some disturbances (non-radiological in nature) from the series of tests conducted at Frenchman Flat. Tests were also conducted at Jackass Flats, to the west of the proposed Dry Lake Valley North SEZ, and Pahute Mesa, located to the north and west of the SEZ. Nuclear tests were conducted in an effort to test new weapons concepts, proof test existing weapons, and test the impact of nuclear weapons on manmade structures and the physical environment. Experimental testing in search of possible peaceful uses, specifically the Pluto ramjet, Plowshare, and Rover rocket programs, was also conducted. 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 the goals that they were seeking, 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 on both sides. However, this testing was performed mostly underground at the NTS, with most atmospheric tests being 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 U.S. and 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, but it has yet to be ratified by the U.S. Senate; however, nuclear tests have not been conducted since. In total, 1,021 of the 1,149 nuclear detonations that were detonated by the U.S. during the Cold War were conducted at the NTS (Fehner and Gosling 2000).

11.4.17.1.4 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. Within their traditional use area, landscapes as a whole are often culturally important. Adverse effects to one part damages the whole (Stoffle and Zedeño 2001a). From their perspective, landscapes include places of power. Among the most important of 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 Valley North SEZ is situated just over the mountains (about 12 mi, or 20 km) from Meadow Valley. Traditionally, the Southern Paiute farmed the banks of Meadow Valley Wash and gathered high-quality pine nuts from Panaca Summit. Paiutes and Shoshones camped in the canyons east of Pioche and in the Pioche Hills, where they harvested pine nuts, berries, and wild grasses, and hunted deer and rabbits. Members of the Indian Peak and Cedar Bands interviewed for a proposed power line to be built in Dry Lake Valley and Meadow Valley expressed their greatest concern over burial sites, springs, and religious sites. The important food-gathering sites they identified were largely in Meadow Valley and surrounding mountains. However, the Black Canyon Range and the Burnt Springs Range adjacent to the southern end of the SEZ were considered culturally important, as were the Delamar Mountains 9 mi (15 km) to the south. Dry Lake Valley itself was considered to have a somewhat lesser importance (Stoffle and Dobyns 1983). However, a scattering of isolated stone flakes indicates that over the years Dry Lake Valley has been the site of Native American activities. Isolates and temporary campsites are more common in the southern part of the SEZ, closer to Black Canyon and the Burnt Springs Range. A repeatedly used campsite is located along the western side of the dry lake outside the SEZ.

11.4.17.1.5 Cultural Surveys and Known Archaeological and Historical Resources

In the proposed Dry Lake Valley North SEZ, 19 surveys have been conducted within the boundaries of the SEZ, covering approximately 2.8% of the SEZ, and 23 additional surveys have been conducted within 5 mi (8 km) of the SEZ. Of the 19 surveys conducted within the boundaries of the SEZ, 18 have been block surveys, 12 of which also had linear segments. Only one survey was strictly linear, and one was strictly a block survey. A total of 53 sites (including isolated artifacts) have been documented in the Dry Lake Valley North SEZ, 50 prehistoric sites and 3 historic sites. Another 153 sites have been documented within 5 mi (8 km) of the proposed SEZ; of these, 140 are prehistoric, and 13 are historic (de DuFour 2009).

The SEZ has potential to yield significant cultural resources, especially prehistoric sites in the areas around the dry lake, at the south end of the SEZ, as well as in alluvial fans, fan piedmonts, ridge tops, passes, and stream terraces, located on the outer portions of the SEZ (Drews and Ingbar 2004). Around the dry lake in the SEZ are four sites that have significant potential as to their eligibility for inclusion in the NRHP. These four sites are temporary camps associated with the resource procurement and processing potential of the dry lake. Most of the sites that have been documented in the SEZ are isolated lithic fragments, but some chipping circles and lithic scatters have been documented as well, along with a few temporary camp sites. A few of the isolates have had diagnostic material, a Pinto projectile point from the early Archaic, an Elko series projectile point from the Middle to Late Archaic, and a Rose Spring projectile point, a bow-and-arrow point used from the Late Archaic through the Formative Period. Historic mining sites are likely to be located outside the boundaries of the SEZ, but within the 5-mi (8-km) buffer of the SEZ a significant number of historic mining claims and camps are in the mountains to the east and north of the SEZ.

The BLM has designated several locations within relatively close proximity to the SEZ as ACECs because of their significant cultural value. The Pahroc Rock Art ACEC is located about 12 mi (19 km) to the southwest of the proposed Dry Lake Valley North SEZ at the southern end of the North Pahroc Range. The Shooting Gallery ACEC is a culturally sensitive rock art area located 30 mi (48 km) southwest of the SEZ, just west of Alamo. The name “Shooting Gallery” was applied to the district as there is evidence that prehistoric people created hunting blinds and a system of channels made of rocks to corral and hunt large game. The Mount Irish ACEC is located 25 mi (40 km) to the west of the SEZ, near Hiko, and is noted for its rock art and prehistoric camp sites. There are several other areas that contain culturally sensitive material and meet the criteria for ACEC designation, but in the interest of protecting the resources the BLM has not designated other ACECs, as it is presumed that the ACEC designation could bring unwanted attention to the site, including an increased potential for vandalism.

National Register of Historic Places

There are four sites within the boundaries of the proposed Dry Lake Valley North SEZ that have potential to be eligible for inclusion in the NRHP, as mentioned above, and all four are associated with the dry lake area at the southern portion of the SEZ. Within 5 mi (8 km) of the SEZ are 10 sites that exhibit potential significance for inclusion in the NRHP. Seven of these sites are prehistoric cultural resources associated with the dry lake, consisting of heavy lithic scatters, workshop sites, and resource processing areas. Three of the other potentially significant sites are historic section markers from surveys conducted in the 1880s, reflecting the initial mapping and exploration of the region. The Bristol Wells site is located about 5 mi (8 km) to the north of the SEZ and was listed in the NRHP in 1972. Bristol Wells, a mining town associated with the prosperous Bristol Mine, was the location where the ore was stamped and smelted; the charcoal kilns used for the process are still standing today. In addition, nine other properties within Lincoln County are listed in the NRHP. Three of these properties are prehistoric sites, the White River Narrows Archaeological District, located about 10 mi (16 km) west of the proposed SEZ; the Black Canyon Petroglyph Site in the Pahranagat National Wildlife Refuge, south of Alamo about 35 mi (56 km) south of the SEZ; and the Panaca Summit Archaeological District, about 30 mi (48 km) east of the SEZ. The other properties listed in the NRHP in Lincoln County are historic sites in the towns of Caliente and Pioche to the southeast and east of the SEZ.

11.4.17.2 Impacts

Direct impacts on significant cultural resources could occur in the proposed Dry Lake Valley North SEZ; however, further investigation is needed at the project-specific level. A cultural resource survey of the entire area of potential effect, including consultation with affected Native American Tribes, would first need to be conducted to identify archaeological sites, historic structures and features, and traditional cultural properties, and an evaluation would need to follow to determine whether any are eligible for listing in the NRHP as historic properties. The Dry Lake Valley North SEZ has a high potential for containing prehistoric sites, especially in the dry lake and dune areas at the southern end of the SEZ; a potential for historic sites also exists in the area, but to a lesser degree. The largest potential for direct impacts on significant cultural values is in the playa area to the south and alluvial fans, located on the outer portions of the SEZ. At least 4 of the 53 sites recorded in this portion of the proposed Dry Lake Valley North SEZ have been determined to be eligible for listing in the NRHP. Section 5.15 discusses the types of impacts that could occur on any significant cultural resources found to be present in the Dry Lake Valley North SEZ. Impacts will be minimized through the implementation of required programmatic design features described in Appendix A, Section A.2.2. Programmatic design features assume that the necessary surveys, evaluations, and consultations will occur.

Indirect impacts on cultural resources resulting from erosion outside of the SEZ boundary (including ROWs) are unlikely, assuming programmatic design features to reduce water runoff and sedimentation are implemented (as described in Appendix A, Section A.2.2).

Approximately 8 mi (13 km) of access road is anticipated to connect to U.S. 93, south of the SEZ, resulting in approximately 58 acres (0.23 km^2) of disturbance. Impacts on cultural resources are possible in areas related to the access ROW, as new areas of potential cultural significance could be directly impacted by construction or opened to increased access from road use. Indirect impacts, such as vandalism or theft, could occur if significant resources are located in close proximity to the ROW. Programmatic design features assume that the necessary surveys, evaluations, and consultation will occur for the ROW, as with the project footprint within the SEZ. In this particular area, several surveys have been previously conducted, resulting in the recordation of five isolated artifacts (four prehistoric and two historic) according to the NVCRIS GIS, and no sites (de DuFour 2009). Although it is assumed elsewhere in this document that 7 mi (11.3 km) of access road is assumed to connect to State Route 318 instead of U.S. 93, this alternative route could result in a greater potential for impacts on cultural resources. The amount of disturbance is less (51 acres [0.21 km^2]), but the disturbance would occur in an area of higher elevation and potentially higher cultural sensitivity. One small survey (of about 8 acres [0.03 km^2]) has been previously conducted in this vicinity, in the lower elevation, resulting in the recordation of an isolated flake; no other surveys have been conducted in the area (de DuFour 2009). No needs for new transmission have currently been identified, assuming existing lines would be used; therefore, no additional areas of cultural concern would be made accessible as a result of transmission development within the proposed Dry Lake Valley North SEZ. 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.

11.4.17.3 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 and cultural awareness training for the workforce, are provided in Appendix A, Section A.2.2.

SEZ-specific design features would be determined in consultation with the Nevada SHPO and affected Tribes and would depend on the results of future investigations.

11.4.18 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 Valley North SEZ, Section 11.4.17 discusses archaeological sites, structures, landscapes, and traditional cultural properties; Section 11.4.8 discusses mineral resources; Section 11.4.9.1.3 discusses water rights and water use; Section 11.4.10 discusses plant species; Section 11.4.11 discusses wildlife species, including wildlife migration patterns; Section 11.4.13 discusses air quality; Section 11.4.14 discusses visual resources; Sections 11.4.19 and 11.4.20 discuss socioeconomics and environmental justice, respectively; and issues of human health and safety are discussed in Section 5.21.

11.4.18.1 Affected Environment

The proposed Dry Lake Valley North SEZ falls within the Tribal traditional use area generally attributed to the Southern Paiute (Kelly and Fowler 1986), although the Paiutes shared resources with the Western Shoshone. All federally recognized Tribes with Southern Paiute or Western Shoshone roots have been contacted and provided an opportunity to comment or consult regarding this PEIS. They are listed in Table 11.4.18.1-1. 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.

11.4.18.1.1 Territorial Boundaries

Southern Paiutes

The traditional territory of the Southern Paiutes lies mainly in the Mojave Desert, stretching from California to the Colorado Plateau. It generally follows the right bank of the Colorado River (heading downstream), including its tributary streams and canyons in southern Nevada and Utah, including most of Clark and Lincoln Counties in Nevada and extending 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 (Clemmer and Stewart 1986; Royster 2008).

Western Shoshone

The Western Shoshone traditionally occupied a swath of the central Great Basin stretching from Death Valley in California through central Nevada and northwestern Utah to southeastern Idaho (Thomas et al. 1986). The proposed Dry Lake Valley North SEZ lies within

TABLE 11.4.18.1-1 Federally Recognized Tribes with Traditional Ties to the Proposed Dry Lake Valley North SEZ

Tribe	Location	State
Chemehuevi Indian Tribe	Havasu Lake	California
Colorado River Indian Tribes	Parker	Arizona
Confederated Tribes of the Goshute Reservation	Ibapah	Utah
Duckwater Shoshone Tribe	Duckwater	Nevada
Ely Shoshone Tribe	Ely	Nevada
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
Skull Valley Band of Goshute Indians	Grantsville	Utah

the northern margins of Southern Paiute territory in an area of shared use (Stoffle and Dobyns 1983).

11.4.18.1.2 Plant Resources

The Southern Paiutes continue to make use of a wide range of indigenous plants for food, medicine, construction materials, and other uses. The vegetation present at the proposed Dry Lake Valley North SEZ is described in Section 11.4.10. The cover types present at the SEZ are all in the Inter-Mountain Basins series. Mixed Salt Desert Scrub predominates. There is a smaller, but substantial, area of Playa, and yet smaller areas of Greasewood Flat, Semi-Desert Shrub Steppe, and Big Sagebrush Shrubland (USGS 2005ab). The SEZ is sparsely vegetated with a pattern of braided drainage running generally north to south. As shown in Table 11.4.18.1-2, there are likely to be some plants used by Native Americans for food and/or medicinal purposes 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.

11.4.18.1.3 Other Resources

Southern Paiutes with ties to the area of the proposed SEZ indicate that springs are some of the most important cultural resources in their cultural landscape. Water is an essential prerequisite for life in the arid areas of the Great Basin. As a result, water holds a key place in

TABLE 11.4.18.1-2 Plant Species Important to Native Americans Observed or Likely To Be Present in the Proposed Dry Lake Valley North SEZ

Common Name	Scientific Name	Status
Food		
Beavertail prickly pear	*Opuntia basilaris*	Observed
Desert trumpet (buckwheat)	*Eriogonum inflatum*	Observed
Cholla cactus	*Cylindropuntia* spp.	Observed
Dropseed	*Sporobolus* spp.	Observed
Greasewood	*Sarcobatus vermiculatus*	Likely
Indian rice grass	*Oryzopsis hymenoides*	Observed
Iodine bush	*Allenrolfea occidentalis*	Possible
Juniper	*Juniperus* spp.	Possible
Wolfberry	*Lycium andersonii*	Possible
Medicine		
Greasewood	*Sacarbatus vermiculatus*	Likely
Mormon tea	*Ephedra* spp.	Observed
Sagebrush	*Artemesia tridentate*	Likely
Saltbush	*Atriplex* spp.	Observed

Sources: Field visit; USGS (2005a); Stoffle and Dobyns (1983); Stoffle et al. (1999).

the religion of desert cultures. Great Basin cultures consider all water sacred and purifying. Springs are often associated with powerful beings, and hot springs in particular figure in Southern Paiute creation stories. Water sources are often associated with rock art. Water sources are seen as connected, so damage to one damages all (Fowler 1991; Stoffle and Zedeño 2001a). There are springs located on the west of the SEZ. Tribes are also sensitive to the use of scarce local water supplies for the benefit of far distant communities and recommend that the determination of adequate water supplies should be a primary consideration in determining whether a site is suitable for the development of a utility-scale solar energy facility (Moose 2009).

Wildlife likely to be found in the proposed Dry Lake Valley North SEZ is described in Section 11.4.11. Deer and rabbit are the animals of most concern, as mentioned by Native Americans with local ties (Stoffle and Dobyns 1983). The SEZ provides suitable habitat for mule deer (*Odocoileus hemionus*), black-tailed jackrabbit (*Lepus californicus*), and desert cottontail (*Sylvilagus audubonii*). Other animals traditionally important to the Southern Paiute include lizards, which are likely to occur in the SEZ, and the golden eagle (*Aquila chrysaetosi*). The SEZ falls within the range of the wide-ranging eagle (USGS 2005b). Common tribally important animals that can be expected to be found in the proposed SEZ are listed in Table 11.4.18.1-3.

TABLE 11.4.18.1-3 Animal Species Used by Native Americans as Food Whose Range Includes the Proposed Dry Lake Valley North SEZ

Common Name	Scientific Name	Status
Mammals		
Badger	*Taxidea taxus*	All year
Black-tailed jackrabbit	*Lepus californicus*.	All year
Bobcat	*Lynx rufus*	All year
Chipmunk	*Tamias* spp.	All year
Coyote	*Canis latrans*	All year
Cottontail	*Silvilagus* spp.	All year
Gray fox	*Urocyon cinereoargenteus*	All year
Kangaroo rat	*Dipodomys* spp.	All year
Kit fox	*Vulpes macotis*	All year
Mule deer	*Odocoileus hemionus*	All year
Pocket gopher	*Thomomys bottae*	All year
Pocket mouse	*Perognathus* spp.	All year
Porcupine	*Erethizon dorsatum*	All year
White-tailed antelope squirrel	*Ammospermophilus leucurus*	All year
Woodrat	*Neotoma* spp.	All year
Birds		
Burrowing owl	*Athene cunicular*	Summer
Common raven	*Corvus corax*	All year
Gambel's quail	*Callipepla gambelii*	All year
Golden eagle	*Aquila chrysaetos*	All year
Great horned owl	*Bubo virginianus*	All year
Great blue heron	*Ardea herodias*	All year
Mourning dove	*Callipepla gambelii*	All year
Northern mockingbird	*Mimus polyglottos*	All year
Sage-grouse	*Centrocercus urophasianus*	All year
Sandhill crane	*Grus Canadensis*	Spring/fall
Reptiles		
Desert horned-lizard	*Phrynosoma platyrhinos*	All year
Western rattlesnake	*Crotalus viridis*	All year
Large lizards	Various species	All year

Sources: Field visit; USGS (2005b); Fowler (1986).

Other natural resources traditionally important to Native Americans include salt, clay for pottery, 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 11.4.7).

11.4.18.2 Impacts

In the past when energy projects have been proposed, Great Basin Native Americans have expressed concern over project impacts on a variety of resources. They tend to take a holistic view of their traditional homeland. For them, 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 Valley North 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. In the area, 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 11.4.17.1.4. Such 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 Dry Lake Valley North SEZ are discussed in Section 11.4.18.1.2.

Meadow Valley was an important farming and harvesting location for the northern bands of Southern Paiutes. Dry Lake Valley is adjacent to Meadow Valley and was almost certainly known by the bands that regularly camped in Meadow Valley. Although the SEZ is sparsely vegetated, its proximity to a traditionally settled area that was a gathering place for the pine nut harvest suggests that the area may be well known to modern Southern Paiutes, and that the resources that do exist there may be exploited by the Southern Paiute, although Meadow Valley and its surrounding mountains appear to hold more abundant resources. This should be confirmed during consultation with the Tribes.

Development of the SEZ would result in the removal of plant species from the footprint of the facility during construction. This would include some plants of cultural importance. However, the primary species that would be affected are abundant in the region; thus the cumulative effect would likely be small. Likewise, habitat for important species, such as the black-tailed jackrabbit, would be reduced (See Sections 11.4.10 and 11.4.11). As consultation with the Tribes continues and project-specific analyses are undertaken, it is also possible that Native American concerns will be 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 discussed in Appendix A, Section A.2.2, should eliminate impacts on Tribes' reserved water rights and the potential for groundwater contamination issues.

11.4.18.3 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 11.4.17.3, in addition to the design features for historic properties presented in Appendix A, Section A.2.2.

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 11.4.18.1-1.

11.4.19 Socioeconomics

11.4.19.1 Affected Environment

This section describes current socioeconomic conditions and local community services within the ROI surrounding the proposed Dry Lake Valley North SEZ. The ROI is a three-county area comprising Clark and Nye Counties in Nevada and Iron County in Utah. It encompasses the area in which workers are expected to spend most of their salaries and in which a portion of site purchases and nonpayroll expenditures from the construction, operation, and decommissioning phases of the proposed SEZ facility are expected to take place.

11.4.19.1.1 ROI Employment

In 2008, employment in the ROI stood at 944,909 (Table 11.4.19.1-1). Over the period 1999 to 2008, the annual average employment growth rate was higher in Lincoln County (5.1%) than in Iron County (3.4%) or Clark County (3.2%). At 3.2%, growth rates in the ROI as a whole was higher than the average rate for the state of Nevada (2.7%).

In the ROI in 2006, the services sector provided the highest percentage of employment at 59.3%, followed by wholesale and retail trade at 14.9% and construction (11.7%) (Table 11.4.19.1-2). Within the three counties in the ROI, the distribution of employment across sectors is different than that of the ROI as a whole; employment in services (59.6%) higher in Clark County than in the ROI as a whole, while employment in wholesale and retail trade (14.8%), and agriculture (0.0%) were lower than in other counties in the ROI.

TABLE 11.4.19.1-1 ROI Employment in the Proposed Dry Lake Valley North SEZ

Location	1999	2008	Average Annual Growth Rate, 1999–2008 (%)
Clark County, Nevada	675,693	922,878	3.2
Lincoln County, Nevada	1,114	1,731	5.1
Iron County, Utah	14,571	20,300	3.4
ROI	691,582	944,909	3.2
Nevada	978,969	1,282,012	2.7
Utah	1,080,441	1,336,556	2.1

Sources: U.S. Department of Labor (2009a,b).

TABLE 11.4.19.1-2 ROI Employment in the Proposed Dry Lake Valley North SEZ by Sector, 2006

	Clark County, Nevada		Lincoln County, Nevada		Iron County, Utah		ROI	
Industry	Employment	% of Total	Employment	% of Total	Employment	% of Total	Employment	% of Total
Agriculture[a]	213	0.0	130	16.1	934	7.0	1,277	0.1
Mining	522	0.1	38	4.7	10	0.1	570	0.1
Construction	100,817	11.6	60	7.4	*1,829*	13.8	102,706	11.7
Manufacturing	25,268	2.9	0	0.0	1,732	13.1	27,000	3.1
Transportation and public utilities	38,529	4.4	70	8.7	363	2.7	38,962	4.4
Wholesale and retail trade	128,498	14.8	309	38.3	2,650	20.0	131,407	14.9
Finance, insurance, and real estate	56,347	6.5	24	3.0	646	4.9	57,044	6.5
Services	516,056	59.6	343	42.6	5,068	38.2	521,500	59.3
Other	105	0.0	0	0.0	10	0.1	115	0.0
Total	866,093		806		13,250		880,149	

[a] Agricultural employment includes 2007 data for hired farmworkers.

Sources: U.S. Bureau of the Census (2009a); USDA (2009a,b).

11.4.19.1.2 ROI Unemployment

The average unemployment rate in Lincoln County over the period 1999 to 2008 was 5.2%, slightly higher than the rate in Clark County (5.0%) and higher than the rate in Iron County (45.1%) (Table 11.4.19.1-3). The average rate in the ROI over this period was 5.0%, the same as the average rate for Nevada. Unemployment rates for the first 11 months of 2009 contrast with rates for 2008 as a whole; in Clark County, the unemployment rate increased to 11.1%, while the rate reached 8.0% in Lincoln County and 6.1% in Iron County. The average rates for the ROI (11.0%) and for Nevada as a whole (11.0%) were also higher for the first 11 months of 2009 than the corresponding average rates for 2008.

11.4.19.1.3 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 11.4.19.1-4). In addition, there are two smaller cities in the county, Mesquite (16,528) and Boulder City (14,954). A number of unincorporated urban areas in Clark County are not included in the urban population; that is, the percentage of the county population not living in urban areas is overstated. The largest urban area in Iron County, Cedar City, had an estimated 2008 population of 28,439; other urban areas in the county include Enoch (5,076) and Parowan (2,606) (Table 11.4.19.1-4). In addition, there are three other urban areas in the county, Paragonah (477), Kanaraville (314) and Brian Head (126). Most of these cities are less than 100 miles (161 km) from the site of the proposed SEZ.

TABLE 11.4.19.1-3 ROI Unemployment Rates for the Proposed Dry Lake Valley North SEZ (%)

Location	1999–2008	2008	2009[a]
Clark County, Nevada	5.0	6.6	11.1
Lincoln County, Nevada	5.2	5.4	8.0
Iron County, Utah	4.1	4.2	6.4
ROI	5.0	6.5	11.0
Nevada	5.0	6.7	11.0
Utah	4.1	3.4	5.2

[a] Rates for 2009 are the average for January through November.

Sources: U.S. Department of Labor (2009a–c).

TABLE 11.4.19.1-4 ROI Urban Population and Income for the Proposed Dry Lake Valley North 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
Brian Head	118	126	0.8	56,732	NA	NA
Caliente	1,123	1,191	0.7	33,260	NA	NA
Cedar City	20,527	28,439	4.2	41,719	41,318	−0.1
Enoch	3,467	5,076	4.9	48,112	NA	NA
Henderson	175,381	253,693	4.7	72,035	67,886	−0.7
Kanaraville	311	314	0.1	44,258	NA	NA
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
Paragonah	470	477	0.2	43,721	NA	NA
Parowan	2,565	2,606	0.2	41,749	NA	NA

[a] Data are averages for the period 2006 to 2008.

[b] NA = data not available.

Source: U.S. Bureau of the Census (2009b–d).

Population growth rates in the ROI have varied over the period 2000 to 2008 (Table 11.4.19.1-4). 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%), Enoch (4.9%), and Henderson (4.7%). The cities of Las Vegas (2.1%), Brian Head (0.8%), Caliente (0.7%), and others experienced a lower growth rate between 2000 and 2008, while Boulder City (0.0%) experienced a static growth rate during this period.

11.4.19.1.4 ROI Urban Income

Median household incomes vary across urban areas in the ROI. Data for the period 2006 to 2008 were available for only four cities. Henderson ($67,886) and North Las Vegas ($60,506) had median incomes that were higher than the average for Nevada ($56,348) and Utah ($56,484), while Las Vegas ($55,113) and Cedar City ($41,318) had median incomes slightly lower than both state averages (Table 11.4.19.1-4).

Growth rates between 1999 and 2006 to 2008 were small in North Las Vegas (0.2%) and negative in Henderson (−0.7%), Las Vegas (−0.3%), and Cedar City (−0.1%). The average median household income growth rate over this period was −0.2% in Nevada and −0.5% in Utah.

11.4.19.1.5 ROI Population

Table 11.4.19.1-5 presents recent and projected populations in the three counties, the ROI, and the two states as a whole. Population in the ROI stood at 1,927,930 in 2008, having grown at an average annual rate of 4.0% since 2000. The growth rate for the ROI was higher than that for the state of Nevada (3.4%).

All three counties in the ROI experienced growth in population between 2000 and 2008; population in Clark County grew at an annual rate of 4.0%; in Iron County, 3.4%; and in Lincoln County, 1.4%. The ROI population is expected to increase to 2,782,449 by 2021 and to 2,865,746 by 2023.

11.4.19.1.6 ROI Income

Total personal income in the ROI stood at $75.2 billion in 2007 and grew at an annual average rate of 4.9% over the period 1998 to 2007 (Table 11.4.19.1-6). Per-capita income also rose over the same period at a rate of 1.0%, increasing from $36,099 to $39,847. Per-capita incomes were higher in Clark County ($40,307) than in Lincoln County ($26,858) and Iron County ($21,922) in 2007. Growth rates in total personal income have been higher in Clark County than in Iron County and Lincoln County. Personal income growth rates in the ROI

TABLE 11.4.19.1-5 ROI Population for the Proposed Dry Lake Valley North SEZ

Location	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	2021	2023
Clark County, Nevada	1,375,765	1,879,093	4.0	2,710,303	2,791,161
Lincoln County, Nevada	4,165	4,643	1.4	5,350	5,412
Iron County, Utah	33,779	44,194	3.4	66,796	69,173
ROI	1,413,709	1,927,930	4.0	2,782,449	2,865,746
Nevada	1,998,257	2,615,772	3.4	3,675,890	3,779,745
Utah	2,233,169	2,727,343	2.5	3,546,228	3,666,248

Sources: U.S. Bureau of the Census (2009e,f); Nevada State Demographers Office (2008).

TABLE 11.4.19.1-6 ROI Personal Income for the Proposed Dry Lake Valley North SEZ

Location	1998	2007	Average Annual Growth Rate, 1998–2007 (%)
Clark County, Nevada			
Total income[a]	45.7	74.1	5.0
Per-capita income	36,509	40,307	1.0
Lincoln County, Nevada			
Total income[a]	0.1	0.1	0.7
Per-capita income	24,711	24,121	-0.2
Iron County, Utah			
Total income[a]	0.7	0.9	3.5
Per-capita income	21,352	21,922	0.3
ROI			
Total income[a]	46.5	75.2	4.9
Per-capita income	36,099	39,847	1.0
Nevada			
Total income[a]	68.9	105.3	4.3
Per-capita income	37,188	41,022	1.0
Utah			
Total income[a]	61.9	82.4	2.9
Per-capita income	28,567	31,003	0.8

[a] Unless indicated otherwise, values are reported in $ billion 2008.

Sources: U.S. Department of Commerce (2009); U.S. Bureau of Census (2009e,f).

were higher than the rates for Nevada (4.3%) and Utah (2.9%), but per-capita income growth rates in Clark County were the same, while rates in Lincoln County and Iron County were lower than in Nevada as a whole (1.0%) and Utah (0.8%) as a whole.

Median household income in 2006 to 2008 varied from $41,173 in Lincoln County, to $42,687 in Iron County, to $56,954 in Clark County (U.S. Bureau of the Census 2009d).

11.4.19.1.7 ROI Housing

In 2007, more than 774,400 housing units were located in the three ROI counties; about 97% of these were in Clark County (Table 11.4.19.1-7). Owner-occupied units composed

TABLE 11.4.19.1-7 ROI Housing Characteristics for the Proposed Dry Lake Valley North SEZ

Parameter	2000	2007
Clark County, Nevada		
Owner-occupied	302,834	393,453
Rental	209,419	268,572
Vacant units	47,546	92,144
Seasonal and recreational use	8,416	NA[a]
Total units	559,799	754,169
Lincoln County, Nevada		
Owner-occupied	1,156	1,204
Rental	384	400
Vacant units	638	664
Seasonal and recreational use	305	NA
Total units	2,178	2,268
Iron County, Utah		
Owner-occupied	7,040	8,387
Rental	3,587	5,387
Vacant units	2,991	4,202
Seasonal and recreational use	1,986	NA
Total units	13,618	17,976
ROI		
Owner-occupied	311,030	403,044
Rental	213,390	274,359
Vacant units	51,175	97,010
Seasonal and recreational use	10,707	NA
Total units	575,595	774,413

[a] NA = data not available.

Sources: U.S. Bureau of the Census (2009h-j).

approximately 60% of the occupied units in the two counties; rental housing made up 40% of the total. Vacancy rates in 2007 were 29.3% in Lincoln County, 23.4% in Iron County, and 12.2% in Clark County. With an overall vacancy rate of 12.5% in the ROI, there were 97,010 vacant housing units in the ROI in 2007, of which 39,291 are estimated to be rental units that would be available to construction workers. At the time of the 2000 Census, there were 10,707 units in seasonal, recreational, or occasional use in the ROI; 1.5% of housing units in Clark County, 14.6% in Iron County, and 14.0% in Lincoln County were 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 198,818 new units added to the existing housing stock (Table 11.4.19.1-7).

The median value of owner-occupied housing in 2006 to 2008 varied from $80,300 in Lincoln County, to $112,000 in Iron County, to $139,500 in Clark County (U.S. Bureau of the Census 2009g).

11.4.19.1.8 ROI Local Government Organizations

The various local and county government organizations in the ROI are listed in Table 11.4.19.1-8. In addition, three Tribal governments are located in the ROI, with members of other Tribal groups located in the county but whose Tribal governments are located in adjacent counties or states.

11.4.19.1.9 ROI Community and Social Services

This section describes educational, health care, law enforcement, and firefighting resources in the ROI.

Schools

In 2007, the three-county ROI had a total of 347 public and private elementary, middle, and high schools (NCES 2009). Table 11.4.19.1-9 provides summary statistics for enrollment

TABLE 11.4.19.1-8 ROI Local Government Organizations and Social Institutions in the Proposed Dry Lake Valley North SEZ

Governments	
City	
Boulder City	Kanaraville
Brian Head	Las Vegas
Caliente	Mesquite
Cedar City	North Las Vegas
Enoch	Paragonah
Henderson	Parowan
County	
Clark County	Lincoln County
Lincoln 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	
Paiute Indian Tribe of Utah	

Sources: U.S. Bureau of the Census (2009b); U.S. Department of the Interior (2010).

TABLE 11.4.19.1-9 ROI School District Data for the Proposed Dry Lake Valley North SEZ, 2007

Location	Number of Students	Number of Teachers	Student-Teacher Ratio	Level of Service[a]
Clark County, Nevada	303,448	15,930	19.0	8.7
Lincoln County, Nevada	1,074	81	13.3	18.2
Iron County, Utah	8,522	402	21.2	9.1
ROI	313,044	16,413	19.1	8.7

[a] Number of teachers per 1,000 population.

Source: NCES (2009).

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 Iron County schools (21.2) is higher than that in Clark County (19.0) and Lincoln County schools (13.3), while the level of service is much higher in Lincoln County (18.2) than elsewhere in the ROI, where there are fewer teachers per 1,000 population (Iron County, 9.1; Clark County, 8.7).

Health Care

The total number of physicians (4,220) and the number of physicians per 1,000 population (2.3) are higher in Clark County than in Iron County (55; 1.2) and in Lincoln County (2; 0.4) (Table 11.4.19.1-10).

TABLE 11.4.19.1-10 Physicians in the ROI for the Proposed Dry Lake Valley North SEZ, 2007

Location	Number of Primary Care Physicians	Level of Service[a]
Clark County, Nevada	4,220	2.3
Lincoln County, Nevada	2	0.4
Iron County, Utah	55	1.2
ROI	4,277	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 11.4.19.1-11). Lincoln County has 26 officers and would provide law enforcement services to the SEZ. There are 3,214 officers in Clark County and 31 officers in Iron County. Levels of service of police protection are 5.8 per 1,000 population in Lincoln County, 1.7 in Clark County, and 0.7 in Iron County. Currently, there are 1,000 professional firefighters in the ROI (Table 11.4.19.1-11).

11.4.19.1.10 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.

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, metal health, and divorce, which might be used as indicators of social change, are presented in Tables 11.4.19.1-12 and 11.4.19-1.13, respectively.

TABLE 11.4.19.1-11 Public Safety Employment in the ROI for the Proposed Dry Lake Valley North SEZ

Location	Number of Police Officers[a]	Level of Service[b]	Number of Firefighters[c]	Level of Service
Clark County, Nevada	3,214	1.7	991	0.5
Lincoln County, Nevada	26	5.8	1	0.2
Iron County, Utah	31	0.7	8	0.2
ROI	3,271	1.7	1,000	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).

TABLE 11.4.19.1-12 County and ROI Crime Rates for the Proposed Dry Lake Valley North SEZ[a]

	Violent Crime[b]		Property Crime[c]		All Crime	
Location	Offenses	Rate	Offenses	Rate	Offenses	Rate
Clark County, Nevada	15,505	8.0	66,905	34.5	82,410	42.5
Lincoln County, Nevada	6	1.3	34	7.3	40	8.6
Iron County, Utah	56	1.2	1,085	23.7	1,141	24.9
ROI	15,567	8.1	68,024	35.3	83,591	43.4

[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 11.4.19.1-13 Alcoholism, Drug Use, Mental Health, and Divorce in the ROI for the Proposed Dry Lake Valley North SEZ[a]

Geographic Area	Alcoholism	Illicit Drug Use	Mental Health[b]	Divorce[c]
Nevada Clark	8.2	2.7	10.5	–[d]
Nevada Rural (includes Lincoln County)	8.0	2.7	9.5	–
Utah Southwest Region (includes Iron County)	5.6	2.5	11.3	–
Nevada				6.5
Utah				3.6

[a] Data for alcoholism and drug use represent percentage of the population over 12 years of age with dependence or abuse of alcohol, illicit drugs. Data are averages for 2004 to 2006.

[b] Data for mental health represent percentage of the population over 18 years of age suffering from serious psychological distress. Data are averages for 2002 to 2004.

[c] Divorce rates are the number of divorces per 1,000 population. Data are for 2007.

[d] A dash indicates data not available.

Sources: SAMHSA (2009); CDC (2009).

There is some variation in the level of crime across the ROI, with higher rates of violent crime in Clark County (8.0 per 1,000 population) than in Lincoln County (1.3) or Iron County (1.2) (Table 11.4.19.1-12). Property-related crime rates are also higher in Clark County (34.5) than in Iron County (23.7) or Lincoln County (7.3); overall crime rates in Clark County (42.5) were higher than in Iron County (24.9) or Lincoln County (8.6).

Other measures of social change—alcoholism, illicit drug use, and mental health—are not available at the county level and thus are presented for the SAMHSA region in which the ROI is located. There is slight variation across the two regions in which the three counties are located; rates for alcoholism and mental health are slightly higher in the region in which Clark County is located (Table 11.4.19.1-13).

11.4.19.1.11 ROI Recreation

Various areas in the vicinity of the proposed SEZ are used for recreational purposes, with natural, ecological, and cultural resources in the ROI attracting visitors for a range of activities, including hunting, fishing, boating, canoeing, wildlife watching, camping, hiking, horseback riding, mountain climbing, and sightseeing. These activities are discussed in Section 11.4.5.

Because the number of visitors using state and federal lands for recreational activities is not available from the various administering agencies, the value of recreational resources in these areas based solely on the number of recorded visitors is likely to be an underestimation. In addition to visitation rates, the economic valuation of certain natural resources can also be assessed in terms of the potential recreational destination for current and future users, that is, their nonmarket value (see Section 5.17.1).

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; some activity occurs 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, 240,631 people were employed in the ROI in the various sectors identified as recreation, constituting 26.1% of total ROI employment (Table 11.4.19.1-14). Recreation spending also produced almost $9,455 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.

11.4.19.2 Impacts

The following analysis begins with a description of the common impacts of solar development, including common impacts on recreation and on social change. These impacts would occur regardless of the solar technology developed in the SEZ. The impacts of development employing various solar energy technologies are analyzed in detail in subsequent sections.

TABLE 11.4.19.1-14 Recreation Sector Activity in the Proposed Dry Lake Valley North SEZ ROI, 2007

ROI	Employment	Income ($ million)
Amusement and recreation services	4,681	147.6
Automotive rental	2,909	118.3
Eating and drinking places	105,589	3,230.5
Hotels and lodging places	116,751	5,620.2
Museums and historic sites	285	17.8
Recreational vehicle parks and campsites	352	10.1
Scenic tours	5,448	221.7
Sporting goods retailers	4,436	88.4
Total ROI	240,631	9,454.7

Source: MIG, Inc. (2009).

11.4.19.2.1 Common Impacts

Construction and operation of a solar energy facility at the proposed Dry Lake Valley North 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 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 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). 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 accommodation otherwise used for recreational visits, thus reducing visitation and consequently affecting the economy of the ROI.

Social Change

Although an extensive literature in sociology documents the most significant components of social change in energy boomtowns, the nature and magnitude of the social impact of energy development projects 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, with a consequent increase in alcoholism, depression, suicide, social conflict, divorce, delinquency, and deterioration in levels of community satisfaction (BLM 1980, 1983, 1996).

In overall terms, the in-migration of workers and their families into the ROI would represent an increase of 0.1% in regional population during construction of the trough technology, with smaller increases for the power tower, dish engine, and PV technologies, and during the operation of each technology. While it is possible that some construction and operations workers will choose to locate in communities closer to the SEZ, because of the lack of available housing in smaller rural communities in the ROI to accommodate all in-migrating workers and families and an insufficient range of housing choices to suit all solar occupations, many workers are likely to commute to the SEZ from larger communities elsewhere in the ROI, thereby reducing the potential impact of solar development on social change. Regardless of the pace of population growth associated with the commercial development of solar resources and the likely residential location of in-migrating workers and families in communities some distance from the SEZ itself, the number of new residents from outside the ROI is likely to lead to some demographic and social change in small rural communities in the ROI. Communities hosting solar development projects 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.

Livestock Grazing Impacts

*C*attle ranching and farming supported 95 jobs, and $1.3 million in income in the ROI in 2007, (MIG, Inc. 2010). The construction and operation of solar facilities in the Dry Lake Valley North SEZ could result in a decline in the amount of land available for livestock grazing, resulting in total (direct plus indirect) impacts of the loss of less than one job and less than

$0.1 million in income in the ROI. There would also be a decline in grazing fees payable to the BLM and to the USFS by individual permitees based on the number of AUMs required to support livestock on public land. Assuming the 2008 fee of $1.35 per AUM, grazing fee losses would amount to $6,614 annually on land dedicated to solar development in the SEZ.

Access Road Impacts

The impacts of construction of an access road connecting the proposed SEZ could include the addition of 148 jobs in the ROI (including direct and indirect impacts) in the peak year of construction (Table 11.4.19.2-2). Construction activities in the peak year would

TABLE 11.4.19.2-2 ROI Socioeconomic Impacts of an Access Road Connecting the Proposed Dry Lake Valley North SEZ[a]

Parameter	Construction	Operations
Employment (no.)		
Direct	85	<1
Total	148	<1
Income[b]		
Total	5.8	<0.1
Direct state taxes[b]		
Sales	0.2	<0.1
Income	<0.1	<0.1
In-migrants (no.)	0	0
Vacant housing[c] (no.)	0	0
Local community service employment		
Teachers (no.)	0	0
Physicians (no.)	0	0
Public safety (no.)	0	0

[a] Construction impacts assume 7 mi (8 km) of access road is required for the Dry Lake Valley North SEZ. Construction impacts are assessed for the peak year of construction. Although gravel surfacing might be used, the analysis assumes the access road will be paved.

[b] Unless indicated otherwise, values are reported in $ million 2008. There is currently no individual income tax in Nevada; data provided are for workers who would reside in Utah.

[c] Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

constitute less than 1% of total ROI employment. Access road construction would also produce $5.8 million in ROI income. Direct sales taxes would be less than $0.2 million; direct income taxes in Utah, less than $0.1 million.

Total operations (maintenance) employment impacts in the ROI (including direct and indirect impacts) of an access road would be less than 1 job during the first year of operation (Table 11.4.19.2-2) and would also produce less than $0.1 million in income. Direct sales taxes would be less than $0.1 million in the first year; direct income taxes, less than $0.1 million.

Construction and operation of an access road would not require the in-migration of workers and their families from outside the ROI; consequently, no impacts on housing markets in the ROI would be expected, and no new community service employment would be required in order to meet existing levels of service in the ROI.

11.4.19.2.2 Technology-Specific Impacts

The economic impacts of solar energy development in the proposed SEZ were measured in terms of employment, income, state tax revenues (sales and income), population in-migration, housing, and community service employment (education, health, and public safety). More information on the data and methods used in the analysis are presented in Appendix M.

The assessment of the impact of the construction and operation of each technology was based on SEZ acreage, assuming 80% of the area could be developed. To capture a range of possible impacts, solar facility size was estimated on the basis of the land requirements of various solar technologies, assuming that 9 acres/MW (0.04 km^2/MW) would be required for power tower, dish engine, and PV technologies and 5 acres/MW (0.02 km^2/MW) for solar trough technologies. Impacts of multiple facilities employing a given technology at each SEZ were assumed to be the same as impacts for a single facility with the same total capacity. Construction impacts were assessed for a representative peak year of construction, assumed to be 2021 for each technology. Construction impacts assumed that a maximum of three projects could be constructed within a given year, with a corresponding maximum land disturbance of up to 9,000 acres (36 km^2). For operations impacts, a representative first year of operations was assumed to be 2023 for trough and power tower, 2022 for the minimum facility size for dish engine and PV, and 2023 for the maximum facility size for these technologies. The years of construction and operations were selected as representative of the entire 20-year study period, because they are the approximate midpoint; construction and operations could begin earlier.

Solar Trough

Construction. Total construction employment impacts in the ROI (including direct and indirect impacts) from the use of solar trough technologies would be up to 9,071 jobs (Table 11.4.1.19.2-3). Construction activities would constitute 0.7% of total ROI employment.

TABLE 11.4.19.2-3 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Dry Lake Valley North SEZ with Solar Trough Facilities[a]

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	5,232	2,679
Total	9,071	4,126
Income[b]		
Total	554.2	155.3
Direct state taxes[b]		
Sales	3.5	0.5
Income	1.1	0.2
BLM payments		
Acreage-related fee	NA[c]	4.8
Capacity fee[d]	NA	80.8
In-migrants (no.)	2,229	341
Vacant housing[e] (no.)	1,114	307
Local community service employment		
Teachers (no.)	20	3
Physicians (no.)	5	1
Public safety (no.)	5	1

a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 1,800 MW (corresponding to 9,000 acres [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 12,300 MW.

b Unless indicated otherwise, values are reported in $ million 2008. There is currently no individual income tax in Nevada; data provided are for workers who would reside in Utah.

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 2010h), 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.

A solar facility would also produce $554.2 million in income. Direct sales taxes would be $3.5 million; direct income taxes in Utah, $1.1 million.

Given the scale of construction activities and the likelihood of local worker availability in the required occupational categories, construction of a solar facility would mean that some in-migration of workers and their families from outside the ROI would be required, with 2,229 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility construction on the number of vacant rental housing units would not be expected to be large, with 1,114 rental units expected to be occupied in the ROI. This occupancy rate would represent 1.8% 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, 20 new teachers, 5 physicians, and 5 public safety employee (career firefighters and uniformed police officers) would be required in the ROI. These increases would represent 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 4,126 jobs (Table 11.4.19.2-3). Such a solar facility would also produce $155.3 million in income. Direct sales taxes would be $0.5 million; direct income taxes in Utah, $0.2 million. Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010h), acreage–related fees would be $4.8 million, and solar generating capacity fees would total at least $80.8 million.

Given the likelihood of local worker availability in the required occupational categories, operation of a solar facility would mean that some in-migration of workers and their families from outside the ROI would be required, with 341 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 307 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, 3 new teachers, 1 physician, and 1 public safety employee (career firefighters and uniformed police officers) 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 3,613 jobs (Table 11.4.19.2-4). Construction activities would constitute 0.3% of total ROI employment. Such a solar facility would also produce $220.7 million in income. Direct sales taxes would be $1.4 million; direct income taxes in Utah, $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 888 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility construction on the number of vacant rental housing units would not be expected to be large, with 444 rental units expected to be occupied in the ROI. This occupancy rate would represent 0.7% 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, 8 new teachers, 2 physicians, and 2 public safety employees would be required in the ROI. These increases would represent less than 0.1% of total ROI employment expected in these occupations.

Operations. Total operations employment impacts in the ROI (including direct and indirect impacts) of a build-out using power tower technologies would be 1,880 jobs (Table 11.4.19.2-4). Such a solar facility would also produce $65.0 million in income. Direct sales taxes would be $0.1 million; direct income taxes in Utah, $0.1 million. Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010h), acreage–related fees would be $4.8 million, and solar generating capacity fees would total at least $44.9 million.

Given the likelihood of local worker availability in the required occupational categories, operation of a solar facility means that some in-migration of workers and their families from outside the ROI would be required, with 176 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 159 owner-occupied units expected to be required in the ROI.

In addition to the potential impact on housing markets, in-migration would affect community service (education, health, and public safety) employment. An increase in such

TABLE 11.4.19.2-4 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Dry Lake Valley North SEZ with Power Tower Facilities[a]

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	2,084	1,384
Total	3,613	1,880
Income[b]		
Total	220.7	65.0
Direct state taxes[b]		
Sales	1.4	0.1
Income	0.4	0.1
BLM payments		
Acreage-related fee	NA[c]	4.8
Capacity fee[d]	NA	44.9
In-migrants (no.)	888	176
Vacant housing[e] (no.)	444	159
Local community service employment		
Teachers (no.)	8	2
Physicians (no.)	2	0
Public safety (no.)	2	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 1,000 MW (corresponding to 9,000 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 6,833 MW.

[b] Unless indicated otherwise, values are reported in $ million 2008. There is currently no individual income tax in Nevada; data provided are for workers who would reside in Utah.

[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 2010h), 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.

employment would be required to meet existing levels of service in the ROI. Accordingly, 2 new teachers would be required in the ROI.

Dish Engine

Construction. Total construction employment impacts in the ROI (including direct and indirect impacts) from the use of dish engine technologies would be up to 1,469 jobs (Table 11.4.19.2-5). Construction activities would constitute 0.1% of total ROI employment. Such a solar facility would also produce $89.7 million in income. Direct sales taxes would be $0.6 million; direct income taxes in Utah, $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 361 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility construction on the number of vacant rental housing units would not be expected to be large, with 180 rental units expected to be occupied in the ROI. This occupancy rate would represent 0.3% 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 (education, health, and public safety) employment. An increase in such employment would be required to meet existing levels of service in the ROI. Accordingly, 3 new teachers, 1 physician, and 1 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 1,827 jobs (Table 11.4.19.2-5). Such a solar facility would also produce $63.1 million in income. Direct sales taxes would be $0.1 million; direct income taxes in Utah, $0.1 million. Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010h), acreage–related fees would be $4.8 million, and solar generating capacity fees would total at least $44.9 million.

Given the likelihood of local worker availability in the required occupational categories, operation of a dish engine solar facility means that some in-migration of workers and their families from outside the ROI would be required, with 171 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-

TABLE 11.4.19.2-5 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Dry Lake Valley North SEZ with Dish Engine Facilities[a]

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	847	1,345
Total	1,469	1,827
Income[b]		
Total	89.7	63.1
Direct state taxes[b]		
Sales	0.6	0.1
Income	0.2	0.1
BLM payments		
Acreage-related fee	NA[c]	4.8
Capacity fee[d]	NA	44.9
In-migrants (no.)	361	171
Vacant housing[e] (no.)	180	154
Local community service employment		
Teachers (no.)	3	2
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 1,000 MW (corresponding to 9,000 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 6,833 MW.

[b] Unless indicated otherwise, values are reported in $ million 2008. There is currently no individual income tax in Nevada; data provided are for workers who would reside in Utah.

[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 2010h), 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.

occupied housing units would not be expected to be large, with 154 owner-occupied units expected to be required in the ROI.

In addition to the potential impact on housing markets, in-migration would affect community service employment (education, health, and public safety). An increase in such employment would be required to meet existing levels of service in the ROI. Accordingly, 2 new teachers would be required in the ROI.

Photovoltaic

Construction. Total construction employment impacts in the ROI (including direct and indirect impacts) from the use of PV technologies would be up to 685 jobs (Table 11.4.19.2-6). Construction activities would constitute less than 0.1 % of total ROI employment. Such a solar development would also produce $41.9 million in income. Direct sales taxes would be $0.3 million; direct income taxes in Utah, $0.1 million.

Given the scale of construction activities and the likelihood of local worker availability in the required occupational categories, construction of a solar facility would mean that some in-migration of workers and their families from outside the ROI would be required, with 168 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility construction on the number of vacant rental housing units would not be expected to be large, with 84 rental units expected to be occupied in the ROI. This occupancy rate would represent 0.1% of the vacant rental units expected to be available in the ROI.

In addition to the potential impact on housing markets, in-migration would affect community service (education, health, and public safety) employment. An increase in such employment would be required to meet existing levels of service in the ROI. Accordingly, 2 new teachers 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 182 jobs (Table 11.4.19.2-5). Such a solar facility would also produce $6.3 million in income. Direct sales taxes would be less than $0.1 million; direct income taxes in Utah would be less than $0.1 million. Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010h), acreage–related fees would be $4.8 million, and solar generating capacity fees would total at least $35.9 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 17 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of

TABLE 11.4.19.2-6 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Dry Lake Valley North SEZ with PV Facilities[a]

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	395	134
Total	685	182
Income[b]		
Total	41.9	6.3
Direct state taxes[b]		
Sales	0.3	<0.1
Income	0.1	<0.1
BLM payments		
Acreage-related fee	NA[c]	4.8
Capacity fee[d]	NA	35.9
In-migrants (no.)	168	17
Vacant housing[e] (no.)	84	15
Local community service employment		
Teachers (no.)	2	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 1,000 MW (corresponding to 9,000 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 6,833 MW.

[b] Unless indicated otherwise, values are reported in $ million 2008. There is currently no individual income tax in Nevada; data provided are for workers who would reside in Utah.

[c] Not applicable.

[d] The BLM annual capacity payment was based on a fee of $5,256 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010h) , assuming full build-out of the site.

[e] Construction activities would affect vacant rental housing; operations activities would affect owner-occupied housing.

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 15 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.

11.4.19.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features addressing socioeconomic impacts have been identified for the proposed Dry Lake Valley North 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.

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11.4.20 Environmental Justice

11.4.20.1 Affected Environment

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (*Federal Register,* Volume 59, page 7629, Feb. 11, 1994), formally requires federal agencies to incorporate environmental justice as part of their missions. 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 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 Dry Lake Valley North SEZ could affect environmental justice if any adverse health and environmental impacts resulting from either phase of development are significantly high and if these impacts disproportionately affect minority and low-income populations. If the analysis determines that health and environmental impacts are not significant, there can be no disproportionate impacts on minority and low-income populations. In the event impacts are significant, disproportionality would be determined by comparing the proximity of any high and adverse impacts with the location of low-income and minority populations.

The analysis of environmental justice issues associated with the development of solar facilities considered impacts within the SEZ and an associated 50-mi (80-km) radius around the boundary of the SEZ. A description of the geographic distribution of minority and low-income groups in the affected area was based on demographic data from the 2000 Census (U.S. Bureau of the Census 2009k,l). The following definitions were used to define minority and low-income population groups:

- **Minority.** Persons who identify themselves as belonging to any of the following racial groups: (1) Hispanic, (2) Black (not of Hispanic origin) or African American, (3) American Indian or Alaska Native, (4) Asian, or (5) Native Hawaiian or Other Pacific Islander.

  Beginning with the 2000 Census, where appropriate, the census form allows individuals to designate multiple population group categories to reflect their ethnic or racial origins. In addition, persons who classify themselves as being of multiple racial origins 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 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 11.4.20.1-1 show the minority and low-income composition of the total population 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.

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 Nevada, 18.5% of the population is classified as minority, while 9.9% is classified as low-income. However, the number of minority individuals does not exceed 50% of the total population in the area and does not exceed the state average by 20 percentage points or more; thus, in aggregate, there is no minority population in the SEZ area based on 2000 Census data and CEQ guidelines. The number of low-income individuals does not exceed the state average by 20 percentage points or more and does 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.

In the Utah portion of the 50-mi (80-km) radius, 9.2% of the population is classified as minority, while 15.7% is classified as low-income. The number of minority individuals does not exceed 50% of the total population in the area and does not exceed the state average by 20 percentage points or more; thus, in aggregate, there is no minority population in the SEZ area based on 2000 Census data and CEQ guidelines. The number of low-income individuals does not exceed the state average by 20 percentage points or more and does not exceed 50% of the total

TABLE 11.4.20.1-1 Minority and Low-Income Populations within the 50-mi (80-km) Radius Surrounding the Proposed Dry Lake Valley North SEZ

Parameter	Nevada	Utah
Total population	8,878	5,523
White, non-Hispanic	7,239	5,015
Hispanic or Latino	692	264
Non-Hispanic or Latino minorities	947	244
One race	767	185
Black or African American	428	8
American Indian or Alaskan Native	258	151
Asian	42	15
Native Hawaiian or Other Pacific Islander	7	3
Some other race	32	8
Two or more races	180	59
Total minority	1,639	508
Low-income	883	865
Percentage minority	18.5	9.2
State percentage minority	17.2	15.9
Percentage low-income	9.9	15.7
State percentage low-income	10.5	9.4

Source: U.S Bureau of the Census (2009k,l).

population in the area; thus, in aggregate, there are no low-income populations in the Utah portion of the SEZ.

Figure 11.4.20.1-1 shows the locations of the low-income population groups within the 50-mi (80-km) radius around the boundary of the SEZ.

At the individual block group level there are low-income populations in one census block group, in Iron County west of Cedar City (including the towns of Newcastle and Modena), which has a low-income population that is more than 20 percentage points higher than the state average. There are no other block groups exceeding the 20% threshold in the 50-mi (80-km) area, and there are no block groups with low income or minority populations that exceed 50% of the total population in the block group, and the number of minority individuals does not exceed the state average by 20 percentage points or more at the individual block group level.

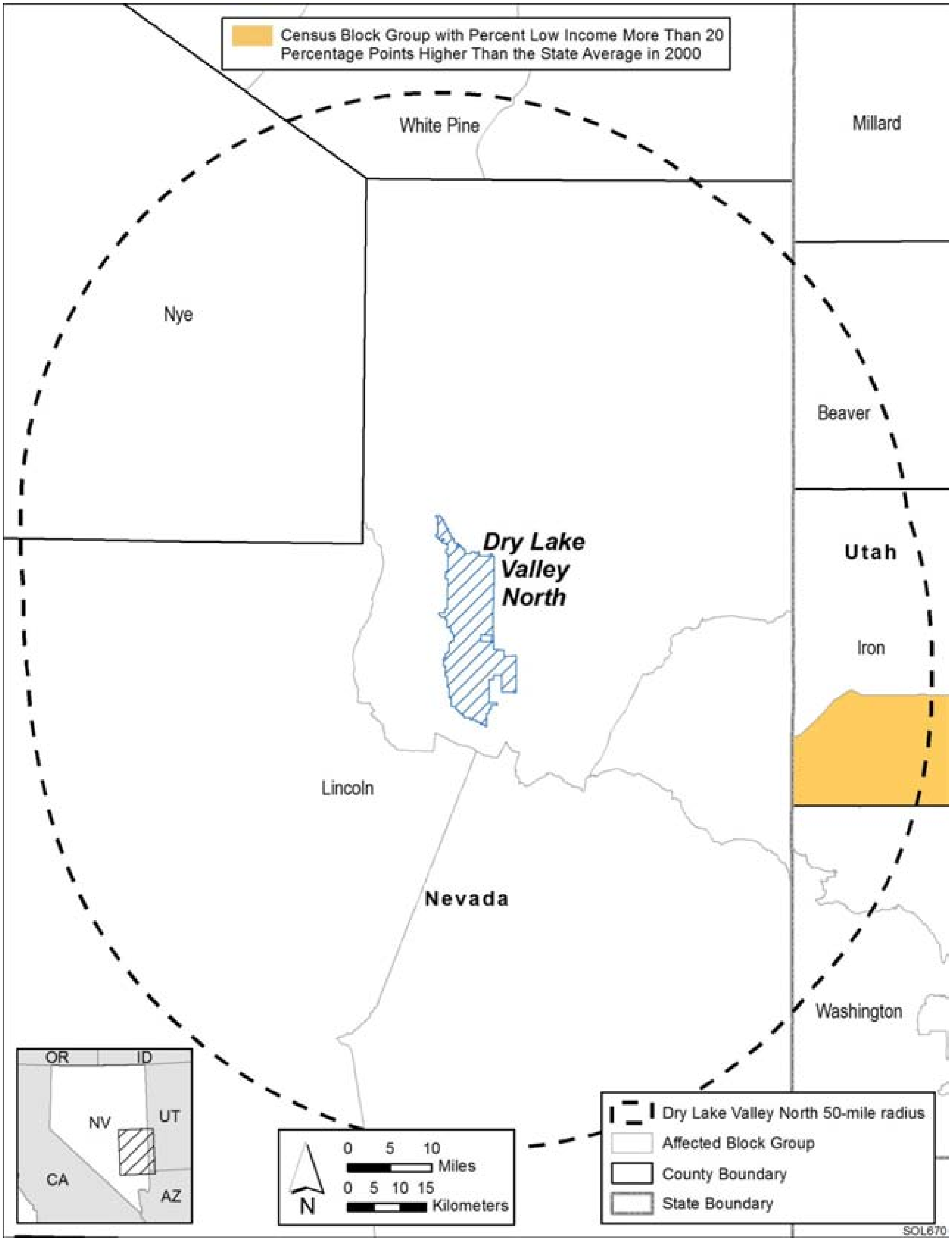

FIGURE 11.4.20.1-1 Low-Income Population Groups within the 50-mi (80-km) Radius Surrounding the Proposed Dry Lake Valley North SEZ

11.4.20.2 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 Valley North 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 no minority populations defined by CEQ guidelines (Section 11.4.20.1) within the 50-mi (80-km) radius around the boundary of the SEZ; this means that any adverse impacts of solar projects could not disproportionately affect minority populations. Because there are low-income populations within the 50-mi (80-km) radius, there could be impacts on low-income populations.

11.4.20.3 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 Valley North 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.

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11.4.21 Transportation

The proposed Dry Lake Valley North SEZ is accessible by road with rail nearby. One U.S. highway and one state highway serve the area as does a major railroad. Three small airports are in the general area. General transportation considerations and impacts are discussed in Sections 3.4 and 5.19, respectively.

11.4.21.1 Affected Environment

The closest major road, Nevada State Route 318 runs north–south approximately 7 to 8 mi (11 to 13 km) to the west of the Dry Lake Valley North SEZ as shown in Figure 11.4.21.1-1. To the east of the SEZ, U.S. 93 runs north–south with a closest approach just more than 8 mi (13 km) away. The town of Pioche is situated due east of the central portion of the SEZ along U.S. 93. The Las Vegas metropolitan area is approximately 140 mi (24 km) to the south of the SEZ along State Route 318 to U.S. 93. Several local unimproved dirt roads cross the SEZ from both State Route 318 and U.S. 93. As listed in Table 11.4.21.1-1, the SEZ area and surrounding area have been designated as limited to travel on existing roads and trails. State Route 318 and U.S. 93 each carry average traffic volumes of about 1,000 vehicles per day in the vicinity of the Dry Lake Valley North SEZ (NV DOT 2010).

The UP Railroad serves the region. The main line passes through Las Vegas on its way between Los Angeles and Salt Lake City. The railroad has a stop along this route in Caliente, 25 mi (40 km) south of Pioche on U.S. 93.

The nearest public airport is the Lincoln County Airport, a small local airport about a 10-mi (16-km) drive to the south of Pioche in Panaca. The airport has one asphalt runway 4,260-ft (1,408-m) long in fair condition (FAA 2009). Lincoln County Airport does not have scheduled commercial passenger or freight service. The next two closest public airports, Alamo Landing Field Airport (by Alamo on U.S. 93 south of the State Route 375 junction) and Currant Ranch Airport (on U.S. 6 west of the State Route 318 junction), have dirt runways and are owned by the BLM (FAA 2009). McCarran International Airport in Las Vegas, more than a 140-mi (225-km) drive, is the nearest major airport to the SEZ.

11.4.21.2 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 6,000 vehicle trips per day if three larger projects were to be developed at the same time. The volume of traffic on either State Route 318 or U.S. 93 would represent an increase in traffic of about a factor of 2, 4, or 6 maximum in the area of the SEZ for one, two, or three projects, respectively. Because higher traffic volumes would be experienced during shift changes, traffic on either State Route 318 or U.S. 93 could experience moderate slowdowns during these time periods in the general area of

TABLE 11.4.21.1-1 AADT on Major Roads near the Proposed Dry Lake Valley North SEZ for 2009

Road	General Direction	Location	AADT (Vehicles)
U.S. 93	North–South	North of I-15 junction (I-15 Exit 64)	2,300
		South of State Route 318	1,600
		North of State Route 375	650
		South of State Route 317 by Caliente	740
		North of Caliente	1,400
		North of State Route 319	1,200
		South of Pioche	1,000
		North of Pioche	580
		North of road to Bristol Silver Mine (due east of northern tip of the SEZ)	500
		South of junction with U.S. 6/U.S. 50	300
State Route 318	North–South	West of junction with U.S. 93	1,100
		1.6 mi (2.6 km) north of junction with State Route 375	1,200
		Nye–White Pine County Line	1,000
		In Lund, Nevada	1,600
State Route 319	East–West	East of junction with U.S. 93 (toward Panaca)	1,800
State Route 322	North–South	East of junction with U.S. 93 in Pioche	250
State Route 375	East–West	West of junction with State Route 318	200

Source: NV DOT (2010).

the SEZ. Local road improvements would be necessary on State Route 318 or U.S. 93 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 routes designated as open within the proposed SEZ, these 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).

11.4.21.3 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 Valley North 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.

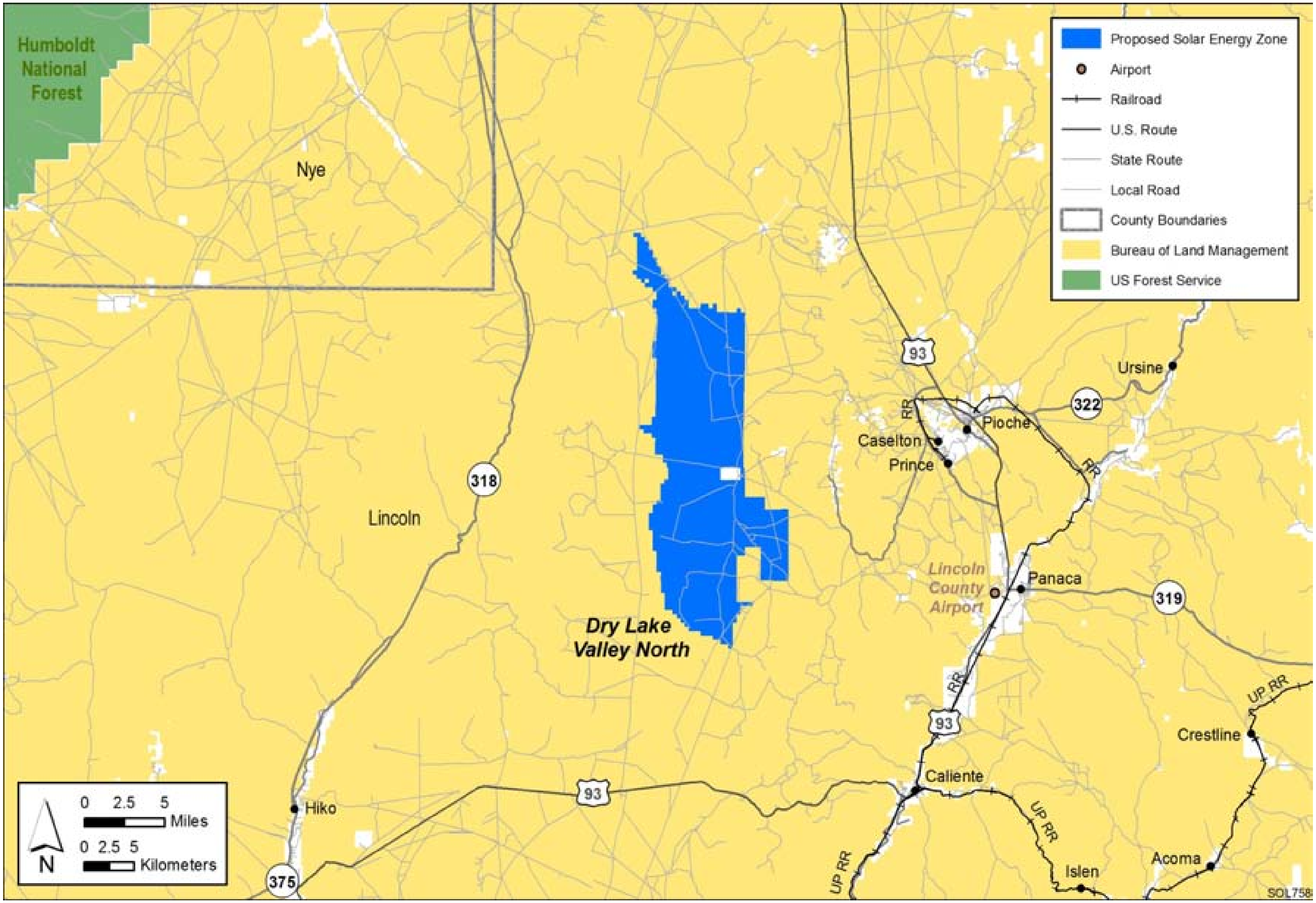

FIGURE 11.4.21.1-1 Local Transportation Network Serving the Proposed Dry Lake Valley North SEZ

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11.4.22 Cumulative Impacts

The analysis presented in this section addresses the potential cumulative impacts in the vicinity of the proposed Dry Lake Valley North SEZ in Lincoln 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 more than 5 to 10 years in the future.

The land surrounding the proposed Dry Lake Valley North SEZ is undeveloped, with no permanent residents in the area. The nearest population centers are the small communities of Caselton and Pioche (population 2,111), located about 13 mi (21 km) and 15 mi (24 km), respectively, from the eastern boundary of the SEZ. The Pahranagat NWR is about 45 mi (72 km) southwest of the SEZ. The northeast boundary of the Desert National Wildlife Range is located just under 50 mi (80 km) southwest of the SEZ. Two WAs are located near the proposed Dry Lake Valley North SEZ: Big Rocks WA is southwest of the SEZ, and the Weepah Spring WA is west of the SEZ. Portions of seven other WAs are within 50 mi (80 km) of the SEZ. The BLM administers about 82% of the lands in the Ely District that contains the Dry Lake Valley North SEZ. In addition, the proposed Delamar Valley SEZ is located about 20 mi (32 km) to the south of the Dry Lake Valley North SEZ, and for many resources, the geographic extent of impacts of the two SEZs overlap.

The geographic extent of the cumulative impacts analysis for potentially affected resources near the proposed Dry Lake Valley North SEZ is identified in Section 11.4.22.1. An overview of ongoing and reasonably foreseeable future actions is presented in Section 11.4.22.2. General trends in population growth, energy demand, water availability, and climate change are discussed in Section 11.4.22.3. Cumulative impacts for each resource area are discussed in Section 11.4.22.4.

11.4.22.1 Geographic Extent of the Cumulative Impacts Analysis

The geographic extent of the cumulative impacts analysis for potentially affected resources evaluated near the proposed Dry Lake Valley North SEZ is provided in Table 11.4.22.1-1. 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). Most of the lands around the SEZ are administered by the BLM, the USFWS, or the DoD. The BLM administers about 93.8% of the lands within a 50-mi (80-km) radius of the SEZ.

TABLE 11.4.22.1-1 Geographic Extent of the Cumulative Impacts Analysis by Resource Area: Proposed Dry Lake Valley North SEZ

Resource Area	Geographic Extent
Land Use	Central Lincoln County–Dry Lake Valley North
Specially Designated Areas and Lands with Wilderness Characteristics	Central Lincoln County
Rangeland Resources	
Grazing	Central Lincoln County
Wild Horses and Burros	A 50 mi (80 km) radius from the center of the Dry Lake Valley North SEZ
Recreation	Central Lincoln County
Military and Civilian Aviation	Central Lincoln County
Soil Resources	Areas within and adjacent to the Dry Lake Valley North SEZ
Minerals	Central Lincoln County
Water Resources	
Surface Water	Dry Lake, Coyote Wash, Fairview Wash, Cherry Creek, and wetlands associated with Dry Lake
Groundwater	Dry Lake Valley and Delamar Valley groundwater basins and the White River flow system
Air Quality and Climate	A 31-mi (50-km) radius from the center of the Dry Lake Valley North SEZ
Vegetation, Wildlife, and Aquatic Biota, Special Status Species	A 50-mi (80-km) radius from the center of the Dry Lake Valley North SEZ, including portions of Lincoln and Nye Counties in Nevada and Washington, Iron, and Beaver Counties in Utah
Visual Resources	Viewshed within a 25-mi (40-km) radius of the Dry Lake Valley North SEZ
Acoustic Environment (noise)	Areas adjacent to the Dry Lake Valley North SEZ
Paleontological Resources	Areas within and adjacent to the Dry Lake Valley North SEZ
Cultural Resources	Areas within and adjacent to the Dry Lake Valley North SEZ for archaeological sites; viewshed within a 25-mi (40-km) radius of the Dry Lake Valley North SEZ for other properties, such as traditional cultural properties.
Native American Concerns	Dry Lake Valley and surrounding mountains; viewshed within a 25-mi (40-km) radius of the Dry Lake Valley North SEZ.
Socioeconomics	Lincoln and Clark Counties in Nevada and Iron County in Utah
Environmental Justice	Lincoln County and Clark Counties in Nevada and Iron County in Utah
Transportation	U.S. Highway 93; State Route 318

11.4.22.2 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 11.4.22.2.1); and (2) other ongoing and reasonably foreseeable actions, including those related to mining and mineral processing, grazing management, transportation, recreation, water management, and conservation (Section 11.4.22.2.2). Together, these actions have the potential to affect human and environmental receptors within the geographic range of potential impacts over the next 20 years.

11.4.22.2.1 Energy Production and Distribution

On February 16, 2007, Governor Jim Gibbons of Nevada signed an Executive Order to encourage the development of renewable energy resources in the state (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). On May 28, 2009, the Nevada legislature passed a bill modifying the Renewable Energy Portfolio Standards (Nevada Senate 2009). The bill requires that 25% of the electricity sold be produced by renewable energy sources by 2025.

No existing or foreseeable energy production facilities are located within a 50-mi (80-km) radius from the center of the proposed Dry Lake Valley North SEZ, which includes portions of Lincoln and Nye Counties in Nevada and Washington, Beaver and Iron Counties in Utah. The closest renewable energy facility or project would be the 152-MW Spring Valley Wind project, a fast-track wind project located about 80 mi (130 km) north of the SEZ. Reasonably foreseeable future actions related to energy development and distribution are identified in Table 11.4.22.2-1 and described in the following sections.

Renewable Energy Development

Renewable energy ROW applications are considered in two categories: fast-track and regular-track applications. Fast-track applications, which apply principally to solar energy facilities, are those applications on public lands for which the environmental review and public participation process is underway, and the 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. There are no fast-track projects with 50 mi (80 km) of the proposed Dry Lake Valley North SEZ. 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 and are discussed in the following section.

Pending Solar and Wind ROW Applications on BLM-Administered Lands.

Applications for ROWs that have been submitted to the BLM include one pending solar project, one pending authorization for wind site testing, six authorized for wind testing, and one pending authorization for development of a wind facility that would be located within 50 mi (80 km) of the Dry Lake Valley North SEZ (BLM 2009b). No applications for geothermal projects have been submitted. Table 11.4.22.2-2 lists these applications and Figure 11.4.22.2-1 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 number and type of projects, listed in Table 11.4.22.2-2, 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 general for their potential 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.

Energy Transmission and Distribution Projects

The following proposed transmission line projects, which would run through or near the proposed Dry Lake Valley North SEZ, are considered reasonably foreseeable projects.

TABLE 11.4.22.2-1 Reasonably Foreseeable Future Actions Related to Energy Development and Distribution near the Proposed Dry Lake Valley North SEZ

Description	Status	Resources Affected	Primary Impact Location
Renewable Energy Development			
None			
Transmission and Distribution Systems			
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
One Nevada Transmission Line Project	Draft Supplemental EIS Nov. 30, 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

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 located in Dry Lake, Nevada, and extends north to a proposed substation about 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 is expected to be completed in 2010. Construction could have potential impacts on the Mojave desert tortoise (BLM 2007a).

One Nevada Transmission Line Project. NV Energy proposes to construct and operate a 236-mi (382-km) long 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 ROW is 200 ft (61 m). The proposed action includes new substations outside the ROI of the proposed Dry Lake Valley North 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 2009a).

Zephyr and Chinook Transmission Line Project. TransCanada is proposing to construct two 500-kV high-voltage direct current 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,

TABLE 11.4.22.2-2 Pending Renewable Energy Project ROW Applications on BLM-Administered Land within 50 mi (80 km) of the Proposed Dry Lake Valley North SEZ[a,b]

Serial Number	Applicant	Application Received	Size (acres)[c]	MW	Technology	Status	Field Office
Solar Applications							
NVN 86350	Solar Reserve LLC	Oct. 2, 2008	7,680	180	Power tower	Pending	Caliente
Wind Applications							
NVN 88325	–[d]	–	–	–	Wind	Pending wind site testing	Schell
NVN 86795	Windlab Developments USA, Ltd.	Feb. 25, 2009	–	–	Wind	Authorized wind site testing	Schell
NVN 87298	Windlab Developments USA, Ltd.	March 9, 2009	–	–	Wind	Authorized wind site testing	Schell
NVN 84477	Nevada Wind	Feb. 25, 2008	5,030	–	Wind	Authorized wind site testing	Schell
NVN 83880	Nevada Wind	June 27, 2008	9,020	–	Wind	Authorized wind site testing	Schell
NVN 84476	Nevada Wind	Sept. 24, 2008	2,950	–	Wind	Authorized wind site testing	Schell
UTU 83063	–	–	–	–	Wind	Authorized wind site testing	Cedar City
NVN 87411	–	–	–	–	Wind	Pending wind facilities development	Schell

a Source: BLM (2009b).

b Information for pending solar energy projects (BLM and USFS 2010c) and pending wind energy projects (BLM and USFS 2010d) was downloaded from GeoCommunicator.

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

d A dash indicates data not available.

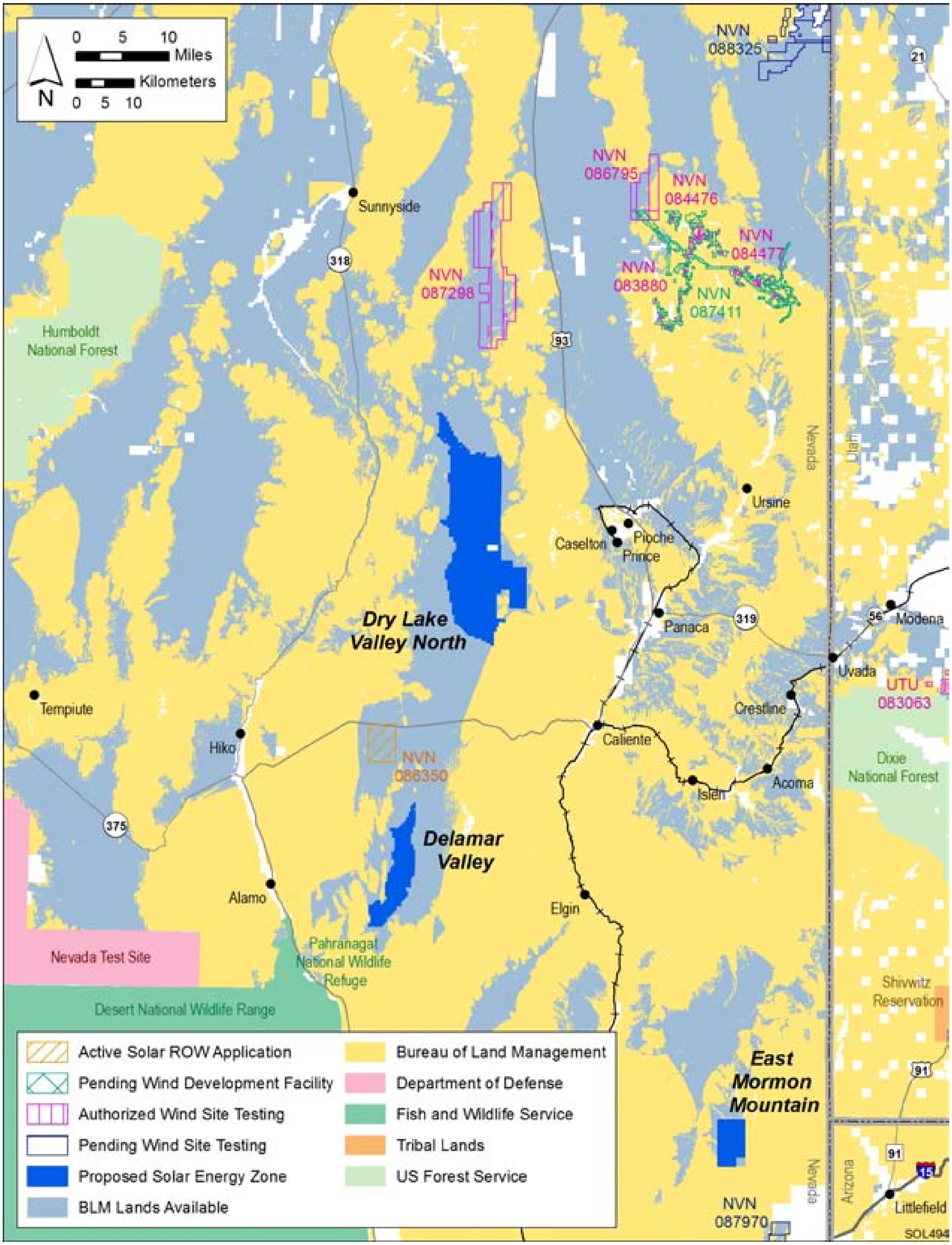

FIGURE 11.4.22.2-1 Locations of Renewable Energy Project ROW Applications on Public Land within a 50-mi (80-km) Radius of the Proposed Dry Lake Valley North SEZ

and terminate in the El Dorado Valley south of Las Vegas. Construction is expected to be complete in 2015 or 2016 (TransCanada 2010).

11.4.22.2.2 Other Actions

Other major ongoing and foreseeable actions identified within 50 mi (80 km) of the proposed Dry Lake Valley North SEZ are listed in Table 11.4.22.2-3 and described in the following subsections.

Other Ongoing Actions

Arizona Nevada Tower Corporation (ANTC). ANTC 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. One site is just east of the SEZ; the others are south and southwest of the site SEZ. 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 (9-m) square 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 2007b).

Patriot Communications Exercise in Lincoln Count. The U.S. Air Force at Nellis Air Force Base has acquired a 15-year communications use lease to support ground-based radar/communications exercises at fourteen 5.7-acre (0.023-km^2) sites. A maximum of five exercises would be conducted annually for a period of 15 years. One site is just east of the SEZ. Three of the sites are along U.S. 93 about 15 mi (24 km) south of the SEZ. The remainder are 20 to 40 mi (32 to 64 km) west of the SEZ (BLM 2008c).

Other Foreseeable Actions

Caliente Rail Alignment. The DOE proposes to construct and operate a railroad for the shipment of spent nuclear fuel and high-level radioactive waste to the geologic repository at Yucca Mountain, Nevada. The rail line would begin near Caliente, Nevada and extend north, then turn in a westerly direction, passing through the SEZ, to a location near the northwest corner of the Nevada Test and Training Range, and then continue south-southwest to Yucca Mountain. The rail line would range in length from approximately 328 mi (528 km) to 336 mi (541 km), depending upon the exact location of the alignment. The rail line would be restricted to DOE shipments. Over a 50-year period, 9,500 casks containing spent nuclear fuel and high-level

TABLE 11.4.22.2-3 Other Major Actions near the Proposed Dry Lake Valley North SEZ[a]

Description	Status	Resources Affected	Primary Impact Location
Arizona Nevada Tower Corporation Communication Sites	EA issued April 2007	Terrestrial habitats, wildlife, cultural resources	East, west, and southwest of the SEZ
Patriot Communication Exercises in Lincoln County	DEA April 2008	Terrestrial habitats, wildlife, soils	East, south, and west of the SEZ
Caliente Rail Realignment	FEIS June 2008	Terrestrial habitats, wildlife cultural resources	Passes through the SEZ
Clark, Lincoln, and White Pine Counties Groundwater Development Project	DEIS expected in March 2011	Terrestrial habitats, wildlife, groundwater	Within the SEZ
Lincoln County Land Act Groundwater Development and Utility ROW	FEIS issued May 2009 ROD Jan. 2010	Terrestrial habitats, wildlife, groundwater	Southeast of the SEZ
Alamo Industrial Park and Community Expansion	Preliminary Design Report Jan. 2000; FEIS issued Jan. 2010	Terrestrial habitats, wildlife, socioeconomics	35 mi (56 km) southwest of the SEZ
Meadow Valley Industrial Park	FEIS issued Jan. 2010	Terrestrial habitats, wildlife, socioeconomics	14 mi (22 km) southeast of the SEZ
NV Energy Microwave and Mobile Radio Project	Preliminary EA March 2010	Terrestrial habitats, wildlife cultural resources	Two of the sites are 40 mi (64 km) west of SEZ; one site is 50 mi (80 km) northwest of SEZ
U.S. Highway 93 Corridor Wild Horse Gather	EA issued Dec. 28, 2009	Terrestrial habitats, wildlife	East of the SEZ
Silver King Herd Management Area Wild Horse Gather	Preliminary EA issued June 10, 2010	Terrestrial habitats, wildlife	In and around the SEZ
Eagle Herd Management Area Wild Horse Gather	Preliminary EA issued Dec. 17, 2009	Terrestrial habitats, wildlife	East of the SEZ
Ash Canyon Sagebrush Restoration and Fuels Reduction Project	Preliminary EA issued May 2010	Terrestrial habitats, wildlife	25 mi (40 km) southeast of the SEZ
Pioche/Caselton Wildland Urban Interface Project	Preliminary EA issued May 2010	Terrestrial habitats, wildlife	East of the SEZ

radioactive waste, and approximately 29,000 rail cars of other materials, including construction materials, would be shipped to the repository. An average of 17 one-way trains per week would travel along the rail line. Construction of support facilities - interchange yard, staging yard, maintenance-of-way facility, rail equipment maintenance yard, cask maintenance facility, and Nevada Rail Control Center and National Transportation Operation Center would also be required. Construction would take 4 to 10 years and cost $2.57 billion. Construction activities would occur inside a 1000 ft (300 m) wide right-of-way for a total footprint of 40,600 acres (164 km^2) (DOE 2008).

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, and 2 primary and 5 secondary substations. A portion of the project will be located in the Dry Lake Valley North SEZ. The project would develop groundwater in the following amounts in two hydraulically connected valleys that would supply groundwater to the Dry Lake Valley North 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 south of the SEZ and downgradient of the other two basins (SNWA 2010).

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) temporarily disturbed. The closest approach to the SEZ is about 30 mi (48 km) southeast (USFWS 2009b).

Alamo Industrial Park and Community Expansion. The BLM is planning to transfer four parcels, consisting of 855 acres (3.46 km^2) to Lincoln County. Parcel A, consisting of approximately 217 acres (0.88 km^2), is intended to be used for light industrial use. It is assumed that the industrial park structures would require 117 acres (0.47 km^2) with parking, roads and support infrastructure on another 100 acres (0.40 km^2). The remaining parcels would be used for community expansion and would be developed primarily for residential purposes. Housing units limited to about 3 units per acre would be built over a 20-year period. The site, about 0.1 mi (0.16 km) southeast of the Town of Alamo along U.S. 93, is about 35 mi (56 km) southwest of the SEZ (Agra Infrastructures, Inc. 2000, BLM 2007f; USFWS 2010b).

Meadow Valley Industrial Park. The BLM is planning to transfer a 103-acre (0.42-km^2) parcel to the City of Caliente, Nevada, for the construction of the Meadow Valley Industrial Park. The site is located on a previously disturbed area used for agriculture and recreation at the intersection of U.S. 93 and State Route 317, about 20 mi (32 km) southeast of the SEZ. Improvements to the site would include construction of a rail spur, access roads, and water and sewer extensions (USFWS 2010b).

NV Energy Microwave and Mobile Radio Project. NV Energy is proposing the installation of a new microwave and radio communications network at 13 sites. Two sites are within about 10 mi (16 km) of the SEZ and another is about 45 mi (72 km) south of the SEZ. The two closest sites are small, occupying about 0.6 acre (0.0024 km^2). The more distant site is 0.6 acre (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 or three propane tanks, and a generator. Two of the sites would each have an 80-ft (24-m) self-supporting lattice tower, and one would have a 200-ft (60-m) tower (BLM 2010a).

U.S. Highway 93 Corridor Wild Horse Gather. The BLM Schell Field Office plans to gather and remove about 50 excess wild horses residing outside the wild horse herd management areas. The horses are considered to pose a safety hazard on U.S. 93 (BLM 2009c).

Silver King Herd Management Area Wild Horse Gather. The BLM Schell and Caliente Field Offices propose to gather and remove 445 excess wild horses from within and outside the Silver King HMA. The Silver King HMA is 606,000 acres (2,452 km^2) in size and is located 16 mi (26 km) north of Caliente, Nevada (BLM 2010b).

Eagle Herd Management Area Wild Horse Gather. The BLM Schell Field Office proposes to gather and remove 545 excess wild horses from within and outside the Eagle HMA. The Eagle HMA is 670,000 acres (2,710 km^2) in size and is located 20 mi (32 km) northeast of Caliente, Nevada (BLM 2009d).

Ash Canyon Sagebrush Restoration and Fuels Reduction Project. The BLM Caliente Field Office is proposing to conduct a sagebrush improvement and fuels reduction project adjacent to Ash Canyon, about 5 mi (8 km) southeast of Caliente, Nevada, and about 25 mi (40 km) southeast of the SEZ. The size of the project area is 870 acres (3.5 km^2). The goal is to reduce pinyon and juniper in order to achieve a desired state where sagebrush is present along with an understory of perennial species; to reduce risk of wild fires by reducing fuel loading; to restore the historic disturbance regime; and to improve the available habitat for resident wildlife (BLM 2010d).

Pioche/Caselton Wildland Urban Interface Project. The BLM is proposing to conduct a wildland urban interface project near Pioche and Caselton, Nevada, east of the SEZ. About 3,246 to 4,711 acres (13.1 to 19.1 km^2) is planned for treatment. The goal is to reduce the threat of wildfire to Pioche and Caselton through implementation of fuel reduction treatments; to reduce the risk of large, uncontrolled wildfires by reducing fuel loading; and to restore the historic disturbance regime within the project area. The treatment would include reduction of canopy cover and fuel continuity of single-leaf pinyon, Utah juniper, and shrub species to prevent crown fire potential (BLM 2010e).

Grazing

The BLM Ely District in which the proposed SEZ is located has a total of 242 grazing allotments under its administration. There are 139 individual permittees, of which 129 are cattle operators and 10 are sheep operators (BLM 2010f). In Grazing Year 2009 (March 1, 2009 to February 2, 2010) grazing permits were issued for a total of 131,901 AUMs of forage (BLM 2009e).

Mining

The only active mining in the Ely District is at Bald Mountain Mine and Mooney Basin Mine, which are more than 100 mi (162 km) north the SEZ. The Meadow Valley Gypsum Project is proposing to mine gypsum on 21.2 acres (0.086 km^2) of public land more than 50 mi (80 km) south of the SEZ. A total of 46.7 acres (0.19 km^2) would be disturbed during the 10-year lifetime of the project. A 1.5-mi (2.5-km) long access road and a 1.8-acre (0.007-km^2) railroad siding would be constructed (BLM 2007c).

11.4.22.3 General Trends

General trends of population growth, energy demand, water availability, and climate change for the proposed Dry Lake Valley SEZ are presented in this section. Table 11.4.22.3-1 lists the relevant impacting factors for the trends.

11.4.22.3.1 Population Growth

Over the period 2000 to 2008, population grew by 1.4% in Lincoln County, 4.0% in Clark County, and 1.4% in Iron County Utah, the ROI for the Dry Valley North SEZ (see Section 11.4.19.1.5). The population of the ROI in 2008 was 1,927,930. The growth rate for the state of Nevada as a whole was 3.4%, and for Utah was 2.5%.

TABLE 11.4.22.3-1 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

11.4.22.3.2 Energy Demand

The growth in energy demand is related to population growth through increases in housing, commercial floorspace, transportation, manufacturing, and services. Given that 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 the high cost of oil throughout the projection period. Primary energy consumption in the United States between 2007 and 2030 is expected to grow by about 0.5% each year, 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).

11.4.22.3.3 Water Availability

As described in Section 11.4.9.1, the perennial yield of the Dry Lake Valley basin is equal to 12,700 ac-ft/yr (16 million m^3/yr). Approximately 1,009 ac-ft/yr (1.2 million m^3/yr) (for irrigation) of water rights are permitted in the basin, and an additional 57 ac-ft/year (70,300 m^3/yr) (about 30% for mining, the rest for stock watering) of water rights are certified (i.e., the well was previously permitted, beneficial use was subsequently demonstrated, and a certificate of water right was issued) In July 2008, the State Engineer (NDWR 2008) granted 11,584 ac-ft/yr (14 million m^3/yr) in water rights in the Dry Lake Valley groundwater basin to the SNWA for use in a project that would convey water to Las Vegas (SNWA 2010). However, the allocations are under review by the Nevada Supreme Court and the water rights applications have been opened up by the NDWR to public comment. Concerned parties could present new information about the groundwater basin, and thus the NDWR could alter its previous assessment of water availability in the basin.

In 2005, water withdrawals from surface waters and groundwater in Lincoln County were 57,100 ac-ft/yr (70 million m^3/yr), 11% of which came from surface waters and 89% from groundwater. The largest water use category was irrigation, at 55,100 ac-ft/yr (68 million m^3/yr). Public supply/domestic water uses accounted for 1,300 ac-ft/yr (1.6 million m^3/yr), with livestock and mining water uses on the order of 230 ac-ft/yr (280,000 m^3/yr) and 450 ac-ft/yr (560,000 m^3/yr), respectively (Kenny et al. 2009).

11.4.22.3.4 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 committee's report summarized the present scientific understanding of climate change and its potential impacts on the state. 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:

- 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 (0.8ºC) compared to a 1960 to 1979 baseline, and by the end of the century, the average annual temperature is projected to rise 4º to 10ºF (2.2º to 5.5ºC).

- 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.

- 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.

11.4.22.4 Cumulative Impacts on Resources

This section addresses potential cumulative impacts in the proposed Dry Lake Valley North SEZ on the basis of the following assumptions: (1) because of the large size of the proposed SEZ (more than 30,000 acres [121 km^2]), up to three projects could be constructed at a time, and (2) maximum total disturbance over 20 years would be about 61,499 acres (249 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 69-kV transmission line intersects the southeastern corner of 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 11.4.1.2). Regarding site access, the nearest major road is State Route 318, which extends north-south and lies about 7 mi (11 km) west of the SEZ. It is assumed that an access road would be constructed to this existing route to support solar development in the SEZ.

Cumulative impacts in each resource area that would result from the construction, operation, and decommissioning of solar energy development projects within the proposed SEZ when added to other past, present, and reasonably foreseeable future actions described in the previous section are discussed below. At this stage of development, because of the uncertain nature of the future projects in terms of size, number, and 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.

11.4.22.4.1 Lands and Realty

The area covered by the proposed Dry Lake Valley North SEZ is largely isolated and undeveloped. In general, the area surrounding the SEZ is rural in nature. An existing dirt road from State Route 318 provides access to the northern portion of the SEZ, and a dirt road from U.S. 93 provides access to the southern portions of the SEZ. Numerous dirt ranch roads provide access throughout the SEZ (Section 11.4.2.1).

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. Utility-scale solar energy development would be a new and discordant land use in the area.

As shown in Table 11.4.22.2-2 and Figure 11.4.22.2-1, there is one pending solar development ROW application, six authorized and one pending wind site testing applications, and one pending wind development application on BLM administered land within a 50-mi (80-km) radius of the proposed Dry Lake Valley North SEZ. There are currently no solar applications within the SEZ. The lone solar application lies about 13 mi (21 km) southwest of the SEZ, while five of the wind applications lie generally northeast and one lies east in Utah. In addition, the proposed Delamar Valley SEZ is about 20 mi (32 km) south. While not all of these proposed solar and wind projects would likely be built, the number of applications indicates a fairly strong interest in the development of wind energy in particular northeast of the proposed SEZ.

An additional foreseeable project of note is the proposed Groundwater Development Project discussed in Section 11.4.22.2.2. This project would include the construction of a water pipeline and other water conveyance facilities as well as a parallel electrical transmission line extending north-south through the Dry Lake Valley (SNWA 2010).

The development of utility-scale solar projects on public lands in combination with ongoing, foreseeable, and potential actions within the geographic extent of effects, nominally within 50 mi (80 km), could have small cumulative effects on land use in the vicinity of the proposed Dry Lake Valley North SEZ. Most other actions outside of the proposed SEZ are wind energy projects, which would allow many current land uses to continue, including grazing. However, the number and size of such projects could result in cumulative effects, especially if the SEZ is fully developed with solar projects.

11.4.22.4.2 Specially Designated Areas and Lands with Wilderness Characteristics

Fourteen specially designated areas are within 25 mi (40 km) of the proposed Dry Lake Valley North SEZ (Section 11.4.3.1). Potential exists for 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 and outside the SEZ for transmission lines. Currently proposed solar and wind projects lie far enough away from the SEZ that sensitive areas would not likely be cumulatively affected by facilities within the geographic extent of effects. However, facilities and associated roads and transmission lines would add to the visual clutter of the area.

11.4.22.4.3 Rangeland Resources

The proposed Dry Lake Valley North SEZ contains large acreages of three perennial grazing allotments (Section 11.4.4.1.1). If utility-scale solar facilities were constructed on the SEZ, those areas occupied by the solar projects would be excluded from grazing. The effects of other renewable energy projects within the geographic extent of effects, including pending solar and wind applications within 50 mi (80 km) of the SEZ, that are ultimately developed would not likely result in cumulative impacts on grazing because of the small number and distance of the proposed facilities from Dry Lake Valley North and the generally low impact of wind facilities on grazing.

The proposed Dry Lake Valley North SEZ would encompass about 32,440 acres (131.3 km^2) of the 606,000-acre (2,452.4-km^2) Silver King HMA (Section 11.4.4.2.2). Wild horses would be excluded from areas where utility-scale facilities may be constructed on the SEZ. The BLM already had plans to remove 445 of the 505 (88.1%) of the wild horses from the HMA. This would offset the loss of up to 5.4% of the HMA by solar energy development within the SEZ. The effects of other renewable energy projects within the geographic extent of effects, including pending solar and wind applications within 50 mi (80 km) of the SEZ that are ultimately developed, would not likely result in cumulative impacts on wild horses because of the small number and distance of the proposed facilities from Dry Lake Valley North and the generally low impact of wind facilities on wild horses. The wild and horse and burro territories administered by the USFS are located more than 50 mi (80 km) from the Dry Lake Valley North SEZ. Thus, solar energy development within the SEZ would not directly affect wild horses and burros managed by the USFS and would not contribute to cumulative effects on wild horses and burros managed by the USFS.

11.4.22.4.4 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 actions, primarily potential solar and wind projects, would similarly affect areas of low recreational use, but cumulative impacts on recreation within the geographic extent of effects would be small because of the small number and distance from the SEZ of potential developments.

11.4.22.4.5 Military and Civilian Aviation

Portions of the proposed Dry Valley Lake North SEZ are covered by two aircraft MTRs and a major SUA. The military has expressed serious concern over possible solar energy facilities within the SEZ. Nellis Air Force Base and NTTR have each indicated that facilities of over 50 ft (15 m) tall may be incompatible with their respective missions (Section 11.4.6.2). Additional solar and particularly wind facilities northeast of the SEZ could present additional concerns for military aviation, depending on the eventual location of such facilities with respect to training routes and, thus, could result in cumulative impacts on military aviation. The closest civilian municipal airports located in St. George and Cedar City, Utah, 75 mi (120 km) and 85 mi (137 km) southeast of the SEZ, respectively, are unlikely to be impacted by developments in the SEZ.

11.4.22.4.6 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 renewable energy facilities, recreational uses, and agriculture. Overall, the cumulative impacts on soil resources would be small, however, because of the small number of currently foreseeable projects within the geographic extent of effects. The number of pending solar and wind applications in this area suggests that future impacts could increase somewhat over that from any development in the SEZ, but would be expected to remain small.

Landscaping of solar energy facility areas in the SEZ could alter drainage patterns and lead to increased siltation of surface water streambeds, in addition to that from other solar and wind developments and other activities, e.g., OHV use, outside the SEZ. However, with the programmatic design features in place, cumulative impacts would be small.

11.4.22.4.7 Minerals (Fluids, Solids, and Geothermal Resources)

As discussed in Section 11.4.8, currently six oil and gas leases, all classified as nonproducing, are within the proposed Dry Lake Valley North SEZ; no mining claims or proposals for geothermal energy development are pending. Because of the generally low level of mineral production in the proposed SEZ and surrounding area and the expected low impact on mineral accessibility of other foreseeable actions within the geographic extent of effects, no cumulative impacts on mineral resources are expected.

11.4.22.4.8 Water Resources

Section 11.4.9.2 describes the water requirements for various technologies if they were to be used to develop utility-scale solar energy facilities on the SEZ. The amount of water needed during the peak construction year for all evaluated solar technologies would be 2,946 to 4,220 ac-ft (3.6 million to 5.2 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 349 to 184,605 ac-ft/yr (430,000 to 228 million m^3/yr). The amount of water needed during decommissioning would be similar to or less than the amount used during construction.

As discussed in Section 11.4.22.2.3, water withdrawals in 2005 in Lincoln County were 57,100 ac-ft/yr (70 million m^3/yr), of which 11% came from surface waters and 89% came from groundwater. The largest water use category was irrigation, at 55,100 ac-ft/yr (68 million m^3/yr). Therefore, cumulatively the additional water resources needed for solar facilities in the SEZ during operations would constitute from a relatively small (0.6%) to a very large (320%) increment (the ratio of the annual operations water requirement to the annual amount withdrawn in Lincoln 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 11.4.9.1.3, the estimated perennial yield for the Dry Lake Valley basin is only an estimated 12,700 ac-ft/yr (15.7 million m^3/yr), of which1,065 ac-ft/yr (1.3 million m^3/yr) has been appropriated and 11,584 ac-ft/yr (14 million m^3/yr) are under review by the NDWR for SNWA for municipal use. If granted the water rights, the SNWA has committed to providing up to 1,500 ac-ft/yr (1.3 million m^3/yr) of water rights to Lincoln County (Section 11.4.9.1.3).Thus, even if water rights were available, water requirements for solar developments on the SEZ would have the potential to far exceed the physically available groundwater in the basin and even within Lincoln County using wet-cooling, while full development with dry-cooled solar trough technologies could exceed the current estimate of the perennial yield (Section 11.4.9.2.2).

While solar development of the proposed SEZ with water-intensive technologies would likely be infeasible due to impacts on groundwater supplies and restrictions on water rights, withdrawals at or above currently appropriated levels could result in impacts on groundwater levels in the Dry Lake Valley basin, which, in turn, could lead to declines in water availability in the adjacent Delamar Valley, which receives outflow from the Dry Lake Valley groundwater basin (Section 11.4.9.2.2). Thus, a significant increase in groundwater withdrawals for development within the proposed SEZ could result in a major impact on groundwater in the Dry Lake Valley. Further cumulative impacts could occur if these withdrawals were combined with other future uses in the valley or on the Delamar Valley basin from solar developments in both the proposed Dry Lake Valley North and in the proposed Delamar Valley SEZ, located 20 mi (32 km) to the south. Another foreseeable action with groundwater demands within in the central portion of the White River groundwater flow system, which is described in Section 11.4.22.2.2, is the Clark, Lincoln, and White Pine Counties Groundwater Development Project, which could withdraw 14,000 ac-ft/yr (17.3 million m^3/yr) from the Dry Lake and Delamar Valley groundwater basins.

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 28 to 212 ac-ft (34,000 to 274,000 m^3) during the peak construction year and would range from less than 7.7 up to 172 ac-ft/yr (up to 212,000 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 1,940 to 3,493 ac-ft/yr (2.4 to 4.3 million m^3/yr) 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 were effectively lined in order to prevent contamination of groundwater. Thus, blowdown water would not contribute to cumulative effects on treatment systems or on groundwater.

11.4.22.4.9 Vegetation

The proposed Dry Lake Valley North SEZ is located within the Shadscale-Dominated Saline Basins ecoregion, which primarily supports shadscale low scrub community (Section 11.4.10.1). The southwestern portion of the SEZ is located within the Salt Deserts ecoregion, and the southeastern portion is within the Carbonate Sagebrush Valleys ecoregion. Surrounding lands also include the Carbonate Woodland Zone ecoregion. 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 large impacts on Inter-Mountain Basins Mixed Salt Desert Scrub, Inter-Mountain Basins Playa, Inter-Mountain Basins Semi-Desert Grassland, Inter-Mountain Basins Big Sagebrush Steppe, and Undifferentiated Barren Land cover types and moderate impacts on Inter-Mountain Basins Semi-Desert Shrub Steppe and Inter-Mountain Basins Greasewood Flat cover types (Section 11.4.10.2.1).

Two mapped wetlands and numerous smaller playa areas that are not mapped, as well as numerous dry washes, are located within the proposed SEZ. Any wetland or riparian habitats within or outside of the SEZ that are supported by groundwater discharge could be affected by hydrologic changes resulting from project activities.

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 activities in the area. 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. The primary plant community types within the proposed SEZ are relatively common in the SEZ region. Ongoing and reasonably foreseeable future actions would have cumulative effects on both abundant and rare community types. Such effects could be moderate with full build-out of the SEZ, but would likely fall to small for foreseeable development due to the abundance of the primary species and the relatively small number of foreseeable actions within the geographic extent of effects. Cumulative effects on wetland species could occur from water use, drainage modifications, and stream sedimentation from development in the region. The magnitude of such effects is difficult to predict at the current time.

11.4.22.4.10 Wildlife and Aquatic Biota

Amphibian, reptile, bird, and mammal wildlife species could potentially be affected by the development of utility-scale solar energy facilities in the proposed SEZ. 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, 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 would 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 11.4.22.2, other ongoing, reasonably foreseeable and potential future actions within 50 mi (80 km) of the proposed SEZ include a groundwater transfer project, one pending solar application, and eight pending wind applications in various stages of approval (Figure 11.4.22.2-1). While impacts from full build-out over 80% of the proposed SEZ would result in small to moderate impacts on some wildlife species (Section 11.4.11), impacts from foreseeable development within the 50-mi (80-km) geographic extent of effects would be small. Many of the wildlife species present within the proposed SEZ that could be affected by other actions have extensive available habitat within the region, while no foreseeable solar or wind projects have been firmly identified within the geographic extent of effects. Some number of the pending solar and wind applications in the region could contribute to small cumulative effects, however, as would the foreseeable groundwater transfer project.

No surface water bodies or perennial streams occur within the proposed Dry Lake Valley North SEZ, washes are typically dry and flow only after precipitation, and an unnamed dry lake and associated wetlands rarely contain water. Thus, no standing aquatic communities are likely to be present in the proposed SEZ. However, aquatic communities do exist within the 50-mi (80-km) geographic extent of effects, including in the White River (Section 11.4.11.4). Nonetheless, potential contributions to cumulative impacts on aquatic biota and habitats resulting from groundwater drawdown or soil transport to surface streams from solar facilities within the SEZ and within the geographic extent of effects are low. Potentially affected habitats are generally too far away to be affected by groundwater use in the proposed SEZ, while there is little foreseeable development within the geographic extent of effects. The magnitude of any cumulative impacts on aquatic species that might occur would depend on the extent of eventual solar and other development in the region and on cooling technologies employed by solar facilities.

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

On the basis of recorded occurrences or suitable habitat, as many as 22 special status species could occur within the Dry Lake Valley North SEZ or could be affected by groundwater use there. Three of these species have been recorded within or near the SEZ: Blaine fishhook cactus, Eastwood milkweed, and Desert Valley kangaroo mouse. The Mojave population of the desert tortoise—listed as threatened under the ESA—is not likely to occur in the area of direct effects based upon the lack of suitable habitat and information provided by the USFWS. Numerous other species that may occur on or in the vicinity of the SEZ are protected by the state of Nevada or listed as a sensitive species by the BLM (Section 11.4.12.1).

Design features to be used to reduce or eliminate the potential for effects on special status species from 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 include avoidance of occupied or unique habitats and minimization of erosion, sedimentation, and dust deposition. Ongoing effects on special status species include those from roads, transmission lines, and recreational activities in the area. However, since the amount of foreseeable development within the geographic extent of effects is low – including only potential solar and wind projects, a groundwater transfer pipeline, and several transmission line projects – the likelihood of cumulative impacts on protected species is relatively low. Actual impacts would depend on the number, location, and cooling technologies of projects that are actually built. Projects would employ mitigation measures to limit effects.

11.4.22.4.12 Air Quality and Climate

While solar energy generates minimal emissions compared with fossil fuels, the site preparation and construction activities associated with development of 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 $\mu g/m^3$. Dust generation from construction activities could be controlled by implementing aggressive dust control measures, such as increased watering frequency or road paving or treatment.

Because the area proposed for the SEZ is rural and undeveloped land, no significant industrial sources of air emissions occur in the area. The only type of air pollutant of concern is dust generated by winds. Because the number of other foreseeable and potential actions that could produce fugitive dust emissions is small and because such projects are unlikely to overlap in both time and affected area, cumulative air quality effects due to dust emissions during any construction periods would be small.

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 use of coal, oil, and natural gas to produce energy. As discussed in Section 11.4.13.2.2, 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 Valley North SEZ was fully developed (80% of its acreage) with solar facilities, the quantity of pollutants avoided could be as large as 57% of all emissions from the current electric power systems in Nevada.

11.4.22.4.13 Visual Resources

The proposed Dry Lake Valley North SEZ is located in the central portion of the broad and flat Dry Lake Valley. The valley is bounded by mountain ranges on the east and west, with more open views to the north and south (Section 11.4.14.1). The area is sparsely inhabited, remote, and rural in character.

The VRI values for the SEZ and immediate surroundings are VRI Class IV, indicating low relative visual values. Currently, there is a low level of cultural disturbance, including from OHV use and from roads, fences, livestock ponds, and a transmission line.

Construction of utility-scale solar facilities on the SEZ and associated transmission lines outside the SEZ would significantly 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 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. Currently there are one pending solar application and eight wind applications in various stages of approval on public lands within 50 mi (80 km) of the SEZ, which represent additional potential developments (Figure 11.4.22.2-1). In addition, several new electric transmission projects and a groundwater transfer pipeline project represent foreseeable developments that would pass through or near the proposed SEZ, as discussed in Section 11.4.22.2. While the contribution to cumulative impacts in the area of these potential projects would depend on the number and location of facilities that are actually built, it may be concluded that the general visual character of the landscape within this distance could be altered from what is currently rural desert by the presence of solar facilities, transmission lines, and other new infrastructure. 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 cluster of pending wind applications to the northeast, it is possible that two or more facilities might 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 line corridors, towns, and other infrastructure, as well as the road system itself.

As additional facilities were added, several projects might become visible from one location, or in succession, as viewers moved 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 in light of the fact that only potential solar and wind developments have been identified, small cumulative visual impacts could occur within the geographic extent of effects from future solar, wind, and other existing and future developments.

11.4.22.4.14 Acoustic Environment

The areas around the proposed Dry Lake Valley North SEZ are relatively quiet. The existing noise sources around the SEZ include road traffic, aircraft flyover, and cattle grazing. Other noise sources are associated with current land use around the SEZ, including outdoor recreation and OHV use. 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 no noise during operation of solar facilities, even from solar dish engine facilities and from parabolic trough or power tower facilities using TES, which could also minimally affect nearby residences due to considerable separation distances.

Other ongoing and reasonably foreseeable and potential future activities in the general vicinity of the SEZs are described in Section 11.4.22.2. Because proposed projects and nearest residents are relatively far from the SEZ with respect to noise impacts and the area is sparsely populated, cumulative noise effects during the construction or operation of solar facilities are unlikely.

11.4.22.4.15 Paleontological Resources

The proposed Dry Lake Valley North SEZ has low potential for the occurrence of significant fossil material in 91% of its area, mainly alluvial deposits, and unknown potential in about 9% of its area, mainly playa deposits (Section 11.4.16.1). While impacts on significant paleontological resources are unlikely to occur in the SEZ, the specific sites selected for future projects would be investigated to determine whether a paleontological survey is needed. Any paleontological resources encountered would be mitigated to the extent possible. No significant cumulative impacts on paleontological resources are expected.

11.4.22.4.16 Cultural Resources

The proposed Dry Lake Valley North SEZ is rich in cultural history, with settlements dating as far back as 12,000 years. The area covered by the proposed Dry Lake Valley North SEZ has the potential to contain significant cultural resources, especially in areas around the dry lake and at the south end of the SEZ, as well as in alluvial fans, fan piedmonts, ridge tops, passes, and stream terraces within and adjacent to the SEZ. It is possible that the development of utility-scale solar energy projects in the SEZ, when added to other potential projects likely to occur in the area, could contribute cumulatively to cultural resource impacts occurring in the region. However, the amount of potential and foreseeable development is low, and includes one pending solar application, two authorized wind testing applications, a proposed groundwater transfer pipeline, and several proposed transmission line projects within the 25-mi (40-km) geographic extent of effects (Section 11.4.22.2). 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.

11.4.22.4.17 Native American Concerns

Major Native American concerns in arid portions of the Great Basin include water, culturally important plant and animal resources, and culturally important landscapes. The development of utility-scale solar energy facilities within the SEZ, in combination with the foreseeable development in the surrounding area, could cumulatively contribute to effects on these resources. Development of the SEZ would result in the removal of plant species from the footprint of the facility during construction. This would include some plants of cultural importance. However, the primary species that would be affected are abundant in the region; thus the cumulative effect would likely be small. Likewise, habitat for important species, such as the black-tailed jackrabbit, would be reduced; however, extensive habitat is available in the area, reducing the cumulative effect. The cultural importance of the mountains surrounding the SEZ is as yet undetermined. If culturally important, the view from these features can be an important part of their cultural integrity. The degree of impact on these resources of development at specific locations must be determined in consultation with the Native American Tribes whose traditional use area includes the proposed SEZ. In general, Tribes prefer that development occur on previously disturbed land and this SEZ is largely undeveloped.

Government-to-government consultation is underway with federally recognized Native American Tribes with possible traditional ties to the Dry Lake Valley North area. All federally recognized Tribes with Southern Paiute or Western Shoshone roots have been contacted and provided an opportunity to comment or consult regarding this PEIS. To date, no specific concerns have been raised to the BLM regarding the proposed Dry Lake Valley North SEZ. However, the Paiute Indian Tribe of Utah has asked to be kept informed of PEIS developments, while the Southern Paiute have previously expressed concern over adverse effects of energy projects on a wide range of resources in the area (Section 11.4.18.2). Continued discussions with the area Tribes through government-to-government consultation is necessary to determine the extent to which cumulative effects of solar energy development in the proposed Dry Lake Valley North SEZ can be addressed.

11.4.22.4.18 Socioeconomics

Solar energy development projects in the proposed Dry Lake Valley North SEZ could cumulatively contribute to socioeconomic effects in the immediate vicinity of the SEZs and in the surrounding multicounty ROI. The effects could be positive (e.g., creation of jobs and generation of extra income, increased revenues to local governmental organizations through additional taxes paid by the developers and workers) or negative (e.g., added strain on social institutions such as schools, 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 in combination with temporary workers involved in other new developments in the area, including other renewable energy development. The number of workers involved in the construction of solar projects in the peak construction year (including the transmission lines) could range from about 200 to 2,700 people, 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 330 (solar PV) to as high as 4,400 (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 occur within a 50-mi (80-km) radius of the SEZ occasionally 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 the proposed groundwater transfer pipeline and several proposed transmission line projects. The number of workers needed at the solar facilities would be in the range of 130 to 2,700, with approximately 180 to 3,900 total jobs created in the region, assuming full build-out of the SEZ (Section 11.4.19.2.2). Population increases would contribute to general upward trends in population 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.

11.4.22.4.19 Environmental Justice

No minority or low-income populations as defined by CEQ guidelines are currently located within a 50-mi (80-km) radius of the proposed SEZ (Section 11.4.20.1). If this condition should change in the future, solar development of the proposed SEZ in combination with other development in the area could potentially impact these groups. 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 where minority or low-income populations were located relative to solar and other proposed facilities and on the geographic range of effects. If needed, mitigation measures could be implemented to reduce the impacts on these populations in the vicinity of the SEZ. Thus, it is not expected that the proposed

Dry Lake Valley North SEZ would contribute to cumulative impacts on minority and low-income populations.

11.4.22.4.20 Transportation

State Route 318 extends north–south about 7 mi (11 km) west of the proposed Dry Lake Valley North SEZ, and U.S. 93 is about 8 mi (13 km) from the eastern boundary. The closest airport is Lincoln County Airport at Panaca, about 17 mi (27 km) east of the SEZ. The UP Railroad serves the region.

During construction of utility-scale solar energy facilities, up to 1,000 workers could be commuting to the construction site at the SEZ for a single project, which could increase the AADT on these roads by 2,000 vehicle trips for each facility under construction. With as many as three facilities assumed under construction at the same time, traffic on either State Route 318 or U.S. 93 could experience moderate slowdowns in the area of the SEZ (Section 11.4.21.2). This increase in highway traffic from construction workers could likewise have moderate cumulative impacts in combination with existing traffic levels and increases from additional future developments in the area, including from construction in the proposed Delamar Valley SEZ located 20 mi (32 km) south, should construction schedules overlap. Local road improvements may be necessary on portions of State Route 318 and on U.S. 93 near the proposed SEZ. Any impacts during construction activities would be temporary. The impacts could also be mitigated to some degree by implementing staggered work schedules and ride-sharing programs. Traffic increases during operation would be relatively small because of the low number of workers needed to operate the solar facilities and would have little contribution to cumulative impacts.

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11.4.23 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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