11.7 MILLERS

11.7.1 Background and Summary of Impacts

11.7.1.1 General Information

The proposed Millers SEZ is located in Esmeralda County in southern Nevada (Figure 11.7.1.1-1), 44 mi (71 km) east of the California border. The SEZ has a total area of 16,787 acres (68 km^2). In 2008, the county population was 664, while adjacent Nye County to the west had a population of 44,175. The nearest town is Tonopah, Nevada, about 15 mi (24 km) west in Nye County, with a population of approximately 1,500. The NTTR is 30 mi (48 km) northeast of the SEZ.

The nearest major road access to the proposed SEZ is via U.S. 95/U.S. 6, which runs east–west along its southern border. The nearest railroad stop is 90 mi (145 km) away in Thorne, which is the end of a spur from the main line of the UP Railroad. Tonopah Airport, a small county airport 23 mi (37 km) to the east of the SEZ, and three public airports managed by the BLM serve the area, though none have scheduled commercial passenger service or regular freight service.

A 120-kV transmission line passes through the SEZ. It is assumed that this existing transmission line could potentially provide access from the SEZ to the transmission grid (see Section 11.7.1.1.2).

Applications for ROWs that have been submitted to the BLM include one fast-track solar application, one pending solar project, one pending wind site testing application, four authorized wind site testing projects, and two authorized geothermal projects that would be located within 50 mi (80 km) of the Millers SEZ. These applications are discussed in Section 11.7.22.2.1. There are currently no solar applications within the SEZ.

The proposed Millers SEZ is undeveloped and rural, with few permanent residents in the area. The SEZ is located in the Big Smoky Valley, lying between the Lone Mountain to the south, the Monte Cristo Range to the west, and the San Antonio Mountains to the east. Land within the SEZ is undeveloped scrubland characteristic of a high-elevation, semiarid basin.

The criteria used to identify the proposed Millers SEZ as an appropriate location for solar energy development included proximity to existing transmission or designated corridors, proximity to existing roads, and a slope of generally less than 2%. In addition, the area was identified as being relatively free of other types of conflicts, such as USFWS-designated critical habitat for threatened and endangered species, ACECs, SRMAs, and NLCS lands (see Section 2.2.2.2 for the complete list of exclusions). Although these classes of restricted lands were excluded from the proposed Millers SEZ, other restrictions might be appropriate. The analyses in the following sections address the affected environment and potential impacts

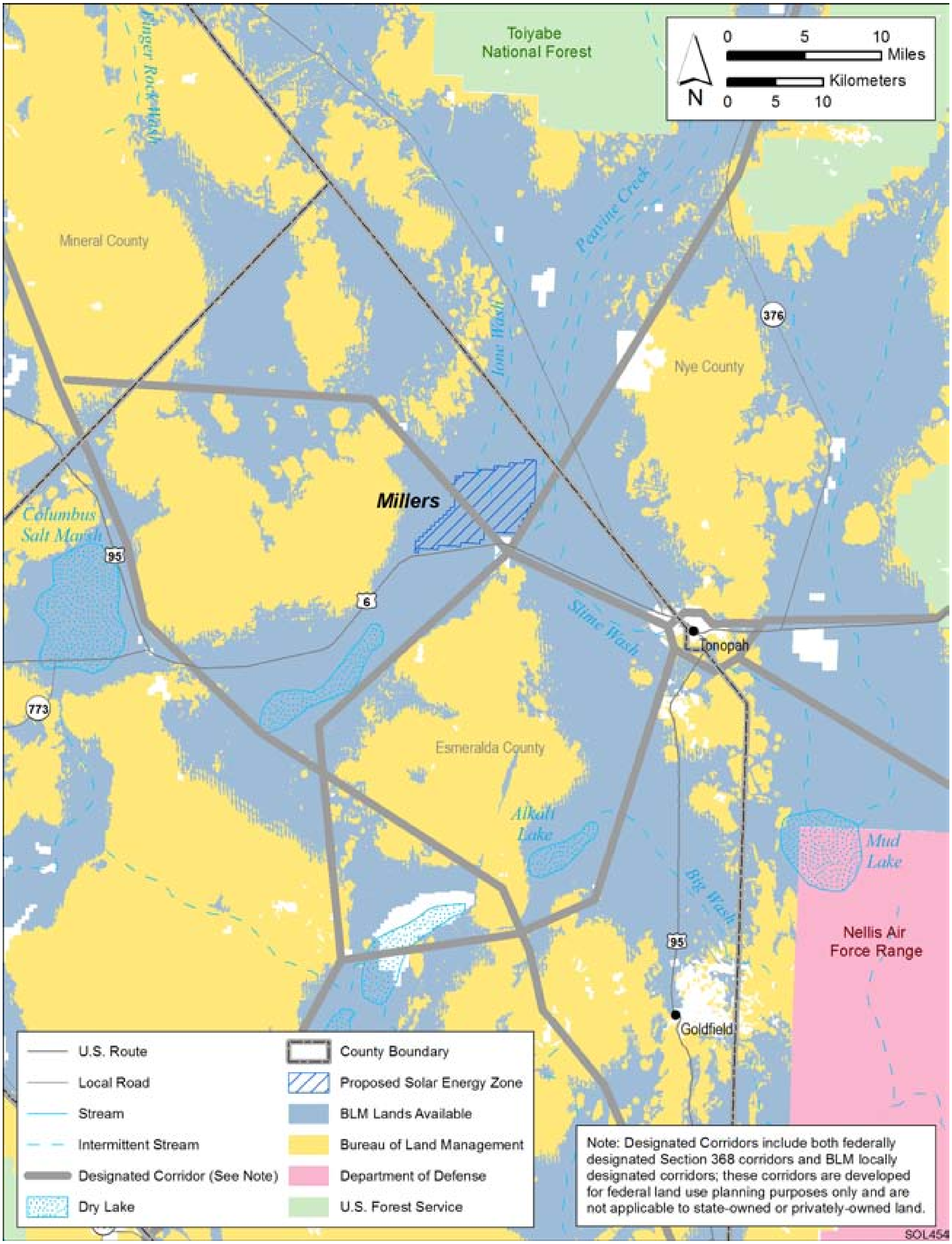

FIGURE 11.7.1.1-1 Proposed Millers SEZ

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 Millers SEZ encompassed 19,205 acres (78 km^2). Subsequent to the study area scoping period, the boundaries of the proposed Millers SEZ were altered somewhat to facilitate the BLM's administration of the SEZ area. The revised SEZ is approximately 2,418 acres (10 km^2) smaller than the original SEZ as published in June 2009.

11.7.1.2 Development Assumptions for the Impact Analysis

Maximum solar development of the Millers SEZ is assumed to be 80% of the SEZ area over a period of 20 years, a maximum of 13,430 acres (54 km^2). These values are shown in Table 11.7.1.2-1, along with other development assumptions. Full development of the Millers SEZ would allow development of facilities with an estimated total of 1,492 MW of electrical power capacity if power tower, dish engine, or PV technologies were used, assuming 9 acres/MW (0.04 km^2/MW) of land required and an estimated 2,686 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 120-kV line that runs

TABLE 11.7.1.2-1 Proposed Millers SEZ—Assumed Development Acreages, Solar MW Output, Access Roads, and Transmission Line ROWs

Total Acreage and Assumed Developed Acreage (80% of Total)	Assumed Maximum SEZ Output for Various Solar Technologies	Distance to Nearest State, U.S., or Interstate Highway	Distance and Capacity of Nearest Existing Transmission Line	Assumed Area of Transmission Line and Road ROWs	Distance to Nearest Designated Corridor[e]
16,787 acres and 13,430 acres[a]	1,492 MW[b] and 2,686 MW[c]	U.S. 95/U.S. 6 adjacent	0 mi and 120 kV	0 acres; NA[d]	Adjacent

[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] NA = no access road construction is assumed necessary for Millers.

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

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 120-kV capacity of that line would be inadequate for 1,492 to 2,686 MW of new capacity (note that 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 Millers SEZ to load centers; however, at this time the location and size of such new transmission facilities are unknown. Generic impacts of transmission and associated infrastructure construction and of line upgrades for various resources are discussed in Chapter 5. Project-specific analyses would need to identify the specific impacts of new transmission construction and line upgrades for any projects proposed within the SEZ.

For the purposes of analysis in the PEIS, it was assumed that the existing 120-kV transmission line which passes through the proposed SEZ and could provide initial access to the transmission grid. and thus, no additional acreage for transmission line access was assessed. Access to the existing transmission line was assumed, without additional information on whether this line would be available for connection of future solar facilities. If a connecting transmission line were constructed in the future to connect facilities within the SEZ to a different, off-site, grid location from the one assumed here, site developers would need to determine the impacts from construction and operation of that line. In addition, developers would need to determine the impacts of line upgrades if they are needed.

Existing road access to the proposed Millers SEZ should be adequate to support construction and operation of solar facilities, because U.S. 95/U.S. 6 runs from east to west along the southern border of the SEZ. Thus, no additional road construction outside of the SEZ was assumed to be required to support solar development.

11.7.1.3 Summary of Major Impacts and SEZ-Specific Design Features

In this section, the impacts and SEZ-specific design features assessed in Sections 11.7.2 through 11.7.21 for the proposed Millers SEZ are summarized in tabular form. Table 11.7.1.3-1 is a comprehensive list of impacts discussed in these sections; the reader may reference the applicable sections for detailed support of the impact assessment. Section 11.7.22 discusses potential cumulative impacts from solar energy development in the proposed SEZ.

Only those design features specific to the proposed Millers SEZ are included in Sections 11.7.2 through 11.7.21 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 11.7.1.3-1 Summary of Impacts of Solar Energy Development within the Proposed Millers SEZ and SEZ-Specific Design Features[a]

Resource Area	Environmental Impacts—Proposed Millers SEZ	SEZ-Specific Design Features
Lands and Realty	Full development of the SEZ could disturb up to 13,430 acres (54 km^2). Development of the SEZ for utility-scale solar energy production would establish a large industrial area that would exclude many existing and potential uses of the land, perhaps in perpetuity. Since the SEZ is rural and undeveloped, utility-scale solar energy development would be a new and dominant land use in the area.	None.
	The designated local transmission corridor located within the SEZ occupies a portion of the proposed SEZ and could limit future solar development within the corridor.	None.
Specially Designated Areas and Lands with Wilderness Characteristics	None.	None.
Rangeland Resources: Livestock Grazing	Grazing on about 4% of the Monte Cristo allotment would be closed.	Development of range improvements in the Monte Cristo allotment should be considered if site-specific analysis determines there would need to be a reduction in permitted AUMs because of lost grazing capacity.
Rangeland Resources: Wild Horses and Burros	Less than 2% of the total land areas of each of two HMAs occur within the indirect impact area of the SEZ. The Paymaster HMA contained an estimated 52 wild horses in FY 2009. The Pilot Mountain HMA contained an estimated 342 wild horses. Indirect impacts on these HMAs and the wild horses in them are expected to be negligible with implementation of design features.	None.

TABLE 11.7.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Millers SEZ	SEZ-Specific Design Features
Recreation	A small amount of recreational use would be eliminated from portions of the SEZ that would be developed for solar energy production.	None.
	A portion of an existing route of a competitive OHV race course that passes through the area would be closed.	Alternative routes for the race course should be considered consistent with local land use plan requirements.
Military and Civilian Aviation	The military has expressed serious concern over construction of solar energy facilities within the SEZ. Nellis Air Force Base has indicated that solar technologies requiring structures higher than 50 ft (15 m) above ground level may present unacceptable electromagnetic compatibility concerns for the NTTR test mission and could interfere with flight operations on MTRs that cross the SEZ.	None
	There are no impacts to civilian aviation.	None.
Geologic Setting and Soil Resources	Impacts on soil resources would occur mainly as a result of ground-disturbing activities (e.g., grading, excavating, and drilling) during the construction phase of a solar 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. The magnitude of impacts would depend on the types and sizes of components built for a given facility. 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. A study may be required to evaluate the potential impacts of building a solar facility in close proximity to Crescent Dunes to the northwest of the site.	None.
Minerals (fluids, solids, and geothermal resources)	None.	None.

TABLE 11.7.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Millers SEZ	SEZ-Specific Design Features
Water Resources	Ground-disturbance activities (affecting 36% of the total area in the peak construction year) could affect surface water quality due to surface runoff, sediment erosion, and contaminant spills. Construction activities may require up to 3,300 ac-ft (4.1 million m^3) of water during the peak construction year. Construction activities would generate as much as 148 ac-ft (182,600 m^3) of sanitary wastewater. Assuming full development of the SEZ, operations would use the following amounts of water: • For parabolic trough facilities (2,686-MW capacity), 1,918 to 4,067 ac-ft/yr (2.4 to 5.0 million m^3/yr) for dry-cooled systems; water requirements for wet-cooled systems exceed the perennial yield of the basin. • For power tower facilities (1,492-MW capacity), 1,061 to 2,255 ac-ft/yr (1.3 to 2.8 million m^3/yr) for dry-cooled systems; water requirements for wet-cooled systems exceed the perennial yield of the basin. • For dish engine facilities (1,492-MW capacity), 763 ac-ft/yr (941,100 m^3/yr). • For PV facilities (1,492-MW capacity), 77 ac-ft/yr (95,000 m^3/yr). • Assuming full development of the SEZ, operations would generate up to 38 ac-ft/yr (46,900 m^3/yr) of sanitary wastewater and up to 763 ac-ft/yr (941,000 m^3/yr) of blowdown water.	Water resource analysis indicates that wet-cooling options would not be feasible; other technologies should incorporate water conservation measures. Land disturbance activities should minimize impacts on the ephemeral stream channels of Ione Wash and Peavine Creek, as well as alluvial fan features along the western edge of the SEZ. 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 through coordination with the NDWR and current water rights holders. 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 the water quality standards of the *Nevada Administrative Code*.

TABLE 11.7.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Millers SEZ	SEZ-Specific Design Features
Vegetation[b]	Up to 80% (13,430 acres [54.3 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 climate 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. Sand transport processes could be altered, potentially affecting sand dune plant communities in Crescent Dunes, northeast of the SEZ, or dunes southwest of the SEZ. Vegetation communities associated with playa habitats, Ione Wash, dry washes, greasewood flats communities, or other intermittently flooded areas within or downgradient from solar projects or the access road could be affected by ground-disturbing activities. Candelaria blazingstar, a plant species on the Nevada Natural Heritage Program watch list may occur within the SEZ and may be directly affected by solar project development. The population occurring east of the SEZ may be indirectly affected by project activities within the SEZ.	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. Invasive species control should focus on biological and mechanical methods where possible to reduce the use of herbicides. Dry washes, Ione Wash, playas, and wetlands within the SEZ 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 the playa wetland and other playas, as well as Ione Wash shrub communities, dry washes and greasewood flat habitats within the SEZ, and downstream occurrences, 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 plant communities that access groundwater, such as those in the vicinity of playas. Potential impacts on springs should be determined through hydrological studies.

TABLE 11.7.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Millers SEZ	SEZ-Specific Design Features
Vegetation[b] *(Cont.)*		A qualified botanist or plant ecologist should survey for candelaria blazing star during a period when it is flowering and easily documented prior to any construction activities within the SEZ. If individuals are located, individuals or populations should be avoided through fencing and flagging of the area, including an appropriate buffer zone.
Wildlife: Amphibians and Reptiles[b]	Direct impacts from SEZ development for all representative amphibian and reptile species would be small (i.e., loss of ≤1.0% of potentially suitable habitats within the SEZ region). With implementation of design features, indirect impacts would be negligible.	Wash and playa habitats should be avoided.
Wildlife: Birds[b]	Direct impacts on representative bird species would be moderate for the killdeer (i.e., loss of 1.1% of potentially suitable habitats within the SEZ region) and small for all other bird species (i.e., loss 0.5% or less of potentially suitable habitats within the SEZ region). 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.	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. Wash and playa habitats should be avoided.
Wildlife: Mammals[b]	Direct impacts on all representative mammal species would be small.	The fencing around the solar energy development

TABLE 11.7.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Millers SEZ	SEZ-Specific Design Features
	Loss of potentially suitable habitats for cougar, mule deer, and pronghorn would be 0.3%, 0.3%, and 0.2%, respectively, of potentially suitable habitats within the SEZ region. Loss of potentially suitable habitats for the other representative mammal species would be 0.4% or less of potentially suitable habitats within the SEZ region. 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.	should not block the free movement of mammals, particularly big game species. Wash and playa habitats should be avoided.
Aquatic Biota[b]	No permanent streams or water bodies occur within the proposed Millers SEZ. The surface water features that do occur in the area are generally dry most of the time and do not support wetland or riparian habitats. Consequently, potential effects on aquatic habitats or biota from solar energy development within the proposed SEZ would be negligible.	None.
Special Status Species[b]	Potentially suitable habitat for 19 special status species occurs in the affected area of the Millers SEZ. For all special status species, less than 1% 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 to occupied habitats is not possible for some species, translocation of individuals from areas of direct effects; or compensatory mitigation of direct effects on occupied habitats could reduce impacts. A comprehensive mitigation strategy for special status species that used one or more of these options to
Special Status Species[b]		offset the impacts of development should be

TABLE 11.7.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Millers SEZ	SEZ-Specific Design Features
(Cont.)		developed in coordination with the appropriate federal and state agencies. Coordination should be conducted with the USFWS and NDOW for the Crescent Dunes aegialian scarab beetle, Crescent Dunes serican scarab beetle, and greater sage-grouse – species that are candidates or under review for ESA listing. Coordination would identify an appropriate survey protocol, and mitigation requirements, which may include avoidance, minimization, translocation, or compensation. 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} and 24-hour $PM_{2.5}$ concentration levels could exceed the AAQS at the SEZ boundaries and in the immediate surrounding areas during the construction of solar facilities. However, concentrations 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. In addition, construction emissions from the engine exhaust of heavy equipment and vehicles could somewhat affect AQRVs at nearby federal Class I areas.	None.
Air Quality and Climate	*Operations*: Positive impact due to avoided emission of air pollutants	

TABLE 11.7.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Millers SEZ	SEZ-Specific Design Features
(Cont.)	from combustion-related power generation: 6.9 to 12% of total SO_2, NO_x, Hg, and CO_2 emissions from electric power systems in the State of Nevada (up to 6,639 tons/yr SO_2, 5,695 tons/yr NO_x, 0.038 tons/yr Hg, and 3,655,000 tons/yr CO_2).	
Visual Resources	The SEZ is in an area of low scenic quality, with some 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. The residents nearest to the SEZ could be subjected to large visual impacts from solar energy development within the SEZ. Large visual impacts on the SEZ and surrounding lands within the SEZ viewshed due to major modification of the character of the existing landscape are possible. Approximately 31 mi (50 km) of U.S. 6 is within the SEZ viewshed. Weak to strong visual contrasts could be observed within the SEZ by travelers on U.S. 6.	None.
Acoustic Environment	*Construction*. For construction activities occurring near the southeastern SEZ boundary, estimated noise levels at the nearest residences (about 11 mi [18 km] east-southeast of the SEZ) would be about 15 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 21 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	None.
Acoustic Environment	facility operation) would be estimated for the nearest residences, which is	

TABLE 11.7.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Millers SEZ	SEZ-Specific Design Features
(Cont.)	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 31 dBA, which is comparable to the typical nighttime mean rural background level of 30 dBA. The day-night average noise level is estimated to be about 41 dBA L_{dn}, which is 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 11 mi (18 km) from the SEZ boundary, would be about 33 dBA, which is below the typical daytime mean rural background level of 40 dBA. Assuming 12-hour daytime operation, the estimated 40 dBA L_{dn} at these residences would be well below the EPA guideline of 55 dBA L_{dn} for residential areas.	
Paleontological Resources	The potential for impacts on significant paleontological resources in 94% of the proposed Millers SEZ is unknown, but potentially high. A more detailed investigation of the lacustrine and playa deposits is needed prior to project approval. A paleontological survey would likely be needed. Few, if any, impacts on significant paleontological resources are likely in the remaining 6% of the proposed SEZ. However, a more detailed look at the geological deposits of the SEZ is needed to determine whether a paleontological survey is warranted.	The need for and the nature of any SEZ-specific design features would depend on the results of future paleontological investigations.
Cultural Resources	Direct impacts on significant cultural resources could occur in the proposed Millers SEZ; however, further investigation is needed. At least 30 sites have been recorded within the SEZ, although none have been evaluated for inclusion in the NRHP. Dune areas have considerable potential for containing significant sites on the valley floors suitable for solar development. The area within the proposed Millers SEZ associated with Lake Tonopah also has the potential to provide significant sites related to exploitation of lacustrine resources.	Avoidance of areas with a high potential for a high density of sites, such as in the vicinity of both the former Lake Tonopah and Millers town site, is recommended.

TABLE 11.7.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Millers SEZ	SEZ-Specific Design Features
Cultural Resources *(Cont.)*	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.	Other SEZ-specific design features would be determined through consultation with the Nevada SHPO and affected Tribes and would depend on the results of future investigations.
Native American Concerns	While no comments specific to the proposed Millers SEZ have been received from Native American Tribes to date, as consultation with the Tribes continues and project-specific analyses are undertaken, it is possible that Native Americans will express concern over potential visual, acoustic, and other effects of solar energy development within the SEZ on specific resources, including culturally important landscapes.	The need for and nature of SEZ-specific design features would be determined during government-to-government consultations with the affected Tribes.
Socioeconomics	*Construction:* 346 to 4,578 total jobs; $21 million to $278.3 million income in ROI. *Operations:* 36 to 785 annual total jobs; $1.2 million to $26.3 million annual income in the ROI.	None.
Environmental Justice	Minority and low-income *individuals* live within 50 mi (80 km) of the SEZ. However, as defined in CEQ guidelines, no minority or low-income *populations* occur within that area; thus, there would be no disproportionately high and adverse human health or environmental effects on low-income or minority populations.	None.

TABLE 11.7.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Millers 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 4,000 vehicle trips per day if two larger projects were to be developed at the same time. The volume of traffic on U.S. 95 along the southern edge of the Millers SEZ would represent an increase in traffic of about 100 or 200% for one or two projects, respectively, should all traffic access the SEZ in that area.	None.

Abbreviations: AAQS = ambient air quality standards; AQRV = air quality-related value; AUM = animal unit month; BLM = Bureau of Land Management; CEQ = Council on Environmental Quality; CO_2 = carbon dioxide; DoD = U.S. Department of Defense; EPA = U.S. Environmental Protection Agency; ESA = Endangered Species Act; FY = Fiscal Year; Hg = mercury; HMA = Herd Management Area; MTR = military training route; NDOW = Nevada Department of Wildlife; NDWR = Nevada Division of Water Resources; NO_x = nitrogen oxides; NRHP = *National Register of Historic Places*; NTTR = Nevada Test and Training Range; OHV = off-highway vehicle; PEIS = programmatic environmental impact statement; $PM_{2.5}$ = particulate matter with an aerodynamic diameter of 2.5 μm or less; PM_{10} = particulate matter with an aerodynamic diameter of 10 μm or less; PSD = prevention of significant deterioration; PV = photovoltaic; ROI = region of influence; SEZ = solar energy zone; SHPO = State Historic Preservation Office; SO_2 = sulfur dioxide; USFS = U.S. Forest Service; USFWS = U.S. Fish and Wildlife Service.

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

[b] The scientific names of all plants, wildlife, aquatic biota, and special status species are provided in Sections 11.7.10 through 11.7.12.

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11.7.2 Lands and Realty

11.7.2.1 Affected Environment

The proposed Millers SEZ is a large and very well-blocked area of BLM-administered public land. The overall character of the land in the SEZ area is rural and undeveloped, although there are numerous dirt roads that cross the SEZ. The old town site of Millers is located just south of the SEZ, and there is land disturbance all around the SEZ associated with road construction, power line construction, mining, and development of the town site. U.S. 6/U.S. 95 parallels the southern side of the SEZ and provides good access to the site. There is a highway rest stop just south of the southeastern corner of the SEZ.

There are several transmission lines within ROWs in and near the SEZ. Two lines traverse the area, one in a north–south direction and the other in a northwest–southeast direction. There are maintenance roads along these transmission lines. The latter line is located within one of the two locally designated corridors near the SEZ. The second corridor, which contains two existing transmission lines, parallels the southeastern boundary of the SEZ, and small portions of the ROW for one of the transmission lines lie within the SEZ. There is a designated Section 368 (of the Energy Policy Act of 2005) energy corridor about 15 mi (24 km) southwest of the SEZ. Small portions of the ROWs for U.S. 6/U.S. 95 and a fiber optic line paralleling the highway are within the SEZ as well.

As of February 2010, there were no ROW applications for solar energy facility development on the SEZ; however, the BLM is processing a solar energy application for a site about 3 mi (5 km) east of the proposed SEZ.

11.7.2.2 Impacts

11.7.2.2.1 Construction and Operations

Full development of the proposed Millers SEZ could disturb up to 13,430 acres (54 km^2) (Table 11.7.1.2-1). 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 rural and undeveloped, utility-scale solar energy development would be a new and dominant land use in the area.

Existing ROW authorizations on the SEZ are prior existing rights, and facilities within the ROWs would not be affected by solar energy development. Since the small portions of three ROWs within the southern and southeastern boundaries of the SEZ were issued in aliquot parts rather than based on a survey, it is likely that there is no physical development in them within the SEZ. There is a technical issue about whether the existing ROW holders would agree to amend their existing ROWs to allow solar development to occur within the existing ROWs or if it would be necessary to make minor adjustments to the proposed SEZ boundary to avoid these ROWs. Either way, existing rights issued to the ROW holders would be protected. 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, and there is a large amount of potentially available BLM-administered land nearby, it is not anticipated that approval of solar energy development would have a significant impact on public land available for future ROWs in the area.

The designated local transmission corridor located within the SEZ occupies an undetermined amount of the proposed SEZ and could limit future solar development within the corridor. 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 corridor could be relocated outside the SEZ to allow full solar development within the SEZ. This is an administrative conflict that the BLM can address through its planning process; but if the existing corridor alignment is retained, there would be implications for the amount of potential solar energy development that could be accommodated within the SEZ.

11.7.2.2.2 Transmission Facilities and Other Off-Site Infrastructure

An existing 120-kV transmission line runs adjacent to the SEZ; this line might be available to transport the power produced in this SEZ. Establishing a connection to the existing line would not involve the construction of a new transmission line outside of the SEZ. If a connecting transmission line were constructed in a different location outside of the SEZ in the future, site developers would need to determine the impacts from construction and operation of that line. In addition, developers would need to determine the impacts of line upgrades if they were needed. .

U.S. 6/U.S. 95 is adjacent to the SEZ, and it is assumed that no new roads would be required to provide access to the site. Roads and transmission lines would be constructed within the SEZ as part of the development of the area.

11.7.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

There are no SEZ specific design features proposed to protect lands and realty resources. Implementing the programmatic design features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would provide 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.

11.7.3 Specially Designated Areas and Lands with Wilderness Characteristics

11.7.3.1 Affected Environment

Specially designated areas normally consist of the following:

- National Parks, National Monuments, National Recreation Areas, National Preserves, National Wildlife Refuges, National Reserves, National Conservation Areas, National Historic Sites;
- Congressionally authorized Wilderness Areas;
- Wilderness Study Areas;
- National Wild and Scenic Rivers;
- Congressionally authorized Wild and Scenic Study Rivers;
- National Scenic Trails and National Historic Trails;
- National Historic Landmarks and National Natural Landmarks;
- All-American Roads, National Scenic Byways, State Scenic Highways; and BLM- and USFS-designated scenic highways/byways;
- BLM-designated Special Recreation Management Areas;
- BLM-designated ACECs; and
- Designated state or local facilities or attractions.

In the case of the proposed Millers SEZ, none of these types of areas are present within 25 mi (40 km) of the SEZ. In addition, there are no areas within 25 mi (40 km) of the SEZ that have been identified by the BLM as possessing wilderness characteristics.

11.7.3.2 Impacts

There would be no impacts on specially designated areas in the SEZ.

11.7.3.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features would be required to protect specially designated areas.

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11.7.4 Rangeland Resources

11.7.4.1 Livestock Grazing

11.7.4.1.1 Affected Environment

The proposed Millers SEZ contains a small portion of the Monte Cristo perennial grazing allotment. The total acreage of the allotment is 496,018 acres (2,007 km^2). One permittee operates in the allotment.

11.7.4.1.2 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 the permittee for their portion of the value for any range improvements in the area removed from the grazing allotment. There are 16,787 acres (68 km^2) of public lands in this SEZ, which is less than 4% of the Monte Cristo allotment. Because of the size of the allotment, the loss of this portion of the allotment is not anticipated to have a significant impact on the overall grazing operation because there likely are opportunities to make livestock management changes and/or to provide additional livestock management facilities to mitigate the loss of forage within the SEZ. No loss of AUMs is anticipated.

Transmission Facilities and Other Off-Site Infrastructure

Because of the availability of a major transmission line in the SEZ, and U.S. 6/U.S. 95 near the SEZ, and assuming that additional project-specific analysis would be done for construction of such infrastructure, no assessment of the impacts of such activities outside of the SEZ was conducted (see Section 11.7.1.2).

11.7.4.1.3 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 adequate mitigation for some identified impacts. The exception may be the loss of 4% of the Monte Cristo grazing allotment.

A proposed design features specific to the Millers SEZ is:

- Development of range improvements in the Monte Cristo allotment should be considered if site-specific analysis determines there would need to be a reduction in permitted AUMs because of lost grazing capacity.

11.7.4.2 Wild Horses and Burros

11.7.4.2.1 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 2009d). A number of HMAs occur within the 50-mi (80-m) SEZ region for the proposed Millers SEZ (Figure 11.7.4.2-1). A portion of the Paymaster and Pilot Mountain HMAs occurs within the indirect impact area of the SEZ. The Paymaster HMA contained an estimated population of 52 wild horses in FY 2009, although the appropriate management level is only 38 wild horses. The Pilot Mountain HMA contained an estimated population of 342 wild horses, which is less than the appropriate management level of 415 wild horses (BLM 2010c).

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 territories to the Millers SEZ are the Toiyabe and Monitor territories located about 21 and 23 mi (34 and 37 km), respectively, from the SEZ (Figure 11.7.4.2-1). No wild horses occupy the Toiyabe Territory; wild horses occur in the Monitor Territory, but the number present is not reported (USFS 2005a,b).

11.7.4.2.2 Impacts

The Paymaster HMA totals 100,591 acres (407.1 km^2), of which 99,919 acres (404.4 km^2) are BLM acres. About 998 acres (4 km^2), or 1.0%, of the HMA would be in the area of indirect impact for the proposed Millers SEZ. The Pilot Mountain HMA totals 477,136 acres (1,930.9 km^2), of which 475,499 acres (1,924.3 km^2) are BLM acres. About 29,219 acres (118.2 km^2), or 1.6%, of the HMA would be in the area of indirect impact for the SEZ. Indirect impacts on wild horses could result from surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, noise, and harassment. These indirect impacts are expected to be negligible with the implementation of programmatic design features. USFS wild horse territories are located well outside of the indirect impact area for the proposed Millers SEZ; thus, no direct or indirect impacts on any wild horses in USFS wild horse territories would occur from the construction or operations of solar facilities in the SEZ.

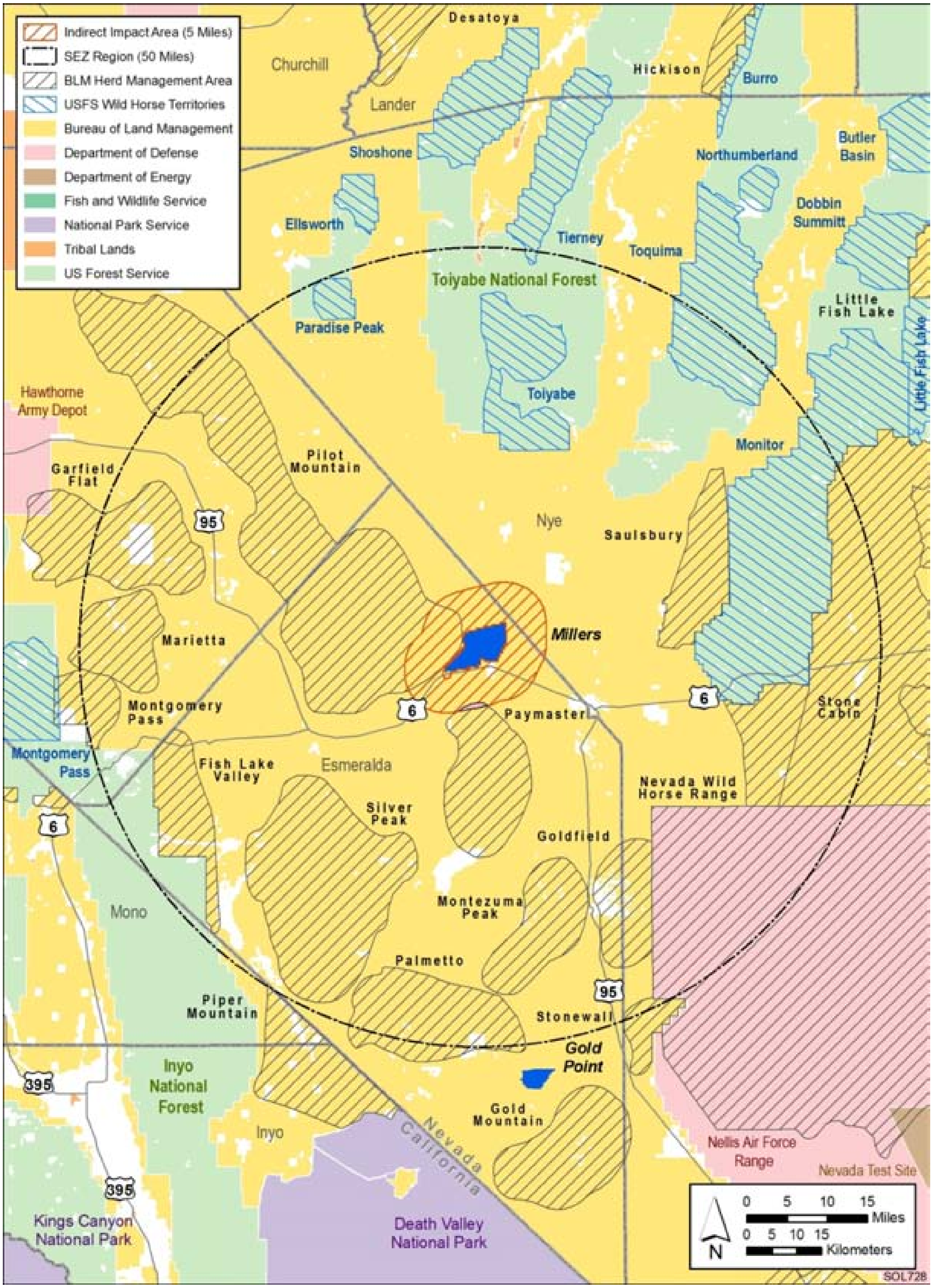

FIGURE 11.7.4.2-1 Wild Horse and Burro Herd Management Areas and Territories within the Analysis Area for the Proposed Millers SEZ (Sources: BLM 2010b; USFS 2007)

11.7.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features for solar development within the proposed Millers SEZ would be necessary to protect or minimize direct impacts on wild horses and burros. Indirect impacts should be reduced to negligible levels by implementing programmatic design features and engineering controls that reduce noise lighting, spills, and fugitive dust.

11.7.5 Recreation

11.7.5.1 Affected Environment

The site of the proposed Millers SEZ is located adjacent to U.S. 6/U.S. 95 and is about 15 mi (24 km) from Tonopah. The area is flat and generally unremarkable, with numerous roads and trails that provide access through the area. While there are no recreational use data for the area, backcountry driving, OHV use of the roads and trails, and hunting are likely to be the major recreational activities in the area. A portion of the route for the annual Las Vegas to Reno OHV race passes through the area.

11.7.5.2 Impacts

11.7.5.2.1 Construction and Operations

Recreational use would be eliminated from portions of the SEZ developed for solar energy production. Although there are no recreational use figures for the area, the nature of the area does not encourage recreational use. The area contains numerous roads and trails that are available for travel that would be closed if solar energy development would occur, and the route of the Las Vegas to Reno OHV race within the SEZ would be closed. The potential loss of recreational use that would accompany solar development of the SEZ is anticipated to be small.

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

11.7.5.2.2 Transmission Facilities and Other Off-Site Infrastructure

Because of the availability of an existing transmission line and U.S. 6/U.S. 95 near the SEZ, no additional construction of transmission or road facilities was assessed. Should additional transmission lines be required outside of the SEZ, there may be additional recreation impacts. See Section 11.7.1.2 for the development assumptions underlying this analysis.

11.7.5.3 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 some mitigation for some identified impacts. The exceptions may be recreational use of the area developed for solar energy production would be lost and would not be mitigatable.

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

- Alternative routes for the Las Vegas to Reno race should be considered consistent with local land use plan requirements.

11.7.6 Military and Civilian Aviation

11.7.6.1 Affected Environment

Approximately the eastern two-thirds of the proposed Millers SEZ is covered by MTRs, with 50- and 100-ft (15- and 30-m) AGL operating limits. The area is located about 26 mi (42 km) northwest of the boundary of the NTTR and the Nellis Air Force Base.

The closest civilian municipal aviation facility is the Tonopah Municipal Airport, which is located about 20 mi (32 km) southeast of the SEZ. The airport does not have scheduled commercial passenger service or regular freight service.

11.7.6.2 Impacts

The military has expressed serious concern over solar energy facilities being constructed within the proposed Millers SEZ and at the solar energy site currently being evaluated just east of the SEZ. The military is especially concerned over the potential use of power tower facilities that would obstruct existing military airspace. Nellis Air Force Base has indicated that it has concerns for its use of the MTRs because of potential overflight restrictions above a solar energy facility, the height of solar facilities, possible restrictions on hydrocarbon or residue from fuel burn by aircraft, possible glare from reflective surfaces, and any potential restrictions on supersonic operations over solar facilities. 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 at the NTTR. 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 that solar facilities exceeding 50 ft (15 m) could significantly affect military operations.

The Air Force states that the NTTR complex is unique in the world in its ability to provide realistic training of air crews. In addition to the effect of individual solar energy facilities, there is a more general concern over the potential for cumulative effects from multiple solar energy projects around the NTTR to eventually have a serious adverse effect on the training environment of the NTTR.

The Tonopah Airport is located far enough away from the proposed SEZ that there would be no effect on airport operations.

11.7.6.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

11.7.7 Geologic Setting and Soil Resources

11.7.7.1 Affected Environment

11.7.7.1.1 Geologic Setting

Regional Setting

The proposed Millers SEZ is located in the Big Smoky Valley, a north-trending basin within the Basin and Range physiographic province in south-central Nevada. In the Millers SEZ region, the valley is bounded on the northwest by the Monte Cristo Range and Royston Hills and on the east by the San Antonio Mountains. The Lone Mountain lies to the south (Figure 11.7.7.1-1). The Big Smoky Valley is one of many structural basins (graben) typical of the Basin and Range province.

Exposed sediments in the Big Smoky Valley consist mainly of modern alluvial (Qa) and playa (Qp) sediments. Alluvial sediments at the Millers SEZ cover or partially cover lacustrine deposits (Ql) associated with Lake Tonopah, an ancient lake that covered the valley during the Pleistocene (Figure 11.7.7.1-2). These fine-grained sediments—sandy silts, silts, sandy clays, and clays—are found in the valley center and are abundant within the SEZ. Sand dunes and dune complexes also occur throughout the valley; the Crescent Dunes are located about 6 mi (10 km) to the northwest of the SEZ. In the surrounding mountains, exposures are predominantly Tertiary volcanics. The oldest rocks in the region are the Late Proterozoic to Cambrian metamorphic rocks (CZq) that occur in Lone Mountain south of the SEZ. These rocks have been intruded by Mesozoic granites and granodiorites.

Semiconsolidated to unconsolidated basin-fill deposits are estimated to be about 5,000 ft (1,530 m) thick in the northern part of the Big Smoky Valley; estimates for the southern part of the valley, where the proposed Millers SEZ is located, have not been reported. Basin-fill sediments constitute the most important aquifers in the Big Smoky Valley (Handman and Kilroy 1997).

Topography

The Big Smoky Valley covers an area of about 567,700 acres (2,300 km^2) (USDA 1980) and stretches 115 mi (185 km) across three counties in south-central Nevada (Figure 11.7.7.1-1). Elevations along the valley axis range from about 6,200 ft (1,890 m) at its northern end (Lander County) and along the valley sides to about 4,750 ft (1,450 m) at its southern end (Esmeralda County). Alluvial fan deposits occur along the mountain fronts on both sides of the valley; near the SEZ, they enter the valley from the west. The valley is drained by several unnamed ephemeral streams. Other topographic features include sand dunes, playas, and the many

FIGURE 11.7.7.1-1 Physiographic Features of the Big Smoky Valley Region

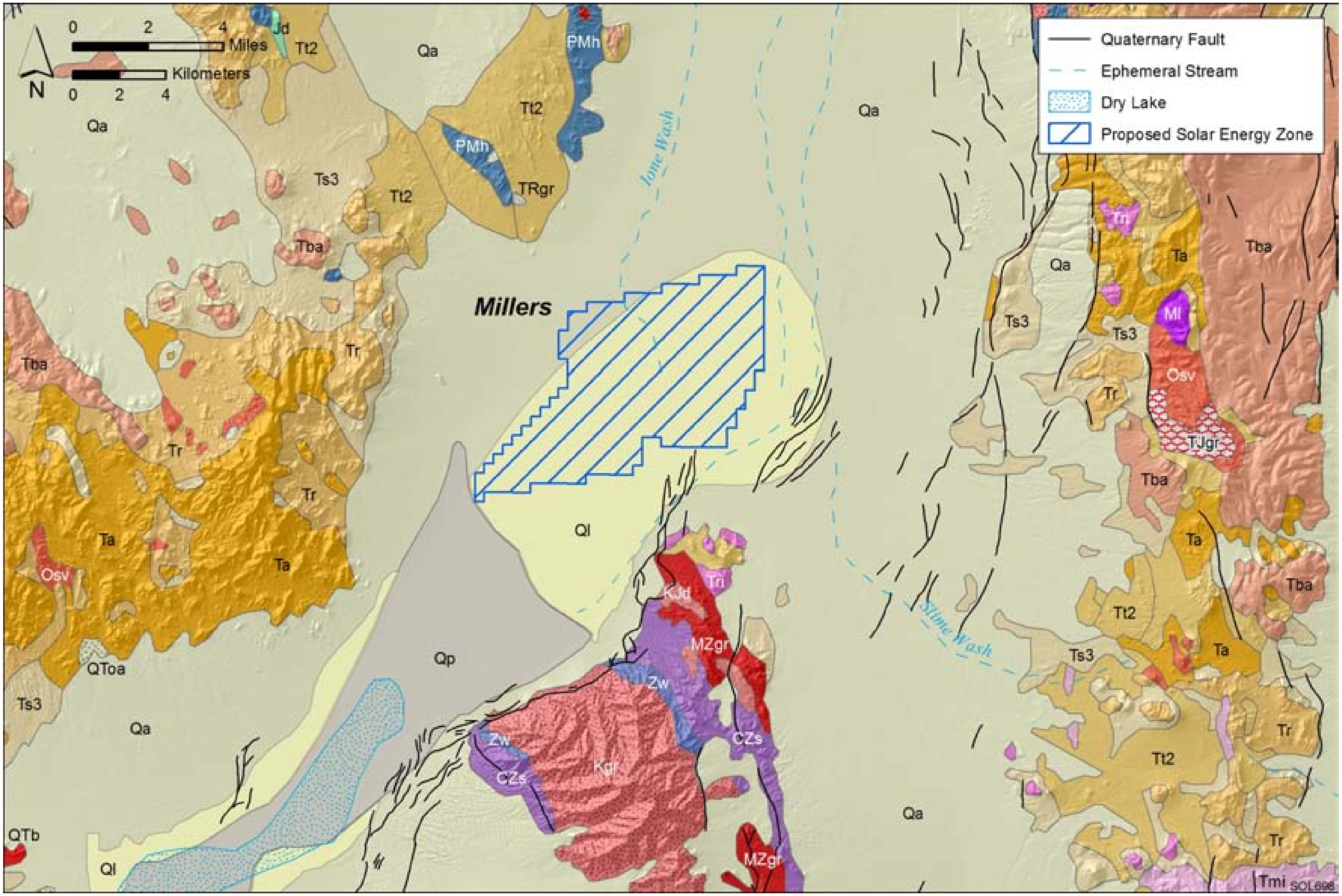

FIGURE 11.7.7.1-2 Geologic Map of the Big Smoky Valley Region (Sources: Ludington et al. 2007; Stewart and Carlson 1978; Soller et al. 2009)

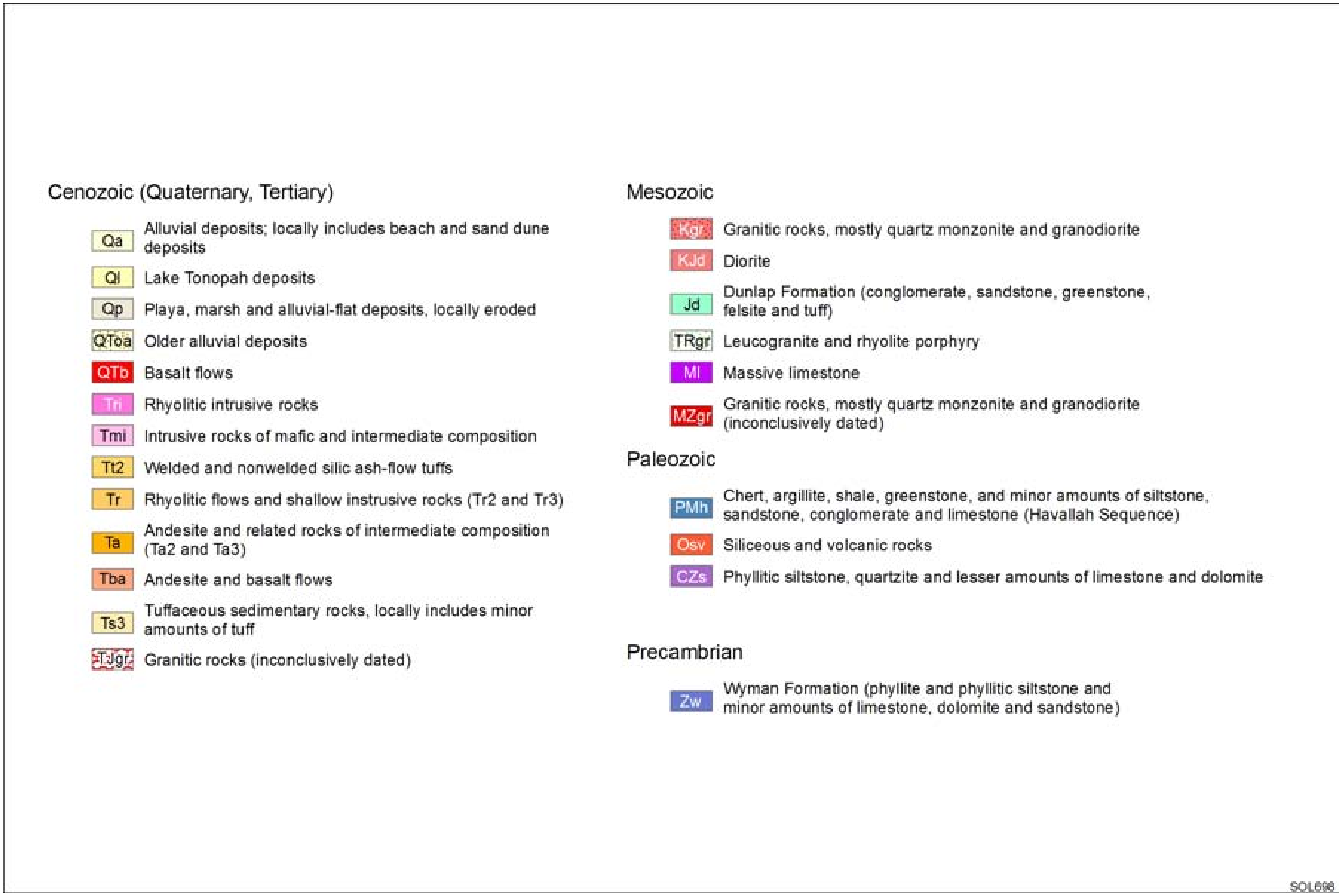

FIGURE 11.7.7.1-2 (Cont.)

unnamed washes that drain the surrounding mountains and feed the central streams in the valley center.

The proposed Millers SEZ is located in the southern part of the Big Smoky Valley, between the Monte Cristo Range and Royston Hills to the northwest, the Lone Mountain to the south, and the San Antonio Mountains to the east. Its terrain is relatively flat, with elevations ranging from about 4,850 ft (1,480 m) along the northern border to 4,780 ft (1,460 m) near the southwest end (Figure 11.7.7.1-3). Several drainages enter the SEZ from the north and drain to a large playa southwest of the site. A series of unnamed sand dunes occupy the northeast corner of the site.

Geologic Hazards

The types of geologic hazards that could potentially affect solar project sites and their mitigation are discussed in Section 5.7.3. The following sections provide a preliminary assessment of these hazards at the proposed Millers 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. The Big Smoky Valley is located within the Walker Lane Belt, a northwest-trending seismic region along the Nevada–California border that accommodates (right-lateral shear) strain from movement between the Pacific and North American plates. The proposed Millers SEZ lies within a zone of north–northeast trending extensional (normal) faults that run parallel to the valley axis and border the mountains to the southeast. These include the Lone Mountain and Paymaster Ridge faults, which extend from the SEZ to the southwest, and the Crescent Dune fault, which extends from the SEZ to the northeast (Figure 11.7.7.1-4).

The Lone Mountain fault extends from the southeast corner of the Millers SEZ near the Nye-Esmeralda county border to the southwest, along the northwest front of Lone Mountain and the Weepah Hills and the southeast side of the Big Smoky Valley sand dunes (Figure 11.7.7.1-4). Well-defined scarps along the fault trace in these areas show down-to-the-northwest displacement of as much as 16 ft (5 m). With the estimated age of offset sediments, the most recent movement along the fault is estimated at less than 15,000 years ago. The slip rate along this fault is estimated to be less than 0.2 mm/yr. Recurrence intervals have not been estimated (Anderson and Sawyer 1999).

The north-trending Paymaster Ridge fault is located about 4 mi (6.4 km) south of the Millers SEZ (Figure 11.7.7.1-4). It extends to the south, along the eastern front of Lone Mountain, and continues for the length of Paymaster Ridge to the south. The fault is thought to be the major block-bounding fault separating Paymaster Ridge from the basin (graben) beneath Clayton Valley to the west. The fault plane likely dips gently to the west, and displacement is down to the west. With the age of offset sediments (Late Pleistocene), the most recent movement along the fault is estimated at less than 130,000 years ago. The slip rate along this fault is

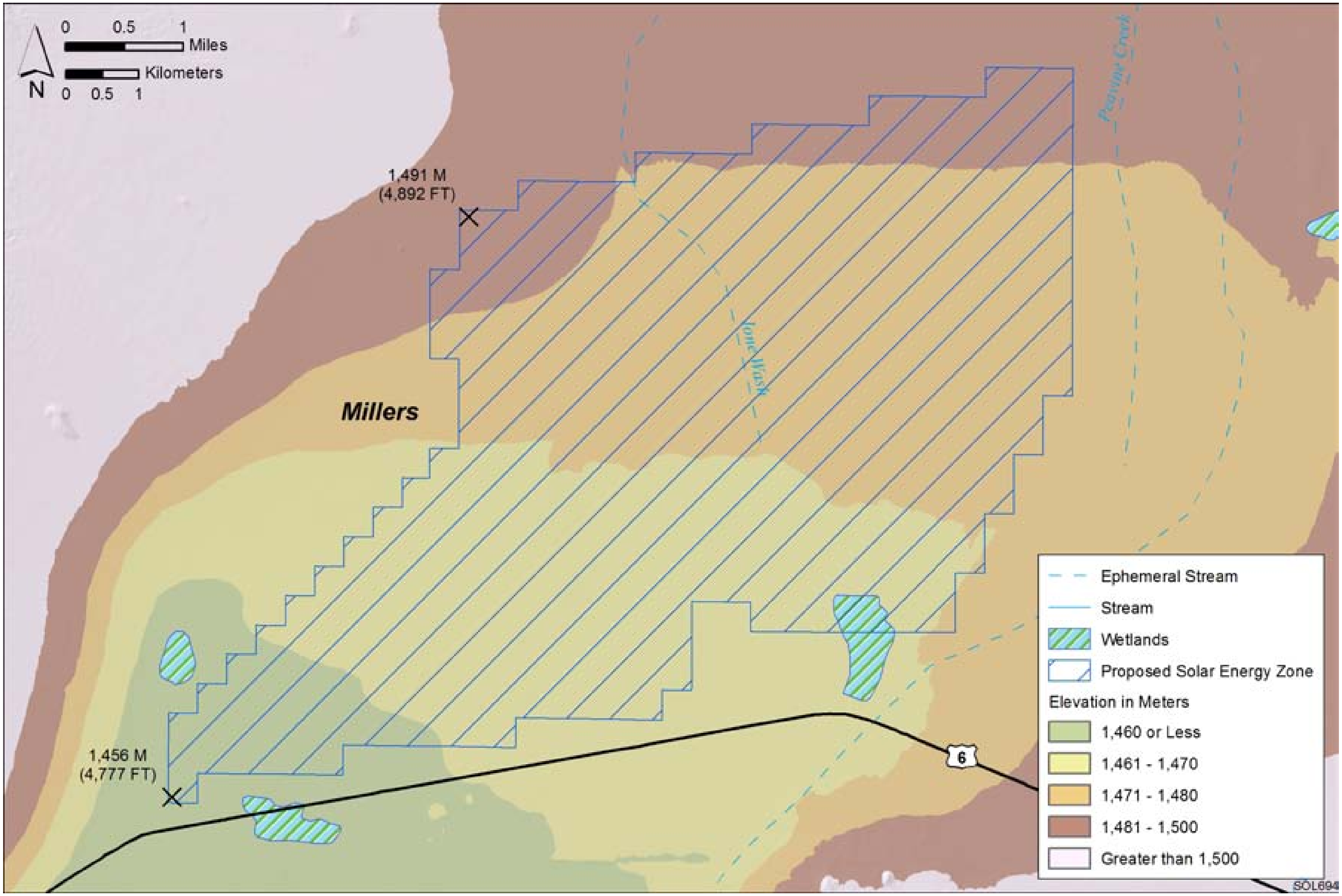

FIGURE 11.7.7.1-3 General Terrain of the Proposed Millers SEZ

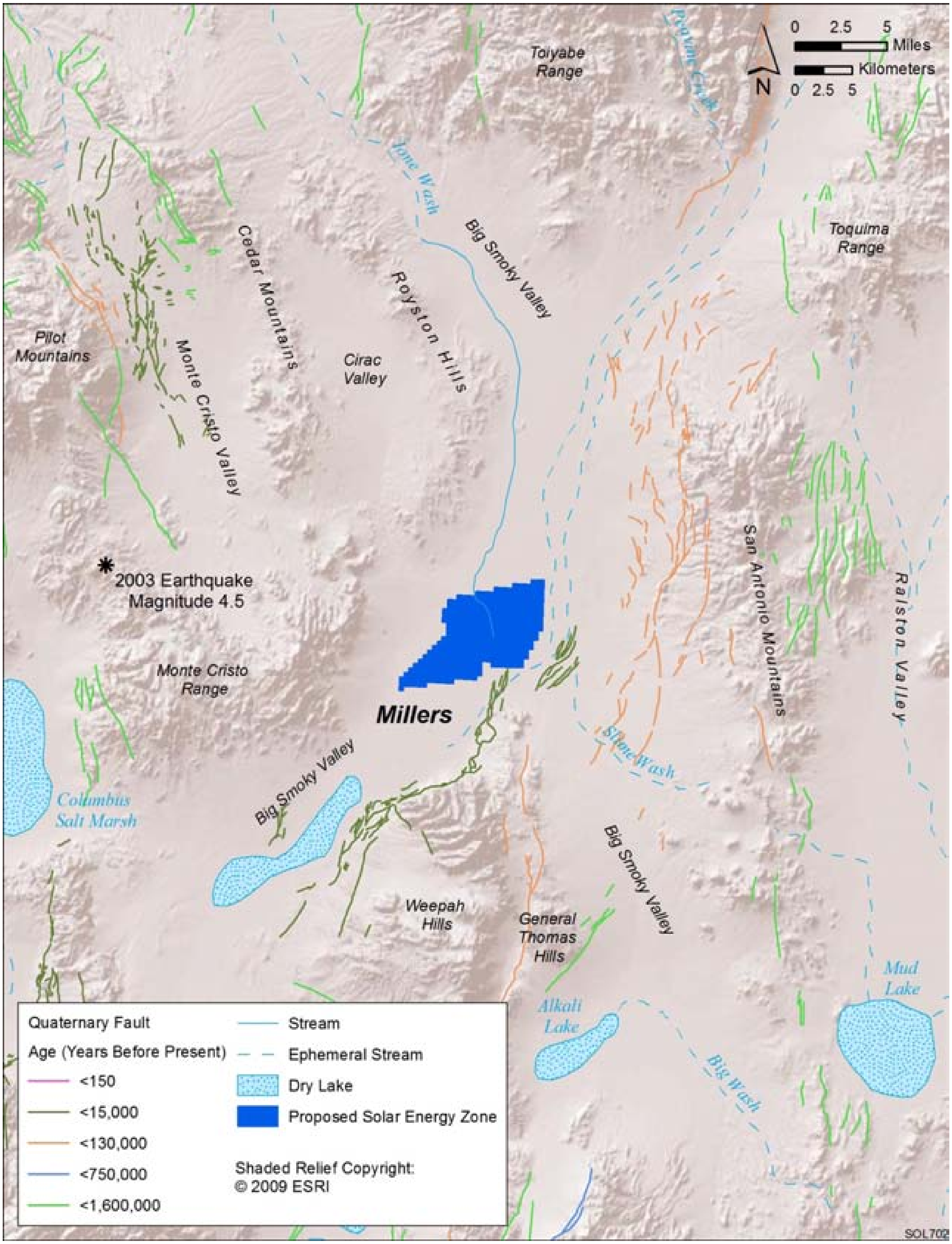

FIGURE 11.7.7.1-4 Quaternary Faults in the Big Smoky Valley Region (Sources: USGS and NBMG 2010)

estimated to be less than 0.2 mm/yr. Recurrence intervals have not been estimated (Anderson and Ernest 1999).

The Crescent Dune fault is located about 4 mi (6.4 km) east of the Millers SEZ (Figure 11.7.7.1-4). It comprises a series of normal faults that extend to the north, along the western front of the San Antonio Mountains and across the piedmont slopes in the eastern part of the Big Smoky Valley. Scarps at the northwest end of the San Antonio Mountains and piedmont slope surfaces indicate displacement of as much as 13 ft (4 m). With the age of offsets of Early Pleistocene sediments and Tertiary volcanic rocks, the most recent movement along these faults is estimated at less than 130,000 years ago. Slip rates along these faults are estimated to be less than 0.2 mm/yr. Recurrence intervals have not been estimated (Sawyer 1999).

From June 1, 2000 to May 31, 2010, 123 earthquakes were recorded within a 61-mi (100-km) radius of the proposed Millers SEZ. The largest earthquake during that period occurred on November 15, 2003. It was located about 19 mi (30 km) west of the SEZ in the Monte Cristo Mountains (north of the Columbus Salt Marsh) and registered a Richter scale magnitude (ML[1]of 4.5 (Figure 11.7.7.1-4). During this period, 63 (51 %) 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 Millers SEZ lies within an area where the peak horizontal acceleration with a 10% probability of exceedance in 50 years is between 0.15 and 0.20 g. Shaking associated with this level of acceleration is generally perceived as strong to very strong; however, potential damage to structures is light to moderate (USGS 2008). Given the deep water table (from 8 to 78 ft [2 to 24 m] below the surface [USGS 2010b]) and the low intensity of ground shaking estimated for the Big Smoky Valley, the potential for liquefaction in valley sediments is likely to be low.

Volcanic Hazards. The Millers SEZ is located about 80 mi (130 km) northwest 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. The area has been studied extensively because of its proximity to the NTS and Yucca Mountain repository. Two types of fields are present in the region: (1) large-volume, long-lived fields with a range of basalt types associated with more silicic volcanic rocks produced by melting of the lower crust, and (2) small-volume fields formed by scattered basaltic scoria cones during brief cycles of activity, called rift basalts because of their association with extensional structural features. The basalts of the region typically belong to the second group; examples include the basalts of Silent Canyon and Sleeping Butte (Byers et al. 1989; Crowe et al. 1983).

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

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 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 indicate an increase in the recurrence rate (and thus the probability of disruption). These data 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.

The Long Valley Caldera of eastern California, is located about 70 mi (113 km) southeast. The Long Valley Caldera is part of the Mono-Inyo Craters volcanic chain, which extends from Mammoth Mountain (on the caldera rim) northward about 25 mi (40 km) to Mono Lake. Small to moderate eruptions have occurred at various sites along the volcanic chain in the past 5,000 years, at intervals ranging from 250 to 700 years. Windblown ash from some of these eruptions is known to have drifted as far east as Nebraska. Since 1980, when Long Valley experienced a swarm of strong earthquakes, the central part of the caldera has been rising, indicating the rise of magma below the caldera. Although the probability of an eruption within the volcanic chain in any given year is small (less than 1%), serious hazards could result from an eruption. Depending on the location, size, timing (season), and type of eruption, hazards could include mudflows and flooding, pyroclastic flows, small to moderate volumes of tephra, and falling ash (Hill et al. 1998, 2000; Miller 1989).

Slope Stability and Land Subsidence. The incidence of rock falls and slope failures can be moderate to high along mountain fronts and can present a hazard to facilities on the relatively flat terrain of valley floors like the Big Smoky 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 the Big Smoky Valley to date; the potential for subsidence is not currently known.

Other Hazards. Other potential hazards at the proposed Millers SEZ include those associated with soil compaction (restricted infiltration and increased runoff), expanding clay soils (destabilization of structures), and hydro-compactible 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 Big Smoky 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 11.7.9.1.1 provides further discussion of flood risks within the Millers SEZ.

11.7.7.1.2 Soil Resources

Soils within the proposed Millers SEZ are gravelly sands, gravelly fine sandy loams, fine sands, silt loams, silty clay loams (playas), and gravelly loams of the Yomba, Youngston, Belcher, Kawich, Wardenot, and Izo series, which together make up about 98% of the soil coverage at the site (Figure 11.1.7.1-5). Soil map units within the Millers SEZ are described in Table 11.7.7.1-1. These level to sloping soils are derived from mixed alluvium, typical of soils on alluvial fans, alluvial flats, and playas. They are characterized as very deep and well to excessively drained (except for playa soils, which are very poorly drained). Most soils on the site have low to moderate surface runoff potential and slow to rapid permeability. The natural soil surface is suitable for roads (except for playa soils which have a severe rutting hazard) with a slight erosion hazard when used as roads or trails. The water erosion potential is low for most soils. The susceptibility to wind erosion is moderate to high, with as much as 220 tons (200 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.

All of the soils within the proposed Millers SEZ are rated as partially hydric.[2] Flooding is rare for most soils at the site except for the Youngston-Playas and Slaw-Playas associations, which cover about 319 ac (1 km^2) and have an occasional flooding rating (with a 5 to 50% chance in any year). None of the soils is classified as prime or unique farmland (NRCS 2010).

11.7.7.2 Impacts

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

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

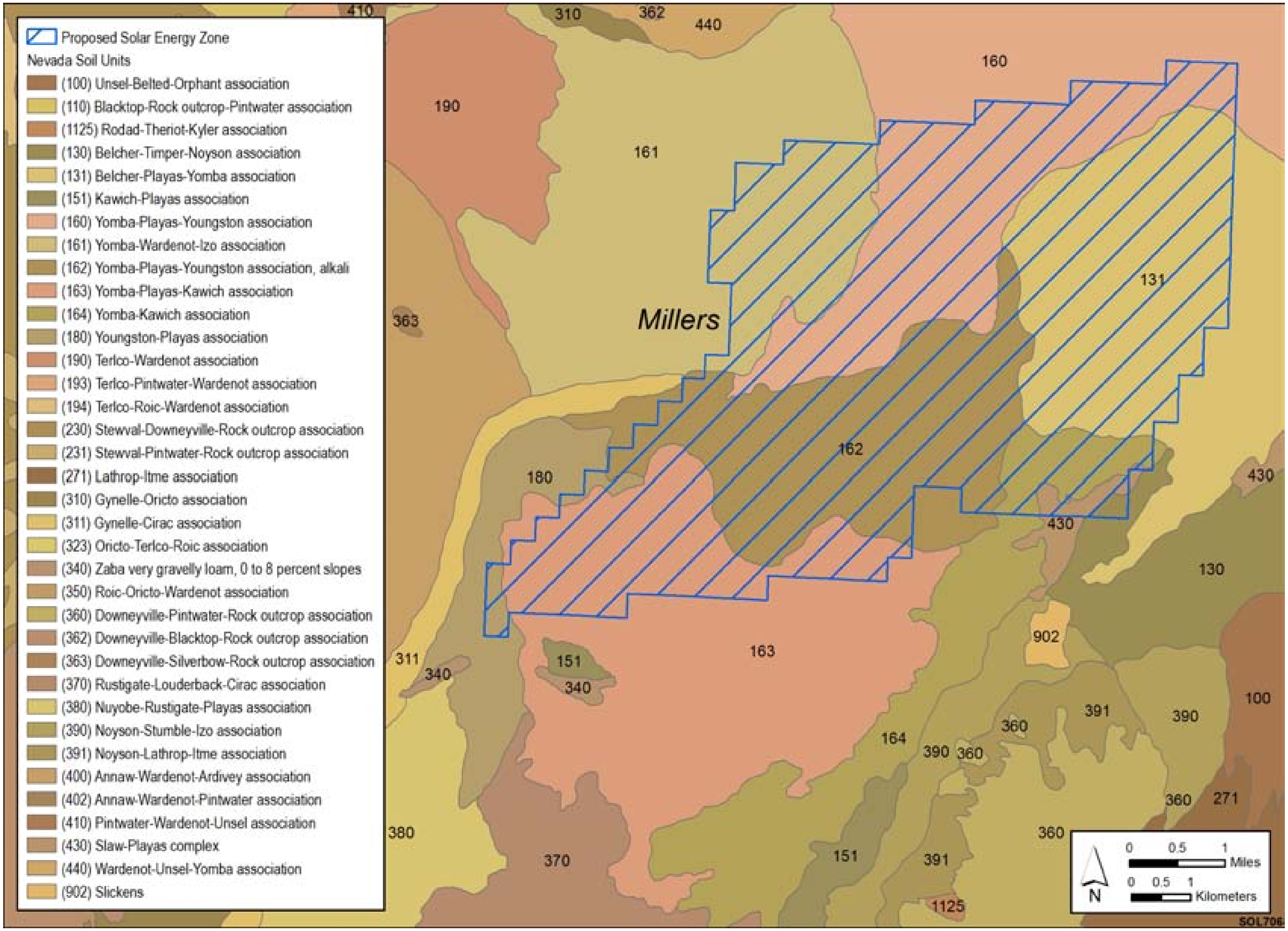

FIGURE 11.7.7.1-5 Soil Map for the Proposed Millers SEZ (NRCS 2008)

TABLE 11.7.7.1-1 Summary of Soil Map Units within the Proposed Millers SEZ

Map Unit Symbol	Map Unit Name	Water Erosion Potential[a]	Wind Erosion Potential[b]	Description	Area, in Acres[c] (% of SEZ)
162	Yomba-Playas-Youngston association, alkali	Low	Moderate (WEG 4L)[d]	Consists of about 40% Yomba gravelly sand and 25% Playas (silty clay loam). Level to moderately sloping soils on alluvial flats, playas, and drainageways. Parent material is alluvium from mixed sources. Very deep and very poorly (Playas) to somewhat excessively drained, with moderate surface runoff potential and moderately slow to slow permeability. Available water capacity is very low (Playas) to low. Severe rutting hazard. Used mainly for livestock grazing and wildlife habitat.	4,068 (24)
131	Belcher-Playas-Yomba association	Low	High (WEG 2)	Consists of 45% Belcher gravelly sand, 20% Yomba gravelly fine sandy loam, and 20% Playas (silty clay loam). Level to nearly level soils on alluvial flats and playas. Parent material is alluvium from mixed sources. Shallow to a duripan (Belcher) and very deep and very poorly (Playas) to somewhat excessively drained, with high surface runoff potential (very slow infiltration rate) and moderate to moderately rapid permeability. Available water capacity is very low to low. Moderate rutting hazard. Used mainly for wildlife grazing, wildlife habitat, and irrigated cropland (alfalfa, corn silage, and small grains).	4,030 (24)
160	Yomba-Playas-Youngston association	Low	Moderate (WEG 4L)	Consists of 40% Yomba gravelly sand, 25% Playas (silty clay loam), and 20% Youngston silt loam. Level to moderately sloping soils on alluvial flats, playas, and drainageways. Parent material is alluvium from mixed sources. Very deep and very poorly (Playas) to somewhat excessively drained, with moderate surface runoff potential and moderately slow to slow permeability. Available water capacity is very low (Playas) to high. Severe rutting hazard. Used mainly for livestock grazing and wildlife habitat.	3,654 (22)

TABLE 11.2.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential[a]	Wind Erosion Potential[b]	Description	Area, in Acres[c] (% of SEZ)
163	Yomba-Playas-Kawich association	Moderate	High (WEG 1)	Consists of 30% Yomba gravelly sand, 30% Playas (silty clay loam), and 30% Kawich fine sand. Level to sloping soils on sand sheets (Kawich on stabilized sand dunes), alluvial flats, and playas. Parent material is alluvium from mixed sources and eolian sand. Very deep and very poorly (Playas) to excessively drained, with low surface runoff potential (high infiltration rate) and moderate to very rapid permeability. Available water capacity is very low (Playas) to low. Moderate rutting hazard. Used mainly for livestock grazing and wildlife habitat.	2,262 (13)
161	Yomba-Wardenot-Izo association	Low	High (WEG 2)	Consists of 45% Yomba gravelly sand, 25% Wardenot gravelly fine sandy loam, and 15% Izo very gravelly sand. Level to sloping soils formed on alluvial flats and fan skirts. Parent material is alluvium from mixed sources. Very deep and somewhat excessively to excessively drained, with moderate surface runoff potential and moderate to rapid permeability. Available water capacity is very low to low. Moderate rutting hazard. Used mainly for grazing and wildlife habitat.	1,803 (11)
164	Yomba-Kawich association	Low	High (WEG 2)	Consists of 50% Yomba gravelly sand and 35% Kawich fine sand. Level to sloping soils on alluvial flats and fan skirts (Kawich on stabilized sand dunes). Parent material is alluvium from mixed sources. Very deep and somewhat excessively to excessively drained, with low surface runoff potential (high infiltration rate) and moderate to very rapid permeability. Available water capacity is very low to low. Moderate rutting hazard. Used mainly as livestock grazing and wildlife habitat.	602 (4)

TABLE 11.2.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential[a]	Wind Erosion Potential[b]	Description	Area, in Acres[c] (% of SEZ)
180	Youngston-Playas association	Moderate	Moderate (WEG 4L)	Consists of 60% Youngston silt loam and 25% Playas (silty clay loam). Level to nearly level soils on alluvial flats and playas. Parent material is alluvium from mixed sources. Very deep and very poorly (Playas) to well drained, with moderate surface runoff potential and moderately slow permeability. Available water capacity is very low (Playas) to high. Severe rutting hazard. Used mainly for livestock grazing, wildlife habitat, and irrigated cropland (alfalfa, corn silage, and small grains).	182 (1)
430	Slaw-Playas complex	Moderate	Moderate (WEG 4L)	Consists of 45% Slaw loam and 40% Playas (silty clay loam). Level to nearly level soils on alluvial flats and playas. Parent material is alluvium from mixed sources. Very deep and very poorly (Playas) to well drained, with high surface runoff potential (slow infiltration rate) and slow permeability. Available water capacity is very low (Playas) to high. Severe rutting hazard. Used mainly for livestock grazing and wildlife habitat.	137 (1)

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

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

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

[d] WEG = wind erodibility group. WEGs are based on soil texture, content of organic matter, effervescence of carbonates, content of rock fragments, and mineralogy, and also take into account soil moisture, surface cover, soil surface roughness, wind velocity and direction, and the length of unsheltered distance (USDA 2004). Groups range in value from 1 (most susceptible to wind erosion) to 8 (least susceptible to wind erosion). The NRCS provides a wind erodibility index, expressed as an erosion rate in tons per acre per year, for each of the wind erodibility groups: WEG 1, 220 tons (200 metric tons) per acre (4,000 m^2) per year; WEG 2, 134 tons (122 metric tons) per acre (4,000 m^2) per year; and WEG 4L, 86 tons (78 metric tons) per acre (4,000 m^2) per year.

Source: NRCS (2010).

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.

It is not known whether construction within the proposed Millers SEZ would affect the eolian processes that maintain the Crescent Dunes to the northwest of the site. A study may be required to evaluate the impacts of constructing and operating a solar facility in close proximity to the landform and to develop specific mitigation measures to avoid or minimize them.

11.7.7.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

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11.7.8 Minerals (Fluids, Solids, and Geothermal Resources)

11.7.8.1 Affected Environment

As of July 19, 2010, there are no locatable mining claims within the SEZ (BLM and USFS 2010a), and the public land within the SEZ has been closed to locatable mineral entry since June 2009 pending the outcome of this solar energy PEIS. There are no active oil and gas leases in the area, and the area has not been leased in the past (BLM and USFS 2010b). The area remains open for discretionary mineral leasing for oil and gas and other leasable minerals, and for disposal of salable minerals. There is no active geothermal leasing or development in or near the SEZ, nor has the area been leased previously (BLM and USFS 2010b).

11.7.8.2 Impacts

If the area is identified as a solar energy development zone, it would continue to be closed to all incompatible forms of mineral development. For the purpose of this analysis, it is assumed that future development of oil and gas resources, should any be found, would continue to be possible, since such development could occur with directional drilling from outside the SEZ. 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. For that reason, it is not anticipated that solar development would adversely affect development of geothermal resources.

11.7.8.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ specific design features are 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 mineral resource impacts.

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11.7.9 Water Resources

11.7.9.1 Affected Environment

The proposed Millers SEZ is located within the Central Nevada Desert subbasin of the Great Basin hydrologic region (USGS 2010a) and the Basin and Range physiographic province characterized by intermittent mountain ranges and desert valleys (Planert and Williams 1995). Big Smoky Valley is an elongated valley with a northeast–southwest orientation that covers an area of 2,926 mi^2 (7,578 km^2), and the proposed Millers SEZ is located in the southern half of the valley known as the "Tonopah Flat." The northern part of Big Smoky Valley is internally drained with a shallow surface divide between the northern part and the Tonopah Flat, which connects with Ione Valley to the north through a narrow mountain pass (Meinzer 1917). The Tonopah Flat region covers an area of 1,603 mi^2 (4,512 km^2) and has a general slope from northeast to southwest. Surface elevations within the vicinity of the proposed SEZ range from 4,775 to 4,865 ft (1,455 to 1,483 m), and surface elevations in the surrounding Monte Cristo Range and San Antonio Mountains reach greater than 7,500 ft (2,286 m) (Figure 11.7.9.1-1). The climate in this region of Nevada is characterized as having low humidity and precipitation, with mild winters and hot summers (Planert and Williams 1995; WRCC 2010a). The average annual precipitation is 5 in. (13 cm), and the average annual snowfall is 13 in. (33 cm) near the town of Tonopah, located at a slightly higher elevation than the proposed SEZ at 5,395 ft (1,644 m) (WRCC 2010b). In the mountain regions, the average annual precipitation is on the order of 7 in. (18 cm), with annual snowfalls of 50 in. (127 cm) (WRCC 2010c). Pan evaporation rates are estimated to be 94 in./yr (239 cm/yr) (Cowherd et al. 1988; WRCC 2010d), and reference crop evapotranspiration has been estimated at 58 in./yr (147 cm) (Huntington and Allen 2010) in the Big Smoky Valley.

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

There are no perennial surface water features in the proposed Millers SEZ. Three intermittent streams form braided stream channels and flow from north to south into the proposed Millers SEZ. The Ione Wash drains the Ione Valley to the north of Big Smoky Valley, and Peavine Creek and an unnamed wash flow out of the Toiyabe Range near the boundary of the northern part of Big Smoky Valley and Tonopah Flat (Figure 11.7.9.1-1). The Ione Wash contributes approximately 300 ac-ft/yr (370,000 m^3/yr), and together Peavine Creek and the unnamed wash contribute approximately 2,800 ac-ft/yr (3.5 million m^3/yr) of surface runoff to the Tonopah Flat (Rush and Schroer 1971). In the vicinity of the proposed SEZ is Slime Wash, an intermittent stream that flows from east to west out of the town of Tonopah and ends approximately 3 mi (5 km) east of the proposed SEZ. An elongated dry lake is located between 5 and 15 mi (8 and 24 km) southwest of the proposed SEZ and covers an area of 8,960 acres along the axis of the valley.

Approximately 2,200 acres (9 km^2) of the northwestern portion of the proposed Millers SEZ is located at the base of an alluvial fan coming out of the pass between the Monte Cristo Range and Royston Hills with several ephemeral washes present along the fan

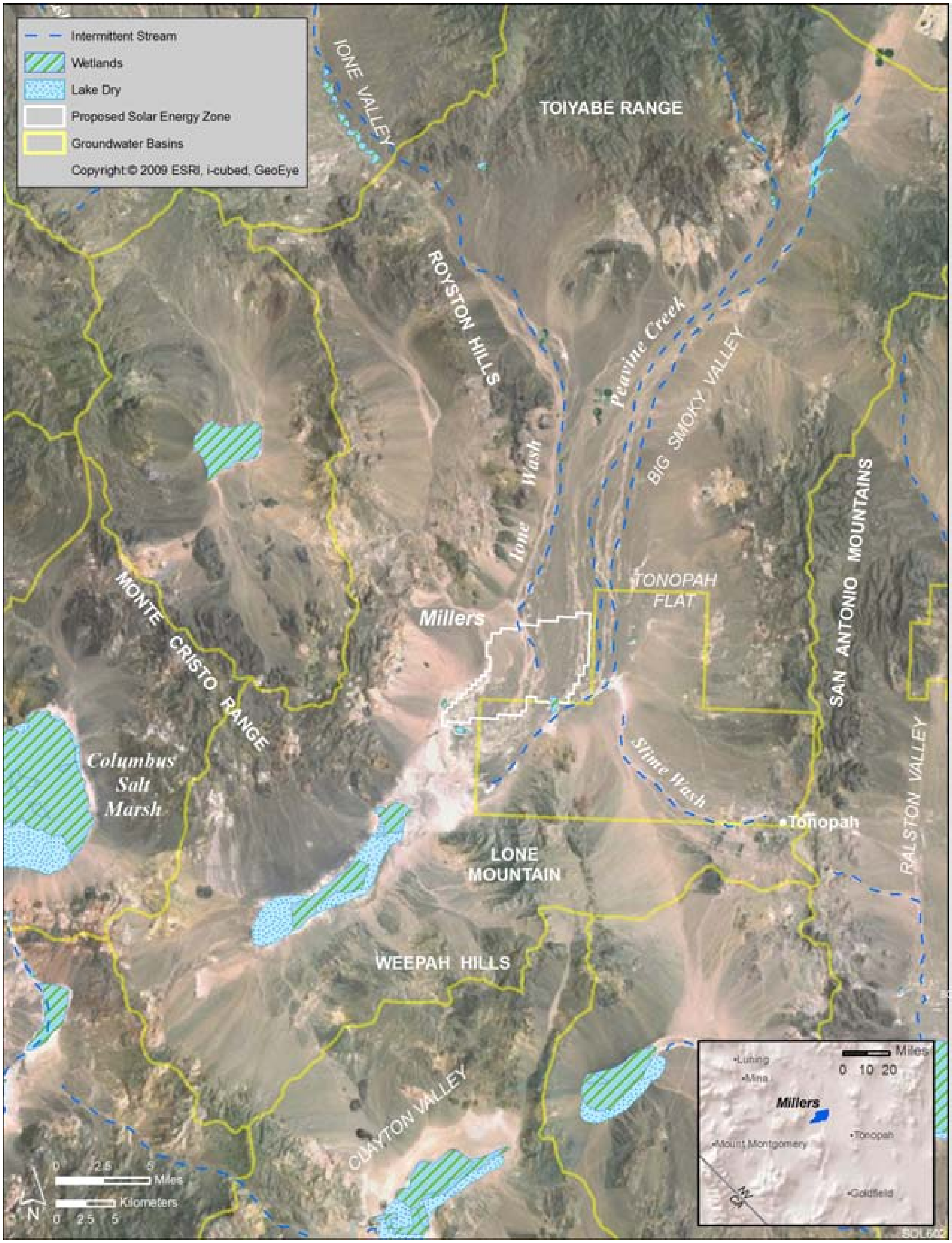

FIGURE 11.7.9.1-1 Surface Water Features near the Proposed Millers SEZ

(Figure 11.7.9.1-1). Smaller alluvial fans southwest of the proposed SEZ are generated by several ephemeral washes originating in the Monte Cristo Range. Peak discharges in these mountain washes can range from 2 to 460 ft^3/s (0.06 to 13 m^3/s) (USGS 2010b; stream gauge 10249680).

Several lacustrine wetlands in the Tonopah Flat area range in size from 43 to 2,770 acres (0.2 to 11 km^2), according to the NWI (USFWS 2009). Wetlands near the proposed Millers SEZ are typically small, less than 200 acres (0.8 km^2), and have sparse vegetation with water levels below the land surface for most of the year. Two larger wetland areas are located within the large dry lake bed southeast of the SEZ, and the Columbus Salt Marsh is located in the adjacent valley west of Big Smoky Valley. These playa features can contain a high amount of dissolved salts in certain areas (Meinzer 1917). Further information on wetlands within the region of the proposed SEZ is presented in Section 11.7.10.1.

Flood hazards have not been identified in Esmeralda County but have been mapped for Nye County just 1 mi (1.6 km) north and east of the proposed Millers SEZ (FEMA 2009). In Nye County, the braided stream channels of the intermittent Ione Wash, Peavine Creek, and the unnamed wash are all identified as being within a 100-year floodplain. It is very likely that these 100-year floodplains extend into Esmeralda County, and preliminary estimates using aerial photography suggest that approximately 2,000 acres (8 km^2) of the proposed Millers SEZ would potentially be classified as within a 100-year floodplain. Additionally, erosion and sedimentation along the alluvial fan in the northwestern corner of the proposed SEZ, as well as temporary flooding in low-lying areas, may occur during large rainfall events.

11.7.9.1.2 Groundwater

The proposed Millers SEZ is located within the Big Smoky Valley-Tonopah Flat groundwater basin (simply referred to as Tonopah Flat groundwater basin), which covers an area of 1,025,900 acres (4,152 km^2) (NDWR 2010a). The mountains surrounding the Tonopah Flat area are principally composed of volcanic and sedimentary rocks. Groundwater in the Tonopah Flat groundwater basin is primarily within the basin-fill aquifer, which comprises lenses of gravels, sands, and clays of Quaternary and late Tertiary age sediments (Rush and Schroer 1971; Whitebread and John 1992). The basin-fill deposits are typically 1,500 to 2,500 ft (457 to 762 m) in thickness near the proposed SEZ and reach a maximum thickness of 5,000 ft (1,524 m) toward the southern portion of the valley; transmissivity values range from 3,300 to 6,600 ft^2/day (307 to 613 m^2/day) (Rush and Schroer 1971).

The bedrock that contains the basin-fill deposits in the Big Smoky Valley is highly impervious, thus groundwater recharge is principally derived from precipitation and snow runoff to the valley (Meinzer 1917). Groundwater recharge from precipitation and snowfall, both on the valley surface and as runoff from the surrounding mountains, has been estimated to be 12,000 ac-ft/yr (14.8 million m^3/yr) in the Tonopah Flat basin (Rush and Schroer 1971); however, more recent estimates of recharge range from 2,807 to 4,060 ac-ft/yr (3.5 million to 5.0 million m^3/yr) (Flint et al. 2004). Subsurface inflow from the northern part of the Big Smoky Valley was estimated to be 2,000 ac-ft/yr (2.5 million m^3/yr) (Rush and Schroer 1971), and subsurface inflow from Ralston Valley to the east was estimated to be less than 500 ac-ft/yr (616,700 m^3/yr) (NDWR 1971). Groundwater discharge processes in the Big Smoky Valley include evapotranspiration, discharge to springs, groundwater withdrawals, and subsurface outflow. Evapotranspiration by phreatic vegetation was estimated at 6,000 ac-ft/yr (7.4 million m^3/yr); discharge to springs was estimated at 230 ac-ft/yr (283,700 m^3/yr); and groundwater extractions totaled 260 ac-ft/yr (320,700 m^3/yr) in 1968 (Rush and Schroer 1971). Subsurface outflow is primarily to the Clayton Valley directly south of the Tonopah Flat basin, with an estimated annual discharge of 8,000 ac-ft/yr (9.9 million m^3/yr) (NDWR 1971).

The general groundwater flow pattern in the Tonopah Flat basin is from northeast to southwest along the axis of the valley. Depth to groundwater ranges from 8 to 78 ft (2 to 24 m) below the land surface within a 5-mi (8-km) radius of the proposed SEZ (USGS 2010b; well numbers 380645117315801, 38083011727200, 381345117230501). In general, depth to groundwater is greater in the northern portion of the Tonopah Flat basin and is near surface levels in the vicinity of the dry lake playas in the southern portion of the basin (Meinzer 1917; Rush and Schroer 1971). Groundwater surface elevations range from 4,695 to 5,233 ft (1,431 to 1,595 m) along the axis of the valley, resulting in an approximate slope of 0.3% in groundwater surface elevations (USGS 2010b; well numbers 375821117440201, 381906117232001). Groundwater quality generally meets drinking water standards, except for the dry lake playa regions in the southern portion of the Tonopah Flat basin, where there are elevated sulfate, chloride, and dissolved solids concentrations (Rush and Schroer 1971).

11.7.9.1.3 Water Use and Water Rights Management

In 2005, water withdrawals from surface waters and groundwater in Esmeralda County were 46,786 ac-ft/yr (57.7 million m^3/yr), of which 9% came from surface waters and 91% came from groundwater. The largest water use categories for groundwater were irrigation and mining at 28,235 and 14,202 ac-ft/yr (34.8 million and 17.5 million m^3/yr), respectively. The remaining groundwater withdrawals were used for domestic and livestock (Kenny et al. 2009). In the Tonopah Flat basin, groundwater extractions totaled 260 ac-ft/yr (320,700 m^3/yr) in 1968 and were used primarily for irrigation purposes (Rush and Schroer 1971).

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 Office of the State Engineer, is the agency responsible for managing both the surface water and groundwater resources, and this responsibility includes overseeing water right applications, appropriations, and interbasin transfers (NDWR 2010b). The two principal 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. Additionally, water rights are treated as both real and personal property, such that water rights can be transferred without affecting the land ownership (NDWR 2010b). 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 Nevada

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).

Both the northern part and the Tonopah Flat basins within the Big Smoky Valley are designated groundwater basins according to Orders 725 and 827 (NDWR 1979, 1983a). Additionally, approximately 1,300 acres (5.3 km^2) of the proposed SEZ in T.3N-R.40E falls under Order 828 (NDWR 1983b), which designates municipal and domestic water uses as the preferred beneficial use. The perennial yield of the Tonopah Flat groundwater basin is set at 6,000 ac-ft/yr (7.4 million m^3/yr), and water rights in the basin are over-appropriated with a total of 19,588 ac-ft/yr (24.2 million m^3/yr) being allotted for irrigation, mining; municipal, and stockwater uses (95% of allotments used for irrigation and mining, NDWR 2010a). As mentioned previously, groundwater extractions totaled 260 ac-ft/yr (320,700 m^3/yr) in 1968 (Rush and Schroer 1971) in the Tonopah Flat basin. However, a current groundwater extraction inventory is not available (NDWR 2010a), so it is not known how much of the allotted groundwater rights are in use. Solar energy developers would have to purchase and transfer existing water rights through coordination of the NDWR and current water rights holders.

11.7.9.2 Impacts

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

11.7.9.2.1 Land Disturbance Impacts on Water Resources

Impacts related to land disturbance activities are common to all utility-scale solar energy facilities, which are described in more detail for the four phases of development in Section 5.9.1; these impacts will be minimized through the implementation of programmatic design features described in Appendix A, Section A.2.2. Land disturbance activities should be minimized in the vicinity of the ephemeral stream channels of Ione Wash located through the middle of the proposed SEZ, as well as in the vicinity of Peavine Creek just east of the proposed SEZ. During large storm events, these intermittent streams have the potential to flood and cause sedimentation and erosion issues (it is suspected that these intermittent streams are within the 100-year floodplain, which will have to be determined during the site characterization phase).

Approximately 2,200 acres (9 km^2) of the northwestern corner of the proposed SEZ is located on the base of an alluvial fan containing several ephemeral washes. Disturbances to these ephemeral washes could cause erosion impacts and disrupt groundwater recharge. Additionally, site design and land disturbance activities could potentially alter surface water drainage and sedimentation off the proposed SEZ to the southwest of the Tonopah Flat basin, which would potentially impair the dry lake playa regions at the southern edge of Big Smoky Valley.

11.7.9.2.2 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 Millers SEZ are as follows:

- On the basis of a total area of 16,787 acres (68 km^2), it is assumed that two solar projects would be constructed during the peak construction year;
- Water needed for making concrete would come from an off-site source;
- The maximum land disturbance for an individual solar facility during the peak construction year is 3,000 acres (12 km^2);
- Assumptions on individual facility size and land requirements (Appendix M), along with the assumed number of projects and maximum allowable land disturbance, result in the potential to disturb up to 36% 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 for dry-cooling systems (see Section 5.9.2.1).

Site Characterization

During site characterization, water would be used mainly for fugitive dust suppression and 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 the workforce potable water supply. Because there are no significant surface water bodies on the proposed Millers SEZ, the water requirements for construction activities could be met by either trucking water to the sites or by using on-site groundwater resources.

Water requirements for dust suppression and potable water supply during construction, shown in Table 11.7.9.2-1, could be as high as 3,300 ac-ft (4.1 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 1,418 to 2,045 gpm (5,368 to 7,741 L/min) to meet the estimated construction water requirements. These yields are on the same order of magnitude as large municipal and agricultural production wells (Harter 2003), so multiple wells may be needed in order to meet the water requirements. In addition, the up to 148 ac-ft (186,600 m^3) of sanitary wastewater that would be generated would need to be treated either on-site or sent to an off-site facility.

The total water use requirements for the peak construction year, listed in Table 11.7.9.2-1, are approximately one-third to one-half of the perennial yield for the Tonopah Flat groundwater basin. The potential impacts associated with groundwater withdrawals of this magnitude would have to be assessed during the site characterization phase. Significant declines in groundwater surface elevations as the result of groundwater extractions could potentially affect phreatic vegetation within the Big Smoky Valley and impair other groundwater users in the region.

TABLE 11.7.9.2-1 Estimated Water Requirements during the Peak Construction Year for the Proposed Millers SEZ

Activity	Parabolic Trough	Power Tower	Dish Engine	Photovoltaic
Water use requirements[a]				
Fugitive dust control (ac-ft)[b,c]	2,140	3,210	3,210	3,210
Potable supply for workforce (ac-ft)	148	90	37	19
Total water use requirements (ac-ft)	2,288	3,300	3,247	3,229
Wastewater generated				
Sanitary wastewater (ac-ft)	148	90	37	19

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

[b] Fugitive dust control estimation assumes a local pan evaporation rate of 94 in./yr (239 cm/yr) (Cowherd et al. 1988; WRCC 2010d).

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

Operations

During operations, water would be required for mirror/panel washing, the workforce potable water supply, and cooling (parabolic trough and power tower only) (Table 11.7.9.2-2). Water needs for cooling are a function of the type of cooling used (dry, hybrid, wet). Further refinements to water requirements for cooling would result from the percentage of time that the option was employed (30 to 60% range assumed) and the power of the system. The differences between the water requirements reported in Table 11.7.9.2-2 for the parabolic trough and power tower technologies are attributable to the assumptions of acreage per megawatt. As a result, the water usage for the more energy-dense parabolic trough technology is estimated to be almost twice as large as that for the power tower technology.

At full build-out capacity, water needs for mirror/panel washing are estimated to range from 75 to 1,343 ac-ft/yr (92,500 to 1.7 million m^3/yr), and the workforce potable water supply, from 2 to 38 ac-ft/yr (2,500 to 46,900 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 40,327 ac-ft/yr (49.7 million m^3/yr). Water usage for dry-cooling systems would be as high as 4,067 ac-ft/yr (5.0 million m^3/yr), approximately a factor of 10 times less than the wet-cooling option. Non-cooled technologies, dish engine and PV systems, require substantially less water at full build-out capacity at 763 ac-ft/yr (941,100 m^3/yr) for dish engine and 77 ac-ft/yr (95,000 m^3/yr) for PV (Table 11.7.9.2-2). Operations would produce up to 38 ac-ft/yr (46,900 m^3/yr) of sanitary wastewater; in addition, for wet-cooled technologies, 424 to 763 ac-ft/yr (523,000 to 941,100 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 Millers SEZ. The NDWR has set the perennial yield for the Tonopah Flat groundwater basin at 6,000 ac-ft/yr (7.4 million m^3/yr), which is less than half of the amount of water needed to support wet-cooled parabolic trough operations under the full build-out scenario. Water use requirements for wet-cooled power tower operations are also greater than the perennial yield, so wet cooling is not feasible for the proposed Millers SEZ. Water use requirements for dry-cooled parabolic trough and power tower technologies, as well as dish engine and PV, could be supported by groundwater resources in the Tonopah Flats groundwater basin, assuming that groundwater rights could be transferred.

Decommissioning/Reclamation

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

TABLE 11.7.9.2-2 Estimated Water Requirements during Operations at the Proposed Millers SEZ

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Full build-out capacity (MW)[a,b]	2,686	1,492	1,492	1,492
Water use requirements				
Mirror/panel washing (ac-ft/yr)[c,d]	1,343	746	746	75
Potable supply for workforce (ac-ft/yr)	38	17	17	2
Dry cooling (ac-ft/yr)[e]	537–2,686	298–1,492	NA[f]	NA
Wet cooling (ac-ft/yr)[e]	12,087–38,946	6,715–21,637	NA	NA
Total water use requirements				
Non-cooled technologies (ac-ft/yr)	NA	NA	763	77
Dry-cooled technologies (ac-ft/yr)	1,918–4,067	1,061–2,255	NA	NA
Wet-cooled technologies (ac-ft/yr)	13,468–40,327	7,478–22,400	NA	NA
Wastewater Generated				
Blowdown (ac-ft/yr)[g]	763	424	NA	NA
Sanitary wastewater (ac-ft/yr)	38	17	17	2

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

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

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

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

[e] Dry-cooling value assumes 0.2 to 1.0 ac-ft/yr/MW, and wet-cooling value assumes 4.5 to 14.5 ac-ft/yr/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.

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.

11.7.9.2.3 Off-Site Impacts: Roads and Transmission Lines

Impacts associated with the construction of roads and transmission lines primarily deal with water use demands for construction, water quality concerns relating to potential chemical spills, and land disturbance effects on the natural hydrology. The extent of the impacts on water resources is proportional to the amount and location of land disturbance needed to connect the proposed SEZ to major roads and existing transmission lines. The proposed Millers SEZ is located adjacent to existing roads and transmission lines, as described in Section 11.7.1.2, so it is assumed that impacts would be negligible.

11.7.9.2.4 Summary of Impacts on Water Resources

The impacts on water resources associated with developing solar energy at the proposed Millers SEZ are related to 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 alter groundwater recharge and discharge processes. The ephemeral stream channels of Ione Wash, Peavine Creek, and an unnamed wash are likely located within a 100-year floodplain, according to FEMA maps, in the adjacent Nye County (FEMA 2009). The 100-year floodplain would be identified during the site characterization phase, and areas of the proposed SEZ within the 100-year floodplain should be avoided. Additionally, alteration of the surface water drainage pattern off the proposed SEZ toward the southwest could impair the dry lake playa areas through sedimentation and erosion, as well as divert water from these natural drainage lows of the Big Smoky Valley.

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 Millers SEZ. The water use requirements for technologies using wet cooling are greater than the perennial yield for the Tonopah Flats groundwater basin, so wet cooling would not be feasible for the full build-out scenario. For evaluating wet-cooling technologies for the proposed Millers SEZ, an analysis of the maximum power production was done assuming that the water use was limited to the perennial yield of the basin, 6,000 ac-ft/yr (7.4 million m^3/yr). This analysis suggests that between 15 and 27% of the full build-out power production potential is possible for wet-cooled parabolic trough and power tower technologies (assuming a 60% operating time) if the water supply is limited to the perennial yield of the basin.

Dry-cooling, dish engine, and PV technologies all have full build-out water use requirements that are lower than the perennial yield of the basin, suggesting that groundwater resources in the Tonopah Flats basin could support their development. However, facilities using these technologies should also implement water conservation practices to limit water needs. Water conservation plans will help solar energy developers in purchasing and transferring needed water rights within the overappropriated Tonopah Flats basin.

11.7.9.3 SEZ-Specific Design Features and Design Feature Effectiveness

The program for solar energy development on BLM-administered lands would require the programmatic design features presented in Appendix A, Section A.2.2, to be implemented, thus mitigating some impacts on water resources. Programmatic design features would focus on coordination with federal, state, and local agencies that regulate the use of water resources to meet the requirements of permits and approvals needed to obtain water for development, and on the performance of 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.

Design features specific to the proposed Millers 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 minimize impacts on the ephemeral stream channels of Ione Wash and Peavine Creek, as well as alluvial fan features along the western edge of the SEZ;

- 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 through coordination with the NDWR and current water rights holders;

- 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 the water quality standards of the *Nevada Administrative Code* (445A.453-445A.455).

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11.7.10 Vegetation

This section addresses vegetation that could occur or is known to occur within the potentially affected area of the proposed Millers 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 only the SEZ. No new access roads or transmission projects are expected to be needed to serve development on the SEZ because of the proximity of existing infrastructure (refer to Section 11.7.1.2 for development assumptions). The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ boundary, where ground-disturbing activities would not occur but that could be indirectly affected by activities in the area of direct effects.

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

11.7.10.1 Affected Environment

The proposed Millers SEZ is located primarily within the Tonopah Basin Level IV ecoregion, which primarily supports sparse shadscale (*Atriplex confertifolia*) communities on broad valleys, hills, bajadas, and alluvial fans (Bryce et al. 2003). Additional commonly occurring shrubs in this ecoregion include bud sagebrush (*Picrothamnus desertorum*), spiny hopsage (*Grayia spinosa*), seepweed (*Suaeda* sp.), fourwing saltbush (*Atriplex canescens*), spiny menodora (*Menodora spinescens*), Nevada ephedra (*Ephedra nevadensis*), littleleaf horsebrush (*Tetradymia glabrata*), Douglas rabbitbrush (*Chrysothamnus viscidiflorus*), and winterfat (*Krascheninnikovia lanata*), which, along with shadscale, often codominate in highly diverse mosaics. Warm season grasses, such as Indian rice grass (*Achnatherum hymenoides*) and galleta grass (*Pleuraphis jamesii*), occur in the understory. Stands of inland saltgrass (*Distichlis spicata*) and alkali sacaton (*Sporobolus airoides*) also occur. Bailey greasewood (*Sarcobatus baileyi*) and Shockley wolfberry (*Lycium* sp.) are widespread and often codominate on lower alluvial slopes in this ecoregion. Black greasewood occurs in saline bottoms. Springs and sporadic precipitation in foothills provide surface water sources. The southwestern portion of the Millers SEZ is located within the Lahontan and Tonopah Playas. This Level IV ecoregion is nearly level and contains mud flats, alkali flats, intermittent saline lakes, and low sand dunes. Marshes, remnant lakes, and playas occur within this ecoregion. Rivers terminate in the playas, which during winter fill with seasonal runoff from nearby mountains. Only scattered, highly salt-tolerant plants, such as alkali sacaton, inland saltgrass, and seepweed, occur in this mostly barren ecoregion. Bordering the playas, black greasewood (*Sarcobatus vermiculatus*) or fourwing saltbush may form a transition to the salt shrub community. Playas may be sources of wind-generated salt dust. Annual precipitation in the vicinity of the SEZ is very low, averaging 5.1 in. (12.9 cm) at Tonopah airport (see Section 11.7.13).

The Tonopah Basin and Lahontan and Tonopah Playas lie within the Central Basin and Range Level III ecoregion, described in Appendix I, and are part of the Great Basin desertscrub biome.

The area surrounding the SEZ consists of a mosaic of the Tonopah Basin, Lahontan and Tonopah Playas, and the Tonopah Sagebrush Foothills Level IV ecoregions. This area supports black sagebrush (*Artemisia nova*) and Mojave species, such as blackbrush (*Coleogyne ramosissima*), Joshua tree (*Yucca brevifolia*), and cholla (*Cylindropuntia* sp.), on rocky substrates.

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 Millers SEZ are shown in Figure 11.7.10.1-1. Table 11.7.10.1-1 provides the surface area of each cover type within the potentially affected area.

Lands within the proposed Millers SEZ are classified primarily as Inter-Mountain Basins Mixed Salt Desert Scrub. Additional cover types within the SEZ are given in Table 11.7.10.1-1. Dominant species in the sparse low salt scrub communities observed in most portions of the SEZ in August 2009 include shadscale, Nevada ephedra, Bailey's greasewood, and spiny hopsage, with rabbitbrush (*Chrysothamnus/Ericameria* sp.) in disturbed areas. The SEZ includes many low playa areas, predominantly in the southern portion, containing widely scattered low hummocks of black greasewood, occasionally with Indian ricegrass. The playas are bordered by a predominantly black greasewood community. Much of the SEZ consists of north to south trending broad, barren, gravel-covered washes, with small scattered playa areas, with shadscale and fourwing saltbush along the margins or in isolated stands. Sensitive habitats on the SEZ include desert dry washes, playas, and wetlands. A population of candelaria blazingstar (*Mentzelia candelariae*) occurs approximately 3 mi (4.8 km) east of the SEZ. This species is on the NNHP watch list and may potentially occur on the SEZ.

The area of indirect effects, including the area surrounding the SEZ within 5 mi (8 km), contains 15 cover types, which are listed in Table 11.7.10.1-1. The predominant cover type is Inter-Mountain Basins Mixed Salt Desert Scrub. Crescent Dunes, mapped as Inter-Mountain Basins Active and Stabilized Dune, are located about 5 mi (8 km) northeast of the SEZ. Sand dunes are also located about 5 mi (8 km) southwest of the SEZ.

One wetland mapped by the NWI is located within the southeastern portion of the SEZ (USFWS 2009) (Figure 11.7.10.1-2). This sparsely vegetated lacustrine wetland is mapped primarily as Inter-Mountain Basins Playa, with small areas of Inter-Mountain Basins Greasewood Flat and Inter-Mountain Basins Mixed Salt Desert Scrub. Approximately 84 acres (0.3 km^2) of this 192.9-acre (0.8-km^2) wetland is located within the SEZ. The remaining portion is located entirely within the area of indirect effects. Smaller playa areas not mapped by the NWI

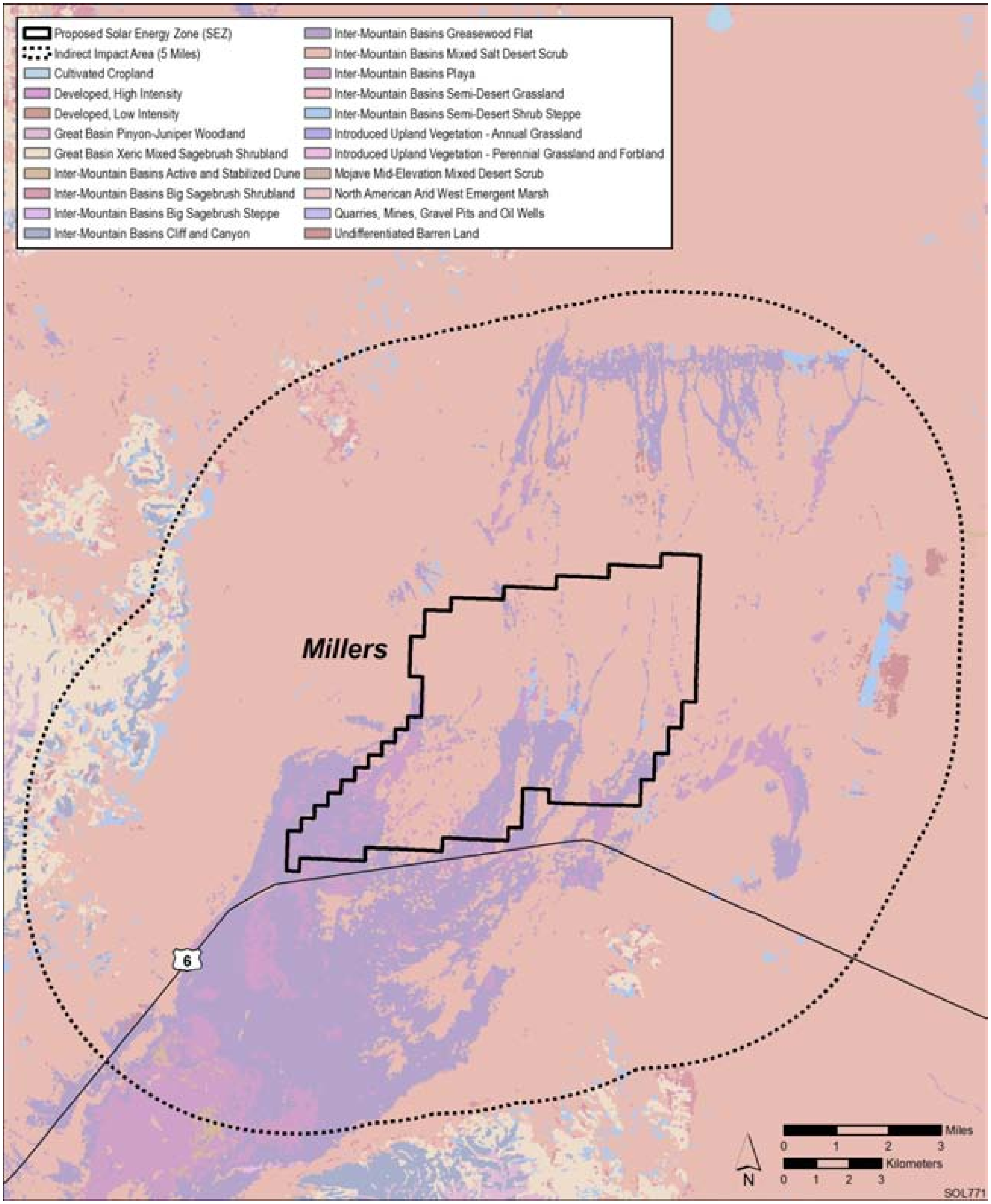

FIGURE 11.7.10.1-1 Land Cover Types within the Proposed Millers SEZ (Source: USGS 2004)

TABLE 11.7.10.1-1 Land Cover Types within the Potentially Affected Area of the Proposed Millers SEZ and Potential Impacts

Land Cover Type[a]	Area of Cover Type Affected (acres)[b] Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e]
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.	12,211 acres[f] (0.5%, 0.5%)	93,460 acres (3.6%)	Small
Inter-Mountain Basins Greasewood Flat: Dominated or codominated 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 codominated by, other shrubs, and may include a graminoid herbaceous layer.	3,149 acres (3.4%, 3.7%)	19,074 acres (20.4%)	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.	1,290 acres (1.4%, 1.7%)	5,307 acres (5.6%)	Moderate
Inter-Mountain Basins Semi-Desert Shrub Steppe: Generally consists of perennial grasses with an open shrub and dwarf shrub layer.	137 acres (0.1%, 0.1%)	2,240 acres (0.3%)	Small
Mojave Mid-Elevation Mixed Desert Scrub: The vegetation composition is quite variable. Dominant species include shrubs forbs and grasses and may include *Yucca* spp.	4 acres (0.2%, 0.5%)	37 acres (2.3%)	Small
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 codominants may be Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) or yellow rabbitbrush (*Chrysothamnus viscidiflorus*). Other shrub species, as well as sparse perennial bunchgrasses, may also be present.	0 acres	3,788 acres (0.6%)	Small

TABLE 11.7.10.1-1 (Cont.)

	Area of Cover Type Affected (acres)[b]		
Land Cover Type[a]	Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e]
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	720 acres (1.8%)	Small
Undifferentiated Barren Land: Includes a variety of barren areas, generally with less than 15% cover of vegetation.	0 acres	683 acres (13.5%)	Small
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.	0 acres	541 acres (0.1%)	Small
Inter-Mountain Basins Active and Stabilized Dune: Includes Dune and sandsheet areas that are unvegetated or sparsely vegetated, with up to 30% plant cover, but generally less than 10%. Plant communities consist of patchy or open grassland, shrubland, or shrub steppe, with species often adapted to the shifting sandy substrate.	0 acres	149 acres (6.5%)	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	54 acres (<0.1%)	Small
Introduced Upland Vegetation–Annual Grassland: Dominated by non-native annual grass species.	0 acres	33 acres (1.4%)	Small
Inter-Mountain Basins Semi-Desert Grassland: Consists of perennial bunchgrasses as dominants or codominants. Scattered shrubs or dwarf shrubs may also be present.	0 acres	5 acres (0.1%)	Small

TABLE 11.7.10.1-1 (Cont.)

	Area of Cover Type Affected (acres)[b]		
Land Cover Type[a]	Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e]
Inter-Mountain Basins Big Sagebrush Steppe: Dominated by basin big sagebrush (*Artemisia tridentata tridentata*), Wyoming big sagebrush (*Artemisia tridentata wyomingensis*), or both. Other shrubs may be present. Perennial grasses are often abundant.	0 acres	4 acres (0.2%)	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.	0 acres	2 acres (1.1%)	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 Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary where ground-disturbing activities would not occur. Indirect effects include effects from surface runoff, dust, and other factors from projects. The potential degree of indirect effects would decrease with increasing distance from the SEZ. Includes the area of the cover type within the indirect effects area and the percentage that area represents of all occurrences of that cover type within the SEZ region.

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

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

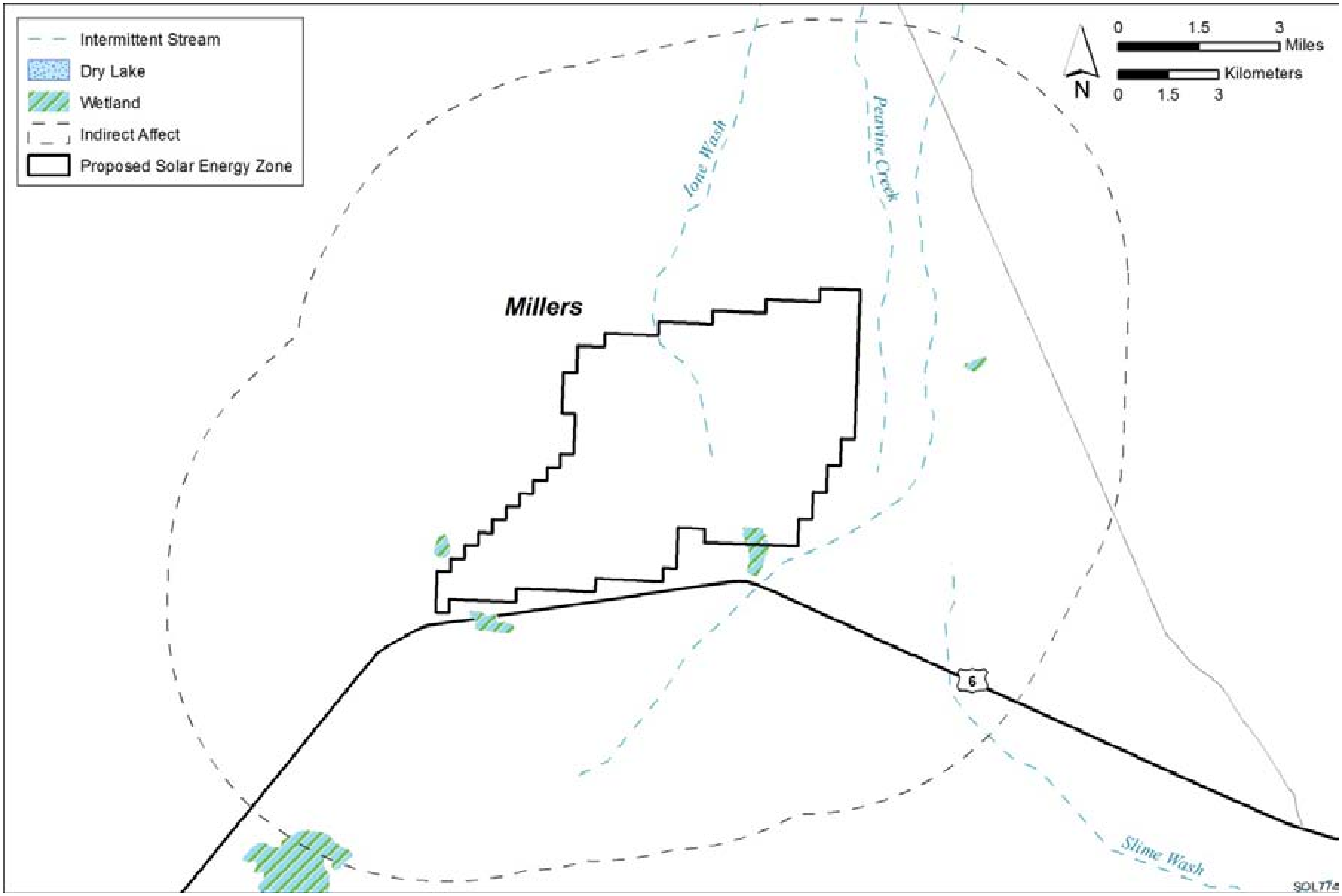

FIGURE 11.7.10.1-2 Wetlands within the Proposed Millers SEZ (Source: USFWS 2009)

occur within the SEZ. Numerous dry washes occur within the SEZ, generally flowing to the south and terminating in the playa areas. These washes do not support wetland or riparian habitats. Ione Wash, an intermittent stream, flows south into the SEZ. Two additional intermittent streams, Peavine Creek and an unnamed wash, are located immediately east of the SEZ. These streams generally carry surface flows during spring months. The dry washes and playas typically contain water for short periods during or following precipitation events.

Four additional wetlands occur within the area of indirect effects. All of these are sparsely vegetated lacustrine wetlands, which are mapped primarily as Inter-Mountain Basins Playa, with small areas of Inter-Mountain Basins Greasewood Flat and Inter-Mountain Basins Mixed Salt Desert Scrub. Large areas of these playa habitats are located southwest of the SEZ. Groundwater is relatively shallow in the vicinity of the playas in the southern portion of the Tonopah Flat basin, which includes the Millers SEZ (see Section 11.7.9), and supports plant communities when surface water is absent. Several springs also occur in the vicinity of the SEZ.

The State of Nevada maintains an official list of weed species designated as noxious species (NDA 2010). Table 11.7.10.1-2 provides a summary of the noxious weed species regulated in Nevada that are known to occur in Esmeralda County (USDA 2010), which includes the proposed Millers SEZ. According to Creech et al. (2010), none of the weed species from the Nevada state list occurs in the county. No species included in Table 11.7.10.1-2 were observed on the SEZ in August 2009.

The NDA classifies noxious weeds into one of three categories (NDA 2010):

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

TABLE 11.7.10.1-2 Designated Noxious Weeds of Nevada Occurring in Esmeralda County

Common Name	Scientific Name	Category
Musk thistle	*Carduus nutans*	B
Puncture vine	*Tribulus terrestris*	C
Saltcedar	*Tamarix* spp.	C

Sources: NDA (2010); USDA (2010).

- "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."

11.7.10.2 Impacts

The construction of solar energy facilities within the proposed Millers 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 (13,430 acres [54.3 km^2]) would be expected to be cleared with full development of the SEZ. The plant communities affected would depend on facility locations and could include any of the communities occurring on the SEZ. Therefore, for this analysis, all the area of each cover type within the SEZ is considered to be directly affected by removal with full development of the SEZ.

Indirect effects (caused, e.g., 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 11.7.10.2.3, below, identifies design features of particular relevance to the proposed Millers SEZ.

11.7.10.2.1 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); moderate (>1 but <10%) if the impact could affect an intermediate proportion of cover type; and large if the impact could affect more than 10% of a cover type.

Solar facility construction and operation in the proposed Millers 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 Greasewood Flat, Inter-Mountain Basins Playa, Inter-Mountain Basins Semi-Desert Shrub Steppe, and Mojave Mid-Elevation Mixed Desert Scrub. Table 11.7.10.1-1 summarizes the potential impacts on land cover types resulting from solar energy facilities in the proposed Millers SEZ. Most of these cover types are relatively common in the SEZ region; however, Mojave Mid-Elevation Mixed Desert Scrub is relatively uncommon, representing 0.03% of the land area within the SEZ region. Desert dry washes, playas, and wetlands are important sensitive habitats on the SEZ.

The construction, operation, and decommissioning of solar projects within the proposed Millers Valley SEZ would result in moderate impacts on the Inter-Mountain Basins Greasewood Flat and Inter-Mountain Basins Playa cover types. Solar project development within the SEZ would result in small impacts on the remaining cover types in the affected area.

Because of the arid conditions, re-establishment of shrub or shrub steppe 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, 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 area of indirect effects identified in Table 11.7.10.1-1. Solar project development within the SEZ could alter sand transport processes, potentially affecting sand dune plant communities in Crescent Dunes, northeast of the SEZ, or dunes southwest of the SEZ.

Communities associated with playa habitats, Ione Wash, greasewood flats communities, or other intermittently flooded areas within and downgradient from solar projects could be affected by ground-disturbing activities. Extensive playa habitats southwest of the SEZ could be affected. 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 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 wash habitats within the SEZ. 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. Disturbance of the dry washes within the SEZ could affect groundwater recharge.

Potential impacts on wetlands as a result of solar energy development are described in Section 5.6.1. Approximately 84 acres (0.3 km^2) of wetland habitat have been identified within the Millers SEZ, associated with playa habitat, and could be affected by project development. Direct impacts on the wetland would occur if fill material is placed within the playa for solar facility construction. Indirect impacts, as described above, could occur if project construction occurs near or upgradient from the playa.

Although the use of groundwater within the Millers 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 Tonopah Flat groundwater basin, or other hydrologically-connected basins. Plant communities that access groundwater, such as those in the vicinity of playas, or 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.

Candelaria blazingstar, a plant species on the NNHP watch list, may occur within the SEZ and may be directly affected by solar project development. The population occurring east of the SEZ may be indirectly affected by project activities within the SEZ.

11.7.10.2.2 Impacts from Noxious Weeds and Invasive Plant Species

Executive Order (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 Millers SEZ, and increase the probability that weeds could be transported into areas that previously were relatively weed-free. This could result in reduced restoration success and possible widespread habitat degradation.

Invasive species potentially occur on the SEZ. Species designated as noxious weeds in Nevada, and known to occur in Esmeralda County, are given in Table 11.7.10.1-2. No cover types of introduced species occur within the SEZ. Within the area of indirect effects, 33 acres (0.13 km^2) of Introduced Upland Vegetation–Annual Grassland are mapped. Disturbance associated with solar project development may promote the establishment and spread of invasive species associated with this cover type. Past or present land uses, such as OHV activity, 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.

11.7.10.3 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 specific practices are best established when project details are being considered, the following 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. Invasive species control should focus on biological and mechanical methods where possible to reduce the use of herbicides.

- Dry washes, Ione Wash, playas, and wetlands within the SEZ 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 the playa wetland and other playas, as well as Ione Wash shrub communities, dry washes, and greasewood flat habitats within the SEZ, and downstream occurrences, 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 plant communities that access groundwater, such as those in the vicinity of playas. Potential impacts on springs associated with the Tonopah Flat basin or other hydrologically connected basins should be determined through hydrological studies.

- A qualified botanist or plant ecologist should survey for candelaria blazing star during a period when it is flowering and easily documented prior to any construction activities within the SEZ. If individuals are located, individuals or populations should be avoided through fencing and flagging of the area, including an appropriate buffer zone.

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

11.7.11 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 Millers 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 by using available GIS surface water datasets.

The affected area considered in this assessment included the areas of direct and indirect effects. The area of direct effects was defined as the area that would be physically modified during project development (i.e., where ground-disturbing activities would occur) within the SEZ. The maximum developed area within the SEZ would be 13,430 acres (54.3 km^2). No areas of direct effects would occur for either a new transmission line or a new access road, because existing transmission line and road corridors are adjacent to or pass through the SEZ.

The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ boundary where ground-disturbing activities would not occur, but that could be indirectly affected by activities in the area of direct effects (e.g., surface runoff, dust, noise, lighting, and accidental spills in the SEZ). Potentially suitable habitat within the SEZ greater than the maximum of 13,430 acres (54.3 km^2) of direct effects was also included as part of the area of indirect effects. The potential degree of indirect effects would decrease with increasing distance from the SEZ. The 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. These areas of direct and indirect effects 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 11.7.10). Potentially unique habitats in the affected area include wash and playa habitats. Aquatic habitats that occur in the SEZ and the area of indirect effects include Ione Wash, Peavine Wash, and several small unnamed dry lakes (see Figure 11.7.9.1-1).

11.7.11.1 Amphibians and Reptiles

11.7.11.1.1 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 Millers SEZ. The list of amphibian and reptile species potentially present in the SEZ area was determined from species lists available from the Nevada Natural Heritage Program (NDCNR 2002) and range maps and habitat information available from SWReGAP

(USGS 2007). Land cover types suitable for each species were determined from SWReGAP (USGS 2004, 2005a, 2007). Appendix M provides additional information on the approach used.

Based on species distributions within the area of the SEZ and habitat preferences of the amphibian species, the Great 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 or near the wash and playa habitats within the SEZ.

More than 25 reptile species occur within the area that encompasses the proposed Millers SEZ (USGS 2007; Stebbins 2003). The desert tortoise (*Gopherus agassizii*) is a federal and state-listed threatened species. This species is discussed in Section 11.7.12. 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*), 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*).

Table 11.7.11.1-1 provides habitat information for representative amphibian and reptile species that could occur within the proposed Millers SEZ. Special status amphibian and reptile species are addressed in Section 11.7.12.

11.7.11.1.2 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 measures applied. Section 11.7.11.1.3 identifies SEZ-specific design features of particular relevance to the proposed Millers 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 11.7.11.1.1, 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 11.7.11.1.3).

In general, impacts on amphibians and reptiles would result from habitat disturbance (i.e., habitat reduction, fragmentation, and alteration) and from disturbance, injury, or mortality to individual amphibians and reptiles. On the basis of the magnitude of the impacts on amphibians and reptiles summarized in Table 11.7.11.1-1, direct impacts on representative

TABLE 11.7.11.1-1 Habitats, Potential Impacts, and Potential Mitigation for Representative Amphibian and Reptile Species That Could Occur on or in the Affected Area of the Proposed Millers SEZ

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Amphibians				
Great 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 4,548,700 acres[g] of potentially suitable habitat occurs within the SEZ region.	12,211 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	97,831 acres of potentially suitable habitat (2.2% of available suitable habitat)	Small overall impact. Wash and playa habitats should be avoided.
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 3,274,500 acres of potentially suitable habitat occurs within the SEZ region.	12,215 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	93,581 acres of potentially suitable habitat (2.9% of available suitable habitat)	Small overall impact. Wash and playa habitats, should be avoided.
Lizards				
Desert horned lizard (*Phrynosoma platyrhinos*)	Deserts dominated by sagebrush, creosotebush, greasewood, or cactus. Occurs on sandy flats, alluvial fans, washes, and edge of dunes. Burrows in soil during periods of inactivity. About 4,114,900 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	127,467 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
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 3,498,200 acres of potentially suitable habitat occurs in the SEZ region.	12,352 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	100,237 acres of potentially suitable habitat (2.9% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.

TABLE 11.7.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]		Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
		Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	
Lizards (Cont.)				
Long-nosed leopard lizard (*Gambelia wislizenii*)	Desert and semidesert areas with scattered shrubs. Prefers sandy or gravelly flats and plains. Also prefers areas with abundant rodent burrows, which they occupy when inactive. About 3,757,800 acres of potentially suitable habitat occurs in the SEZ region.	12,215 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	97,818 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
Western fence lizard (*Sceloporus occidentalis*)	Disturbed areas, roadsides, gravel beds, rock quarries, lava flows, outcrops, talus slopes, shrublands, riparian areas, and coniferous woodlands. About 4,764,000 acres of potentially suitable habitat occurs within the SEZ region.	12,348 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	100,795 acres of potentially suitable habitat (2.1% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
Western whiptail (*Cnemidophorus tigris*)	Arid and semiarid habitats with sparse plant cover. About 4,216,400 acres of potentially suitable habitat occurs within the SEZ region.	13.430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	120,400 acres of potentially suitable habitat (2.9% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
Zebra-tailed lizard (*Callisaurus draconoides*)	Open, warm-desert habitats, especially dry washes and canyons with fine gravel and sand. About 3,288,900 acres of potentially suitable habitat occurs in the SEZ region.	12,215 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	97,426 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small overall impact. Avoid wash habitat, otherwise no species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.

TABLE 11.7.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Snakes				
Coachwhip (*Masticophis flagellum*)	Creosotebush desert, shortgrass prairie, shrub-covered flats and hills. Sandy to rocky substrates. Avoids dense vegetation. About 2,237,800 acres of potentially suitable habitat occurs within the SEZ region.	3,286 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	26,254 acres of potentially suitable habitat (1.2% of available potentially suitable habitat)	Small overall impact.
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 846,400 acres of potentially suitable habitat occurs within the SEZ region.	1,427 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	7,936 acres of potentially suitable habitat (0.9% of available potentially suitable habitat)	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 1,974,800 acres of potentially suitable habitat occurs in the SEZ region.	1,294 acres of potentially suitable habitat lost (0.07% of available potentially suitable habitat) during construction and operations	9,575 acres of potentially suitable habitat (0.5% of available potentially suitable habitat)	Small overall impact. Wash and playa habitats should be avoided.
Groundsnake (*Sonora semiannulata*)	Arid and semiarid regions with rocky to sandy soils. River bottoms, desert flats, sand hummocks, and rocky hillsides. About 1,996,600 acres of potentially suitable habitat occurs within the SEZ region.	141 acres of potentially suitable habitat lost (<0.01% of available potentially suitable habitat) during construction and operations	6,669 acres of potentially suitable habitat (0.3% of available potentially suitable habitat)	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, seeks refuge underground, in crevices, or under rocks. About 3,569,900 acres of potentially suitable habitat occurs within the SEZ region.	13,430 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	101,974 acres of potentially suitable habitat (2.9% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.

Footnotes continued on next page.

TABLE 11.7.11.1-1 (Cont.)

[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 overestimates the amount of suitable habitat in the project area. A maximum of 13,430 acres of direct effects 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 13,430 acres of direct effects was also added to the area of indirect effects. 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 from the SEZ.

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

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

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

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

amphibian and reptile species would be small, because 0.4% or less of potentially suitable habitats identified for the species in the SEZ region would be lost. Larger areas of potentially suitable habitats for the amphibian and reptile species occur within the area of potential indirect effects. Other impacts on amphibians and reptiles could result from surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, accidental spills, collection, and harassment. These indirect impacts are expected to be negligible with implementation of programmatic design features.

Decommissioning after operations cease could result in short-term negative impacts on individuals and habitats within and adjacent to the SEZ. The negative impacts of decommissioning would be reduced or eliminated as reclamation proceeds. Potentially long-term benefits could accrue as habitats are restored in previously disturbed areas. Section 5.10.2.1.4 provides an overview of the impacts of decommissioning and reclamation on wildlife. Of particular importance for amphibian and reptile species would be the restoration of original ground surface contours, soils, and native plant communities associated with semiarid shrublands.

11.7.11.1.3 SEZ-Specific Design Features and Design Feature Effectiveness

The successful implementation of required 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:

- Wash and playa habitats should be avoided.

If this SEZ-specific design feature is implemented in addition to the programmatic design features, impacts on amphibian and reptile species could be reduced. However, because potentially suitable habitats for a number of the representative 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.

11.7.11.2 Birds

11.7.11.2.1 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 Millers SEZ. The list of bird species potentially present in the SEZ area was determined from the Nevada Natural Heritage Program (NDCNR 2002) and range maps and habitat information available from SWReGAP (USGS 2007). Land cover types suitable for each species were determined from SWReGAP (USGS 2004, 2005a, 2007). Appendix M provides additional information on the approach used.

Five 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*), burrowing owl (*Athene cunicularia*), common raven (*Corvus corax*), ladder-backed woodpecker (*Picoides scalaris*), and Le Conte's thrasher (*Toxostoma lecontei*). Habitats for most of these species are described in Table 11.7.11.2-1. Because of its special species status, the burrowing owl is discussed in Section 11.7.12.

Waterfowl, Wading Birds, and Shorebirds

> **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).

As discussed in Section 4.10.2.2.2, waterfowl (ducks, geese, and swans), wading birds (herons and cranes), and shorebirds (avocets, gulls, plovers, rails, sandpipers, stilts, and terns) are among the most abundant groups of birds in the six-state solar study area. However, within the proposed Millers 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 larger dry lake 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 4.10.2.2.3, neotropical migrants represent the most diverse category of birds within the six-state study area. Species expected to occur within the proposed Millers SEZ include the ash-throated flycatcher, Bewick's wren (*Thryomanes bewickii*), common poorwill (*Phalaenoptilus nuttallii*), common raven, 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*), rock wren (*Salpinctes obsoletus*), sage sparrow (*Amphispiza belli*), Say's phoebe (*Sayornis saya*), and western kingbird (*Tyrannus verticalis*) (USGS 2007).

Birds of Prey

Section 4.10.2.2.4 provides an overview of the birds of prey (raptors, owls, and vultures) within the six-state study area. Raptor species that could occur within the proposed Millers SEZ

TABLE 11.7.11.2-1 Habitats, Potential Impacts, and Potential Mitigation for Representative Bird Species That Could Occur on or in the Affected Area of the Proposed Millers SEZ

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Shorebirds				
Killdeer (*Charadrius vociferus*)	Open areas such as fields, meadows, lawns, mudflats, and shores. Nests on ground in open dry or gravelly locations. About 122,100 acres[g] of potentially suitable habitat occurs within the SEZ region.	1,290 acres of potentially suitable habitat lost (1.1% of available potentially suitable habitat) during construction and operations	5,147 acres of potentially suitable habitat (4.2% of potentially suitable habitat)	Moderate overall impact. Wash and playa habitats should be avoided. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Neotropical Migrants				
Ash-throated flycatcher (*Myiarchus cinerascens*)	Common in scrub and woodland habitats including desert riparian and desert washes. Requires hole/cavity for nesting. Uses shrubs or small trees for foraging perches. About 4,517,100 acres of potentially suitable habitat occurs within the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	118,559 acres of potentially suitable habitat (2.6% of potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Bewick's wren (*Thryomanes bewickii*)	Generally associated with dense, brushy habitats. 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. 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 2,356,400 acres of potentially suitable habitat occurs within the SEZ region.	4,576 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	31,246 acres of potentially suitable habitat (1.3% of available potentially suitable habitat)	Small overall impact. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 11.7.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]		Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
		Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	
Neotropical Migrants (Cont.)				
Common poorwill (*Phalaenoptilus nuttallii*)	Scrubby and brushy areas, prairie, desert, rocky canyons, open woodlands, and broken forests. Mostly in arid and semi-arid habitats. Nests in open areas on a bare site. About 4,627,100 acres of potentially suitable habitat occurs within the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	118,518 acres of potentially suitable habitat (2.6% of potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects. Some measure of mitigation also provided by the requirements of the Migratory Bird Treaty Act.
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 4,908,100 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	121,695 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 11.7.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]		Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
		Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	
Neotropical Migrants (Cont.)				
Greater roadrunner (*Geococcyx californianus*)	Desert scrub, chaparral, edges of cultivated lands, and arid open areas with scattered brush. Fairly common in all desert habitats. 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 4,474,400 acres of potentially suitable habitat occurs in the SEZ region.	12,215 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	98,592 acres of potentially suitable habitat (2.2% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Horned lark (*Eremophila alpestris*)	Common to abundant resident in a variety of open habitats. Breeds in grasslands, sagebrush, semidesert shrublands, and alpine tundra. During migration and winter, inhabits the same habitats other than tundra, and occurs in agricultural areas. Usually occurs where plant density is low and there are exposed soils. About 4,225,100 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	127,323 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 11.7.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Neotropical Migrants (Cont.)				
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 3,307,300 acres of potentially suitable habitat occurs within the SEZ region.	12,215 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	94,412 acres of potentially suitable habitat (2.9% of potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
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 2,600,100 acres of potentially suitable habitat occurs in the SEZ region.	12,215 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat) during construction and operations	93,489 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small overall impact. Avoid wash habitats; otherwise no species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 11.7.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b] Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
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 3,760,100 acres of potentially suitable habitat occurs within the SEZ region.	12,215 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	97,967 acres of potentially suitable habitat (2.6% of potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
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 4,848,700 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	121,661 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 11.7.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b] Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b] Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Neotropical Migrants (Cont.)				
Northern mockingbird (*Mimus polyglottos*)	Parkland, cultivated lands, second-growth habitats, desert scrub, and riparian areas at low elevations. Forages on ground in short, grassy to nearly barren substrates. About 4,932,900 acres of potentially suitable habitat occurs within the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	128,098 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Rock wren (*Salpinctes obsoletus*)	Arid and semi-arid habitats. 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 4,593,300 acres of potentially suitable habitat occurs within the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	128,780 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	Small overall impact. Avoid wash habitats; otherwise no species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 11.7.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Neotropical Migrants (Cont.)				
Sage sparrow (*Amphispiza belli*)	Prefers shrubland, grassland, and desert habitats. The nest, constructed of twigs and grasses, is located either low in a shrub or on the ground. About 4,856,300 acres of potentially suitable habitat occurs within the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	121,765 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Say's phoebe (*Sayornis saya*)	Arid open country, deserts, sagebrush plains, dry barren foothills, canyons, cliffs, ranches, and rural homes. Nests in cliff crevices, holes in banks, sheltered ledges, tree cavities, under bridges and roofs, and in mines. About 1,428,800 acres of potentially suitable habitat occurs within the SEZ region.	3,153 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	23,843 acres of potentially suitable habitat (1.7% of potentially suitable habitat)	Small overall impact. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Western kingbird (*Tyrannus verticalis*)	Occurs in a variety of habitats including riparian forests and woodlands, savannahs, shrublands, agricultural lands, deserts, and urban areas. Nesting occurs in trees, bushes, and other raised areas, such as buildings. Migrates to Central America or the southeastern United States for the winter. About 4,074,900 acres of potentially suitable habitat occurs within the SEZ region.	12,352 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	100,778 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 11.7.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Birds of Prey				
American kestrel (*Falco sparverius*)	Occurs in most open habitats, in various shrub and early successional forest habitats, forest openings, and various ecotones. Perches on trees, snags, rocks, utility poles and wires, and fence posts. Uses cavities in trees, snags, rock areas, banks, and buildings for nesting and cover. About 4,875,200 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	121,657 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
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 4,862,700 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	121,661 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Bald and Golden Eagle Protection Act.
Great horned owl (*Bubo virginianus*)	Needs large abandoned bird nest or large cavity for nesting. Usually lives on forest edges and hunts in open areas. In desert areas, requires wooded cliff areas for nesting. About 5,024,300 acres of potentially suitable habitat occurs within the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	128,963 acres of potentially suitable habitat (2.6% of potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.

TABLE 11.7.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Birds of Prey (Cont.)				
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 4,809,500 acres of potentially suitable habitat occurs within the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	121,090 acres of potentially suitable habitat (2.5% of potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
Red-tailed hawk (*Buteo jamaicensis*)	Wide variety of habitats from deserts, mountains, and populated valleys. Open areas with scattered, elevated perch sites such as scrub desert, plains and montane grassland, agricultural fields, pastures urban parklands, broken coniferous forests, and deciduous woodland. Nests on cliff ledges or in tall trees. About 3,305,900 acres of potentially suitable habitat occurs in the SEZ region.	12,352 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	96,991 acres of potentially suitable habitat (2.9% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
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. Roosts communally in trees, exposed boulders, and occasionally transmission line support towers. About 3,321,700 acres of potentially suitable habitat occurs in the SEZ region.	12,215 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	94,263 acres of potentially suitable habitat (2.8% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.

TABLE 11.7.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Upland Game Birds				
Chukar (*Alectoris chukar*)	Steep, semi-arid slopes with rocky outcrops and shrubs with a grass and forb understory. Sources of water are required during hot, dry periods, with most birds during the brooding period found within 0.25 mi (0.4 km) of water. About 4,727,900 acres of potentially suitable habitat occurs in the SEZ region.	12,352 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	100,150 acres of potentially suitable habitat (2.1% of available potentially suitable habitat)	Small overall impact. Avoid wash and playa habitats; otherwise no species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects. However, avoidance of Ione Wash and an unnamed dry lake would protect potential occasional sources of water.
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 1,467,600 acres of potentially suitable habitat occurs within the SEZ region.	3,290 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	26,088 acres of potentially suitable habitat (1.8% of potentially suitable habitat)	Small overall impact. Avoid wash and playa habitats.
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 4,219,700 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	123,622 acres of potentially suitable habitat (2.9% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.

TABLE 11.7.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Upland Game Bird (Cont.)				
Wild turkey (*Meleagris gallopavo*)	Lowland riparian forests, foothill shrubs, pinyon-juniper woodlands, foothill riparian forests, and agricultural areas. About 2,259,300 acres of potentially suitable habitat occurs within the SEZ region.	1,427 acres of potentially suitable habitat lost (0.06% of available potentially suitable habitat) during construction and operations	12,494 acres of potentially suitable habitat (0.6% of available potentially suitable habitat)	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 overestimates the amount of suitable habitat in the project area. A maximum of 13,430 acres of direct effects 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 13,340 acres of direct effects was also added to the area of indirect effects. 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 from the SEZ.

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

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

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

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

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 11.7.12.1, including the burrowing owl, ferruginous hawk (*Buteo regalis*), prairie falcon (*Falco mexicanus*), and Swainson's hawk (*B. swainsoni*).

Upland Game Birds

Section 4.10.2.2.5 provides an overview of the upland game birds (primarily pheasants, grouse, quail, and doves) that occur within the six-state study area. Upland game species that could occur within the proposed Millers SEZ include the chukar (*Alectoris chukar*), Gambel's quail (*Callipepla gambelii*), mourning dove (*Zenaida macroura*), and wild turkey (*Meleagris gallopavo*) (USGS 2007).

Table 11.7.11.2-1 provides habitat information for representative bird species that could occur within the proposed Millers SEZ. Special status bird species are discussed in Section 11.7.12.

11.7.11.2.2 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 the applications of any additional mitigation measures. Section 11.7.11.2.3, below, identifies design features of particular relevance to the proposed Millers 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 11.7.11.2.1, 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 11.7.11.2.3).

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 11.7.11.2-1 summarizes the magnitude of potential impacts on representative bird species resulting from solar energy development in the proposed Millers SEZ. Direct impacts on representative bird species would be moderate for the killdeer (loss of 1.1% of potentially suitable habitat) and small for all other bird species (ranging from 0.06% for the wild turkey to 0.5% for Le Conte's thrasher (Table 11.7.11.2-1). Larger areas of potentially suitable habitat for bird species occur within the area of potential indirect effects (e.g., up to 4.2% of potentially suitable habitat for the killdeer). Other impacts on birds could result from collision with vehicles and infrastructure (e.g., buildings and fences), surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, noise, lighting, spread of invasive species, accidental spills, and harassment. Indirect impacts on areas outside the SEZ (e.g., impacts caused by dust generation, erosion, and sedimentation) are expected to be negligible with implementation of programmatic design features.

Decommissioning after operations cease could result in short-term negative impacts on individuals and habitats within and adjacent to the SEZ. The negative impacts of decommissioning would be reduced or eliminated as reclamation proceeds. Potentially long-term benefits could accrue as habitats are restored in previously disturbed areas. Section 5.10.2.1.4 provides an overview of the impacts of decommissioning and reclamation on wildlife. Of particular importance for bird species would be the restoration of original ground surface contours, soils, and native plant communities associated with semiarid shrublands.

11.7.11.2.3 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., washes and playas). 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 reducing impacts on birds are best established when project details are considered, 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.

- Wash and playa 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, because 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.

11.7.11.3 Mammals

11.7.11.3.1 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 Millers SEZ. The list of mammal species potentially present in the SEZ area was determined from the Nevada Natural Heritage Program (NDCNR 2002) and range maps and habitat information available from SWReGAP (USGS 2007). Land cover types suitable for each species were determined from SWReGAP (USGS 2004, 2005a, 2007). Appendix M provides additional information on the approach used.

More than 55 species of mammals have ranges that encompass the area of the proposed Millers 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 study area (Section 4.6.2.3), the following discussion 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 Millers 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 11.7.12.1. Among the other big game species, potentially suitable habitat for the cougar, mule deer, and pronghorn occurs within the SEZ (Table 11.7.11.3-1). No potentially suitable habitat for elk occurs within the SEZ. Figures 11.7.11.3-1 and 11.7.11.3-2 show the location of the SEZ relative to mapped ranges of mule deer and pronghorn, respectively.

Other Mammals

A number of mid-size mammal species (e.g., carnivores and rabbits) occur within the area of the proposed Millers SEZ. Species that could occur within the area of the SEZ include the American badger (*Taxidea taxus*), black-tailed jackrabbit (*Lepus californicus*), bobcat (*Lynx rufus*), coyote (*Canis latrans*, common), desert cottontail (*Sylvilagus audubonii*), gray fox (*Urocyon cinereoargenteus*), kit fox (*Vulpes macrotis*), and red fox (*Vulpes vulpes*) (USGS 2007).

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

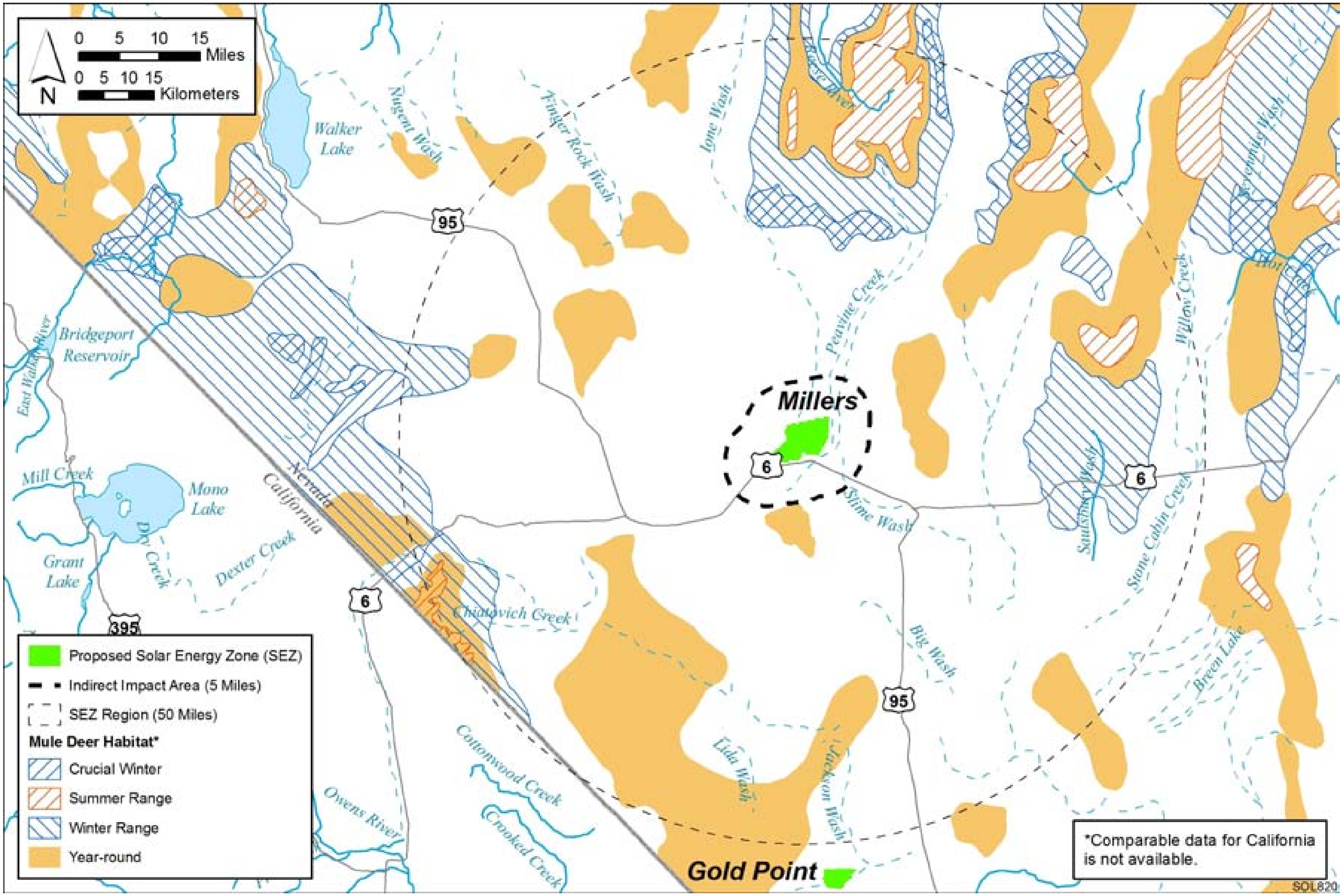

FIGURE 11.7.11.3-1 Location of the Proposed Millers SEZ Relative to the Mapped Range of Mule Deer (Source: NDOW 2010)

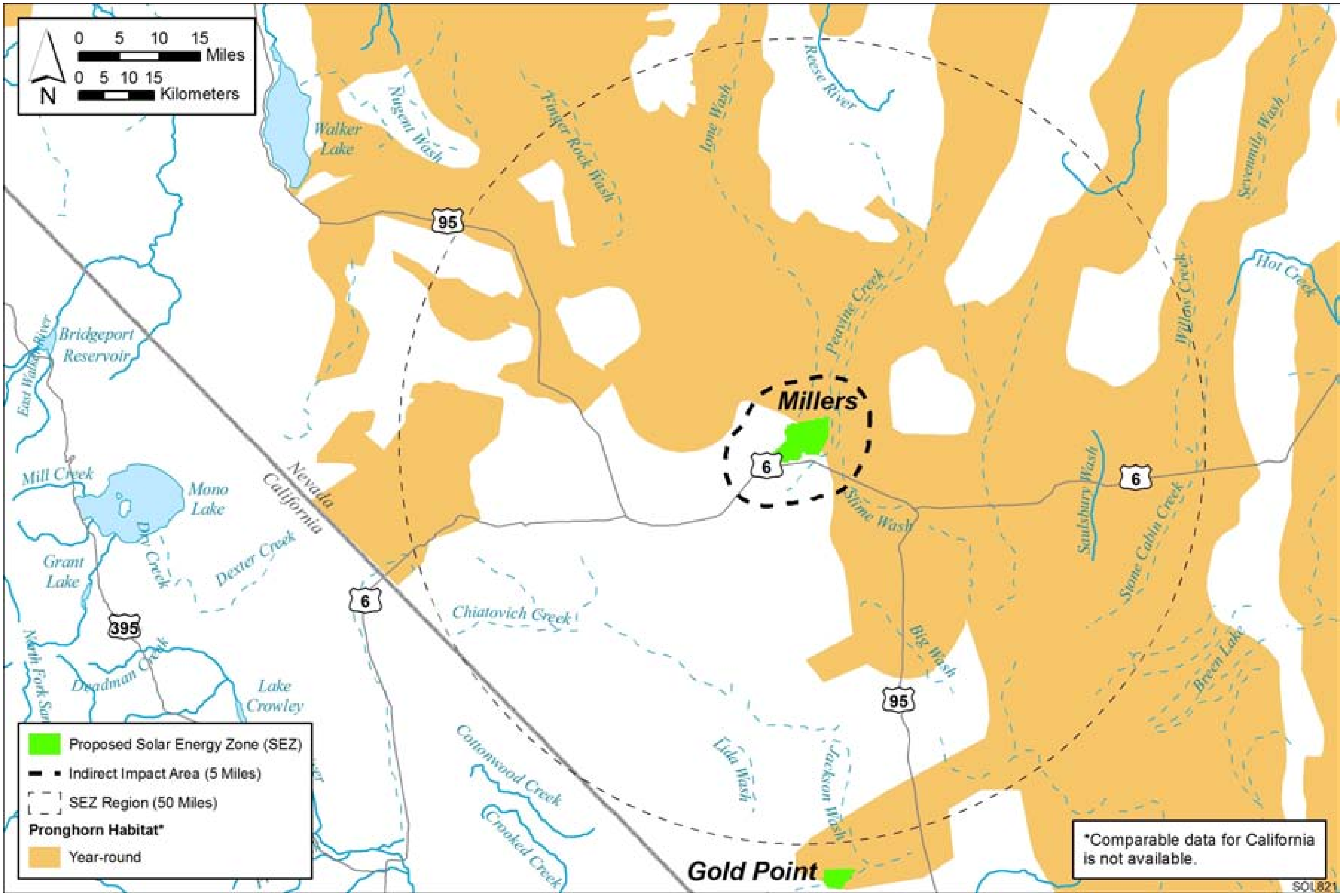

FIGURE 11.7.11.3-2 Location of the Proposed Millers SEZ Relative to the Mapped Range of Pronghorn (Source: NDOW 2010)

(*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 described in Section 11.7.12.1.

Table 11.7.11.3-1 provides habitat information for representative mammal species that could occur within the proposed Millers SEZ. Special status mammal species are discussed in Section 11.7.12.

11.7.11.3.2 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 the application of any additional mitigation measures. Section 11.7.11.3.3, below, identifies design features of particular relevance to mammals for the proposed Millers 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 11.7.11.3.1, 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 actions required to avoid or mitigate impacts on mammals (see Section 11.7.11.3.3). Table 11.7.11.3-1 summarizes the magnitude of potential impacts on representative mammal species resulting from solar energy development (with the inclusion of required programmatic design features) in the proposed Millers SEZ.

Cougar

Up to 12,352 acres (50 km^2) of potentially suitable cougar habitat could be lost by solar energy development within the proposed Millers SEZ. This represents about 0.3% of potentially suitable cougar habitat within the SEZ region. About 100,800 acres (408 km^2) of potentially suitable cougar habitat occurs within the area of indirect effects. Overall, impacts on cougar from solar energy development in the SEZ would be small.

TABLE 11.7.11.3-1 Habitats, Potential Impacts, and Potential Mitigation for Representative Mammal Species That Could Occur on or in the Affected Area of the Proposed Millers SEZ

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Big Game				
Cougar (*Puma concolor*)	Most common in rough, broken foothills and canyon country, often in association with montane forests, shrublands, and pinyon-juniper woodlands. About 4,795,400 acres[g] of potentially suitable habitat occurs in the SEZ region.	12,352 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	100,837 acres of potentially suitable habitat (2.1% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
Mule deer (*Odocoileus hemionus*)	Most habitats including coniferous forests, desert shrub, chaparral, and grasslands with shrubs. Greatest densities in shrublands on rough, broken terrain that provides abundant browse and cover. About 4,168,200 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	120,888 acres of potentially suitable habitat (2.9% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
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 1,542,600 acres of potentially suitable habitat occurs in the SEZ region.	3,286 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	25,327 acres of potentially suitable habitat (1.6% of available potentially suitable habitat)	Small overall impact.
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 4,950,600 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	128,098 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.

TABLE 11.7.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Small Game and Furbearers (Cont.)				
Black-tailed jackrabbit (*Lepus californicus*)	Open plains, fields, and deserts with scattered thickets or patches of shrubs. Also open, early stages of forests and chaparral habitats. Rests during the day in shallow depressions, and uses shrubs for cover. About 4,952,700 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	128,780 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
Bobcat (*Lynx rufus*)	Most habitats except subalpine coniferous forest and montane meadow grasslands. Most common in rocky country from deserts through ponderosa forests. About 2,237,500 acres of potentially suitable habitat occurs in the SEZ region.	4,580 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	30,718 acres of potentially suitable habitat (1.4% of available potentially suitable habitat)	Small overall impact.
Coyote (*Canis latrans*)	All habitats at all elevations. Least common in dense coniferous forest. Where human control efforts occur, restricted to broken, rough country with abundant shrub cover and a good supply of rabbits or rodents. About 5,023,900 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	128,963 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
Desert cottontail (*Sylvilagus audubonii*)	Abundant to common in grasslands, open forests, and desert shrub habitats. Can occur in areas with minimal vegetation as long as adequate cover (e.g., rock piles, fallen logs, fence rows) is present. Thickets and patches of shrubs, vines, and brush also used as cover. About 4,812,200 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	121,583 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.

TABLE 11.7.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Small Game and Furbearers (Cont.)				
Gray fox (*Urocyon cinereoargenteus*)	Deserts, open forests and brush. Prefers wooded areas, broken country, brushlands, and rocky areas. Tolerant of low levels of residential development. About 3,716,700 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	123,877 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
Kit fox (*Vulpes macrotis*)	Desert and semidesert areas with relatively open vegetative cover and soft soils. Seeks shelter in underground burrows. About 4,127,100 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	105,416 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
Red fox (*Vulpes vulpes*)	Most common in open woodlands, pasturelands, riparian areas, and agricultural lands. About 2,267,400 acres of potentially suitable habitat occurs in the SEZ region.	1,427 acres of potentially suitable habitat lost (0.06% of available potentially suitable habitat) during construction and operations	12,499 acres of potentially suitable habitat (0.6% of available potentially suitable habitat)	Small overall impact.
Nongame (small) Mammals				
Big brown bat (*Eptesicus fuscus*)	Most habitats from lowland deserts to timberline meadows. Roosts in hollow trees, rock crevices, mines, tunnels, and buildings. About 3,700,800 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	123,876 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.

TABLE 11.7.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Nongame (small) Mammals (Cont.)				
Botta's pocket gopher (*Thomomys bottae*)	Variety of habitats including shortgrass plains, oak savanna, agricultural lands, and deserts. Burrows are more common in disturbed areas such as roadways and stream floodplains. About 3,559,800 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	123,494 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
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 4,260,900 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	124,380 acres of potentially suitable habitat (2.9% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
Cactus mouse (*Peromyscus eremicus*)	Variety of areas including desert scrub, semidesert chaparral, desert wash, semidesert grassland, and cliff and canyon habitats. About 982,800 acres of potentially suitable habitat occurs in the SEZ region.	3,290 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	21,963 acres of potentially suitable habitat (2.2% of available potentially suitable habitat)	Small overall impact. Avoid wash habitats.
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 3,541,200 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	123,644 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.

TABLE 11.7.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Nongame (small) Mammals (Cont.)				
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 4,785,100 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	121,811 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
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 3,079,400 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	122,995 acres of potentially suitable habitat (4.0% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
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 4,863,900 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	121,661 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
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 1,092,500 acres of potentially suitable habitat occurs in the SEZ region.	4,576 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	27,071 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact.

TABLE 11.7.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]		Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
		Within SEZ (Direct Effects)[c]	Outside SEZ (Indirect Effects)[d]	
Nongame (small) Mammals (Cont.)				
Little pocket mouse (*Perognathus longimembris*)	Mostly sandy and gravelly soils, but also stony soils and rarely rocky sites. About 3,927,500 acres of potentially suitable habitat occurs in the SEZ region.	12,352 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	100,207 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
Long-legged myotis (*Myotis volans*)	Prefers pine forest, desert, and riparian habitats. Old buildings, rock crevices, and hollow trees used for daytime roosting and winter hibernation. It forages in open areas, such as forest clearings. About 3,794,200 acres of potentially suitable habitat occurs within the SEZ region.	13,430 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	123,728 acres of potentially suitable habitat (3,3% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
Long-tailed pocket mouse (*Chaetodipus formosus*)	Common in sagebrush, desert scrub, and desert succulent shrub habitats with rocky or stony groundcover. About 3,964,100 acres of potentially suitable habitat occurs in the SEZ region.	12,352 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	100,778 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
Merriam's kangaroo rat (*Dipodomys merriami*)	Plains grasslands, scrub-grasslands, desertscrub, shortgrass plains, oak and juniper savannahs, mesquite dunes, and creosote flats. About 4,120,300 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	127,472 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.

TABLE 11.7.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Nongame (small) Mammals (Cont.)				
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 2,107,800 acres of potentially suitable habitat occurs within the SEZ region.	141 acres of potentially suitable habitat lost (<0.01% of available potentially suitable habitat) during construction and operations	6,818 acres of potentially suitable habitat (0.3% of available potentially suitable habitat)	Small overall impact.
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 4,167,600 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	102,362 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
Southern grasshopper mouse (*Onychomys torridus*)	Low, arid, shrub and semiscrub vegetation of deserts. About 2,774,100 acres of potentially suitable habitat occurs within the SEZ region.	12,352 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	95,883 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
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 3,658,700 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	123,691 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.

TABLE 11.7.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Nongame (small) Mammals (Cont.)				
Western pipistrelle (*Parastrellus hesperus*)	Deserts and lowlands, desert mountain ranges, desert scrub flats, and rocky canyons. Roosts mostly in rock crevices, sometimes in mines and caves, and rarely in buildings. Suitable roosts occur in rocky canyons and cliffs. Most abundant bat in desert regions. About 3,550,400 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	124,177 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
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 nights and other periods of inactivity in underground burrows. About 3,646,800 acres of potentially suitable habitat occurs within the SEZ region.	13,430 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	126,782 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.
Yuma myotis (*Myotis yumanensis*)	Riparian areas, grasslands, semidesert shrubland, mountain brush, woodlands, and deserts. Occurs where there is open water, regardless of the habitat. Roosts in caves, mines, cliffs, crevices, buildings, and swallow nests. About 3,463,900 acres of potentially suitable habitat occurs in the SEZ region.	13,430 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	101,742 acres of potentially suitable habitat (2.9% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible, because suitable habitat is widespread in the area of direct effects.

[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 overestimates the amount of suitable habitat in the project area. A maximum of 13,430 acres of direct effects within the SEZ was assumed.

Footnotes continued on next page

TABLE 11.7.11.3-1 (Cont.)

[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 13,430 acres of direct effects was also added to the area of indirect effects. Indirect effects include effects from surface runoff, dust, noise, lighting, and so on from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ.

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

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

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

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

Elk

Potentially suitable elk habitat does not occur within the proposed Millers SEZ. Thus, solar energy development would not directly affect elk habitat. About 4,330 acres (17.5 km^2) of potentially suitable elk habitat occurs within the area of indirect effects. This is only about 0.3% of potentially suitable elk habitat within the SEZ region. No mapped elk ranges occur within 23 mi (37 km) of the SEZ (NDOW 2010). Overall, impacts on elk from solar energy development in the SEZ would be small.

Mule Deer

Based on land cover analyses, up to 13,430 acres (54.3 km^2) of potentially suitable mule deer habitat could be lost by solar energy development within the proposed Millers SEZ. This represents about 0.3% of potentially suitable mule deer habitat within the SEZ region. About 120,900 acres (489.3 km^2) of potentially suitable mule deer habitat occurs within the area of indirect effects. No mapped mule deer ranges occur within the SEZ. The closest year-round habitat is about 5 mi (8 km) from the SEZ. The closest summer, winter, and crucial winter ranges are over 20 mi (324 km) from the SEZ (Figure 11.7.11.3-1). Thus, no direct or indirect effect to these mule deer ranges would occur. Overall, impacts on mule deer from solar energy development in the SEZ would be small.

Pronghorn

Based on land cover analyses, up to 3,286 acres (13.3 km^2) of potentially suitable pronghorn habitat could be lost by solar energy development within the proposed Millers SEZ. This represents about 0.2% of potentially suitable mule deer habitat within the SEZ region. About 25,325 acres (102.5 km^2) of potentially suitable pronghorn habitat occurs within the area of indirect effects. Based on mapped range, year-round pronghorn habitat occurs within the SEZ (Figure 11.7.11.3-2). About 5,215 acres (21.1 km^2) of year-round habitat occurs within the SEZ. Loss of this range would total about 0.2% of the year-round pronghorn range within the SEZ region. About 60,445 acres (244.6 km^2) of year-round pronghorn habitat occurs within the area of indirect effect. This is about 2.3% of the year-round pronghorn habitat within the SEZ region. Overall, impacts on pronghorn from solar energy development in the SEZ would be small.

Other Mammals

Direct impacts on all other representative mammal species would be small, because 0.4% or less of their potentially suitable habitat within the proposed Millers SEZ region would be lost (Table 11.7.11.3-1). Larger areas of potentially suitable habitat for these species occur within the area of potential indirect effects (e.g., up to 4.0% of potentially suitable habitat for the desert shrew).

Summary of Impacts

Overall, direct impacts on mammal species from habitat loss would be small (Table 11.7.11.3-1). Other impacts on mammals could result from collision with vehicles and infrastructure (e.g., fences), surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, noise, lighting, spread of invasive species, accidental spills, and harassment. Indirect impacts on areas outside the SEZ (e.g., impacts caused by dust generation, erosion, and sedimentation) would be negligible with implementation of programmatic design features.

Decommissioning after operations cease could result in short-term negative impacts on individuals and habitats within and adjacent to the SEZ. The negative impacts of decommissioning would be reduced or eliminated as reclamation proceeds. Potentially long-term benefits could accrue as habitats are restored in previously disturbed areas. Section 5.10.2.1.4 provides an overview of the impacts of decommissioning and reclamation on wildlife. Of particular importance for mammal species would be the restoration of original ground surface contours, soils, and native plant communities associated with semi-arid shrublands.

11.7.11.3.3 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 would 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.

- Wash and playa 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.

11.7.11.4 Aquatic Biota

11.7.11.4.1 Affected Environment

This section addresses aquatic habitats and biota known to occur on the proposed Millers 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 permanent streams or water bodies within the proposed Millers SEZ. There is one intermittent/ephemeral wash (Ione Wash), which runs for approximately 3 mi (5 km) through the center of the proposed SEZ. Several other ephemeral washes also cross the Millers SEZ, but based on site visits these drainages contain water only for brief periods following rainfall and do not support wetland or riparian habitats. Ione Wash does not drain into any permanent surface waters and therefore does not provide habitat for fish populations from perennial waters. There are also wetlands along the southern edge of the SEZ. However, wetlands in the southwest rarely have surface water or contain water for only brief periods and typically do not support aquatic communities. The assumed access road corridor does not intersect any intermittent or permanent surface water features. Overall, aquatic habitat and communities are not likely to be present in ephemeral and intermittent desert wetland and surface water features. However, opportunistic crustaceans and aquatic insect larvae adapted to desert conditions may be present even under dry conditions. More detailed site survey data is needed to characterize the aquatic biota, if present, in Millers SEZ.

Six miles (10 km) of Ione Wash and 29 mi (47 km) of additional unnamed intermittent washes are located within the area of indirect effects, as are wetlands along the southern border of the proposed SEZ. The washes are typically dry and are not expected to contain permanent aquatic habitat or communities. Like Ione Wash, the intermittent washes in the area of indirect effects do not connect to any permanent water bodies but rather terminate in dry lakes.

Outside of the area of indirect effects, but within 50 mi (80 km) of the proposed Millers SEZ, are 63,486 acres (257 km^2) of dry lakes, 43 mi (69 km) of perennial streams, and 434 mi (698 km) of intermittent streams. Intermittent streams are the only surface water feature present in the area of direct and indirect effects and account for about 8% of the total amount of intermittent stream present in the SEZ region.

11.7.11.4.2 Impacts

Because surface water habitats are a unique feature in the arid landscape in the vicinity of the proposed Millers SEZ, the maintenance and protection of such habitats is important to the survival of aquatic and terrestrial organisms. The types of impacts that aquatic habitats and biota could incur from the development of utility-scale solar energy facilities are described in detail in Section 5.10.3. Aquatic habitats present on or near the locations selected for construction of solar energy facilities could be affected in a number of ways, including (1) direct disturbance, (2) deposition of sediments, (3) changes in water quantity, and (4) degradation of water quality.

The intermittent Ione Wash is present in the proposed Millers SEZ, and direct effects such as ground disturbance are possible. However, Ione Wash is typically dry and impacts on aquatic habitat and communities are not likely. Sediment deposition into intermittent/ephemeral washes in the area of direct and indirect effects is possible via runoff and airborne particulate deposition, especially if ground disturbance occurs near Ione Wash and the intermittent streams and wetlands. However, no aquatic habitats or aquatic communities are present. Although ephemeral and intermittent surface waters are not likely to contain aquatic habitat, more detailed site surveys for biota in would be necessary to determine whether solar energy development activities would result in direct or indirect impacts to aquatic biota. The streams and wetlands in the SEZ and area of indirect effects are not connected to any permanent surface water features, and the nearest perennial surface water feature is greater than 35 mi (56 km) from the Millers SEZ. Therefore, impacts from runoff on aquatic habitat and communities outside of the area of direct and indirect effects are not likely.

In arid environments, reductions in the quantity of water in aquatic habitats are of particular concern. Water quantity in aquatic habitats could also be affected if significant amounts of surface water or groundwater were utilized for power plant cooling water, for washing mirrors, or for other needs. The greatest need for water would occur if technologies employing wet cooling, such as parabolic trough or power tower, were developed at the site; the associated impacts would ultimately depend on the water source used (including groundwater from aquifers at various depths). Obtaining cooling water from other perennial surface water features in the region could affect water levels and, as a consequence, aquatic organisms in those water bodies located outside the SEZ. Additional details on the volume of water required and the types of organisms present in potentially affected water bodies would be required in order to further evaluate the potential for impacts from water withdrawals.

As identified in Section 5.10.3, water quality in aquatic habitats could be affected by the introduction of contaminants such as fuels, lubricants, or pesticides/herbicides during site characterization, construction, operation, or decommissioning for a solar energy facility. There is the potential for contaminants to enter intermittent streams and wetlands, especially if heavy machinery is used in or nearby these surface water features. Thus, the introduction of contaminants can be minimized by avoiding construction near intermittent streams like Ione Wash. The intermittent streams within the SEZ region are typically dry, do not support aquatic communities, and are not connected to any permanent surface water features. Therefore contaminant effects on aquatic habitat and biota inside and outside of the area of direct and indirect effects are not likely.

11.7.11.4.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features are identified at this time. If programmatic project design features described in Appendix A, Section A.2.2, are implemented as needed 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 proposed Millers SEZ would be negligible.

11.7.12 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, within the potentially affected area of the proposed Millers SEZ. Special status species include the following types of species:[3]

- Species listed as threatened or endangered under the ESA;
- Species that are proposed for listing, under review, or are candidates for listing under the ESA;
- Species that are listed by the BLM as sensitive;
- Species that are listed by the State of Nevada;[4] and
- Species that have been ranked by the State of Nevada as S1 or S2, or species of concern by the State of Nevada or the USFWS; hereafter referred to as "rare" species.

Special status species known to occur within 50 mi (80 km) of the center of the proposed Millers SEZ (i.e., the SEZ region) were determined from natural heritage records available through NatureServe Explorer (NatureServe 2010), information provided by the NDOW, the NNHP (Miskow 2009; NDCNR 2004, 2005, 2009a,b), SWReGAP (USGS 2004, 2005a, 2007), and the USFWS Environmental Conservation Online System (ECOS) (USFWS 2010). Information reviewed consisted of county-level occurrences as determined from Nature Serve, 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 Esmeralda, Mineral, and Nye Counties, Nevada. However, the SEZ occurs only in Esmeralda County, Nevada. The affected area occurs within Esmeralda and Nye Counties, Nevada. See Appendix M for additional information on the approach used to identify species that could be affected by development within the SEZ.

11.7.12.1 Affected Environment

The affected area considered in this assessment included the areas of direct and indirect effects for solar development within the proposed SEZ. 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 proposed Millers SEZ, the area of direct effect was limited to the SEZ itself. Due to the proximity of existing infrastructure, the impacts of

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

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

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. Similarly, the impacts of construction or upgrades to access roads were not assessed for this SEZ due to the proximity of an existing federal highway (see Section 11.7.1.2 for a discussion of development assumptions for this SEZ). The area of indirect effects was defined as the area within 5 mi [8 km] of the SEZ boundary where ground-disturbing activities would not occur but that could be indirectly affected by activities in the area of direct effect. Indirect effects considered in the assessment included effects from surface runoff, dust, noise, lighting, and accidental spills from the SEZ, but do not include ground disturbing activities. The potential magnitude of indirect effects would decrease with increasing distance from the SEZ. This area of indirect effect was identified on the basis of professional judgment and was considered sufficiently large to bound the area that would potentially be subject to indirect effects.

The primary land cover habitat type within the affected area is inter-mountain basins mixed salt desert scrub (see Section 11.7.10). Potentially unique habitats in the affected area in which special status species may reside include desert dune, cliff and rock outcrop, wash, and playa habitats. Aquatic habitats that occur on the SEZ and the area of indirect effects include unnamed playa habitats and the Ione Wash, Peavine Creek, Slime Wash, and an unnamed intermittent stream (Figure 11.7.12.1-1).

All special status species that are known to occur within the proposed Millers SEZ region (i.e., the area within 50 mi [80 km] of the center of the SEZ) are listed, along with their status, nearest recorded occurrence, and habitats in Appendix J. Nineteen of those species 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 11.7.12.1-1. The predicted potential occurrence in the affected area of many of the species listed in the table (especially plants and invertebrates), 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 potentially present in the affected area probably overestimates the number of species that actually occur there. For many of the species identified as having potentially suitable habitat in the affected area, the nearest known actual occurrence is more than 20 mi (32 m) away from the SEZ.

Based on NNHP records, two special status species are known to occur within the affected area of the proposed Millers SEZ: Tonopah milkvetch and western small-footed bat. The Tonopah milkvetch is considered a rare species (state rank S2 in Nevada); the western small-footed bat is a BLM-designated sensitive species (the USFWS considers it a species of concern). 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 Millers SEZ region (Section 11.7.9).

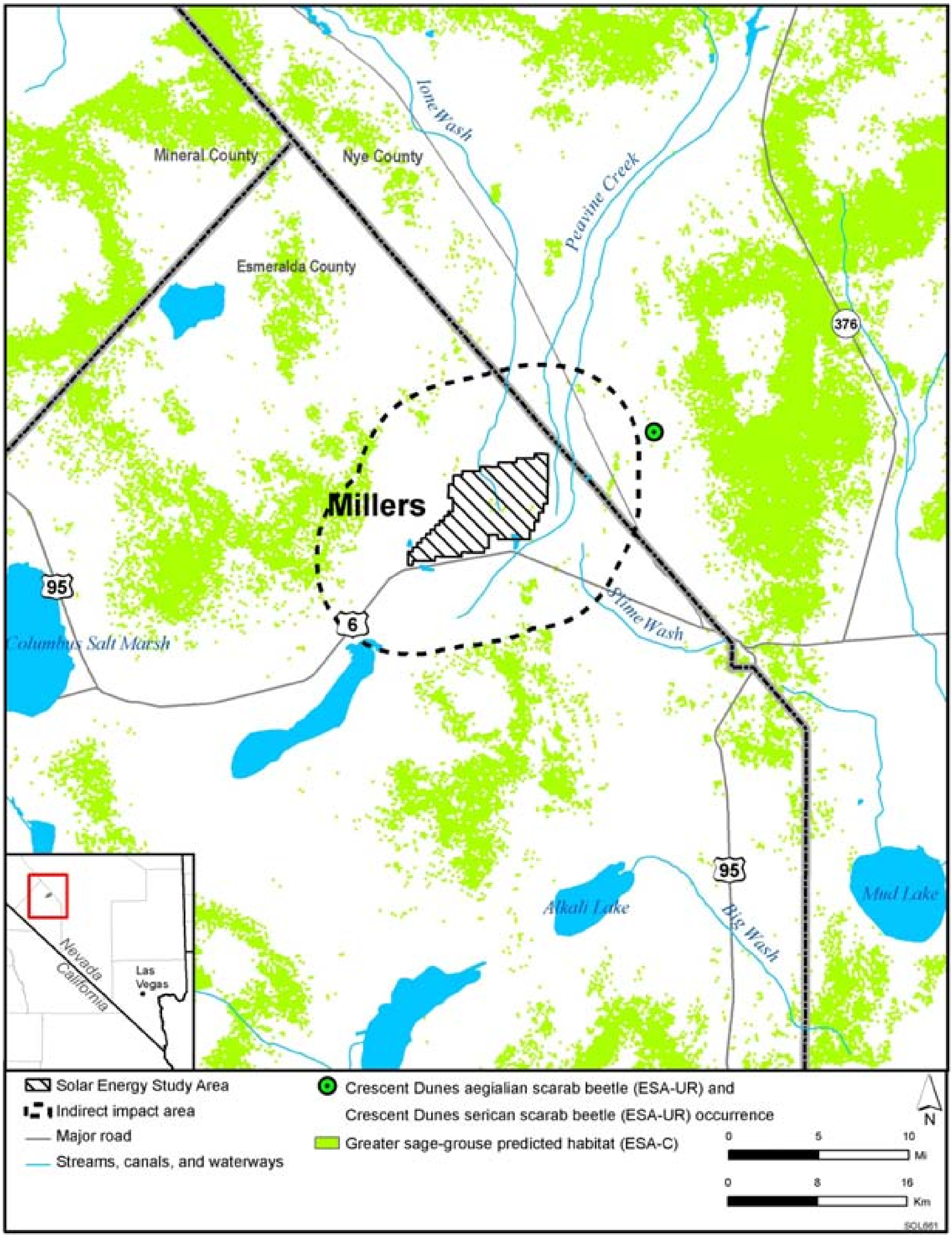

FIGURE 11.7.12.1-1 Known or Potential Occurrences of Species Listed as Endangered or Threatened under the ESA, Candidate for Listing under the ESA, or Species under Review for ESA Listing in the Affected Area of the Proposed Millers SEZ (Sources: Miskow 2009; NDCNR 2005; USFWS 2010; USGS 2007)

TABLE 11.7.12.1-1 Habitats, Potential Impacts, and Potential Mitigation for Special Status Species That Could be Affected by Solar Energy Development on the Proposed Millers SEZ

				Maximum Area of Potential Habitat Affected[c]		
Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Within SEZ (Direct Effects)[d]	Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants						
Eastwood milkweed	*Asclepias eastwoodiana*	BLM-S; FWS-SC; NV-S2	Endemic to Nevada from 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[h]. Nearest recorded occurrence is 12 mi[i] southeast of the SEZ. About 379,398 acres[j] of potentially suitable habitat occurs within the SEZ region.	3,300 acres of potentially suitable habitat lost (0.9% of available potentially suitable habitat)	22,000 acres of potentially suitable habitat (5.8% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoidance or minimization of disturbance to occupied habitats in the areas of direct effect; translocation of individuals from areas of direct effect; or compensatory mitigation of direct effects on occupied habitats could reduce impacts. Note that these same potential mitigations apply to all special status plants.
Nevada dune beardtongue	*Penstemon arenarius*	BLM-S; FWS-SC; NV-S2	Endemic to western Nevada on sand dunes or deep sand occurring on deep, loose, sandy soils of valley bottoms, aeolian deposits, and dune skirts, often in alkaline areas, sometimes on road banks and other recovering disturbances crossing such soils, in shadscale communities. Nearest recorded occurrence is along Peavine Creek, approximately 17 mi northeast of the SEZ. About 97,638 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	150 acres of potentially suitable habitat (6.5% of available potentially suitable habitat)	Small overall impact; no direct effect. No species-specific mitigation is warranted.

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TABLE 11.7.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Ripley biscuitroot	*Cymopterus ripleyi* var. *ripleyi*	FWS-SC; NV-S2	Restricted to southeastern California and western Nevada in deep loose, sandy soils of stabilized dunes, dune skirt areas, aeolian deposits, and alluvial drainage areas at elevations between 4,400 and 6,000 ft. Nearest recorded occurrence is 14 mi northeast of the SEZ. About 2,281acres of potentially suitable habitat occurs within the SEZ region.	0 acres	150 acres of potentially suitable habitat (6.5% of available potentially suitable habitat)	Small overall impact; no direct effect. No species-specific mitigation is warranted.
Sanicle biscuitroot	*Cymopterus ripleyi* var. *saniculoides*	BLM-S; FWS-SC	Endemic to Nevada on loose, sandy to gravelly, often somewhat alkaline soils on volcanic tuff deposits and mixed valley alluvium within blackbrush, mixed-shrub, sagebrush, and lower pinyon-juniper communities. Elevation ranges between 3,150 and 6,700 ft. Nearest recorded occurrence is 12 mi northeast of the SEZ. About 4,039,523 acres of potentially suitable habitat occurs within the SEZ region.	13,475 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	102,500 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. See Eastwood milkweed for a list of other potential mitigations.

TABLE 11.7.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Squalid milkvetch	*Astragalus serenoi* var. *sordescens*	NV-S2	Endemic to Nevada on dry, open, gravelly or sandy soils along gentle slopes of alluvial fans or light-colored clay hills, within mixed-shrub, sagebrush, and lower pinyon-juniper communities at elevations between 5,000 and 6,800 ft. Nearest recorded occurrence is from the Toiyabe National Forest, about 17 mi northeast of the SEZ. About 4,416,115 acres of potentially suitable habitat occurs within the SEZ region.	12,175 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	97,800 acres of potentially suitable habitat (2.2% of available potentially suitable habitat)	Small overall impact. See Eastwood milkweed for a list of other potential mitigations.
Tonopah milkvetch[k]	***Astragalus pseudiodanthus***	NV-S2	Restricted to southeastern California and western Nevada in deep, loose, sandy soils of stabilized and active dune margins, old beaches, valley floors, or drainages at elevations between 4,500 and 6,000 ft. Nearest recorded occurrence is 4 mi southeast of the SEZ. About 2,281 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	150 acres of potentially suitable habitat (6.5% of available potentially suitable habitat)	Small overall impact; no direct effect. No species-specific mitigation is warranted.
Toquima milkvetch	*Astragalus toquimanus*	BLM-S; NV-S2	Endemic to Nevada on dry, stiff, sandy to gravelly, basic or calcareous soils along gentle slopes or flats at elevations between 6,500 and 7,500 ft. Nearest recorded occurrence is 21 mi east of the SEZ. About 1,156,759 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	4,320 acres of potentially suitable habitat (0.4% of available potentially suitable habitat)	Small overall impact; no direct effect. No species-specific mitigation is warranted.

TABLE 11.7.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Invertebrates						
Crescent Dunes aegialian scarab beetle	*Aegialia crescenta*	ESA-UR; BLM-S; NV-S1	Sand dune obligate species endemic to Nevada on the Crescent Dunes and possibly also to the San Antonio and Game Range Dunes. Nearest recorded occurrence is from the Crescent Dunes SRMA, about 6 mi east of the SEZ. About 2,281 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	150 acres of potentially suitable habitat (6.5% of available potentially suitable habitat)	Small overall impact; no direct effect. A review of mitigation effectiveness to avoid indirect effects (e.g., site runoff and erosion, disruption of sand transport systems) on this species should be conducted during the project design phase and in coordination with the USFWS and NDOW. Coordination would identify the need for mitigation, which may include avoidance, minimization, translocation, or compensation.
Crescent Dunes serican scarab beetle	*Serica ammomenisco*	ESA-UR; BLM-S; NV-S1	Sand dune obligate species endemic to Nevada on the Crescent Dunes. Nearest recorded occurrence is from the Crescent Dunes SRMA, approximately 6 mi east of the SEZ. About 2,281 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	150 acres of potentially suitable habitat (6.5% of available potentially suitable habitat)	Small overall impact; no direct effect. A review of mitigation effectiveness to avoid indirect effects (e.g., site runoff and erosion, disruption of sand transport systems) on this species should be conducted during the project design phase and in coordination with the USFWS and NDOW. Coordination would identify the need for mitigation, which may include avoidance, minimization, translocation, or compensation.

TABLE 11.7.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Birds						
Ferruginous hawk	*Buteo regalis*	BLM-S; NV-P; FWS-SC	Year-round resident in the SEZ region. Grasslands, sagebrush, and saltbrush habitats, as well as the periphery of pinyon-juniper woodland. Nests in tall trees or on rock outcrops along cliff faces. Known to occur in Esmeralda County, Nevada. About 1,403,676 acres of potentially suitable habitat occurs within the SEZ region.	3,125 acres of potentially suitable foraging habitat lost (0.2% of available potentially suitable habitat)	24,000 acres of potentially suitable foraging and nesting habitat (1.7% 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.
Greater sage-grouse	*Centrocercus urophasianus*	ESA-C; BLM-S	Plains, foothills, and mountain valleys dominated by sagebrush. Lek sites are located in relatively open areas surrounded by sagebrush or in areas where sagebrush density is low. Nesting usually occurs on the ground where sagebrush density is higher. Some populations may travel up to 60 mi between summer and winter habitats. Known to occur in Esmeralda County, Nevada. About 1,264,279 acres of potentially suitable habitat occurs within the SEZ region.	125 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	6,450 acres of potentially suitable habitat (0.5% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoidance or minimization of disturbance to occupied and/or suitable leks and nesting sites in the areas of direct effect or compensatory mitigation of direct effects on occupied habitats could reduce impacts. The potential for impact and need for mitigation should be determined in coordination with the USFWS and NDOW.

TABLE 11.7.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Birds (Cont.)						
Prairie falcon	*Falco mexicanus*	BLM-S	Year-round resident in open habitats in mountainous areas, steppe, grasslands, or cultivated areas. Nests in well-sheltered ledges of rocky cliffs and outcrops. Known to occur in Esmeralda County, Nevada. About 3,612,314 acres of potentially suitable habitat occurs within the SEZ region.	12,050 acres of potentially suitable foraging habitat lost (0.3% of available potentially suitable habitat)	100,300 acres of potentially suitable foraging and nesting habitat (2.8% of available potentially suitable habitat)	Small overall impact. Direct impact on foraging habitat only. Avoidance of direct impacts on all foraging habitat is not feasible because suitable foraging habitat is widespread in the area of direct effect.
Swainson's hawk	*Buteo swainsoni*	BLM-S; NV-P; NV-S2	Summer breeding resident in the SEZ region. Savanna, open pine-oak woodlands, grasslands, and cultivated lands. Nests in solitary trees, bushes, or small groves. Known to occur in Esmeralda County, Nevada. About 847,596 acres of potentially suitable habitat occurs within the SEZ region.	125 acres of potentially suitable foraging habitat lost (<0.1% of available potentially suitable habitat)	2,225 acres of potentially suitable foraging and nesting habitat (0.3% of available potentially suitable habitat)	Small overall impact. Direct impact on foraging habitat only. Avoidance of direct impacts on all foraging habitat is not feasible because suitable foraging habitat is widespread in the area of direct effect.
Western burrowing owl	*Athene cunicularia hypugaea*	BLM-S; FWS-SC	Summer breeding resident in SEZ region in open grasslands and prairies, as well as disturbed sites such as golf courses, cemeteries, and airports. Nests in burrows constructed by mammals (prairie dog, badger, etc.). Known to occur in Esmeralda County, Nevada. About 4,035,785 acres of potentially suitable habitat occurs within the SEZ region.	13,600 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	105,600 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	Small overall impact on foraging and nesting habitat. Pre-disturbance surveys and avoidance or minimization of disturbance to occupied burrows in the area of direct effect or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 11.7.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Mammals						
Fringed myotis	*Myotis thysanodes*	BLM-S; NV-P; FWS-SC; NV-S2	Year-round resident in SEZ region in wide range of habitats, including lowland riparian, desert shrub, pinyon-juniper, and sagebrush habitats. Roosts in buildings and caves. Known to occur in Esmeralda County, Nevada. About 4,549,929 acres of potentially suitable habitat occurs within the SEZ region.	15,200 acres of potentially suitable foraging habitat lost (0.3% of available potentially suitable habitat)	119,600 acres of potentially suitable foraging and roosting habitat (2.6% of available potentially suitable habitat)	Small overall impact. Direct impact on foraging habitat only. Avoidance of direct impacts on all foraging habitat is not feasible because suitable foraging habitat is widespread in the area of direct effect.
Nelson's bighorn sheep	*Ovis canadensis nelsoni*	BLM-S; FWS-SC	Open, steep rocky terrain in mountainous habitats of the eastern Mojave and Sonoran Deserts in California. Uses desert lowland as corridors for travel between mountain ranges. Known to occur in Esmeralda County, Nevada. About 1,866,606 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	17,250 acres of potentially suitable habitat (0.9% of available potentially suitable habitat)	Small overall impact; no direct effect. Pre-disturbance surveys and avoidance or minimization of disturbance of habitats within the area of direct effects that serve as movement corridors could further reduce impacts.
Spotted bat	*Euderma maculatum*	BLM-S; NV-P; FWS-SC; NV-S2	Year-round resident in SEZ region near forests and shrubland habitats. Roosts and hibernates in caves and rock crevices. Nearest recorded occurrence is 30 mi south of the SEZ. About 3,863,972 acres of potentially suitable habitat occurs within the SEZ region.	15,075 acres of potentially suitable foraging habitat lost (0.4% of available potentially suitable habitat)	114,000 acres of potentially suitable foraging and roosting habitat (2.9% 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 11.7.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Mammals (Cont.)						
Townsend's big-eared bat	*Corynorhinus townsendii*	BLM-S; NV-P; NV-S2	Year-round resident in SEZ region near forests and shrubland habitats below 9,000 ft elevation. Roosts and hibernates in caves, mines, and buildings. Nearest recorded occurrence is 7 mi south of the SEZ. About 3,580,069 acres of potentially suitable habitat occurs within the SEZ region.	13,600 acres of potentially suitable foraging habitat lost (0.4% of available potentially suitable habitat)	102,100 acres of potentially suitable foraging and roosting habitat (2.9% of available potentially suitable habitat)	Small overall impact. Direct impact on foraging habitat only. Avoidance of direct impacts on all foraging habitat is not feasible because suitable foraging habitat is widespread in the area of direct effect.
Western small-footed bat	***Myotis ciliolabrum***	BLM-S; FWS-SC	Year-round resident in woodlands and riparian habitats at elevations below 9,000 ft (2,750 m). Roosts in caves, buildings, mines, and crevices of cliff faces. Nearest recorded occurrence is 4 mi north of the SEZ. About 4,949,592 acres of potentially suitable habitat occurs within the SEZ region	16,725 acres of potentially suitable foraging habitat lost (0.3% of available potentially suitable habitat)	125,275 acres of potentially suitable foraging and roosting habitat (2.5% of available potentially suitable habitat)	Small overall impact. Direct impact on foraging habitat only. Avoidance of direct impacts on all foraging habitat is not feasible because suitable foraging habitat is widespread in the area of direct effect.

[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 access road and transmission line construction, upgrade, or operation are not assessed in this evaluation due to the proximity of existing infrastructure to the SEZ.

Footnotes continued on next page.

TABLE 11.7.12.1-1 (Cont.)

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

[e] Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary 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, etc. from projects. 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.

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

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

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

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

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

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

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

In their scoping comments on the proposed Millers SEZ, the USFWS (Stout 2009) did not express concern for impacts of project development within the SEZ on any species listed as threatened or endangered under the ESA. There are no NNHP records of or potentially suitable habitats for any ESA-listed species within the affected area. According to SWReGAP and USGS habitat suitability models, potentially suitable habitat for the desert tortoise, a species listed as threatened under the ESA, does not occur within the affected area of the proposed Millers SEZ.

11.7.12.1.2 Species That Are Candidates for Listing under the ESA

In their scoping comments on the proposed Millers SEZ, the USFWS did not identify any candidate species for listing under the ESA that may be directly or indirectly affected by solar energy development on the SEZ (Stout 2009). However, one candidate species, the greater sage-grouse, may occur within the affected area. This species inhabits primarily sagebrush habitats in plains, foothills, and mountain valley regions. This species occurs in Esmeralda County, Nevada, and potentially suitable year-round sagebrush habitat is expected to occur within the SEZ and other portions of the affected area (Figure 11.7.12.1-1). According to the SWReGAP habitat suitability model, about 125 acres (0.5 km^2) of potentially suitable habitat for this species occurs on the SEZ; about 6,450 acres (26 km^2) of potentially suitable habitat occurs in the area of indirect effects (Table 11.7.12.1-1). Additional basic information on life history, habitat needs, and threats to populations of the greater sage-grouse is provided in Appendix J.

11.7.12.1.3 Species That Are under Review for Listing under the ESA

In their scoping comments on the proposed Millers SEZ, the USFWS did not identify any species under ESA review that may be directly or indirectly affected by solar energy development on the SEZ (Stout 2009). However, on the basis of occurrence records, two such species, the Crescent Dunes aegialian scarab beetle and the Crescent Dunes serican scarab beetle, may occur within the affected area. These species are sand dune obligates endemic to Nevada, where they are restricted primarily to the Crescent Dunes in Esmeralda County. The nearest recorded occurrences of these two species are from the Crescent Dunes, approximately 6 mi (10 km) east of the SEZ (Figure 11.7.12.1-1). According to the SWReGAP land cover model, potentially suitable sand dune habitat for these species does not occur on the SEZ; however, approximately 150 acres (0.6 km^2) of potentially suitable sand dune habitat occurs in the area of indirect effects (Table 11.7.12.1-1). Additional basic information on life history, habitat needs, and threats to populations of these species is provided in Appendix J.

11.7.12.1.4 BLM-Designated Sensitive Species

There are 16 BLM-designated sensitive species that may occur in the affected area of the proposed Millers SEZ (Table 11.7.12.1-1). These BLM-designated sensitive species include the following (1) plants: Eastwood milkweed, Nevada dune beardtongue, sanicle biscuitroot, and Toquima milkvetch; (2) invertebrates: Crescent Dunes aegialian scarab beetle and Crescent Dunes serican scarab beetle; (3) birds: ferruginous hawk, greater sage-grouse, prairie falcon, Swainson's hawk, and western burrowing owl; and (3) mammals: fringed myotis, Nelson's bighorn sheep, spotted bat, Townsend's big-eared bat, and western small-footed bat. Of these BLM-designated sensitive species with potentially suitable habitat in the affected area, only the western small-footed bat has 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 for each in the affected area, and known locations of the species relative to the SEZ are presented in Table 11.7.12.1-1. Three of these species—Crescent Dunes aegialian scarab beetle, Crescent Dunes serican scarab beetle, and greater sage-grouse—were discussed above because of their known or pending status under the ESA (Sections 11.7.12.1.2 and 11.7.12.1.3). The remaining 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.

Eastwood Milkweed

The Eastwood milkweed is a perennial forb endemic to Nevada found on 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 about 12 mi (19 km) southeast of the SEZ. Although it is not known to occur in the affected area, potentially suitable shrubland and desert wash habitat may occur in the SEZ and other portions of the affected area (Table 11.7.12.1-1).

Nevada Dune Beardtongue

The Nevada dune beardtongue is a perennial forb endemic to sandy habitats in western Nevada. The species occurs primarily on dunes or deep sand in valley bottoms, alkaline areas, or road banks. Nearest recorded occurrences are from Peavine Creek, about 17 mi (27 km) northeast of the SEZ. The species is not known to occur within the affected area of the SEZ, and potentially suitable habitat does not occur on the SEZ. However, potentially suitable dune habitat may occur in the area of indirect effects (Table 11.7.12.1-1).

Sanicle Biscuitroot

The sanicle biscuitroot is a perennial forb endemic to Nevada occurring in mixed desert scrub and pinyon-juniper woodland communities on sandy to gravelly alkaline substrates and volcanic deposits. The nearest recorded occurrences are about 12 mi (19 km) northeast of the SEZ. Although it is not known to occur in the affected area, potentially suitable desert scrub habitats may occur in the SEZ and other portions of the affected area (Table 11.7.12.1-1).

Toquima Milkvetch

The Toquima milkvetch is a perennial forb endemic to Nevada on sandy to gravelly slopes or flats at elevations between 6,500 and 7,500 ft (1,980 and 2,280 m). The nearest recorded occurrences are about 21 mi (34 km) east of the SEZ. This species is not known to occur in the affected area, and potentially suitable habitat does not occur on the SEZ. However, potentially suitable sagebrush habitat may occur in the area of indirect effects (Table 11.7.12.1-1).

Ferruginous Hawk

The ferruginous hawk occurs throughout the western United States. According to the SWReGAP habitat suitability model, potentially suitable year-round habitat for the ferruginous hawk may occur within the affected area of the proposed Millers SEZ. This species inhabits open grasslands, sagebrush flats, desert scrub, and the edges of pinyon-juniper woodlands. It occurs in Esmeralda County, Nevada, and potentially suitable foraging habitat occurs on the SEZ and in other portions of the affected area (Table 11.7.12.1-1). On the basis of an evaluation of SWReGAP land cover types, no suitable nesting habitat occurs within the area of direct effects, but about 54 acres (0.2 km^2) of pinyon-juniper woodlands and 720 acres (3 km^2) of cliffs and rock outcrops that may be potentially suitable nesting habitat occur in the area of indirect effects.

Prairie Falcon

The prairie falcon occurs throughout the western United States. According to the SWReGAP habitat suitability model, potentially suitable year-round habitat for the prairie falcon may occur within the affected area of the proposed Millers SEZ. 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 Esmeralda County, Nevada, and potentially suitable foraging habitat occurs on the SEZ and in other portions of the affected area (Table 11.7.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is no suitable nesting habitat within the area of direct effects, but about 720 acres (3 km^2) of cliff and rock outcrop 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, only potentially suitable summer foraging and nesting habitat occurs in the affected area of the proposed Millers SEZ. 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 Esmeralda County, Nevada, and potentially suitable foraging habitat occurs on the SEZ and in other portions of the affected area (Table 11.7.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is no suitable nesting habitat (solitary trees) within the area of direct effects, but about 54 acres (0.2 km^2) of pinyon-juniper woodland 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, only potentially suitable summer breeding habitat may occur in the affected area of the proposed Millers SEZ. The species forages in grasslands, shrublands, open disturbed areas, and nests in burrows typically constructed by mammals. The species occurs in Esmeralda County, Nevada, and potentially suitable breeding habitat is expected to occur in the SEZ and in other portions of the affected area (Table 11.7.12.1-1). 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.

Fringed Myotis

The fringed myotis is a year-round resident in the proposed Millers SEZ region. It occurs in a variety of habitats, including riparian, shrubland, sagebrush, and pinyon-juniper woodlands. The species roosts in buildings and caves. It occurs in Esmeralda 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 11.7.12.1-1). On the basis of an evaluation of SWReGAP land cover types, no suitable roosting habitat occurs within the SEZ, but about 720 acres (3 km^2) of cliff and rock outcrop habitat that may be potentially suitable roosting habitat occurs in the area of indirect effects.

Nelson's Bighorn Sheep

The Nelson's bighorn sheep (also called the desert bighorn sheep) is a subspecies of bighorn sheep known to occur in the proposed Millers 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 Esmeralda County, Nevada. According to the SWReGAP habitat suitability model for the species, potentially suitable habitat does not occur on the SEZ; but portions of the affected area may provide important range and migratory habitat for the Nelson's bighorn sheep (Table 11.7.12.1-1).

Spotted Bat

The spotted bat is a year-round resident in the proposed Millers SEZ region, where it occurs in a variety of forested and shrubland habitats. It roosts in caves and rock crevices. The species occurs about 30 mi (56 km) south of the SEZ. Potentially suitable foraging habitat may occur on the SEZ and in other portions of the affected area (Table 11.7.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is no suitable roosting habitat within the SEZ, but about 720 acres (3 km^2) of cliff and rock outcrop habitat that may be potentially suitable roosting habitat occurs in the area of indirect effects.

Townsend's Big-Eared Bat

The Townsend's big-eared bat is a year-round resident in the proposed Millers SEZ region, where it forages in a wide variety of desert and non-desert habitats. The species roosts in caves, mines, tunnels, buildings, and other man-made structures. The nearest recorded occurrences of this species are about 7 mi (11 km) south of the SEZ. Potentially suitable foraging habitat may occur on the SEZ and in other portions of the affected area (Table 11.7.12.1-1). On the basis of an evaluation of SWReGAP land cover types, no suitable roosting habitat occurs within the SEZ, but about 720 acres (3 km^2) of cliff and rock outcrop habitat that may be potentially suitable roosting habitat occurs in the area of indirect effects.

Western Small-Footed Bat

The western small-footed bat is a year-round resident in the proposed Millers SEZ region, where it occupies a wide variety of desert and non-desert habitats. including cliffs and rock outcrops, grasslands, shrubland, and mixed woodlands. The species roosts in caves, mines, tunnels, buildings, and other man-made structures and beneath boulders or loose bark. The species is known to occur as near as 4 mi (6 km) north of the SEZ. Potentially suitable foraging habitat may occur on the SEZ and in other portions of the affected area (Table 11.7.12.1-1). On the basis of an evaluation of SWReGAP land cover types, no suitable roosting habitat occurs within the SEZ, but about 720 acres (3 km^2) of cliff and rock outcrop habitat that may be potentially suitable roosting habitat occurs in the area of indirect effects.

11.7.12.1.5 State-Listed Species

There are 5 species listed by the State of Nevada that may occur in the proposed Millers SEZ affected area (Table 11.7.12.1-1). These species are (1) birds: ferruginous hawk and Swainson's hawk; and (2) mammals: fringed myotis, spotted bat, and Townsend's big-eared bat. All of these species are protected in the state of Nevada under NRS 501.110. Each of these species has been previously discussed because of its status under the BLM (Section 11.7.12.1.4). Appendix J provides additional life history information for these species.

11.7.12.1.6 Rare Species

There are 17 rare species (i.e., state rank of S1 or S2 in Nevada or a species of concern by the State of Nevada or USFWS) that may be affected by solar energy development on the proposed Millers SEZ (Table 11.7.12.1-1). Of these species, three rare plants have not been discussed previously—Ripley biscuitroot, squalid milkvetch, and Tonopah milkvetch. The only rare species known to occur within 5 mi (8 km) of the proposed Millers SEZ are the Tonopah milkvetch and western small-footed bat (Table 11.7.12.1-1).

11.7.12.2 Impacts

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

The assessment of impacts to special status species is based on available information on the presence of species in the affected area as presented in Section 11.7.12.1 following the analysis approach described in Appendix M. It is assumed that pre-disturbance 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 11.7.12.3).

Solar energy development within the proposed Millers SEZ could affect a variety of habitats (see Sections 11.7.9 and 11.7.10). These impacts on habitats could in turn affect special status species dependent on those habitats. Based on NNHP records, two special status species are known to occur within 5 mi (8 km) of the proposed Millers SEZ boundary: Tonopah milkvetch and western small-footed bat (listed in bold in Table 11.7.12.1-1). 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 11.7.12.1, this approach to identifying the species that could occur in the affected area probably overestimates the number of species that actually occur there and, therefore, may overestimate impacts to 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 those activities are sited in areas where special status species are known to or could occur. As presented in Section 11.7.1.2, impacts of access road and transmission line construction, upgrade, or operation are not assessed in this evaluation due to the proximity of existing infrastructure to the SEZ.

Direct impacts would result from habitat destruction or modification. It is assumed that direct impacts would occur only within the SEZ where ground disturbing activities are expected to occur. Indirect impacts could result from depletion 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 projects 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 to individuals and habitats adjacent to project areas, but long-term benefits would accrue if original land contours and native plant communities were restored in previously disturbed areas.

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

11.7.12.2.1 Impacts on Species Listed under the ESA

In their scoping comments on the proposed Millers SEZ, the USFWS did not express concern for impacts of project development within the SEZ on any species listed as threatened or endangered under the ESA (Stout 2009). There are no NNHP records or potentially suitable habitats for any ESA-listed species within the affected area. For these reasons, solar energy development within the proposed Millers SEZ is not likely to affect any species currently listed under the ESA.

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

The greater sage-grouse is the only ESA candidate species that could occur in the affected area of the proposed Millers SEZ, based upon information provided by the NNHP (NDCNR 2004, 2005) and SWReGAP (USGS 2007). This species is known to occur in Esmeralda County, Nevada, and potentially suitable year-round sagebrush habitat is expected to occur within the SEZ and other portions of the affected area (Figure 11.7.12.1-1). According to the SWReGAP habitat suitability model, about 125 acres (0.5 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.7.12.1-1). This direct effects area represents less than 0.1% of available suitable habitat for the greater sage-grouse in the SEZ region. About 6,450 acres (26 km^2) of suitable habitat occurs in the area of potential indirect effects; this area represents about 0.5% of the available suitable habitat in the SEZ region (Table 11.7.12.1-1).

The overall impact on the greater sage-grouse from construction, operation, and decommissioning of utility-scale solar energy facilities within the proposed Millers 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 alone may not be sufficient to reduce impacts because potentially suitable sagebrush habitats may not be avoided in the area of direct effects.

Efforts to mitigate the impacts of solar energy facilities in the proposed Millers SEZ on the greater sage-grouse should be developed in consultation with the USFWS and NDOW following the *Strategic Plan for Management of Sage Grouse* (UDWR 2002) and *Guidelines to*

Manage Sage Grouse Populations and Their Habitats (Connelly et al. 2000). Impacts could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the areas of direct effects. If avoidance or minimization is not feasible, a compensatory mitigation plan could be developed and implemented to mitigate direct effects on occupied habitats. Compensation could involve the protection and enhancement of existing occupied or suitable habitats to compensate for habitats lost to development. Any mitigation plans should be developed in coordination with the USFWS and NDOW.

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

Two species under review for ESA listing may occur in the affected area of the proposed Millers SEZ: Crescent Dunes aegialian scarab beetle and Crescent Dunes serican scarab beetle. Both species are sand dune obligates, and they are restricted primarily to the Crescent Dunes, about 6 mi (10 km) east of the SEZ (Figure 11.7.12.1-1). According to the SWReGAP land cover model, potentially suitable sand dune habitat for these species does not occur on the SEZ. However, about 150 acres (0.6 km^2) of dune habitat occurs in the area of indirect effects; this area represents about 0.5% of the available suitable habitat for both of these species in the SEZ region (Table 11.7.12.1-1).

The overall impact on the Crescent Dunes aegialian scarab beetle and Crescent Dunes serican scarab beetle from construction, operation, and decommissioning of utility-scale solar energy facilities within the proposed Millers 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. However, given the location of these species and their habitat adjacent to the SEZ boundary, a review of mitigation effectiveness to avoid indirect effects (e.g., site runoff and erosion, disruption of sand transport systems) on these species should be conducted during the project design phase and in coordination with the USFWS and NDOW. Coordination would identify the need for mitigation, which may include avoidance, minimization, translocation, or compensation.

11.7.12.2.4 Impacts on BLM-Designated Sensitive Species

BLM-designated sensitive species that may be affected by solar energy development on the proposed Millers SEZ and that have not previously been discussed are discussed below.

Eastwood Milkweed

The Eastwood milkweed is not known to occur in the affected area of the proposed Millers SEZ; however, about 3,300 acres (13 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.7.12.1-1). This direct impact area represents about 0.9% of potentially suitable habitat in the SEZ region. About 22,000 acres

(89 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 5.8% of the potentially suitable habitat in the SEZ region (Table 11.7.12.1-1).

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

Avoidance of all potentially suitable habitats is not a feasible option for mitigating impacts on the Eastwood milkweed because potentially suitable sagebrush and mixed shrubland habitat is widespread throughout the area of direct effects. 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 in the area of direct effects. If avoidance or minimization is not feasible, plants could be translocated from the area of direct effects to protected areas that would not be affected directly or indirectly by future development. Alternatively, or in combination with translocation, a compensatory mitigation plan could be developed and implemented to mitigate direct effects on occupied habitats. Compensation could involve the protection and enhancement of existing occupied or suitable habitats to compensate for habitats lost to development. A comprehensive mitigation strategy that used one or more of these options could be designed to completely offset the impacts of development.

Nevada Dune Beardtongue

The Nevada dune beardtongue is not known to occur in the affected area of the proposed Millers SEZ, and potentially suitable sand dune habitat does not occur in the area of direct effects. However, about 150 acres (0.6 km^2) of potentially suitable sand dune habitat occurs in the area of indirect effects; this area represents about 0.4% of the potentially suitable habitat in the SEZ region (Table 11.7.12.1-1).

The overall impact on the Nevada dune beardtongue from construction, operation, and decommissioning of utility-scale solar energy facilities within the proposed Millers 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.

Sanicle Biscuitroot

The sanicle bisuitroot is not known to occur in the affected area of the proposed Millers SEZ; however, about 13,475 acres (55 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.7.12.1-1). This direct impact area represents about 0.3% of potentially suitable habitat in the SEZ region. About 102,500 acres

(415 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 2.5% of the potentially suitable habitat in the SEZ region (Table 11.7.12.1-1).

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

Avoidance of all potentially suitable habitats is not a feasible option for mitigating impacts on the sanicle biscuitroot because potentially suitable shrubland habitat is widespread throughout the area of direct effect. 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.

Toquima Milkvetch

The Toquima milkvetch is not known to occur in the affected area of the proposed Millers SEZ and potentially suitable sand dune habitat does not occur in the area of direct effects. However, approximately 150 acres (0.6 km^2) of potentially suitable sand dune habitat occurs in the area of indirect effects; this area represents about 0.4% of the potentially suitable habitat in the SEZ region (Table 11.7.12.1-1).

The overall impact on the Toquima milkvetch from construction, operation, and decommissioning of utility-scale solar energy facilities within the proposed Millers 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

According to the SWReGAP habitat suitability model, potentially suitable year-round habitat for the ferruginous hawk exists in the affected area of proposed Millers SEZ. About 3,125 acres (13 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.7.12.1-1). This direct impact area represents 0.2% of potentially suitable habitat in the SEZ region. About 24,000 acres (97 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 1.7% of the available suitable habitat in the SEZ region (Table 11.7.12.1-1). Most of the suitable habitat in the affected area could serve as foraging habitat (open shrublands). On the basis of SWReGAP land cover data, suitable nesting habitat (large trees and rock outcrops) does not occur on the SEZ. However, about 54 acres (0.2 km^2) of woodland habitat (pinyon-juniper) and 720 acres

(0.6 km^2) of cliffs and rock outcrops that may be potentially suitable nesting habitat occurs in the area of indirect effects.

The overall impact on the ferruginous hawk from construction, operation, and decommissioning of utility-scale solar energy facilities within the proposed Millers SEZ is considered small because the amount of potentially suitable foraging habitat for this species in the area of direct effects represents less than 1% of potentially suitable foraging habitat in the SEZ region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts on this species to negligible levels. Avoidance of all potentially suitable foraging habitats (desert shrublands) is not a feasible option for 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 proposed Millers SEZ region, and potentially suitable foraging habitat is expected to occur in the affected area. About 12,050 acres (49 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.7.12.1-1). This direct impact area represents 0.3% of potentially suitable habitat in the SEZ region. About 100,300 acres (406 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 2.8% of the potentially suitable habitat in the SEZ region (Table 11.7.12.1-1). Most of this area could serve as foraging habitat (open shrublands). On the basis of SWReGAP land cover data, potentially suitable nesting habitat (cliffs and rock outcrops) does not occur on the SEZ. However, about 720 acres (3 km^2) of cliff and rock outcrop 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 proposed Millers SEZ is considered small because the amount of potentially suitable foraging habitat for this species in the area of direct effects represents less than 1% of potentially suitable foraging habitat in the SEZ region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts on this species to negligible levels. Avoidance of all potentially suitable foraging habitats (desert shrublands) is not a feasible option for 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.

Swainson’s Hawk

Potentially suitable summer foraging and nesting habitat for the Swainson’s hawk is expected to occur throughout much of the proposed Millers SEZ region, and potentially suitable habitat is expected to occur in the affected area. About 125 acres (0.5 km^2) of potentially suitable foraging habitat on the SEZ could be directly affected by construction and operations (Table 11.7.12.1-1). This direct impact area represents <0.1% of potentially suitable habitat in the SEZ region. About 2,225 acres (9 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 0.3% of the available suitable foraging habitat in the SEZ region (Table 11.7.12.1-1). On the basis of SWReGAP land cover data, potentially suitable nesting habitat (solitary trees) does not occur on the SEZ. However, about 54 acres (0.2 km^2) of woodland habitat (pinyon-juniper) 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 proposed Millers 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 foraging habitat in the SEZ region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts on this species to negligible levels. Avoidance of all potentially suitable foraging habitats (desert shrublands) is not a feasible option for 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.

Western Burrowing Owl

Potentially suitable breeding habitat for the western burrowing owl occurs throughout much of the proposed Millers SEZ region, and potentially suitable habitat is expected to occur in the affected area. About 13,600 acres (55 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 11.7.12.1-1). This direct impact area represents 0.3% of potentially suitable habitat in the SEZ region. About 105,600 acres (427 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 2.6% of the potentially suitable habitat in the SEZ region (Table 11.7.12.1-1). 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 proposed Millers SEZ is considered small because the amount of potentially suitable habitat for this species in the area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts on this species to negligible levels.

Avoidance of all potentially suitable habitats is not a feasible option for mitigating impacts on the western burrowing owl because potentially suitable desert scrub habitats are widespread throughout the area of direct effect and readily available in other portions of the SEZ region. Impacts on the western burrowing owl could be reduced to negligible levels through the implementation of programmatic design features and by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied burrows on the SEZ. If avoidance or minimization is not feasible, a compensatory mitigation plan could be developed and implemented to mitigate direct effects on occupied habitats. Compensation could involve the protection and enhancement of existing occupied or suitable habitats to compensate for habitats lost to development. A comprehensive mitigation strategy that 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.

Fringed Myotis

The fringed myotis is a year-round resident within the proposed Millers SEZ region. On the basis of SWReGAP land cover data, suitable roosting habitats (caves) do not occur on the SEZ. However, about 720 acres (3 km^2) of cliff and rock outcrop habitat that may be potentially suitable roosting habitat occurs in the area of indirect effects. About 15,200 acres (62 km^2) of potentially suitable foraging habitat on the SEZ could be directly affected by construction and operations (Table 11.7.12.1-1). This direct impact area represents about 0.3% of potentially suitable foraging habitat in the region. About 119,600 acres (484 km^2) of potentially suitable foraging habitat occurs in the area of indirect effect; this area represents about 2.6% of the available suitable foraging habitat in the region (Table 11.7.12.1-1). Most of the suitable habitat in the affected area could serve as foraging habitat (open shrublands). On the basis of SWReGAP land cover data, potentially suitable roosting habitat (cliffs and rock outcrops) does not occur on the SEZ. However, about 720 acres (3 km^2) of 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 proposed Millers SEZ is considered small because the amount of potentially suitable habitat for this species in the area of direct effects represents less than 1% of potentially suitable habitat in the region. The implementation of programmatic design features may be sufficient to reduce indirect impacts on this species to negligible levels. Avoidance of all potentially suitable foraging habitats (desert shrublands) is not a feasible option for 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.

Nelson's Bighorn Sheep

The Nelson's bighorn sheep is not known to occur on the proposed Millers SEZ and potentially suitable habitat does not occur on the site. However, about 17,250 acres (70 km^2) of potentially suitable habitat occurs within the area of indirect effect; this area represents about 0.9% of the potentially suitable habitat in the region (Table 11.7.12.1-1).

The overall impact on the Nelson's bighorn sheep from construction, operation, and decommissioning of utility-scale solar energy facilities within the proposed Millers SEZ is considered small because no potentially suitable habitat for this species has been identified in the area of direct effects, and only indirect effects are possible. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts to negligible levels. Impacts on the Nelson's bighorn sheep may be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to important movement corridors within the area of direct effects.

Spotted Bat

The spotted bat is a year-round resident within the proposed Millers SEZ region. On the basis of SWReGAP land cover data, suitable roosting habitats (caves and rock outcrops) do not occur on the SEZ. However, about 720 acres (3 km^2) of cliff and rock outcrop habitat that may be potentially suitable roosting habitat occurs in the area of indirect effects. About 15,075 acres (61 km^2) of potentially suitable foraging habitat on the SEZ could be directly affected by construction and operations (Table 11.7.12.1-1). This direct impact area represents about 0.4% of potentially suitable foraging habitat in the region. About 114,000 acres (461 km^2) of potentially suitable foraging habitat occurs in the area of indirect effect; this area represents about 2.9% of the potentially suitable foraging habitat in the region (Table 11.7.12.1-1). Most of the suitable habitat in the affected area could serve as foraging habitat (open shrublands). On the basis of SWReGAP land cover data, potentially suitable roosting habitat (cliffs and rock outcrops) does not occur on the SEZ. However, about 720 acres (3 km^2) of 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 proposed Millers SEZ is considered small because the amount of potentially suitable foraging habitat for this species in the area of direct effects represents less than 1% of potentially suitable habitat in the region. The implementation of programmatic design features may be sufficient to reduce indirect impacts on this species to negligible levels. Avoidance of all potentially suitable foraging habitats (desert shrublands) is not a feasible option for 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.

Townsend's Big-Eared Bat

The Townsend's big-eared bat is a year-round resident within the proposed Millers SEZ region. On the basis of SWReGAP land cover data, suitable roosting habitats (caves) do not occur on the SEZ. However, about 720 acres (3 km^2) of cliff and rock outcrop habitat that may be potentially suitable roosting habitat occurs in the area of indirect effects. About 13,600 acres (55 km^2) of potentially suitable foraging habitat on the SEZ could be directly affected by construction and operations (Table 11.7.12.1-1). This direct impact area represents about 0.4% of potentially suitable foraging habitat in the region. About 102,100 acres (413 km^2) of potentially suitable foraging habitat occurs in the area of indirect effect; this area represents about 2.9% of the potentially suitable foraging habitat in the region (Table 11.7.12.1-1). Most of the suitable habitat in the affected area could serve as foraging habitat (open shrublands). On the basis of SWReGAP land cover data, potentially suitable roosting habitat (cliffs and rock outcrops) does not occur on the SEZ. However, about 720 acres (3 km^2) of potentially suitable roosting habitat occurs in the area of indirect effects.

The overall impact on the Townsend's big-eared bat from construction, operation, and decommissioning of utility-scale solar energy facilities within the proposed Millers SEZ is considered small because the amount of potentially suitable habitat for this species in the area of direct effects represents less than 1% of potentially suitable habitat in the region. The implementation of programmatic design features may be sufficient to reduce indirect impacts on this species to negligible levels. Avoidance of all potentially suitable foraging habitats (desert shrublands) is not a feasible option for 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.

Western Small-Footed Bat

The western small-footed bat is a year-round resident within the proposed Millers SEZ region. On the basis of SWReGAP land cover data, suitable roosting habitats (caves, rock outcrops, and buildings) do not occur on the SEZ. However, about 720 acres (3 km^2) of cliff and rock outcrop habitat that may be potentially suitable roosting habitat occurs in the area of indirect effects. About 16,725 acres (68 km^2) of potentially suitable foraging habitat on the SEZ could be directly affected by construction and operations (Table 11.7.12.1-1). This direct impact area represents about 0.3% of potentially suitable foraging habitat in the region. About 125,275 acres (507 km^2) of potentially suitable foraging habitat occurs in the area of indirect effect; this area represents about 2.5% of the potentially suitable foraging habitat in the region (Table 11.7.12.1-1). Most of the suitable habitat in the affected area could serve as foraging habitat (open shrublands). On the basis of SWReGAP land cover data, potentially suitable roosting habitat (cliffs and rock outcrops) does not occur on the SEZ. However, about 720 acres (3 km^2) of 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 proposed Millers SEZ is considered small because the amount of potentially suitable habitat for this species in the area of direct effects represents less than 1% of potentially suitable habitat in the region. The implementation of programmatic design features may be sufficient to reduce indirect impacts on this species to negligible levels. Avoidance of all potentially suitable foraging habitats (desert shrublands) is not a feasible option for 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.

11.7.12.2.5 Impacts on State-Listed Species

There are five species listed by the State of Nevada that may occur in the proposed Millers SEZ affected area or may be affected by solar energy development on the SEZ (Table 11.7.12.1-1). Impacts to these species have been previously discussed because of their designation by the BLM as sensitive species (Section 11.7.12.2.4).

11.7.12.2.6 Impacts on Rare Species

There are 17 rare species (state rank of S1 or S2 in Nevada or listed as a species of concern by the State of Nevada or USFWS) that may be affected by solar energy development on the proposed Millers SEZ. Impacts have been previously discussed for 14 of these species that are under review for ESA listing (Section 11.7.12.2.3) or that are BLM-designated sensitive (Section 11.7.12.2.4). Impacts to the following three rare species have not been previously discussed: Ripley biscuitroot, squalid milkvetch, and Tonopah milkvetch. Impacts and potentially applicable mitigation measures (if necessary) for each of these species are provided in Table 11.7.12.1-1.

11.7.12.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

- Pre-disturbance surveys should be conducted within the SEZ to determine the presence and abundance of special status species, including those identified in Table 11.7.12.1-1; disturbance to occupied habitats for these species should be avoided or minimized to the extent practicable. If avoiding or minimizing impacts on occupied habitats is not possible, translocation of individuals from areas of direct effects, or compensatory mitigation of direct effects on occupied habitats could reduce impacts. A comprehensive mitigation strategy for special status species that used one or more of these options to offset the impacts of development should be developed in coordination with the appropriate federal and state agencies

- Coordination should be conducted with the USFWS and NDOW for the Crescent Dunes aegialian scarab beetle, Crescent Dunes serican scarab beetle, and greater sage-grouse – species that are candidates or under review for ESA listing. Coordination would identify an appropriate survey protocol, and mitigation requirements, which may include avoidance, minimization, translocation, or compensation.

- 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.

11.7.13 Air Quality and Climate

11.7.13.1 Affected Environment

11.7.13.1.1 Climate

The proposed Millers SEZ is located in southwestern Nevada, in the northern portion of Esmeralda 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 barriers to the cold arctic air masses; thus making long periods of extremely cold weather uncommon. The SEZ lies at an average elevation of about 4,830 ft (1,470 m) in the southwestern portion of the Great Basin Desert, which has an high desert climate marked by pleasant weather (mild winters and warm summers) with large daily temperature swings due to dry air, scant precipitation, low relative humidity, and abundant sunshine. Meteorological data collected at the Tonopah Airport, about 20 mi (32 km) east-southeast of the Millers SEZ boundary, are summarized below.

A wind rose from the Tonopah Airport for the 5-year period 2005 to 2009, taken at a level of 33 ft (10 m), is presented in Figure 11.7.13.1-1 (NCDC 2010b). During this period, the annual average wind speed at the airport was about 9.6 mph (4.3 m/s), with a prevailing wind direction from the north (about 19.7% of the time) and secondarily from the north-northwest (about 16.4% of the time). The northerly wind component predominates, with about 46.7% of wind directions from the northwest clockwise to north. Winds blew predominantly from the north every month throughout the year, except in January and April, when wind blew more frequently from the north-northwest. 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: the highest in spring at 11.2 mph (5.0 m/s); lower in summer and fall at 9.2 mph (4.1 m/s); and lowest in winter at 9.0 mph (4.0 m/s).

For the 1954 to 2009 period, the annual average temperature at Tonopah Airport was 51.6°F (10.9°C) (WRCC 2010e). January was the coldest month, with an average minimum temperature of 19.1°F (−7.2°C), and July was the warmest month with an average maximum of 91.5°F (33.1°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 temperatures were recorded about 2 days per year, mostly in December and January. During the same period, the highest temperature, 104°F (40.0°C), was reached in July 1960, and the lowest, −15°F (–26.1°C), in January 1962. In a typical year, about 50 days had a maximum temperature of ≥90°F (32.2°C), while about 158 days had minimum temperatures at or below freezing.

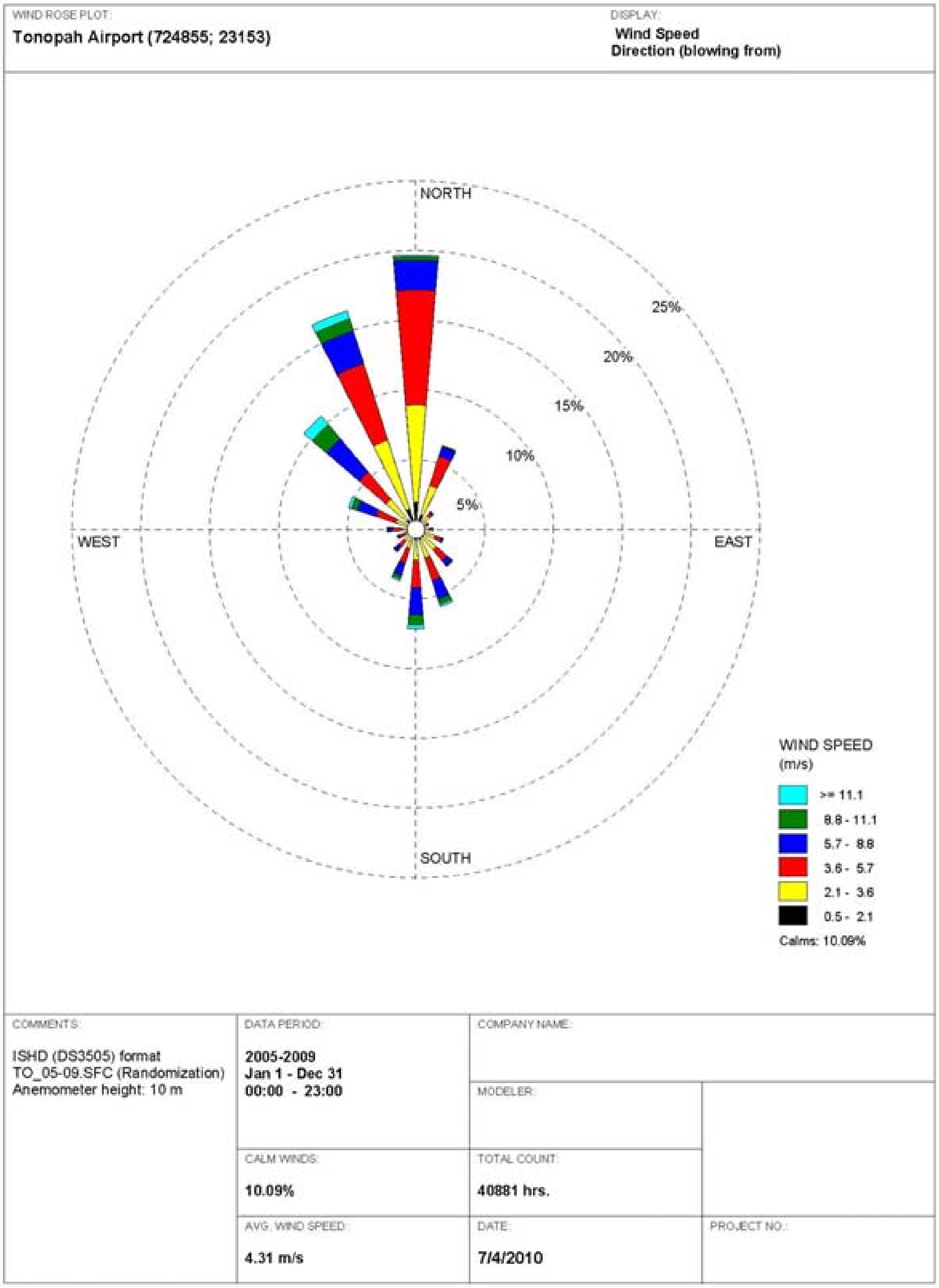

FIGURE 11.7.13.1-1 Wind Rose at 33 ft (10 m) at Tonopah Airport, Nevada, 2005 to 2009 (Source: NCDC 2010b)

Along with prevailing westerlies, Pacific air masses lose most of their moisture on the windward side of the Sierra Nevada Range parallel to Nevada's western boundary with California (NCDC 2010a). Thus, leeward areas like the Millers SEZ vicinity experience a lack of precipitation. For 1954 to 2009, annual precipitation at Tonopah Airport averaged about 5.08 in. (12.9 cm) (WRCC 2010e). On average, 36 days annually have measurable precipitation (0.01 in. [0.025 cm] or higher). Precipitation is relatively evenly distributed by season, although it is slightly higher in spring and summer than in winter and fall. Snow falls as early as October and continues as late as May; most of the snow falls from December to March. The annual average snowfall at Tonopah Airport is about 13.0 in. (33.0 cm).

Because the area surrounding the proposed Millers SEZ is far from major water bodies (more than 250 mi [402 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 could occur from melting of heavy snowpack. On occasion, heavy summer thunderstorms also cause flooding of local streams, usually in sparsely populated mountainous areas, but these are seldom destructive (NCDC 2010a). Since 1997, four flash floods have been reported in Esmeralda County, all of which occurred far from the SEZ and one of which caused minor property damage.

In Esmeralda County, no hail storms have been reported (NCDC 2010c). Forty-two high-wind events have been reported since 1999, which caused some property damage. Such events, with a maximum wind speed of up to 127 mph (57 m/s), have occurred any time of the year, with peaks in March and June (NCDC 2010c). In addition, one thunderstorm wind event with a maximum wind speed of 52 mph (23 m/s) was reported in 2010, which caused minor property damage.

No dust storm events have been reported in Esmeralda County (NCDC 2010c). However, the SEZ is covered primarily with gravelly sands and sandy loams, which have a relatively low dust storm potential. On occasion, high winds and dry soil conditions result in blowing dust in Esmeralda 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, no tropical storm has passed within 100 mi (160 km) of the proposed Millers SEZ (CSC 2010). Tornadoes in Esmeralda County, which encompasses the proposed Millers SEZ, occur infrequently. Only one tornado has been reported; it occurred in 1982 (NCDC 2010c). However, the tornado occurred far from the SEZ and was relatively weak (i.e., F1 on the Fujita tornado scale). It did not cause property damage, injuries, or deaths.

11.7.13.1.2 Existing Air Emissions

Esmeralda County has a few industrial emission sources, related to minerals and mining, but their emissions are relatively small. All industrial sources are located far from the proposed

Millers SEZ. Because of the sparse population, only a handful of major roads, such as U.S. 6 and U.S. 95 and several State Routes (264, 265, 266, and 773) are present in Esmeralda County. Thus, onroad mobile source emissions are not substantial. Data on annual emissions of criteria pollutants and volatile organic compounds (VOCs) in Esmeralda County are presented in Table 11.7.13.1-1 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, point sources were major contributors to total emissions of SO_2 (about 78%). Biogenic sources (i.e., vegetation—including trees, plants, and crops—and soils) that release naturally occurring emissions primarily contributed to NO_x and CO emissions (about 62% and 64%, respectively) and accounted for most of VOC emissions (about 99%). Area sources were major contributors to total emissions of PM_{10} (about 96%) and $PM_{2.5}$ (about 91%), and secondary contributors to SO_2 emissions (about 20%). Onroad sources were secondary contributors to NO_x and CO emissions (about 30% and 35%, respectively). In Esmeralda County, nonroad sources were minor contributors to criteria pollutants and VOCs. (Fire emissions were not estimated in Esmeralda County in 2002.)

In 2005, Nevada produced about 56.3 MMt of *gross*[5] carbon dioxide equivalent (CO_2e)[6] 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 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%).

TABLE 11.7.13.1-1 Annual Emissions of Criteria Pollutants and VOCs in Esmeralda County, Nevada, Encompassing the Proposed Millers SEZ, 2002[a]

Pollutant	Emissions (tons/yr)
SO_2	106
NO_x	1,116
CO	13,832
VOCs	59,144
PM_{10}	937
$PM_{2.5}$	202

[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).

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

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

11.7.13.1.3 Air Quality

The EPA set National Ambient Air Quality Standards (NAAQS) for six criteria pollutants (EPA 2010a): SO_2, NO_2, CO, O_3, PM (PM_{10} and $PM_{2.5}$), and Pb. Nevada has its own State Ambient Air Quality Standards (SAAQS), which are generally similar to the NAAQS but with some differences (NAC 445B.22097). In addition, Nevada has set standards for 1-hour H_2S emissions, which are not addressed by the NAAQS. The NAAQS and Nevada SAAQS for criteria pollutants are presented in Table 11.7.13.1-2.

Esmeralda County is located administratively in the Nevada Intrastate AQCR, along with 10 other counties in Nevada. Not included are Las Vegas Intrastate AQCR, including Clark County only, which encompasses Las Vegas; and Northwest Nevada Intrastate AQCR, including 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 (Title 40, Part 81, Section 329 of the *Code of Federal Regulations* [40 CFR 81.329]).

Because of Esmeralda 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 Esmeralda County is relatively good. No ambient air-monitoring stations are located in Esmeralda County. To characterize ambient air quality around the SEZ, one monitoring station in Clark County was chosen: Jean, about 200 mi (322 km) southeast of the SEZ. The Jean station, which is located upwind of the Las Vegas area, can be considered representative of the proposed SEZ, although its air quality is, to some extent, influenced by transport of air pollutants from the South Coast Air Basin, which includes Los Angeles, along with prevailing westerlies. Ambient concentrations of NO_2, O_3, PM_{10}, and $PM_{2.5}$ are recorded at Jean. The East Sahara Avenue station, which is on the outskirts of Las Vegas, has only one SO_2 monitor in the area. The CO concentrations at the East Tonopah Avenue station in Las Vegas, which is the farthest downwind of Las Vegas among CO monitoring stations, were presented. No Pb measurements have been made in the state of Nevada because of low Pb concentration levels after the phase-out of leaded gasoline. The background concentrations of criteria pollutants at these stations for the period 2004 to 2008 are presented in Table 11.7.13.1-2 (EPA 2010b). Monitored concentration levels at either station were lower than their respective standards (up to 44%), except O_3, which approaches the 1-hour NAAQS/SAAQS and 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.

The Prevention of Significant Deterioration (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. Several Class I areas are located around the Millers SEZ, but none of these is situated within 62-mi (100-km) distance in Nevada and California. The nearest Class I area is the John Muir WA in California (40 CFR 81.405), about 73 mi (118 km) southwest of the proposed Millers SEZ. This Class I area is not located downwind of prevailing

TABLE 11.7.13.1-2 NAAQS, SAAQS, and Background Concentration Levels Representative of the Proposed Millers SEZ in Esmeralda County, Nevada, 2004 to 2008

				Background Concentration Level	
Pollutant[a]	Averaging Time	NAAQS	SAAQS	Concentration[b,c]	Data Source[d]
SO_2	1-hour	75 ppb[e]	–[f]	–	–
	3-hour	0.5 ppm	0.5 ppm	0.009 ppm (1.8%)	Las Vegas, 2005
	24-hour	0.14 ppm	0.14 ppm	0.008 ppm (5.7%)	Las Vegas, 2005
	Annual	0.030 ppm	0.030 ppm	0.006 ppm (20%)	Las Vegas, 2005
NO_2	1-hour	100 ppb[g]	–	–	–
	Annual	0.053 ppm	0.053 ppm	0.004 ppm (7.5%)	Jean Station, 2007
CO	1-hour	35 ppm	35 ppm	5.7 ppm (16%)	Las Vegas, 2004
	8-hour	9 ppm	9 ppm	3.9 ppm (43%)	Las Vegas, 2005
O_3	1-hour	0.12 ppm[h]	0.12 ppm	0.098 ppm (82%)	Jean, 2005
	8-hour	0.075 ppm	–	0.083 ppm (111%)	Jean, 2007
PM_{10}	24-hour	150 $\mu g/m^3$	150 $\mu g/m^3$	66 $\mu g/m^3$ (44%)	Jean, 2008
	Annual	–	50 $\mu g/m^3$	17 $\mu g/m^3$ (34%)	Jean, 2005
$PM_{2.5}$	24-hour	35 $\mu g/m^3$	–	12.9 $\mu g/m^3$ (37%)	Jean, 2008
	Annual	15.0 $\mu g/m^3$	–	4.93 $\mu g/m^3$ (33%)	Jean, 2008
Pb	30-day	–	1.5 $\mu g/m^3$	–	–
	Calendar quarter	1.5 $\mu g/m^3$	–	–	–
	Rolling 3-month	0.15 $\mu g/m^3$ [i]	–	–	–

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 compared to NAAQS was not made, because no measurement data based on new NAAQS are available.

d All air monitoring stations listed are located in Clark County.

e Effective August 23, 2010.

f A hyphen denotes not applicable or not available.

g Effective April 12, 2010.

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 Effective January 12, 2009.

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

winds at the Millers SEZ (Figure 11.7.13.1-1). The next nearest Class I areas are Ansel Adams WA, Kings Canyon NP, Yosemite NP, and Hoover WA, which are about 86 mi (139 km) west–southwest, 88 mi (141 km) southwest, 89 mi (143 km) west, and 91 mi (146 km) west of the Millers SEZ, respectively.

11.7.13.2 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 to generate an equivalent amount of electricity.

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 Millers 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 the application of any additional mitigation measures. Section 11.7.13.3 below identifies SEZ-specific design features of particular relevance to the Millers SEZ.

11.7.13.2.1 Construction

The Millers 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 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.[7] However, no receptors were modeled for PSD analysis at the nearest Class I area, John Muir WA in California, because it is about 73 mi (118 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 John Muir WA were selected as surrogates for the PSD analysis. For the Millers SEZ, the modeling was conducted based on the following assumptions and input:

- Uniformly distributed emissions of 3,000 acres (12.1 km^2) each and 6,000 acres (24.3 km^2) in total, in the southeastern portion of the SEZ, close to the nearest residences and the town of Tonopah,

- Surface hourly meteorological data from Tonopah Airport[8] 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 both PM_{10} and $PM_{2.5}$ concentration increments and total concentrations (modeled plus background concentrations) that would result from construction-related fugitive emissions are summarized in Table 11.7.13.2-1. Maximum 24-hour PM_{10} concentration increments modeled to occur at the site boundaries would be an estimated 539 $\mu g/m^3$, which far exceeds the relevant standard level of 150 $\mu g/m^3$. Total 24-hour PM_{10} concentrations of 605 $\mu g/m^3$ 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 the Silver Peak (about 26 mi [42 km] south-southwest from the SEZ), about 4 $\mu g/m^3$ at Coaldale, and about 2 $\mu g/m^3$ at Tonopah (the closest town, about 11 mi [18 km] east-southeast of the SEZ boundary). Annual average modeled PM_{10} concentration increments and total concentration (increment plus background) at the SEZ boundary would be about 75.8 $\mu g/m^3$ and 92.8 $\mu g/m^3$, respectively, which are much higher than

7 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.

8 The number of missing hours at the Tonopah Airport amounts to about 17.6% 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 Tonopah Airport are more representative of wind at the Millers 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 11.7.13.2-1 Maximum Air Quality Impacts from Emissions Associated with Construction Activities for the Proposed Millers SEZ

Pollutant[a]	Averaging Time	Rank[b]	Concentration ($\mu g/m^3$): Maximum Increment[b]	Background[c]	Total	NAAQS/ SAAQS	Percentage of NAAQS/SAAQS: Increment	Total
PM_{10}	24 hours	H6H	539	66	605	150	359	403
	Annual	–[d]	75.8	17	92.8	50	152	186
$PM_{2.5}$	24 hours	H8H	34.9	12.9	47.8	35	100	136
	Annual	–	7.6	4.9	12.5	15.0	51	83

[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 11.7.13.1-2.

[d] A dash indicates not applicable.

the SAAQS level of 50 $\mu g/m^3$. Annual PM_{10} increments would be much lower, about 0.3 $\mu g/m^3$ at Silver Peak, about 0.1 $\mu g/m^3$ at Tonopah, and lower than 0.1 $\mu g/m^3$ at Coaldale. Total 24-hour $PM_{2.5}$ concentrations would be 48 $\mu g/m^3$ at the SEZ boundary, which is higher than the NAAQS level of 35 $\mu g/m^3$; modeled increments contribute about three times more than background concentration to this total. The total annual average $PM_{2.5}$ concentration would be 12.5 $\mu g/m^3$, which is below the NAAQS level of 15.0 $\mu g/m^3$. At Silver Peak, predicted maximum 24-hour and annual $PM_{2.5}$ concentration increments would be about 0.3 and 0.03 $\mu g/m^3$, respectively.

Predicted 24-hour and annual PM_{10} concentration increments at the surrogate receptors for the nearest Class I Area—John Muir WA in California—would be about 8.7 and 0.2 $\mu g/m^3$, or 109% and 5% of the PSD increments for Class I area, respectively. These surrogate receptors are more than 36 mi (58 km) from the John Muir WA, and thus predicted concentrations in John Muir WA would be much lower than the above values (about 55% of the PSD increments for 24-hour PM_{10}), considering the same decay ratio with distance.

In conclusion, predicted 24-hour and annual PM_{10} and 24-hour $PM_{2.5}$ concentration levels could exceed the standard levels used as guidelines 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 annual $PM_{2.5}$ would be below the respective standard levels. 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 (John Muir WA in California). 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 could cause impacts on AQRVs (e.g., visibility and acid deposition) at the nearby federal Class I areas. The 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. The 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 120-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.

11.7.13.2.2 Operations

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

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

Potential air emissions displaced by the solar project development at the proposed Millers SEZ are presented in Table 11.7.13.2-2. Total power generation capacity ranging from 1,492 to 2,686 MW is estimated for the proposed Millers SEZ for various solar technologies (see Section 11.7.2). 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). Full development of solar power in the SEZ could result in substantial avoided air emissions—ranging from 6.9 to 12% of total emissions of SO_2, NO_x, Hg, and CO_2 from electric power systems in the state of Nevada (EPA 2009c). Avoided emissions could be up to 2.6% 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 10% of SO_2, 3.8% of NO_x, and 6.7% of CO_2 emissions in the state of Nevada (EPA 2009a; WRAP 2009). These emissions could be up to 1.4% of total emissions from all

TABLE 11.7.13.2-2 Annual Emissions from Combustion-Related Power Generation Avoided by Full Solar Development of the Proposed Millers 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
16,787	1,492–2,686	2,614–4,706	3,689–6,639	3,164–5,695	0.021–0.038	2,030–3,655
Percentage of total emissions from electric power systems in Nevada[d]			6.9–12%	6.9–12%	6.9–12%	6.9–12%
Percentage of total emissions from all source categories in Nevada[e]			5.6–10%	2.1–3.8%	–[f]	3.7–6.7%
Percentage of total emissions from electric power systems in the six-state study area[d]			1.5–2.6%	0.86–1.5%	0.72–1.3%	0.77–1.4%
Percentage of total emissions from all source categories in the six-state study area[e]			0.78–1.4%	0.12–0.21%	–	0.24–0.44%

[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] Assumed capacity factor of 20%.

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

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

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

[f] A dash indicates not estimated.

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

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 Millers 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 Millers 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.

11.7.13.2.3 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).

11.7.13.3 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 Millers 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.

11.7.14 Visual Resources

11.7.14.1 Affected Environment

The proposed Millers SEZ is located in Esmeralda County in southwestern Nevada, 44 mi (71 km) east of the California border. The SEZ occupies 16,787 acres (67.9 km^2) within the Big Smoky Valley and extends about 7.7 mi (12.4 km) east to west and nearly 5.8 mi (9.3 km) north to south. The SEZ ranges in elevation from 4,778 ft (1,456 m) in the southwest portion to 4,892 ft (1,491 m) in the northwest portion.

The SEZ lies within the Central Basin and Range Level III ecoregion, which consists of northerly trending fault-block ranges and intervening drier basins. Valleys, lower slopes, and alluvial fans are either shrub- and grass-covered or shrub-covered. Higher elevation mountain slopes support woodland, mountain brush, and scattered forests. The land is primarily used for grazing, with some irrigated cropland found in valleys near mountain water sources. Millers SEZ is located within two Level IV ecoregions. The southwest corner of the SEZ is within the nearly level and mostly barren Lahontan and Tonopah Playas Level IV ecoregion. The playas contain mud flats, alkali flats, and intermittent saline lakes. Playas occur at the lowest elevations in the Lahontan Basin and fill with seasonal runoff from surrounding mountain ranges during winter, providing habitat for migratory birds. (Bryce et al. 2003). The rest of the SEZ is within the *Tonopah Basin* Level IV ecoregion, which is a transition between the Great Basin and the more southerly Mojave Desert. It is typified by broad, nearly flat to rolling valleys containing lake plains, scattered hills, alluvial fans, bajadas, sand dunes, and hot springs. Ephemeral washes occur. Surface water comes from springs and sporadic foothill precipitation events, but is generally scarce.

The SEZ is located within a very flat treeless plain of the broad Big Smoky Valley, resulting in a very strong horizon line. The SEZ is bounded by mountain ranges on the east, south, and west, with open views to the northeast and southwest. Lone Mountain rises 5.5 mi (8.9 km) south of the SEZ. The Monte Cristo Range is located about 3 mi (5 km) west of the SEZ. The San Antonio Mountains to the east are more distant, rising about 9 mi (15 km) from the SEZ. These ranges include peaks generally between 6,000 and 8,000 ft (1,829 and 2,438 m) in elevation, with the peak of Lone Mountain at 9,108 ft (2,776 m). From the northeast to the southwest, the Big Smoky Valley extends 50 mi (81 km) and is about 12 mi (19 km) wide. The SEZ and surrounding mountain ranges are shown in Figure 11.7.14.1-1.

The overall visual impression of the SEZ and its surroundings is of a vast, light-colored plain rising abruptly to rugged mountains to the south and west, with more distant mountains to the east, and generally open views to the north and southwest. The mountains to the south (Lone Mountain) are dark, while the mountains to the west (Monte Cristo Range) present a range of colors from nearly white through rusty red to darker grays and browns. The light soils and lack of vegetation in playas add some visual interest, and in other, scattered, smaller areas, black, featureless, and nearly perfectly flat desert pavement provides striking visual contrasts in color and texture with surrounding vegetation and soils.

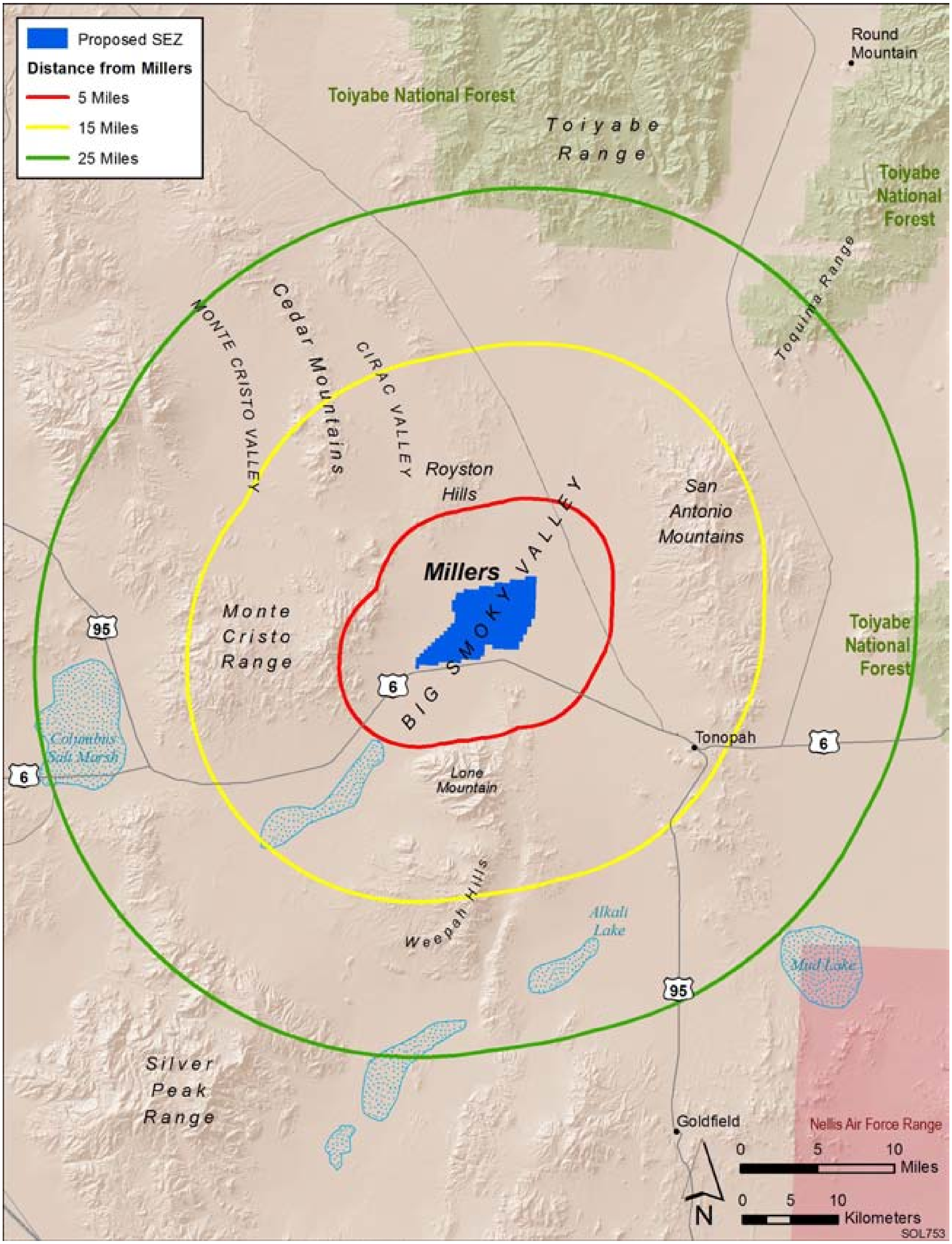

FIGURE 11.7.14.1-1 Proposed Millers SEZ and Surrounding Lands

Vegetation is generally sparse in much of the SEZ, with widely spaced low shrubs generally less than 3 ft (1 m) tall, and much bare soil, particularly in the playas. The vegetation is predominantly greasewood-shadscale. During an August 2009 site visit, the vegetation presented a limited range of light greens, tans, and grays, with medium to coarse textures, and generally low visual interest.

There is no permanent surface water within the SEZ. A number of washes, including Ione Wash, cross the SEZ in a generally north-south direction.

Cultural disturbances visible within the SEZ include existing transmission lines, fences, and roads. There is evidence of OHV use in some areas, but in general, the level of cultural disturbance is low. These cultural modifications generally detract from the scenic quality of the SEZ; however, the SEZ is so large that from many locations within the SEZ, these features are either not visible or are so distant as to have minimal effect on views. From most locations within the SEZ, the landscape is generally natural in appearance, with little disturbance visible.

Off-site cultural disturbances visible from the SEZ include U.S. 6, just south of the SEZ and generally paralleling the southern boundary of the SEZ. Traffic on the highway would be plainly visible from many locations within the SEZ. The Millers rest stop on U.S. 6 includes fences, cleared areas roads, groves of trees, a few low buildings, and a communications tower that is visible for long distances, including from within the SEZ. Transmission towers and lines are visible along U.S. 6 and also between the highway and the SEZ.

The general lack of topographic relief, water, and variety results in low scenic value within the SEZ itself; however, because of the flatness of the landscape, the lack of trees, and the breadth of the Big Smoky Valley, the SEZ presents a vast panoramic landscape with sweeping views of the surrounding mountains that add to the scenic values within the SEZ viewshed. In general, the mountains appear to be devoid of vegetation, and their jagged, irregular forms, and varied colors provide dramatic visual contrasts to the strong horizontal line, light-colored vegetation, the light playa soils and dark desert pavement areas of the valley floor, particularly when viewed from nearby locations within the SEZ. The mountain slopes and peaks to the east, south, and west of the SEZ are, in general, visually pristine. Panoramic views of the SEZ are shown in Figures 11.7.14.1-2, 11.7.14.1-3 and 11.7.14.1-4.

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 for which decisions have been made to preserve a natural landscape. Class II is the highest rating for lands without special designation. More information about VRI methodology is presented in Section 5.12 and in *Visual Resource Inventory*, BLM Manual Handbook 8410-1 (BLM 1986a).

FIGURE 11.7.14.1-2 Approximately 180° Panoramic View of the Proposed Millers SEZ, Facing Southwest from Desert Pavement Area, with Lone Mountain at Left, and Monte Cristo Range at Right

FIGURE 11.7.14.1-3 Approximately 120° Panoramic View of the Proposed Millers SEZ, Facing West toward Monte Cristo Range from Southeastern Portion of the SEZ

FIGURE 11.7.14.1-4 Approximately 120° Panoramic View of the Proposed Millers SEZ, Facing South toward Lone Mountain from West-Central Portion of the SEZ

The VRI values for the SEZ are VRI Class 4, indicating low relative visual values. Most of the immediate surroundings are also VRI Class 4, with the exception of the area immediately to the east of the SEZ. This is VRI Class 3 (BLM 2009c). 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 this draft PEIS. The new VRI data will be incorporated into the analyses presented in the final PEIS. More information about VRI methodology is presented in Section 5.12 and in *Visual Resource Inventory*, BLM Manual Handbook 8410-1 (BLM 1986a).

The Tonopah Resource Management Plan (BLM 1997) indicates that the SEZ and surrounding area 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).

11.7.14.2 Impacts

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

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

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

11.7.14.2.1 Impacts on the Proposed Millers SEZ

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

Common and technology-specific visual impacts from utility-scale solar energy development, as well as impacts associated with electric transmission lines, are discussed in Section 5.12 of this PEIS. Impacts would last throughout construction, operation, and decommissioning, and some impacts could continue after project decommissioning. Visual impacts resulting from solar energy development in the SEZ would be in addition to impacts from solar energy development and other development that may occur on other public or private lands within the SEZ viewshed, and are subject to cumulative effects. For discussion of cumulative impacts, see Section 11.7.22.4.13 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), the current VRM class designated for the SEZ. 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.

11.7.14.2.2 Impacts on Lands Surrounding the Proposed Millers 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). The intervisibility between the project and potentially affected lands is a key component in determining impact levels; 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 information on assumptions and limitations of the methods used). Four viewshed analyses were conducted, assuming four different equipment 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 11.7.14.2-1 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, and dark purple, and at least the upper portions of power tower receivers could be visible from the additional areas shaded in medium brown.

For the following visual impact discussion, the tall solar power tower (650 ft [198.1 m]) and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds are shown in 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.

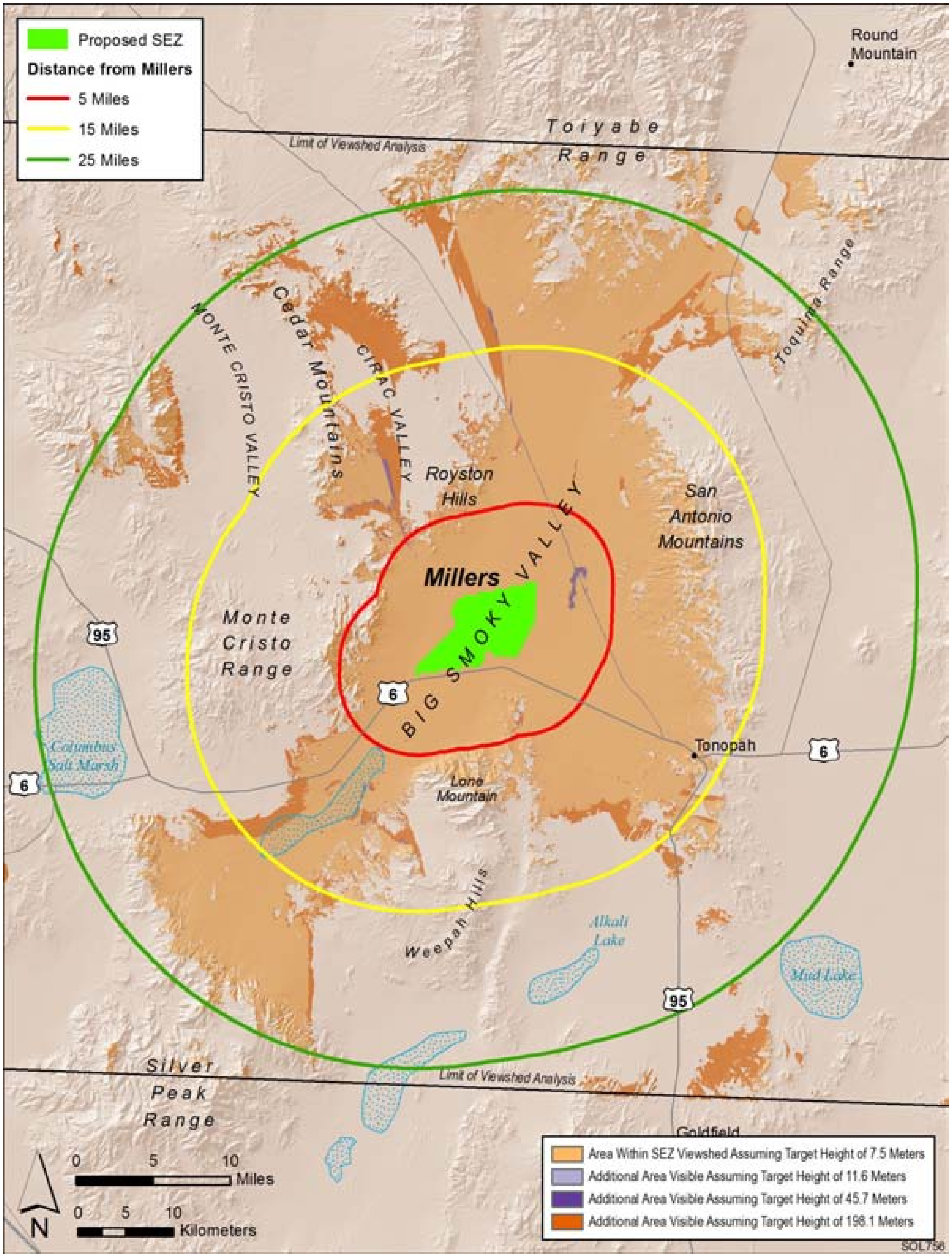

FIGURE 11.7.14.2-1 Viewshed Analyses for the Proposed Millers SEZ and Surrounding Lands, Assuming Solar Technology Heights of 24.6 ft (7.5 m), 38 ft (11.6 m), 150 ft (45.7 m), and 650 ft (198.1 m) (shaded areas indicate lands from which solar development within the SEZ could be visible)

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

A GIS analysis was conducted that overlaid 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. This was done in order to identify which of these sensitive visual resource areas would have views of solar facilities within the SEZ and, therefore, would potentially be subject to visual impacts from those facilities.

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;

- 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.

The results of the GIS analysis demonstrate that none of these types of scenic resources are located within the 25-mi (40-km) viewshed of the Millers SEZ.

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. In addition to the resource types and specific resources analyzed in this PEIS, future site-specific NEPA analyses would include state and local parks, recreation areas, other sensitive visual resources, and communities close enough to the proposed project to be affected by visual impacts. Selected other lands and resources are included in the discussion below. Further discussion of impacts on these areas is presented in Sections 11.7.3 (Specially Designated Areas and Lands with Wilderness Characteristics) and Section 11.7.17 (Cultural Resources) of this PEIS.

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. There is currently a 120-kV transmission line within the proposed SEZ, so construction and operation of a transmission line outside the proposed SEZ would not be required; however, transmission lines to connect facilities to the existing line would be required. For this analysis, the impacts of construction and operation of transmission lines outside of the SEZ were not assessed, assuming that the existing 120-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.

The following visual impact analysis describes *visual contrast levels* rather than *visual impact levels*. *Visual contrasts* are changes in the landscape seen by the viewer, including changes in the forms, lines, colors, and textures of objects. 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.

Impacts on Selected Other Lands and Resources

U.S. 6. About 31 mi (50 km) of U.S. 6 is within the SEZ 25 mi (40 km) viewshed. As shown in Figure 11.7.14.2-1, at the point of closest approach, U.S. 6 passes within 0.2 mi (0.3 km) of the southern boundary of the Millers SEZ and approaches the SEZ from the direction of Tonopah (southeast) and Coaldale (southwest). The AADT value for U.S. 6 just west of Tonopah was 3,900 vehicles in 2009 (NV DOT 2010), although traffic would increase slightly as a result of solar energy development within the SEZ.

For westbound travelers on U.S. 6, solar facilities within the SEZ would come into view just west of Tonopah and would be in full view as vehicles descended the approximately 14-mi (23-km) slope from Tonopah. Near Tonopah, U.S. 6 is elevated nearly 1,000 ft [300 m] above the SEZ elevation, but because of the long distance to the SEZ, the vertical angle of view is low.

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.

The angle of view would decrease as travelers approached the SEZ, but the facilities within the SEZ would increase in apparent size. The SEZ would be visible directly in front of vehicles on the upper portions of the slope, but would gradually appear to shift to the right as westbound travelers approached the SEZ to pass it on its southern side. At highway speeds, the SEZ would be in view or about 15 minutes for westbound travelers as they approached and passed it.

Figure 11.7.14.2-2 is a Google Earth visualization of the SEZ (highlighted in orange) as seen from U.S. 6, on the western outskirts of Tonopah about 12.4 mi (20.0 km) from the southeast corner 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) tall power tower with an 867-acre (3.5-km^2) field of 12-ft (3.7-m) tall heliostats, each representing about 100 MW of electric generating capacity. 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 visualization suggests that from this distance and viewing angle, irregularities in the gentle downward sloping terrain toward the SEZ would screen parts of the SEZ from view, although most of it would be visible. The SEZ would occupy a substantial portion of the horizontal field of view, but solar facilities within the SEZ would be seen nearly edge on, so that the collector/reflector arrays would appear as thin lines at the base of the Monte Cristo Range. The edge-on view of the facilities would reduce the visible surface area, conceal the strong regular geometry of the collector arrays, and repeat the strong horizon line, all of which would tend to reduce associated visual contrasts, although there could be glinting or glare from the collectors or ancillary facilities that might attract visual attention. The receivers of operating power towers within the SEZ would likely be visible as bright point light sources against the

FIGURE 11.7.14.2-2 Google Earth Visualization of the Proposed Millers SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models as Seen from U.S. 6, just West of Tonopah, Nevada

backdrop of the valley floor or the bajadas of the Monte Cristo Range. The tower structures would likely be visible underneath the receiver "glow." Under the 80% development scenario analyzed in the PEIS and depending on project location within the SEZ, the types of solar facilities and their designs, and other visibility factors, weak to moderate visual contrasts from solar energy development within the SEZ could be expected at this location.

Figure 11.7.14.2-3 is a Google Earth visualization of the SEZ as seen from U.S. 6 about 5 mi (8 km) from the southeast corner of the SEZ, the outer limit of the BLM VRM Program's foreground-middleground distance. From this viewpoint, the SEZ would occupy most of the horizontal field of view. Solar facilities within the SEZ would be seen edge on, but any ancillary facilities, such as STGs, cooling towers, substations, etc. would likely be visible projecting above the collector arrays, and adding contrasts in form, line, texture, and color, with the possibility and glinting and glare from any reflective surfaces associated with those project components. The light from operating power tower receivers in the SEZ could appear as very bright non-point light sources as viewed from the road and would be expected to strongly attract visual attention. Under the 80% development scenario analyzed in the PEIS, solar facilities within the SEZ would likely command visual attention and could potentially dominate views from U.S. 6. Depending on project location within the SEZ, the types of solar facilities and their designs, and other visibility factors, strong visual contrasts from solar energy development within the SEZ could be expected at this location.

Figure 11.7.14.2-4 is a Google Earth visualization of the SEZ as seen from U.S. 6 about 0.4 mi (0.7 km) from the southern boundary of the SEZ. From this viewpoint, the SEZ could not be encompassed in a single view; viewers would have to turn their heads to see the entire SEZ. Solar facilities within the SEZ would be seen edge on, but if they were located in closer parts of the SEZ, they could be too large to appear as lines. Depending on the technology, project layout, and location, facilities could block views of the surrounding mountains and dominate views from the roadway.

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

If power tower facilities were located in the SEZ in close proximity to the highway, when operating, the receivers could appear as brilliant white no-point (i.e. having visible cylindrical or rectangular surfaces) light sources as viewed from the highway, and if sufficiently close to the road, would likely strongly attract visual attention. Also, under certain viewing conditions, sunlight on dust particles in the air might result in the appearance of light streaming down from the tower. 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 from U.S. 6. Other lighting associated with solar facilities could be visible as well.

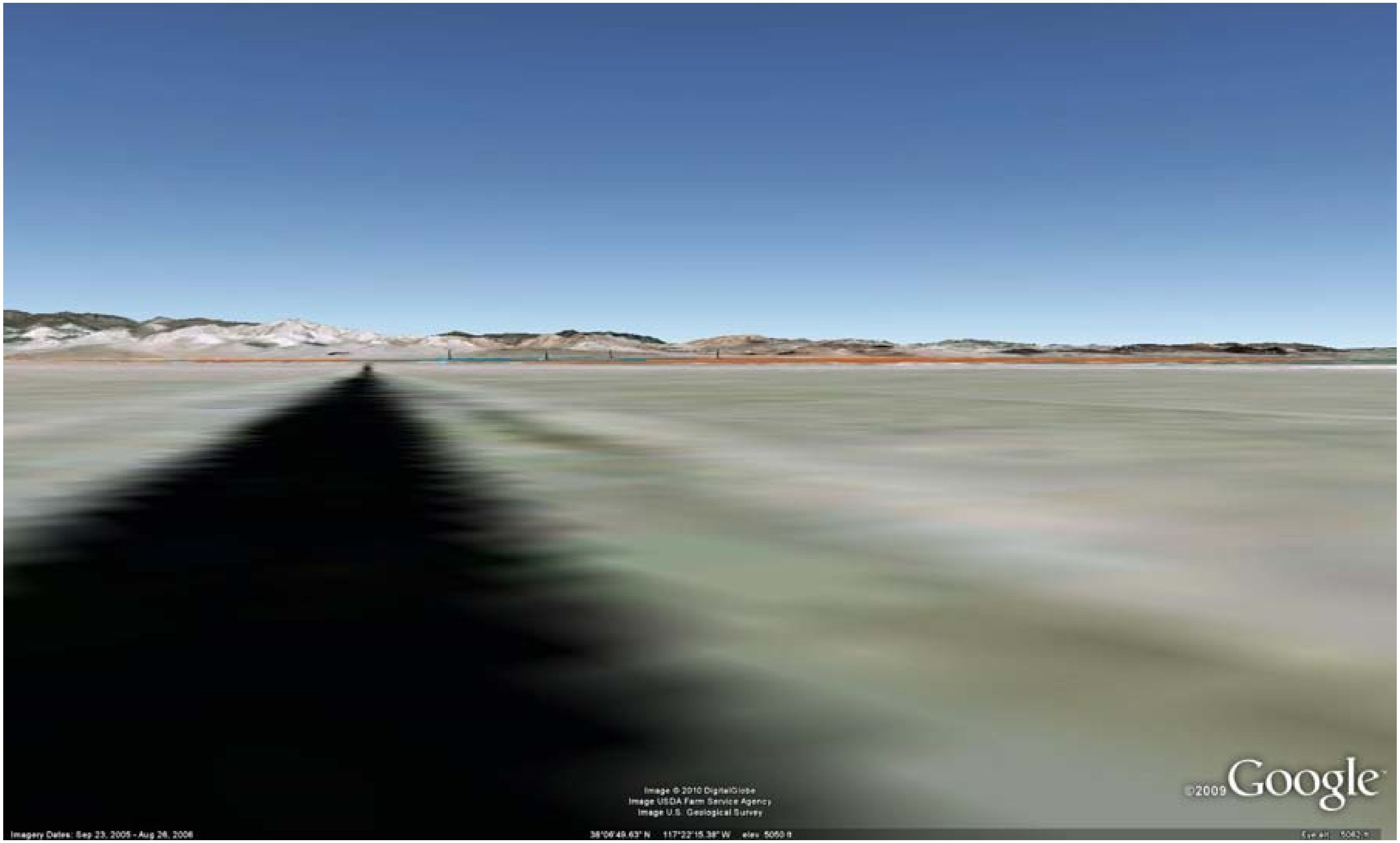

FIGURE 11.7.14.2-3 Google Earth Visualization of the Proposed Millers SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models as Seen from U.S. 6 approximately 5 mi (8 km) Southeast of the SEZ

FIGURE 11.7.14.2-4 Google Earth Visualization of the Proposed Millers SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models as Seen from U.S. 6, 0.4 mi (0.7 km) from the SEZ

As travelers approached and passed by the SEZ, depending on lighting conditions, the solar technologies present, facility layout, and mitigation measures employed, there would be the potential for reflections from facility components. These effects could potentially distract drivers and/or impair views toward the facilities. These potential impacts could be reduced by siting reflective components away from the roadways, employing various screening mechanisms, and/or adjusting the mirror operations to reduce potential impacts; however, it could be difficult to screen power towers from view, because of their height. Under the 80% development scenario analyzed in the PEIS, the various solar facilities within the SEZ would likely dominate views from the roadway and would be expected to create strong visual contrasts as seen from this viewpoint on U.S. 6.

Eastbound travelers on U.S. 6 would have roughly similar visual experiences to westbound travelers in terms of impact magnitude; however, because U.S. 6 essentially does not slope downward toward the SEZ as it approaches the SEZ from the east, there are no elevated views of the SEZ, so the general level of visual contrasts created would likely be somewhat less than for westbound travelers. The SEZ would first come into view about 11 mi (18 km) west of the SEZ. At highway speeds, the SEZ would be in view for about 15 minutes for eastbound travelers as they approached and passed it.

In summary, under the 80% development scenario analyzed in the PEIS and depending on project location within the SEZ, the types of solar facilities and their designs, and other visibility factors, weak to strong visual contrasts from solar energy development within the SEZ would be expected for travelers on U.S. 6.

Town of Tonopah. The viewshed analyses indicate visibility of the SEZ from the town of Tonopah (approximately 13 mi [20.9 km] southeast of the SEZ). Tonopah is more than 1,000 ft (305 m) higher in elevation than the SEZ, so portions of the SEZ would be visible. A detailed future site-specific NEPA analysis is required to determine visibility precisely, but a site visit in 2009 determined that views of the SEZ are screened in most of Tonopah by trees, structures, and small variations in local topography. Visibility of the SEZ is more likely in the far western portions of Tonopah, where the density of structures and planted vegetation diminishes. Figure 11.7.14.2-2 (see above) is a Google Earth visualization of the SEZ with hypothetical solar power tower facilities as seen from the far western outskirts of Tonopah. As noted above, the visualization suggests that from this distance and viewing angle, under the 80% development scenario analyzed in the PEIS, weak levels of visual contrasts would be expected to arise from solar facilities located within the Millers SEZ.

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.

11.7.14.2.3 Summary of Visual Resource Impacts for the Proposed Millers SEZ

Under the 80% development scenario analyzed in the PEIS, the SEZ could 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 due to major modification of the character of the existing landscape. The potential exists for additional impacts from construction and operation of transmission lines and access roads within the SEZ.

The SEZ is in an area of low scenic quality. Residents of Tonopah and nearby areas, 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. The residents nearest to the SEZ could be subjected to large visual impacts from solar energy development within the SEZ. U.S. 6 passes very close to the SEZ, and travelers on that road could be subjected to strong visual contrasts from solar development within the SEZ, but typically their exposure would be brief. Utility-scale solar energy development within the proposed Millers SEZ could cause weak levels of visual contrast for some residents of Tonopah, generally for persons in the westernmost parts of the community.

11.7.14.3 SEZ-Specific Design Features and Design Features Effectiveness

No SEZ-specific design features have been identified to protect visual resources for the proposed Millers SEZ. As noted in Section 5.12, the presence and operation of large-scale solar energy facilities and equipment would introduce major visual changes into non-industrialized landscapes and could create strong visual contrasts in line, form, color, and texture that could not easily be mitigated substantially. Implementation of programmatic design features intended to reduce visual impacts (described in Appendix A, Section A.2.2) would be expected to reduce visual impacts associated with utility-scale solar energy development within the SEZ; however, the degree of effectiveness of these design features could be assessed only at the site- and project-specific level. Given the large scale, reflective surfaces, strong regular geometry of utility-scale solar energy facilities, and the lack of screening vegetation and landforms within the SEZ viewshed, siting the facilities away from sensitive visual resource areas and other sensitive viewing areas is the primary means of mitigating visual impacts. The effectiveness of other visual impact mitigation measures would generally be limited.

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11.7.15 Acoustic Environment

11.7.15.1 Affected Environment

The proposed Millers SEZ is located in the northern portion of Esmeralda County in southwestern Nevada. Neither the State of Nevada nor Esmeralda County has established quantitative noise-limit regulations.

The proposed Millers SEZ is in an undeveloped area, the overall character of which is rural. U.S. 6/95 extends east–west as close as 800 ft (244 m) south of the SEZ, while State Route 89 extends north–south as close as 2.5 mi (4.0 km) east of the SEZ. Numerous dirt roads cross the SEZ. The nearest railroad is in Luning in neighboring Mineral County, about 40 mi (64 km) northwest of the SEZ. Nearby airports include: Coaldale Airport, about 19 mi (30 km) west-southwest of the SEZ; Tonopah Airport in Nye County, about 20 mi (32 km) east–southeast; Goldfield Airport in Esmeralda County, about 32 mi (51 km) south–southeast; and Mina Airport in Mineral County, about 33 mi (53 km) west–northwest. Small-scale irrigated agricultural lands are situated about 10 mi (16 km) north of the SEZ. No industrial or commercial activities are located around the SEZ; grazing is about the only agricultural activity in the immediate vicinity of the SEZ. Millers, a ghost town, is about 0.8 mi (1.3 km) from the southeast corner of the SEZ. No sensitive receptors (e.g., residences, hospitals, schools, or nursing homes) exist around the proposed Millers SEZ. The closest population center with schools is Tonopah, the county seat of Nye County. It is about 11 mi (18 km) east–southeast of the SEZ.

Accordingly, noise sources around the SEZ include road traffic, aircraft flyovers, and cattle grazing. Other noise sources are associated with current land use around the SEZ include occasional OHV races, but not much other recreational use occurs in the area. To date, no environmental noise survey has been conducted around the proposed Millers SEZ. On the basis of the population density, the day-night average noise level (L_{dn} or DNL) is estimated to be 17 dBA for Esmeralda County, well below the 33 to 47 dBA L_{dn} range level typical of a rural area (Eldred 1982; Miller 2002).[9]

11.7.15.2 Impacts

Potential noise impacts associated with solar projects in the Millers SEZ would occur during all phases of the projects. During the construction phase, potential noise impacts on the nearest residences (about 11 mi [18 km] east-southeast of the SEZ boundary) from operation of heavy equipment would be expected to be minimal because of the considerable separation distance. During the operations phase, potential noise impacts on the nearest residences also would be expected to be minimal. However, if the Millers SEZ is fully developed, potential noise

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9 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 daytime level, and it can be interpreted as 33 to 47 dBA (mean 40 dBA) during the daytime hours and 23 to 37 dBA (mean 30 dBA) during nighttime hours.

impacts on residences along the roads would be likely because of vehicular traffic (commuters, visitors, support, and deliveries) 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 Millers 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 the application of any additional SEZ-specific design features applied (see Section 11.7.15.3 below). This section primarily addresses potential noise impacts on humans, although potential impacts on wildlife at nearby sensitive areas are discussed. Additional discussion on potential noise impacts on wildlife is presented in Section 5.10.2.

11.7.15.2.1 Construction

The proposed Millers 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 would be 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 level. 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. Therefore, 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 at about 1,200 ft (370 m) from the power block area, which would be well within the facility boundary. For construction activities occurring near the southeastern SEZ boundary (the closest SEZ boundary to the nearest residences), estimated noise levels at the nearest residences would be about 15 dBA. This noise level is well below a typical daytime mean rural background level of 40 dBA. In addition, an estimated 40-dBA L_{dn}[10] at these residences (i.e., no contribution from construction activities) is well below the EPA guidance of 55 dBA L_{dn} for residential areas.

It is assumed that a maximum of two projects would be developed at any one time for SEZs greater than 10,000 acres (40.47 km^2) but less than 30,000 acres (121.4 km^2), such as the

[10] For this analysis, background levels of 40 and 30 dBA for daytime and nighttime hours, respectively, are assumed, which result in day-night average noise level (L_{dn}) of 40 dBA.

Millers SEZ. If two projects were to be built in the southeastern portion of the SEZ near the nearest residences, noise levels would be about 18 dBA, 3 dBA higher than the value for one project. These levels would be still well below the typical daytime mean rural background level, and thus their contribution to the existing L_{dn} would be minimal.

There are no specially designated areas within 25 mi (40 km) of the proposed Millers SEZ. Thus, noise impacts for nearby specially designated areas were not modeled.

Depending on the 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 rather than the impulsive impact pile drivers frequently seen at large-scale construction sites. Potential impacts on the nearest residences would be anticipated to be negligible, considering the distance to the nearest residences (about 11 mi [18 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 Millers SEZ would cause negligible unavoidable but localized short-term noise impacts on neighboring communities, even when construction activities would occur near the southeastern SEZ boundary, the SEZ boundary closest to the nearest residences.

Construction activities could result in various degrees of ground vibration, depending on the construction equipment and 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 located in close proximity. Therefore, no adverse vibration impacts are anticipated from construction activities, including pile driving for dish engines.

For this analysis, the impacts of construction and operation of transmission lines outside of the SEZ were not assessed, assuming that the existing regional 120-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.

11.7.15.2.2 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 21 dBA at the nearest residences, located about 11 mi (18 km) from the SEZ boundary. This noise level is much lower than typical daytime mean rural background level of 40 dBA. If TES was not used (i.e., if the operation was limited to daytime, 12 hours only[11]), 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 two parabolic trough and/or power tower facilities were operating at the same time, combined noise levels at the nearest residences would be about 24 dBA, 3 dBA higher than the value for a single facility. 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 the simple noise modeling would be anticipated if TES was used during nighttime hours, as explained below and in Section 4.13.1.

On a calm, clear night typical of the proposed Millers 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 down toward the ground. There would be little, if any, shadow zone[12] within 1 or 2 mi (1.6 or 3 km) of the noise source in the presence of a strong temperature inversion (Beranek 1988). In particular, such conditions add to the effect of noise being more discernable during nighttime hours, when the background noise levels are lowest. To estimate the day-night average noise level (L_{dn}), 6-hour nighttime generation with TES is assumed after 12-hour daytime generation. For nighttime hours under temperature inversion, 10 dB is added to noise levels estimated from the uniform atmosphere (see Section 4.13.1). On

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

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

the basis of these assumptions, the estimated nighttime noise level at the nearest residences (about 11 mi [18 km] from the SEZ boundary) would be 31 dBA, which is comparable to the typical nighttime mean rural background level of 30 dBA. However, the noise level would be much lower than this value if considering air absorption among other attenuation mechanisms. 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 was used at a solar facility. In consequence, operating parabolic trough or power tower facilities using TES and located near the 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 use 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 Millers SEZ, on the basis of the assumption of dish engine facilities of up to 1,492 MW total capacity (covering 80% of the total area, or 13,430 acres [54.4 km^2]), up to 59,690 25-kW dish engines could be employed. For a large dish engine facility, about a thousand step-up transformers would be embedded in the dish engine solar field, along with a substation; however, the noise from these sources would be masked by dish engine noise.

The composite noise level of a single dish engine would be about 88 dBA at a distance of 3 ft (0.9 m) (SES Solar Two, LLC 2008). This noise level would be attenuated to about 40 dBA (typical of the mean rural daytime environment) within 330 ft (100 m). However, the combined noise level from tens of thousands of dish engines operating simultaneously would be high in the immediate vicinity of the facility, for example, about 50 dBA at 1.0 mi (1.6 km) and 47 dBA at 2 mi (3 km) from the boundary of the squarely-shaped dish engine solar field. Both of these values are higher than the typical daytime mean rural background level of 40 dBA. However, because of noise attenuation by atmospheric absorption and temperature lapse during daytime hours, these levels would actually occur at somewhat shorter distance than cited above.

To estimate noise levels at the nearest residences, it was assumed that dish engines were placed all over the Millers SEZ at intervals of 98 ft (30 m). Under these assumptions, the estimated noise level at the nearest residences, about 11 mi (18 km) from the SEZ boundary, would be about 33 dBA, which is below the typical daytime mean rural background level of 40 dBA. Assuming 12-hour daytime operation only, the estimated 40 dBA L_{dn} at these residences is well below the EPA guideline of 55 dBA L_{dn} for residential areas. Considering other noise attenuation mechanisms, noise levels at the nearest residences would be lower than values estimated above, and thus potential impacts on nearby residences would be expected 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 Millers 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 to within the facility boundary and not be heard at the nearest residence, assuming a 11.5-mi (18.5-km) distance (at least 0.5 mi [0.8 km] to the facility boundary and 11 mi [18 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 located close by (e.g., within 500 ft [152 m] of a 230-kV transmission line). The proposed Millers 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.

11.7.15.2.3 Decommissioning/Reclamation

Decommissioning/reclamation requires many of the same procedures and items of 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.

11.7.15.3 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. Because of the considerable separation distances, activities within the proposed Millers SEZ during construction and operation would be anticipated to cause only minimal increases in noise levels at the nearest residences and no increases in noise levels at the specially designated areas. Accordingly, SEZ-specific design features are not required.

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11.7.16 Paleontological Resources

11.7.16.1 Affected Environment

The surface geology of the proposed Millers SEZ is predominantly lacustrine sediments (less than 100 ft [30 m] thick) and thick alluvial deposits (more than 100 ft [30 m] thick), ranging in age from the Pliocene to Holocene, with minimal playa deposits (approximately 0.1 acre [0.0004 km^2]) of similar age in the southern tip of the SEZ. The total acreage of the lacustrine sediments within the SEZ is 15,819 acres (64 km^2), and the alluvial deposits include 968 acres (3.9 km^2), or 94% and 6% of the SEZ, respectively. In the absence of a PFYC map for Nevada, a preliminary classification of PFYC Class 3b is assumed for the lacustrine and playa deposits. Class 3b indicates that the potential for the occurrence of significant fossil materials is unknown and needs to be investigated further (see Section 4.14 for a discussion of the PFYC system). Pleistocene lake beds could have a high potential for subsurface fossil resources and could alternatively be classified as PFYC Class 4/5. 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 a low potential for the occurrence of significant fossil material.

11.7.16.2 Impacts

The potential for impacts on significant paleontological resources in 94% of the proposed Millers SEZ is unknown but potentially high. A more detailed investigation of the lacustrine and 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 (BLM 2007) and IM2009-011 (BLM 2008a). Few, if any, impacts on significant paleontological resources are likely to occur in the remaining 6% of the proposed 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 this portion 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. Section 5.14 discusses the types of impacts that could occur on any significant paleontological resources found to be present within the Millers SEZ. Impacts would be minimized through the implementation of required programmatic design features described in Appendix A, Section A.2.2.

Indirect impacts on paleontological resources outside of the SEZ, such as through looting or vandalism, are unknown but unlikely, because any such resources would be below the surface and not readily accessed. Programmatic design features for controlling water runoff and sedimentation would prevent erosion-related impacts on buried deposits outside of the SEZ.

No new roads or transmission lines are currently assessed for the proposed Millers SEZ, assuming existing corridors would be used; therefore, no impacts on paleontological resources are anticipated from new access pathways. Impacts on paleontological resources related to the creation of new corridors not assessed in this PEIS would be evaluated at the project-specific level if new road or transmission construction or line upgrades are to occur.

A programmatic design feature requiring a stop work order in the event of an inadvertent discovery of paleontological resources would reduce impacts by preserving some information and allowing excavation of the resource, if warranted. Depending on the significance of the find, it could also result in some modification to the project footprint. Since the SEZ is predominantly located in an area classified as PFYC Class 3b or greater, 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.

11.7.16.3 SEZ-Specific Design Features and Design Feature Effectiveness

Impacts would be minimized through the implementation of required programmatic design features, including a stop-work stipulation in the event that paleontological resources are encountered during construction, as described in Appendix A, Section A.2.2.

The need for and nature of SEZ-specific design features for 94% of the proposed Millers SEZ would depend on the results of future paleontological investigations. If the geological deposits for the remaining 6% of the SEZ are determined to be as described above and are classified as PFYC Class 2, mitigation of paleontological resources in the alluvial deposits would not likely be necessary.

11.7.17 Cultural Resources

11.7.17.1 Affected Environment

11.7.17.1.1 Prehistory

The proposed Millers SEZ is located in Big Smoky Valley in the Great Basin region of Nevada. It is situated in an area that was once a Late Pleistocene pluvial lake, Lake Tonopah. The earliest known use of the area was during the Paleoindian Period, starting sometime between 12,000 and 10,000 years before present (B.P.). Surface finds of Paleoindian projectile points, the hallmark of the Clovis culture, have been found in the Big Smoky Valley and around the former lakeshores of Pleistocene Lake Tonopah, but no sites with any stratigraphic context have been excavated. The Clovis culture is characterized by fluted projectile points and a hunting and gathering subsistence economy that followed migrating herds of Pleistocene mega fauna. Within the proposed Millers SEZ, a probable Clovis site was documented associated with Lake Tonopah. Sites established during this time period may be difficult to find if they have been buried by the ebb and flow of the pluvial lakes.

The cultural material associated with slightly later pluvial lake habitations is referred to as the Western Pluvial Lakes Tradition; at least eight sites affiliated with this cultural tradition have been well documented in the Big Smoky Valley, and in the proposed Millers SEZ. It is likely that people during this time 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 Lake Mohave and Silver Lake 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 Millers SEZ. 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; Eerkins and Glascock 2000; McGonagle and Waski 1978; NROSL 2009).

The Early Archaic Period in the region began with the recession of most of the pluvial lakes in the area, around 8,000 to 6,000 B.P., and extended until about 4,000 B.P. Archaic Period groups likely congregated around marsh areas, where they still existed, but also used the vast caves that can be found in the mountains of the Great Basin. The settlement system in some areas was most likely based around a central base camp, with temporary camps located at the margins of their territory to exploit resources that were not in the immediate vicinity of the base camp. Archaic groups would sometimes perform communal hunts, notably antelope drives, in which antelope were herded into a corral and then shot, and rabbit drives, in which large nets were used. Some of the key Archaic Period sites in the area near the proposed Millers SEZ are Gatecliff Shelter and Toquima Cave, to the northeast of the SEZ, and Lovelock Cave, Humbolt Cave, and Hidden Cave, to the north of the SEZ. Many of these sites are located near Pleistocene lakes, such as Lake Lahontan to the north of the proposed Millers SEZ, Mud Lake to the east, and Lake Tonopah. The archaeological assemblage from the Early Archaic Period maintains some cultural continuity with the previous period, consisting of large notched Elko and Gatecliff points, leaf-shaped bifaces, scrapers, drills, gravers, and manos and metates (Fowler and Madsen 1986; Neusius and Gross 2007; McGonagle and Waski 1978).

The Middle Archaic Period, 4,000 to 1,500 B.P., saw the 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 (Beck and Jones 2008).

In the vicinity of the proposed Millers 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. Around A.D. 1000, 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 antecedents of the Northern Paiute and Western Shoshone, and the archaeological assemblage associated with this time period consists of Desert Series projectile points, brown-ware ceramic, unshaped manos and milling stones, incised stones, mortars, pestles, and shell beads. Contemporary Native Americans dispute the separation of periods between the Late Archaic and the Numic periods, because they believe that they have been in the area since time immemorial, and see themselves as descendents of all prehistoric people, and not just of Numic derivation. The following section describes the cultural history of the time period in greater detail.

11.7.17.1.2 Ethnohistory

The proposed Millers SEZ is located in territory most often ascribed to the Western Shoshone (Thomas et al. 1986). The Western Shoshone allowed their neighbors, the Northern Paiute, with whom they were on good terms, access to its resources (McGonagle and Waski 1978), but they were far from the main centers of Northern Paiute population. Traditionally, the closest Northern Paiute base camps were around Mono Lake in California; however, some Northern Paiute travelled widely (Fowler and Liljeblad 1986). The Northern Paiute’s southern neighbors, the Owens Valley Paiute, may also have interacted with the Western Shoshone.

Western Shoshone

The Western Shoshone are a group of ethnically similar Central Numic speakers who 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). Their territory lies primarily within the basin and range province of the

Great Basin. They lived in small groups with rather fluid membership, usually identified with the land on which they were centered. Their subsistence base and lifestyle varied with the resources within their territory. Groups often established stable base camps near reliable water sources where they could grow crops. From these base camps, they would move seasonally in a flexible round to exploit resources as they became available in the surrounding mountains and other areas. They gathered a wide variety of plant resources (Stoffle et al. 1990; Crum 1994; Fowler 1986), which they supplemented by hunting and fishing. Pine nuts, available in the mountains, were a storable staple. Pronghorn antelope, bighorn sheep, and mule deer were among the large game animals they hunted, but smaller game, including rodents, birds, and, where available, fish, provided more protein to their diet. Groups varied in size and composition with the season. The largest groups gathered for the pine nut harvest, which could include a rabbit or antelope drive as well. Winter villages were usually close to stores of pine nuts. Additional information on the Western Shoshone can be found in Section 11.1.17.1.2.

Northern Paiute

At the time of Euro-American contact, the Northern Paiute consisted of a collection of politically distinct, but linguistically homogenous, family-centered groups occupying much of northwestern Nevada and southeastern Oregon extending into southwestern Idaho. Probably arriving in the Great Basin sometime between A.D. 500 and A.D. 1000 (Quinian and Woody 2003), their traditional lifeway was similar to that of other indigenous Great Basin populations. Living in small, family-based groups, they pursued a hunting and gathering subsistence base. They congregated in winter base camps located near relatively abundant resources where many family groups could gather. From these base locations, smaller groups followed a seasonal round taking advantage of plant and animal resources as they became available. Although their seasonal movements were patterned, and individual hunting and gathering territories were considered the property of one group or another, there was considerable flexibility and sharing of resources between groups and with their Shoshone neighbors, who spoke related languages (Fowler and Liljeblad 1986).

The game and plants that they exploited varied with local conditions. The more southerly groups, based in the piedmont of the Sierra Nevada, relied on piñon nuts, mule deer, bighorn sheep, quail, marmots, and the larvae of the Pandora moth. Large game animals were hunted individually or in cooperative drives. Smaller game, including rabbits, marmots, porcupines, grouse, and quail, was hunted individually or taken in traps or nets. Rabbits were also taken in cooperative drives. Seeds and other plant products were gathered from over 150 plant species (Fowler and Liljeblad 1986; Fowler and Leland 1967; Fowler 1986). Seeds were often gathered using a variety of twined tools including beaters, trays, and gathering baskets, but some were cut from the plant with knives and flash burned to harden. Seeds and nuts were ground with manos and metates, or with wooden or stone mortars and pestles. Seed meal mushes were stone boiled in twined cooking baskets. Winter houses were dome-shaped and mat-covered structures varying in size with the size of the family, or conical semi-subterranean structures. Summer housing was in open-sided ramada-like structures. Clothing was made of skins, including woven rabbit skins, or plant materials, including tules and sagebrush bark. The family was the basic social and political unit, but non-hereditary headmen emerged in local camp groups and chiefs emerged in response to Euro-American contact. Supernatural power was believed to reside in natural objects, including animals, plants, stones, water, and geographic features (Fowler and Liljeblad 1986).

As with other Great Basin groups, the Northern Paiute were affected by the introduction of the horse by the Spanish, and the "opening of the west" by Euro-American trappers, prospectors and miners, and eventually farmers and ranchers. Immigrant trains and settlements, along with their associated livestock, consumed or destroyed many of the plant, animal, and water resources upon which the Northern Paiute relied. Northern Paiute response varied. Some groups retreated from major trails; others associated themselves with settlements and ranches, forming colonies; and others formed mounted bands that preyed upon immigrants and their settlements. The Northern Paiute were pacified by 1868. Three reservations, Pyramid Lake and Walker River in Nevada, and Malheur in Oregon, were set aside in 1859 and formally established in 1874. The intent was for all Northern Paiutes to subsist on these parcels of land, and for the hunting and gathering Paiute to learn to farm. However, these reservations were not well suited for agriculture and generally lacked sufficient water. Many Paiutes refused to leave their home ranges, where they adapted to the new situation by engaging in wage labor. The establishment of additional colonies and reservations continued well into the twentieth century. The closest of these to the SEZ are Bridgeport Rancheria and Benton Reservation in California. Most groups have organized under the Indian Reorganization Act of 1934 and reservations are managed by Tribal councils. A free-ranging people, individual descendants of the Northern Paiute may be found on reservations as far away as Oregon and Washington. Knowledge of their former subsistence pursuits has been reduced, but has continued on a more limited scale (Fowler and Liljeblad 1986).

Owens Valley Paiute

The Owens Valley Paiute inhabit the valley of the Owens River that parallels the eastern slope of the Sierra Nevada. They speak Mono, a Western Numic language, and are linguistically closely tied to the Northern Paiute (Liljeblad and Fowler 1986). A brief description of the Owens Valley Paiute can be found in Section 11.1.17.1.2.

11.7.17.1.3 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 eighteenth century. Several early explorers made their way into the southern portion of the state by the late eighteenth century, but the area around the proposed Millers SEZ was not explored by Euro-Americans until about 1826. Fur trapping was a popular enterprise during this time, and overzealous trappers were quickly depleting their supplies of furs as they moved west in search of additional materials. Peter Ogden of the Hudson Bay Company and Jedidiah Smith of the Rocky Mountain Fur Company were parts of two different expeditions that entered Nevada in 1827 and 1826, respectively, seeking new beaver fields. Odgen took a more northerly route through Elko, Pershing, and Humbolt Counties, and Smith entered Nevada near Mesquite and traveled across the southern tip of Nevada into California. When he entered California, Smith was detained by Mexican authorities, as he had entered Mexican territory, and was ordered to go back the way from which he had come. However, he decided to travel farther north in California; he was the first white man to cross the Sierra Nevada Mountains, and entered Nevada just south of Lake Tahoe. From there he crossed the state of Nevada and passed very close to (if not actually through) the proposed Millers SEZ; it is assumed that he likely followed a path that would eventually be U.S. 6. Another fur-trapping party, the Walker-Bonneville party, explored the region between 1833 and 1834. This group also likely explored the lands near the proposed Millers SEZ on its way to exploring large portions of the Yosemite Valley in California and the Great Basin. 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 for those moving westward to seek new homes and fortunes. Frémont passed through the vicinity of the proposed Millers SEZ, probably about 25 mi (40 km) to the north, at the northernmost point of Esmeralda County, where it meets Mineral and Nye Counties (Elliott 1973).

Nevada and the Great Basin region have provided a corridor of travel for those seeking to emigrate west. Several heavily traveled trails crossed the region, although other than those initially traversed by Smith and the Walker-Bonneville party, none of the trails passes particularly close to the proposed Millers SEZ. The Old Spanish Trail was an evolving trail system generally established in the early nineteenth century that tended to follow 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 is about 200 mi (322 km) to the southeast of the proposed Millers SEZ as it passes near Las Vegas, Nevada. 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 included the California Trail, which followed portions of the Oregon Trail farther east of Nevada, then broke off from that trail and continued through the northern portion of Nevada along the Humbolt River, about 120 mi (120 km) north of the proposed SEZ, 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, the closest portion being about 70 mi (113 km) northwest of the proposed SEZ (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 Native Americans had 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. One of the first Mormon settlements in Nevada was a trading post, located just north of Genoa, over 100 mi (160 km) northwest of the SEZ. Established in 1850, this trading post provided supplies for those traversing the California Trail.

Nevada's nickname is the "Silver State;" it is so named for the Comstock Lode strike in Virginia City, about 145 mi (233 km) north of the proposed Millers SEZ, in 1859. 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 population influx. The population increase was so dramatic that in 1850 there were less than a dozen non-native people in the state of Nevada; by 1860, there were 6,857, and by 1875 an estimated 75,000 people had migrated to the state. The Comstock Lode strike is important to the history of Nevada not just because of the population growth and significant amount of money that was consequently brought to the area, but also because of several technological innovations that were created and employed in the mines, including the use of square-set timbering. This technique kept loose soil from collapsing on miners, a concept that eventually was employed around the world in other mines (Paher 1970).

Mining for valuable deposits occurred in all regions of the state of Nevada, including in the vicinity of the proposed Millers SEZ. Esmeralda County did not experience much of the early mining boom that was associated with the Comstock Lode strike, other than a small silver strike at Silverpeak, about 20 mi (32 km) south of the proposed Millers SEZ. Major mining operations did not come into the area until the major silver strike at Tonopah, just 13 mi (22 km) to the southeast of the proposed Millers SEZ. The strike at Tonopah was made in 1900, and miners there soon began exporting large amounts of silver. Tonopah's location made it difficult to obtain some of the raw materials and supplies necessary for large-scale mining operations, and the Tonopah-Goldfield Railroad was constructed to alleviate some of these issues. The town of Millers, just 1 mi (1.6 km) south of the proposed SEZ, was originally created as a watering and resting place for stage coaches and freight wagons travelling between Silverpeak Mine and San Antonio Mines to the northeast. After the Tonopah-Goldfield Railroad was constructed in 1904, repair shops for the railroad were built here. In addition, a 100-stamp mill was constructed at Millers in 1906 for crushing the Tonopah ore, and another 50-stamp mill was built the next year. A turquoise mine at Royston, 14 mi (23 km) northeast of the proposed SEZ, was mined by Native Americans in the region for several years, until Tiffany and Co. took control of the mine to obtain the turquoise. Crow Spring, just 5 mi (8 km) north of the proposed Millers SEZ, was an overnight stopping place for teamsters and stages between Sodaville and Tonopah, and supported a short-lived turquoise mine. Goldfield, 25 mi (40 km) south of Tonopah, was initially discovered in 1902 and was one of the single most prosperous gold strikes in the West. The mining stampede to the area began in 1904, with the most lucrative years, 1906 and 1907, producing about $15 million in gold ore. Other mines in the vicinity of the proposed Millers SEZ were mined for borax, notably at Columbus and Fish Lake, located 25 mi (40 km) and 30 mi (48 km) east of the proposed Millers SEZ, respectively, and minor turquoise mining occurred at Gilbert, approximately 6 mi (10 km) from the proposed SEZ.

Nevada's desert-mountain landscape has made it a prime region for use by the U.S. military for several decades. Beginning in October 1940, President Franklin D. Roosevelt established the Las Vegas Bombing and Gunnery Range, a 3.5- million-acre (14,000-km^2) parcel of land northwest of Las Vegas, near Indian Springs, Nevada, 150 mi (241 km) southeast of the SEZ. At the start of the Cold War in 1948, the range was renamed the Nellis Air Force Base; three years later, the Nevada Test Site (NTS) was established within Nellis Air Force Base. For the next 41 years, testing of nuclear weapons occurred throughout regions of the NTS, in addition to regular Air Force training missions. Although the proposed Millers SEZ does not fall within the specific boundaries of Nevada Test Site and Range, the closest portion of the military installation is about 45 mi (72 km) to the southeast, and the Air Force Base and associated ranges have impacted the overall history and context of the region.

11.7.17.1.4 Traditional Cultural Properties—Landscape

The Native Americans whose historical homelands lie within the Great Basin have traditionally taken a holistic view of the world. In this view, the sacred and profane are inextricably intertwined. Landscapes as a whole are often culturally important. Adverse effects on one part damage the whole (Stoffle 2001). From their perspective, landscapes include places of power. Among the most important such places are sources of water; peaks, mountains, and elevated features; caves; distinctive rock formations; and panels of rock art. Places of power are important to the religious beliefs of the Western Shoshone and Northern Paiute, and may be sought out for individual vision quests or healing. 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 often tied together by a network of culturally important trails (Stoffle and Zedeño 2001a).

The proposed Millers SEZ is located in Big Smoky Valley between the Monte Cristo Range and Lone Mountain. As stated above, mountain prominences are often culturally important landscape features and may be places of power. Project-specific investigations would need to establish the cultural importance of these mountains through consultation with the relevant Native American Tribe(s). Mt. Grant, where the Northern Paiute believe their ancestors emerged (Fowler et al. 1970), is 72 mi (116 km) to the northwest and is not likely to be visible from the SEZ. Known important rock art panels are located primarily well south and southwest of the SEZ and should not be affected by development within the SEZ. Archaeological sites within the proposed SEZ, including those associated with pluvial lakeshores, are considered by the Tribes to be the work of their ancestors and form an important part of the Native American cultural landscape. Native Americans commenting on a proposed site for the construction of a solar energy facility directly east of the proposed Millers SEZ indicated that this part of the Big Smoky Valley appeared to have been a travel corridor, not a living area (Rigby 2010).

11.7.17.1.5 Cultural Surveys and Known Archaeological and Historical Resources

In the proposed Millers SEZ, four surveys covering about 4% of the proposed SEZ have been conducted within the boundaries of the SEZ; three were linear surveys and one was a block survey. These surveys have documented 30 sites within the boundaries of the SEZ, all of which are prehistoric in nature. An additional 49 surveys have been performed within 5 mi (8 km) of the proposed SEZ, recording a total of 100 sites (86 prehistoric, 12 historic, and 2 multi-component sites; de Dufour 2009).

Most of the sites that have been documented within the boundaries of the proposed Millers SEZ are prehistoric lithic scatters, some of which contain diagnostic projectile points, as mentioned in Section 11.5.17.1. There is one documented temporary camp site. The potential eligibility of these sites for inclusion on the NRHP has not been evaluated.

The proposed SEZ has the potential to yield further significant cultural resources, especially in the dune area along the edge of the former Lake Tonopah. Because of the fact that the proposed Millers SEZ is located in the immediate vicinity of the Pleistocene lake, more prehistoric cultural resources are likely to be encountered around the margins of this area. Historic period artifacts, likely associated with the town site of Millers, as well as obsidian debitage, were also noted during an initial site visit of the proposed SEZ.

The BLM has also designated several locations within 25 mi (40 km) of the proposed Millers SEZ as cultural resources that should be managed for conservation (BLM 1997); these areas include significant petroglyph sites.

National Register of Historic Places

There are no historic properties listed in the NRHP in the SEZ or within 5 mi (8 km) of the SEZ. However, there are 16 sites that have been documented within 5 mi (8 km) of the proposed Millers SEZ that are potentially eligible for NRHP inclusion. The Millers town site has been determined to be potentially eligible, and five additional sites have been documented that are associated with the Millers town site. One site is the remains of three house basements, associated residential trash, and a mine shaft. Residential activity has also been documented at two sites. Another site is the remains of locomotive maintenance pits, a concrete foundation, and associated trash. Historic corrals and feed lots that were associated with the Millers town site and the Tonopah-Goldfield Railroad were also documented near the proposed Millers SEZ. The Sodaville-Tonopah freight road, a 60-mi (97-km) road that connected these mining towns, has been documented within 5 mi (8 km) of the SEZ. There are nine prehistoric sites within 5 mi (8 km) of the proposed SEZ that are potentially eligible for NRHP inclusion. One site is an Archaic campsite associated with Pleistocene Lake Tonopah. Six sites are campsites and lithic scatters. Another site is a possible proto-historic site, consisting of Shoshone brown-ware pottery and projectile points. A multi-component site, consisting of a prehistoric lithic scatter and an historic wall/lean-to and associated trash, is also eligible for inclusion in the NRHP (de Dufour 2009).

In Esmeralda County, only one property, the Goldfield Historic District, which is located about 32 mi (52 km) south of the proposed Millers SEZ, is listed in the NRHP. In neighboring Nye County, there are 53 properties listed in the NRHP, 48 of which are associated with the Tonopah Multiple Resource Area 13 mi (21 km) southeast of the proposed Millers SEZ. The other five NRHP properties in Nye County are located far enough away (Gatecliff Rockshelter near Austin, 97 mi [157 km] northeast; James Wild Horse Trap near Fish Springs, 80 mi

[129 km] northeast; Tybo Charcoal Kilns, near Tybo, 65 mi [105 km] east; Manhattan School, Manhattan, 42 mi [68 km] northeast; Sedan Crater, near Mercury, 132 mi [212 km] southeast) from the SEZ not to be affected by solar development.

11.7.17.2 Impacts

Direct impacts on significant cultural resources could occur in the proposed Millers SEZ; however, further investigation is needed. At least 30 sites have been recorded within the SEZ, although none of them have been evaluated for inclusion in the NRHP. Consistent with findings at other SEZs, dune areas continue to be areas with considerable potential for containing significant sites on the valley floors suitable for solar development. The area within the proposed Millers SEZ associated with Lake Tonopah also has the potential to provide significant sites related to exploitation of lacustrine resources. 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. It is further recommended that subsurface testing be conducted, because there is potential for significant buried cultural deposits associated with prehistoric use of Lake Tonopah. Section 5.15 discusses the types of effects that could occur on any significant cultural resources found to be present within the proposed Millers SEZ. Impacts would be minimized through the implementation of required programmatic design features described in Appendix A, Section A.2.2. Programmatic design features assume that the necessary surveys, evaluations, and consultations will occur. No traditional cultural properties have been identified to date within the vicinity of the SEZ.

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

No needs for new transmission or access corridors have currently been identified, assuming existing infrastructure would be used. Therefore, no new areas of cultural concern would be made accessible as a result of development within the proposed Millers SEZ, so indirect impacts resulting from vandalism or theft of cultural resources is not anticipated. However, impacts on cultural resources related to the creation of new corridors not assessed in this PEIS would be evaluated at the project-specific level if new road or transmission construction or line upgrades were to occur.

11.7.17.3 SEZ-Specific Design Features and Design Feature Effectiveness

Programmatic design features to mitigate adverse effects on significant cultural resources, such as avoidance of significant sites and features, cultural awareness training for the workforce, and measures for addressing possible looting/vandalism issues through formalized agreement documents, are provided in Appendix A, Section A.2.2.

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

- Avoidance of high-potential, high-density areas is recommended. Because of the high sensitivity of the area for containing prehistoric sites associated with Lake Tonopah and the presence of historic period sites related to the development of Millers town site, complete avoidance of NRHP-eligible sites may not be possible, and it may not be possible to fully mitigate the loss of such a large number of sites associated with one lake system; therefore avoidance of these general areas is recommended.

11.7.18 Native American Concerns

Native Americans share many environmental and socioeconomic concerns with other ethnic groups. This section focuses on concerns specific to Native Americans and 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 Millers SEZ, Section 11.7.17 discusses archaeological sites, structures, landscapes, trails, and traditional cultural properties; Section 11.7.8 discusses mineral resources; Section 11.7.9.1.3 discusses water rights and water use; Section 11.7.10 discusses plant species; Section 11.7.11 discusses wildlife species, including wildlife migration patterns; Section 11.7.13 discusses air quality; Section 11.7.14 discusses visual resources; Sections 11.7.19 and 11.7.20 discuss socioeconomics and environmental justice, respectively; and issues of human health and safety are discussed in Section 5.21.

11.7.18.1 Affected Environment

The proposed Millers SEZ falls within the Tribal traditional use area generally attributed to the Western Shoshone (Liljeblad and Fowler 1986) and is within the area recognized as traditionally belonging to the Western Shoshone by the Indian Claims Commission (Royster 2008). Lying near the western edge of Western Shoshone territory, the SEZ was accessible by the Northern Paiutes, who were on friendly terms with the Western Shoshone (McGonagle and Waski 1978). All federally recognized Tribes with Western Shoshone, Northern Paiute, or Owens Valley Paiute roots have been contacted and provided an opportunity to comment or consult regarding this PEIS. They are listed in Table 11.7.18.1-1. Details of government-to-government consultation efforts are presented in Chapter 14; a listing of all federally recognized tribes contacted for this PEIS is given in Appendix K.

11.7.18.1.1 Territorial Boundaries

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 Millers SEZ lies near the northwestern periphery of their traditional range where Shoshone territory blends into Northern and Owens Valley Paiute territory.

Northern Paiutes

The traditional territory of the Northern Paiute lies mainly along the eastern front of the Sierra Nevada and the divide separating the Pit and Klamath Rivers from the Great Basin,

TABLE 11.7.18.1-1 Federally Recognized Tribes with Traditional Ties to the Proposed Millers SEZ

Tribe	Location	State
Benton Paiute-Shoshone Tribe	Benton	California
Big Pine Paiute Tribe	Big Pine	California
Bishop Paiute Tribe	Bishop	California
Bridgeport Indian Colony	Bridgeport	California
Duck Valley Shoshone-Paiute Tribes	Owyhee	Nevada
Duckwater Shoshone Tribe	Duckwater	Nevada
Ely Shoshone Tribe	Ely	Nevada
Las Vegas Paiute Tribe	Las Vegas	Nevada
Lone Pine Paiute-Shoshone Tribe	Lone Pine	California
Lovelock Paiute Tribe	Lovelock	Nevada
Reno-Sparks Indian Colony	Reno	Nevada
Summit Lake Paiute Tribe	Sparks	Nevada
Te-Moak Tribe of Western Shoshone	Elko	Nevada
Timbisha Shoshone Tribe	Death Valley	California
Washoe Tribe	Gardnerville	Nevada
Wells Indian Colony	Wells	Nevada
Yerington Paiute Tribe	Yerington	Nevada
Yomba Shoshone Tribe	Austin	Nevada

extending from Mono Lake (California) in the south as far as southeastern Oregon. They occupied a wedge-shaped territory extending as far as western Idaho in the north and as far as Nevada's Reese River in the south (Fowler and Liljeblad 1986).

Owens Valley Paiutes

The Owens Valley Paiutes occupy five relatively small reservations within Owens Valley in Inyo and Mono Counties, California, west of the SEZ. Their traditional use area ranged from the headwaters of the Owens River near Benton, California, southward to Owens Lake. They shared the shores of Owens Lake with Western Shoshone groups. The Indian Claims Commission placed Owens Valley within the traditional territory of the Northern Paiutes, with whom the Owens Valley Tribes are linked linguistically (Liljeblad and Fowler 1986; Royster 2008).

11.7.18.1.2 Plant Resources

Native Americans continue to make use of a wide range of indigenous plants for food, medicine, construction materials, and other uses. Although the proposed SEZ is sparsely vegetated, some species traditionally used by Native Americans have been observed or are possible in the SEZ. The vegetation present at the proposed Millers SEZ is described in Section 11.7.10. The cover types present at the SEZ are part of the Inter-mountain Basin series.

Mixed Salt Desert Scrub dominates, but there are substantial areas of Greasewood Flat, smaller amounts of Playa, and a sprinkling of Semi-desert Shrub Steppe (USGS 2005a). As shown in Table 11.7.18.1-2, there are some plants found in the SEZ that have been traditionally used by Native Americans for food and medicine (Stoffle and Dobyns 1983; Stoffle et al. 1999; Fowler 1986). The most common is black greasewood. Other seed-bearing plants appear to be scarce. However, project-specific analyses will be needed to determine their presence at any proposed development site. The importance of any stand to Native Americans must be determined in consultation with the affected Tribe(s).

11.7.18.1.3 Other Resources

Water is an essential prerequisite for life in the arid areas of the Great Basin. As a result, it is a keystone of desert cultures' religion. Most desert cultures consider all water sacred and a purifying agent. Water sources are often associated with rock art. Springs are often associated with powerful beings, and hot springs in particular figure prominently in Owens Valley Paiute creation stories. Water sources are seen as connected—damage to one source damages all (Stoffle and Zedeño 2001a). Tribes are also sensitive about the use of scarce local water supplies for the benefit of distant communities and recommend that determination of adequate water supplies be a primary consideration for 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 Millers Valley SEZ is described in Section 11.7.11. Native American game species whose range includes the SEZ are listed in Table 11.7.18.1-3. Most of these are small animals and birds common throughout much of the

TABLE 11.7.18.1-2 Plant Species Important to Native Americans Observed or Likely To Be Present in the Proposed Millers SEZ

Common Name	Scientific Name	Status
Food		
Big Sagebrush	*Artemisia tridentata*	Possible
Dropseed	*Sporobolus airoides*	Possible
Greasewood	*Sarcobatus vermiculatus*	Observed
Indian Rice Grass	*Oryzopsis hymenoides*	Observed
Iodine Bush	*Allenrolfea occidentalis*	Possible
Wolfberry	*Lycium andersonii*	Possible
Medicine		
Greasewood	*Sacarbatus vermiculatus*	Possible
Mormon Tea	*Ephedra nevadensis*	Possible
Saltbush	*Atriplex canescens*	Observed

Sources: Field visit; USGS (2005a); Stoffle and Dobyns (1983); Stoffle et al. (1999); Fowler (1986).

TABLE 11.7.18.1-3 Animal Species Used by Native Americans as Food whose Range Includes the Proposed Millers SEZ

Common Name	Scientific Name	Status
Mammals		
Badger	*Taxidea taxus*	All year
Black-tailed jack rabbit	*Lepus californicus*	Observed
Wood rats	*Neotoma* spp.	All year
Chipmunks	*Tamias* spp.	Observed
Cottontails	*Silvilagus* spp.	All year
Coyote	*Canis latrans*	Observed
Kangaroo rats	*Dipodomys* spp.	All year
Kit fox	*Vulpes macotis*	All year
Pocket gopher	*Thomomys bottae*	All year
Pocket mice	*Perognathus* spp.	All year
Porcupine	*Erethizon dorsatum*	All year
Rock squirrel	*Spermophilus variegates*	All year
Striped skunk	*Mephitis mephitis*	All year
Birds		
Burrowing owl	*Athene cunicular*	Summer
Common raven	*Corvus corax*	All year
Golden eagle	*Aquila chrysaetos*	Observed
Great horned owl	*Bubo virginianus*	All year
Northern mockingbird	*Mimus polyglottos*	All year
Red-tailed hawk	*Buteo jamaicensis*	Observed
Sharp-shinned hawk	*Accipiter striatus*	Winter
Reptiles		
Western rattlesnake	*Crotalus viridis*	All year
Lizards	Various species	Observed

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

Great Basin. Traditionally, the most important was the black-tailed jackrabbit (*Lepus californicus*), which provided both meat and pelts. Rabbit skin blankets and clothing were common throughout the Great Basin. Important large game animals, mule deer (*Odocoileus hemionus*) and bighorn sheep (*Ovis canadensis*), occur in the nearby Monte Cristo Range and on Lone Mountain (BLM 1994), and occasionally cross through the SEZ when passing between mountain habitats. Bighorn sheep have been observed near the SEZ. The golden eagle (*Aquila chrysaetos*), which is important culturally, has also been observed at the SEZ.

Other natural resources traditionally important to Native Americans include clay for pottery, salt, and naturally occurring mineral pigments for the decoration and protection of the skin (Stoffle and Dobyns 1983). None of these has been reported in the SEZ (see Section 11.7.7).

11.7.18.2 Impacts

In the past, the Western Shoshone and Owens Valley Paiutes have expressed concern over project impacts on a variety of resources. They tend to take a holistic view of their traditional homelands. Effects on one part have ripple effects on the whole. For them, cultural and natural features are inextricably bound together. 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 Millers SEZ have been received from Native American Tribes to date, the Big Pine Paiute Tribe of the Owens Valley has commented on the scope of this PEIS. The Tribe recommends that the BLM preserve undisturbed lands intact and that recently disturbed lands, such as abandoned farm fields, rail yards, mines, and airfields, be given primary consideration for solar energy development. Potential impacts on existing water supplies are also a primary concern (Moose 2009). During energy development projects in adjacent areas, other Great Basin Tribes have expressed concern over adverse effects on a wide range of resources. Among these are geophysical features and physical cultural remains. Known resources of this type in the Millers area are discussed in Section 11.7.17.1.4. Such places are often seen as important because they are thought to be places of power. They are often the location of or have ready access to a variety of plant, animal, and mineral resources (Stoffle et al. 1997). Resources that Native Americans have identified as important include food plants, medicinal plants, plants used in basketry, and plants used in construction; game animals and birds; and sources of clay, salt, and pigments (Stoffle and Dobyns 1983). Those likely to be found within the proposed Millers SEZ are discussed in Section 11.7.18.1.

The construction of utility-scale solar energy facilities within the proposed SEZ would almost certainly result in the destruction of some plants important to Native Americans and the habitat of some traditionally important animals. The Big Smoky Valley is reported to have been a joint use area shared by the surrounding Native American groups (McGonagle and Waski 1978), and to have been a travel corridor, not a habitation area (Rigby 2010). Although it includes some plant species traditionally important to Native Americans, they appear to be relatively scant. While it is within the range of a number of traditional Native American game species, these species for the most part are common throughout the valleys in the area, and may be more abundant elsewhere (See Sections 11.7.10 and 11.7.11). The most important traditional resource likely to be present in the valley is the black-tailed jackrabbit (*Lepus californicus*). Project-specific consultation with Western Shoshone and Northern Paiute Tribes will be required to determine whether the resources present at the SEZ are significant.

As consultation with the Tribes continues and project-specific analyses are undertaken, it is possible that Native Americans will express concern over potential visual, acoustic and other effects of solar energy development within the SEZ on specific resources including culturally important landscapes.

Implementation of required 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.

11.7.18.3 SEZ-Specific Design Features and Design Feature Effectiveness

Programmatic design features to mitigate impacts of potential concern to Native Americans, such as avoidance of sacred sites, water resources, and tribally important plant and animal species are provided 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 11.7.18.1-1.

Mitigation of impacts on archaeological sites and traditional cultural properties is discussed in Section 11.7.17.3, in addition to programmatic design features for historic properties also discussed in Section A.2.2.

11.7.19 Socioeconomics

11.7.19.1 Affected Environment

This section describes current socioeconomic conditions and local community services within the ROI surrounding the proposed Millers SEZ. The ROI is a three-county area comprising Esmeralda, Mineral, and Nye Counties in Nevada. 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.

11.7.19.1.1 ROI Employment

In 2008, employment in the ROI stood at 18,672 (Table 11.7.19.1-1). Over the period 1999 to 2008, the annual average employment growth rate was low in each county in the ROI, with lower rates in Nye County (0.5%) and in Esmeralda County (−2.7%). At 0.4%, growth rates in the ROI as a whole were lower than the average rate for Nevada (2.7%).

In the ROI in 2006, the services sector provided the highest percentage of employment at 46.5%, followed by wholesale and retail trade at 17.9%, with a smaller employment share held by construction (8.7%) and mining (7.0%) (Table 11.7.19.1-2).

TABLE 11.7.19.1-1 ROI Employment in the Proposed Millers SEZ

Location	1999	2008	Average Annual Growth Rate, 1999–2008 (%)
Esmeralda County	590	448	–2.7
Mineral County	1,971	2,188	1.0
Nye County	15,325	16,036	0.5
ROI	17,886	18,672	0.4
Nevada	978,969	1,282,012	2.7

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

TABLE 11.7.19.1-2 ROI Employment in the Proposed Millers SEZ by Sector, 2006

Industry	Esmeralda County		Mineral County		Nye County		ROI	
	Employment	% of Total	Employment	% of Total	Employment	% of Total	Employment	% of Total
Agriculture[a]	10	7.0	0	0.0	325	3.6	335	3.1
Mining	10	7.0	10	0.6	750	8.3	770	7.0
Construction	10	7.0	10	0.6	925	10.2	945	8.7
Manufacturing	60	42.0	10	0.6	329	3.6	399	3.7
Transportation and public utilities	20	14.0	385	22.0	292	3.2	697	6.4
Wholesale and retail trade	60	42.0	185	10.6	1,714	19.0	1,959	17.9
Finance, insurance, and real estate	0	0.0	38	2.2	328	3.6	366	3.4
Services	30	21.0	710	40.6	4,340	48.1	5,080	46.5
Other	0	0.0	0	0.0	0	0.0	0	0.0
Total	143		1,750		9,029		10,922	

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

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

11.7.19.1.2 ROI Unemployment

The average unemployment rate in Nye County over the period 1999 to 2008 was 6.9%, slightly higher than the rate in Mineral County (6.7%) and higher than the rate for Esmeralda County (Table 11.7.19.1-3). The average rate in the ROI over this period was 6.9%, higher than the average rate for Nevada. Unemployment rates for the first 11 months of 2009 contrast with rates for 2008 as a whole; in Nye County, the unemployment rate increased to 14.3%, in Mineral County to 9.1%, and in Esmeralda County to 8.4%. The average rates for the ROI (13.6%) and for Nevada as a whole (11.0%) were also higher during this period than the corresponding average rates for 2008.

11.7.19.1.3 ROI Urban Population and Income

There are no incorporated places in the ROI, and consequently, no urban population or income.

11.7.19.1.4 ROI Total Population

Table 11.7.19.1-4 presents recent and projected populations in the ROI and for the state as a whole. Population in the ROI stood at 49,487 in 2008, having grown at an average annual rate of 3.2% since 2000. Growth rates for ROI were higher than those in Nevada (3.4%) over the same period.

Only one of the three counties in the ROI experienced growth in population between 2000 and 2008; population in Nye County grew at an annual rate of 3.9%, while in Mineral

TABLE 11.7.19.1-3 ROI Unemployment Rates for the Proposed Millers SEZ (%)

Location	1999–2008	2008	2009[a]
Esmeralda County	6.1	5.1	8.4
Mineral County	6.7	7.5	9.1
Nye County	6.9	9.7	14.3
ROI	6.9	9.4	13.6
Nevada	5.0	6.7	11.0

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

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

TABLE 11.7.19.1-4 ROI Population for the Proposed Millers SEZ

Location	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	2021	2023
Esmeralda County	971	664	–4.6	1,387	1,420
Mineral County	5,071	4,648	–1.1	4,160	4,149
Nye County	32,485	44,175	3.9	76,735	79,452
ROI	38,527	49,487	3.2	82,282	85,021
Nevada	1,998,257	2,615,772	3.4	3,675,890	3,779,745

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

County, population fell by −1.1%, and by −4.6% in Esmeralda County. The ROI population is expected to increase to 82,282 by 2021 and to 85,021 by 2023.

11.7.19.1.5 ROI Total Income

Total personal income in the ROI stood at $1.6 billion in 2007 and has grown at an annual average rate of 3.9% over the period 1998 to 2007 (Table 11.7.19.1-5). Per-capita income also rose over the same period at a rate of 1.5%, increasing from $29,208 to $31,882. Per-capita incomes were higher in Esmeralda County ($41,370) than in Nye County ($31,836) and Mineral County ($30,935) in 2007. Growth rates in total personal income have been higher in Nye County than in Mineral County and Esmeralda County. Personal income growth rates in Nevada (4.3%) were higher than the rate for the ROI (3.9%), while per-capita income growth rates in Esmeralda County were higher than those for Nevada as a whole (1.0%), the same as the state rate in Nye County and lower in Mineral County.

Median household income in 2006 to 2008 varied from $42,275 in Nye County, to $42,348 in Mineral County to $42,749 in Esmeralda County (U.S. Bureau of the Census 2009c).

11.7.19.1.6 ROI Housing

In 2007, more than 20,300 housing units were located in the three ROI counties, with about 82% of these located in Nye County (Table 11.7.19.1-6). Owner-occupied units account for approximately 72% of the occupied units in the three counties, with rental housing making up 28% of the total. Vacancy rates in 2007 were 45.4% in Esmeralda County, 23.3% in Mineral County, and 19.3% in Nye County; with an overall vacancy rate of 21% in the ROI, there were

TABLE 11.7.19.1-5 ROI Personal Income for the Proposed Millers SEZ

Location	1998	2007	Average Annual Growth Rate, 1998–2007 (%)
Esmeralda County			
Total income[a]	0.0	0.0	0.2
Per-capita income	26,781	41,370	4.4
Mineral County			
Total income[a]	0.2	0.1	-1.5
Per-capita income	31,655	30,935	-0.2
Nye County			
Total income[a]	0.9	1.4	4.8
Per-capita income	28,857	31,836	1.0
ROI			
Total income[a]	1.1	1.6	3.9
Per-capita income	29,208	31,882	0.9
Nevada			
Total income[a]	68.9	105.3	4.3
Per-capita income	37,188	41,022	1.0

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

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

4,258 vacant housing units in the ROI in 2007, of which 1,198 are estimated to be rental units that would be available to construction workers. There were 734 units in seasonal, recreational, or occasional use in the ROI at the time of the 2000 Census, with 9.5% of housing units in Esmeralda County, 3.5% in Nye County and 3.2% in Mineral County used for seasonal or recreational purposes.

Housing stock in the ROI as a whole grew at an annual rate of 0.5% over the period 2000 to 2007, with 675 new units added to the existing housing stock (Table 11.7.19.1-6).

The median value of owner-occupied housing in 2006 to 2008 varied between $59,500 in Mineral County, $75,600 in Esmeralda County and $122,100 in Nye County (U.S. Bureau of the Census 2009f).

TABLE 11.7.19.1-6 ROI Housing Characteristics for the Proposed Millers SEZ

Parameter	2000	2007[a]
Esmeralda County		
Owner-occupied	305	314
Rental	150	154
Vacant units	378	389
Seasonal and recreational use	79	Na[b]
Total units	833	857
Mineral County		
Owner-occupied	1,593	1,589
Rental	604	603
Vacant units	669	667
Seasonal and recreational use	93	NA
Total units	2,866	2,859
Nye County		
Owner-occupied	10,167	9,630
Rental	3,142	3,760
Vacant units	2,625	3,202
Seasonal and recreational use	562	NA
Total units	15,934	16,592
ROI		
Owner-occupied	12,065	11,533
Rental	3,896	4,517
Vacant units	3,672	4,258
Seasonal and recreational use	734	NA
Total units	19,633	20,308

[a] 2007 data for number of owner-occupied, rental, and vacant units for Esmeralda County and Mineral County are not available; data are based on 2007 total housing units and 2000 data on housing tenure.

[b] NA = data not available.

Sources: U.S. Bureau of the Census (2009g-i).

11.7.19.1.7 ROI Local Government Organizations

The various local and county government organizations in the ROI are listed in Table 11.7.19.1-7. In addition, one Tribal governments is 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.

11.7.19.1.8 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 32 public and private elementary, middle, and high schools (NCES 2009). Table 11.7.19.1-8 provides summary statistics for enrollment and educational staffing and two indices of educational quality—student-teacher ratios and levels of service (number of teachers per 1,000 population). The student-teacher ratio in Nye County schools (16.2) is higher than that in Mineral County (11.5) and Esmeralda County schools (9.6), while the level of service is higher in Esmeralda County (11.6) than elsewhere in the ROI, where there are fewer teachers per 1,000 population (Mineral County, 11.2; Nye County, 9.0).

Health Care

The total number of physicians (41) is much higher in Nye County than Mineral County (4), while the number of physicians per 1,000 population in both counties is similar. No data are available for Esmeralda County (Table 11.7.19.1-9).

TABLE 11.7.19.1-7 ROI Local Government Organizations and Social Institutions in the Proposed Millers SEZ

Governments	
City	
None	
County	
Esmeralda County	Nye County
Mineral County	
Tribal	
Walker River Paiute Tribe of the Walker River Reservation, Nevada	

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

TABLE 11.7.19.1-8 ROI School District Data for the Proposed Millers SEZ, 2007

Location	Number of Students	Number of Teachers	Student-Teacher Ratio	Level of Service[a]
Esmeralda County	77	8	9.6	11.6
Mineral County	612	53	11.5	11.2
Nye County	6,427	396	16.2	9.0
ROI	7,116	457	15.6	9.2

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

Source: NCES (2009).

TABLE 11.7.19.1-9 Physicians in the Proposed Millers SEZ ROI, 2007

Location	Number of Primary Care Physicians	Level of Service[a]
Esmeralda County	0	--
Mineral County	4	0.8
Nye County	41	0.9
ROI	45	0.9

[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 11.7.19.1-10). Esmeralda County has 10 officers and would provide law enforcement services to the SEZ; there are 104 officers in Nye County and 18 officers in Mineral County. Levels of service of police protection are 14.5 per 1,000 population in Esmeralda County, 3.8 in Mineral County, and 2.4 in Nye County. Currently, there are 110 professional firefighters in the ROI (Table 11.7.19.1-10).

11.7.19.1.9 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

TABLE 11.7.19.1-10 Public Safety Employment in the Proposed Millers SEZ ROI

Location	Number of Police Officers[a]	Level of Service[b]	Number of Firefighters[c]	Level of Service
Esmeralda County	10	14.5	0	0.0
Mineral County	18	3.8	28	6.0
Nye County	104	2.4	82	1.9
ROI	132	2.7	110	2.2

[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).

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 11.7.19.1-11 and 11.7.19.1-12, respectively.

There is some variation in the level of crime across the ROI, with higher rates of violent crime in Esmeralda County (4.5 per 1,000 population) than in Mineral County (3.2) and Nye County (2.9) (Table 11.7.19.1-11). Property-related crime rates are higher in Nye County (20.8) than in Esmeralda County (15.1) and Mineral County (5.2); overall crime rates in Nye County (23.0) were higher than in Esmeralda County (19.6) and Mineral County (8.4).

Data on other measures of social change—alcoholism, illicit drug use, and mental health—are not available at the county level and thus are presented for the SAMHSA region in which the ROI is located (Table 11.7.19.1-12).

TABLE 11.7.19.1-11 County and ROI Crime Rates for the Proposed Millers SEZ[a]

	Violent Crime[b]		Property Crime[c]		All Crime	
	Offenses	Rate	Offenses	Rate	Offenses	Rate
Esmeralda County	3	4.5	10	15.1	13	19.6
Mineral County	15	3.2	24	5.2	39	8.4
Nye County	124	2.9	892	20.8	1,016	23.0
ROI	142	2.9	926	18.7	1,068	21.6

[a] Rates are the number of crimes per 1,000 population.

[b] Violent crime includes murder and non-negligent manslaughter, forcible rape, robbery, and aggravated assault.

[c] Property crime includes burglary, larceny, theft, motor vehicle theft, and arson.

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

TABLE 11.7.19.1-12 Alcoholism, Drug Use, Mental Health and Divorce in the Proposed Millers SEZ ROI[a]

Geographic Area	Alcoholism	Illicit Drug Use	Mental Health[b]	Divorce[c]
Nevada Rural (includes Esmeralda, Mineral and Nye County)	8.0	2.7	9.5	–[d]
Nevada				6.5

[a] Data for alcoholism and drug use represent percentage of the population over 12 years of age with dependence or abuse of alcohol, 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 date not available.

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

11.7.19.1.10 ROI Recreation

Various areas in the vicinity of the proposed Millers SEZ are used for recreational purposes, with natural, ecological, and cultural resources in the ROI attracting visitors for a range of activities, including backcountry driving, OHV use and hunting. These activities are discussed in Section 11.7.5.

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 5.17.1.1.1).

Another method is to estimate the economic impact of the various recreational activities supported by natural resources on public land in the vicinity of the proposed solar development, by identifying sectors in the economy in which expenditures on recreational activities occur. Not all activities in these sectors are directly related to recreation on state and federal lands, with some activity occurring on private land (e.g., dude ranches, golf courses, bowling alleys, and movie theaters). Expenditures associated with recreational activities form an important part of the economy of the ROI. In 2007, 1,859 people were employed in the ROI in the various sectors identified as recreation, constituting 9.8 % of total ROI employment (Table 11.7.19.1-13). Recreation spending also produced almost $41.5 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.

11.7.19.2 Impacts

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

TABLE 11.7.19.1-13 Recreation Sector Activity in the Proposed Millers SEZ ROI, 2007

ROI	Employment	Income ($ million)
Amusement and recreation services	105	3.8
Automotive rental	13	0.4
Eating and drinking places	923	16.5
Hotels and lodging places	691	17.8
Museums and historic sites,	1	0.2
Recreational vehicle parks and campsites	56	1.5
Scenic tours	39	1.0
Sporting goods retailers	31	0.4
Total ROI	1,859	41.5

Source: MIG, Inc. (2010).

11.7.19.2.1 Common Impacts

Construction and operation of a solar energy facility at the proposed Millers SEZ would produce direct and indirect economic impacts. Direct impacts would occur as a result of expenditures on wages and salaries and on procurement of goods and services required for project construction and operation, and the collection of state sales and income taxes. Indirect impacts would occur as project wages and salaries, procurement expenditures, and tax revenues subsequently circulate through the economy of each state, thereby creating additional employment, income, and tax revenues. Facility construction and operation would also require in-migration of workers and their families into the ROI surrounding the site, which would affect population, rental housing, health service employment, and public safety employment. Socioeconomic impacts common to all utility-scale solar energy facilities are discussed in detail in Section 5.17. These impacts will be minimized through the implementation of programmatic design features described in Appendix A, Section A.2.2.

Recreation Impacts

Estimating the impact of solar facilities on recreation is problematic, because it is not clear how solar development in the SEZ would affect recreational visitation and nonmarket values (i.e., the value of recreational resources for potential or future visits; see Section 5.17.1.2.3). While it is clear that some land in the ROI would no longer be accessible for recreation, the majority of popular recreational locations would be precluded from solar development. It is also possible that solar development in the ROI would be visible from popular recreation locations, and that construction workers residing temporarily in the ROI would occupy accommodations otherwise used for recreational visits, thus reducing visitation and consequently affecting the economy of the ROI.

Social Change

Although an extensive literature in sociology documents the most significant components of social change in energy boomtowns, the nature and magnitude of the social impact of energy development 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 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, and 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 4.4% 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, the lack of available housing in smaller rural communities in the ROI to accommodate all in-migrating workers and families and insufficient range of housing choices to suit all solar occupations, many workers are likely to commute to the SEZ from larger communities elsewhere in the ROI, thereby reducing the potential impact of solar development on social change. Regardless of the pace of population growth associated with the commercial development of solar resources and the likely residential location of in-migrating workers and families in communities some distance from the SEZ itself, the number of new residents from outside the ROI is likely to lead to some demographic and social change in small rural communities in the ROI. Communities hosting solar development are likely to be required to adapt to a different quality of life, with a transition away from a more traditional lifestyle involving ranching and taking place in small, isolated, close-knit, homogenous communities with a strong orientation toward personal and family relationships, toward a more urban lifestyle, with increasing cultural and ethnic diversity and increasing dependence on formal social relationships within the community.

Livestock Grazing Impacts

*C*attle ranching and farming supported 82 jobs, and $1.8 million in income in the ROI in 2007,(MIG, Inc. 2010). The construction and operation of solar facilities in the Millers SEZ could result in a decline in the amount of land available for livestock grazing. However, because the amount of acreage that would be used in the proposed SEZ would be small compared to the overall size of locally affected land allotments, acreage loss would not have a significant impact on overall grazing operations, with livestock management changes, or the provision of additional livestock management facilities, meaning that no loss of AUMs is anticipated.

11.7.19.2.2 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 is 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 two projects could be constructed within a given year, with a corresponding maximum land disturbance of up to 6,000 acres (24 km^2). For operations impacts, a representative first year of operations was assumed to be 2023 for trough and power tower, 2022 for the minimum facility size for dish engine and PV, and 2023 for the maximum facility size for these technologies. The years of construction and operations were selected as representative of the entire 20-year study period, because they are the approximate midpoint; construction and operations could begin earlier.

Solar Trough

Construction. Total construction employment impacts in the ROI (including direct and indirect impacts) from the use of solar trough technologies would be up to 4,578 jobs (Table 11.7.1.19.2-1). Construction activities would constitute 14.7% of total ROI employment. A solar facility would also produce $278.3 million in income and $0.2 million in direct sales taxes.

Based on 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 3,654 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 be expected to be large, with 1,827 rental units expected to be occupied in the ROI. This occupancy rate would represent 91.7% 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 employment (education, health, and public safety). An increase in such employment would be required to meet existing levels of service in the ROI. Accordingly, 34 new teachers, 3 physicians, and 17 public safety employees (career firefighters and uniformed police officers) would be required in the ROI. These increases would represent 4.4% 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 785 jobs (Table 11.7.19.2-1). Such a solar facility would also produce $26.3 million in income and $0.2 million in direct sales taxes. Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010d), acreage–related fees would be $1.1 million, and solar generating capacity fees would total at least $17.6 million.

Based on 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 373 persons in-migrating into the ROI.

TABLE 11.7.19.2-1 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Millers SEZ with Trough Facilities[a]

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	3,283	585
Total	4,578	785
Income[b]		
Total	278.3	26.3
Direct state taxes[b]		
Sales	0.2	0.2
BLM payments		
Acreage-related fee	NA	1.1
Capacity fee[d]	NA	17.6
In-migrants (no.)	3,654	373
Vacant housing[c] (no.)	1,827	336
Local community service employment		
Teachers (no.)	34	3
Physicians (no.)	3	0
Public safety (no.)	17	2

[a] Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 1,200 MW (corresponding to 6,000 acres [24 km^2] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 2,686 MW.

[b] Unless indicated otherwise, values are reported in $ million 2008. There is currently no individual income tax in Nevada.

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

[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 2010d), 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.

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 336 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 and 2 public safety employees (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 1,823 jobs (Table 11.7.19.2-2). Construction activities would constitute 5.9% of total ROI employment. Such a solar facility would also produce $110.8 million in income and $0.1 million in direct sales taxes.

Based on the scale of construction activities and the likelihood of local worker availability in the required occupational categories, construction of a solar facility would mean that some in-migration of workers and their families from outside the ROI would be required, with 1,456 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 728 rental units expected to be occupied in the ROI. This occupancy rate would represent 36.5% of the vacant rental units expected to be available in the ROI.

In addition to the potential impact on housing markets, in-migration would affect community service (education, health, and public safety) employment. An increase in such employment would be required to meet existing levels of service in the ROI. Accordingly, 13 new teachers, 1 physician, and 7 public safety employees would be required in the ROI. These increases would represent 1.8% 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 370 jobs (Table 11.7.19.2-3). Such a solar facility would also produce $12.0 million in income. Direct sales taxes would be less than $0.1 million. Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010d), acreage–related fees would be $1.1 million, and solar generating capacity fees would total at least $9.8 million.

TABLE 11.7.19.2-2 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Millers SEZ with Power Tower Facilities[a]

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	1,308	302
Total	1,823	370
Income[b]		
Total	110.8	12.0
Direct state taxes[b]		
Sales	0.1	<0.1
BLM payments		
Acreage-related fee	NA	1.1
Capacity fee[d]	NA	9.8
In-migrants (no.)	1,456	193
Vacant housing[c] (no.)	728	173
Local community service employment		
Teachers (no.)	13	2
Physicians (no.)	1	0
Public safety (no.)	7	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 667 MW (corresponding to 6,000 acres [24 km^2] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 1,492 MW.

[b] Unless indicated otherwise, values are reported in $ million 2008. There is currently no individual income tax in Nevada.

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

[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 2010d), 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.

Based on 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 193 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 173 owner-occupied units expected to be required in the ROI.

In addition to the potential impact on housing markets, in-migration would affect community service (education, health, and public safety) employment. An increase in such employment would be required to meet existing levels of service in the ROI. Accordingly, 2 new teachers and 1 public safety employee 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 741 jobs (Table 11.7.19.2-3). Construction activities would constitute 2.4% of total ROI employment. Such a solar facility would also produce $45.1 million in income and less than $0.1 million in direct sales taxes.

Based on the scale of construction activities and the likelihood of local worker availability in the required occupational categories, construction of a solar facility would mean that some in-migration of workers and their families from outside the ROI would be required, with 592 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility construction on the number of vacant rental housing units would not be expected to be large, with 296 rental units expected to be occupied in the ROI. This occupancy rate would represent 14.9% 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, 5 new teachers, 1 physician, and 3 public safety employees would be required in the ROI. These increases would represent less than 0.7% 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 360 jobs (Table 11.7.19.2-3). Such a solar facility would also produce $11.7 million in income and less than $0.1 million in direct sales taxes. Based on fees established by the BLM in its Solar

TABLE 11.7.19.2-3 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Millers SEZ with Dish Engine Facilities[a]

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	532	294
Total	741	360
Income[b]		
Total	45.1	11.7
Direct state taxes[b]		
Sales	<0.1	<0.1
BLM payments		
Acreage-related fee	NA	1.1
Capacity fee[d]	NA	9.8
In-migrants (no.)	592	187
Vacant housing[c] (no.)	296	168
Local community service employment		
Teachers (no.)	5	2
Physicians (no.)	1	0
Public safety (no.)	3	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 667 MW (corresponding to 6,000 acres [24 km^2] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 1,492 MW.

[b] Unless indicated otherwise, values are reported in $ million 2008. There is currently no individual income tax in Nevada.

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

[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 2010d), 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.

Energy Interim Rental Policy (BLM 2010d), acreage–related fees would be $1.1 million, and solar generating capacity fees would total at least $9.8 million.

Based on 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 187 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 168 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 and 1 public safety employee 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 346 jobs (Table 11.7.19.2-4). Construction activities would constitute 1.1% of total ROI employment. Such a solar development would also produce $21.0 million in income and less than $0.1 million in direct sales taxes.

Based on 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 276 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 138 rental units expected to be occupied in the ROI. This occupancy rate would represent6.9% 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 and 1 public safety employee would be required in the ROI. This increase would represent less than 0.3% of total ROI employment expected in this occupation.

TABLE 11.7.19.2-4 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Millers SEZ with PV Facilities[a]

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	248	29
Total	346	36
Income[b]		
Total	21.0	1.2
Direct state taxes[b]		
Sales	<0.1	<0.1
BLM payments		
Acreage-related fee	NA	1.1
Capacity fee[d]	NA	7.8
In-migrants (no.)	276	19
Vacant housing[c] (no.)	138	17
Local community service employment		
Teachers (no.)	3	0
Physicians (no.)	0	0
Public safety (no.)	1	0

[a] Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 667 MW (corresponding to 6,000 acres [24 km^2] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 1,492 MW.

[b] Unless indicated otherwise, values are reported in $ million 2008. There is currently no individual income tax in Nevada.

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

[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 2010d) , assuming full build-out of the site.

Operations. Total operations employment impacts in the ROI (including direct and indirect impacts) of a build-out using PV technologies would be 36 jobs (Table 11.7.19.2-4). Such a solar facility would also produce $1.2 million in income and less than $0.1 million in direct sales taxes. Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010d), acreage–related fees would be $1.1 million, and solar generating capacity fees would total at least $7.8 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 19 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 17 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.

11.7.19.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features addressing socioeconomic impacts have been identified for the proposed Millers SEZ. Implementing the programmatic design features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would reduce the potential for socioeconomic impacts during all project phases.

11.7.20 Environmental Justice

11.7.20.1 Affected Environment

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," formally requires federal agencies to incorporate environmental justice as part of their missions (*Federal Register,* Volume 59, page 7629, Feb. 11, 1994). Specifically, it directs them to address, as appropriate, any disproportionately high and adverse human health or environmental effects of their actions, programs, or policies on minority and low-income populations.

The analysis of the impacts of solar energy projects on environmental justice issues follows guidelines described in the CEQ's *Environmental Justice Guidance under the National Environmental Policy Act* (CEQ 1997). The analysis method has three parts: (1) a description 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 Millers 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 2009j,k). The following definitions were used to define minority and low-income population groups:

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

  Beginning with the 2000 Census, where appropriate, the census form allows individuals to designate multiple population group categories to reflect their ethnic or racial origin. In addition, persons who classify themselves as being of multiple racial origin may choose up to six racial groups as the basis of their racial origins. The term minority includes all persons, including those classifying themselves in multiple racial categories, except those who classify themselves as not of Hispanic origin and as White or "Other Race" (U.S. Bureau of the Census 2009j).

The CEQ guidance proposed that minority populations should be identified where either (1) the minority population of the affected area exceeds 50% or (2) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

This PEIS applies both criteria in using the Census data for census block groups, wherein consideration is given to the minority population that is both greater than 50% and 20 percentage points higher than in the state (the reference geographic unit).

- **Low-Income**. Individuals who fall below the poverty line. The poverty line takes into account family size and age of individuals in the family. In 1999, for example, the poverty line for a family of five with three children below the age of 18 was $19,882. For any given family below the poverty line, all family members are considered as being below the poverty line for the purposes of analysis (U.S. Bureau of the Census 2009k).

The data in Table 11.7.20.1-1 show the minority and low-income composition of the total population located in the proposed SEZ based on 2000 Census data and CEQ guidelines. Individuals identifying themselves as Hispanic or Latino are included in the table as a separate entry. However, because Hispanics can be of any race, this number also includes individuals identifying themselves as being part of one or more of the population groups listed in the table.

Minority and low-income individuals are located in the 50-mi (80-km) area around the boundary of the SEZ. Within the 50-mi (80-km) radius in California, 18.2% of the population is classified as minority, while 9.3% is classified as low-income. However, the number of minority individuals does not exceed 50% of the total population in the area, and the number of minority individuals does not exceed the state average by 20 percentage points or more; thus, in aggregate, there is no minority population in the 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 SEZ area.

In the Nevada portion of the 50-mi (80-km) radius, 16.2% of the population is classified as minority, while 11.6% is classified as low-income. The number of minority individuals does not exceed 50% of the total population in the area and the number of minority individuals does not exceed the state average by 20 percentage points or more; thus, 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

TABLE 11.7.20.1-1 Minority and Low-Income Populations within the 50-mi (80-km) Radius Surrounding the Proposed Millers SEZ

Parameter	California	Nevada
Total population	3,162	7,713
White, non-Hispanic	2,586	6,464
Hispanic or Latino	348	535
Non-Hispanic or Latino minorities	228	714
One race	170	460
Black or African American	3	66
American Indian or Alaskan Native	144	337
Asian	13	24
Native Hawaiian or Other Pacific Islander	5	12
Some other race	5	21
Two or more races	58	254
Total minority	576	1,249
Low-income	293	893
Percentage minority	18.2	16.2
State percentage minority	53.3	34.8
Percentage low-income	9.3	11.6
State percentage low-income	14.2	10.5

Source: U.S. Bureau of the Census (2009j,k).

more and does not exceed 50% of the total population in the area; thus, in aggregate, there are no low-income populations in the SEZ area.

11.7.20.2 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 Millers SEZ include noise and dust during the construction; noise and electromagnetic field (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. Impacts are likely to be small, however, and there are no minority populations defined by CEQ guidelines (Section 11.7.20.1) 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 no low-income populations within the 50-mi (80-km) radius, there could be no impacts on low-income populations.

11.7.20.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features addressing environmental justice impacts have been identified for the proposed Millers SEZ. Implementing the programmatic design features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would reduce the potential for environmental justice impacts during all project phases.

11.7.21 Transportation

The proposed Millers SEZ is accessible by road. One U.S. highway serves the immediate area. The nearest railroad access is approximately 90 mi (145 km) away. Five small airports serve the area within a drive of approximately 90 mi (145 km). General transportation considerations and impacts are discussed in Sections 3.4 and 5.19, respectively.

11.7.21.1 Affected Environment

U.S. 95/U.S. 6 runs east–west along the southern border of the Millers SEZ, as shown in Figure 11.7.21.1-1. The small town of Tonopah is approximately 15 mi (24 km) to the east of the SEZ along U.S. 95. To the southeast of the SEZ, U.S. 95 intersects Interstate 15 (I-15) in the center of the Las Vegas metropolitan area, about 230 mi (370 km) away. The town of Fernley to the northwest, at about the closest approach of I-80 to the SEZ, is approximately a 185-mi (298-km) drive. From the east, U.S. 6 merges with U.S. 95 at Tonopah before they pass along the southern edge of the SEZ. Approximately 20 mi (32 km) to the west of the SEZ, U.S. 95 and U.S. 6 again become separate highways. Several local unimproved dirt roads cross the SEZ as shown in Figure 11.7.21.1-1. Data identifying open OHV routes within the proposed SEZ were not available. As listed in Table 11.7.21.1-1, U.S. 95 carries an average traffic volume of about 2,000 vehicles per day in the vicinity of the Millers SEZ (NV DOT 2010).

The UP Railroad serves the region. A spur from the main line that crosses northern Nevada ends at Thorne (UP Railroad 2009), 90 mi (145 km) northwest of the SEZ along U.S. 95, immediately north of Hawthorne.

The nearest public airport is the Tonopah Airport, a small county airport about a 23-mi (37-km) drive to the east of the SEZ on U.S. 6. The airport has two asphalt runways in good condition, as listed in Table 11.7.21.1-2. Three small airports with single dirt runways managed by the BLM—Dyer, Lida Junction, and Mina—are within a 64-mi (103-km) drive of the Millers SEZ. Hawthorne Industrial Airport, in Hawthorne, has one asphalt and one dirt runway. None of the airports has scheduled commercial passenger service or regular freight service.

Nellis Air Force Base, available only to military aircraft, lies on the northeastern edge of the Las Vegas metropolitan area. Nellis Air Force Base is one of the largest fighter bases in the world and is involved in conducting advanced fighter training. Operations occur over the NTTR, which offers 4,700 mi^2 (12,173 km^2) of restricted land (U.S. Air Force 2010). The northwestern corner of the NTTR is approximately 26 mi (42 km) to the southeast of the Millers SEZ.

11.7.21.2 Impacts

As discussed in Section 5.19, the primary transportation impacts are anticipated to be from commuting worker traffic. Single projects could involve up to 1,000 workers each day, with an additional 2,000 vehicle trips per day (maximum) or possibly 4,000 vehicle trips per day if two larger projects were to be developed at the same time. The volume of traffic on U.S. 95

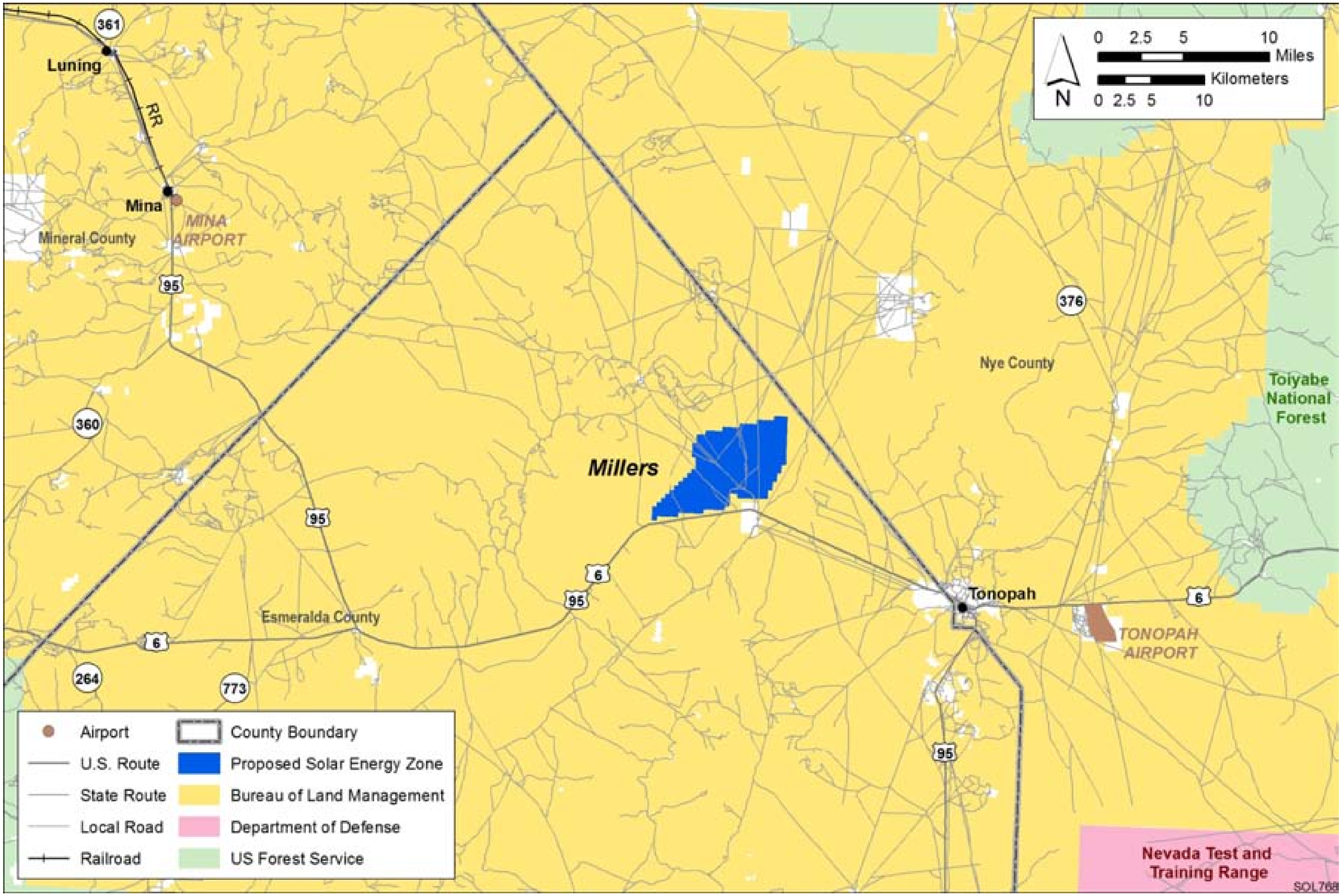

FIGURE 11.7.21.1-1 Local Transportation Network Serving the Proposed Millers SEZ

TABLE 11.7.21-1 AADT on Major Roads near the Proposed Millers SEZ for 2009

Road	General Direction	Location	AADT (Vehicles)
U.S. 6	East–West	*East of merge with U.S. 95*	
		East of State Route 376	580
		East of Tonopah (west of State Route 376)	1,100
		West of merge with U.S. 95	
		West of Coaldale junction	280
U.S. 95	Northwest–Southeast	North of Coaldale junction	1,700
		West of junction with State Route 265 (west of SEZ)	2,000
		North of Tonopah, 13 mi (21 km) past the Nye/ Esmeralda County line (east of the SEZ)	1,900
		South of Tonopah	2,100
		South of Goldfield	2,000
		North of junction with State Route 266	1,900
		South of junction with State Route 266	2,000
State Route 265	North–South	South of junction with U.S. 95	110
State Route 376	North–South	North of U.S. 6	490
State Route 773	Southwest–Northeast	South of junction with U.S. 6	70

Source: NV DOT (2010).

along the southern edge of the Millers SEZ would represent an increase in traffic of about 100 or 200% for one or two projects, respectively, should all traffic access the SEZ in that area.

Because higher traffic volumes would be experienced during shift changes, traffic on U.S. 95 would experience slowdowns during these time periods in the vicinity of access roads for projects in the SEZ. Local road improvements would be necessary on any portion of U.S. 95 that might be developed so as not to overwhelm the local access roads near any site access point(s).

Solar development within the SEZ would affect public access along OHV routes designated open and available for public use. If there are any designated as open within the proposed SEZ, open routes crossing areas issued ROWs for solar facilities would be re-designated as closed (see Section 5.5.1 for more details on how routes coinciding with proposed solar facilities would be treated).

11.7.21.3 Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features have been identified related to impacts on transportation systems around the proposed Millers SEZ. The programmatic design features described in Appendix A, Section A.2.2, including local road improvements, multiple site access locations, staggered work schedules, and ride-sharing, would all provide some relief to traffic congestion on local roads leading to the site. Depending on the location of solar facilities within the SEZ, more specific access locations and local road improvements could be implemented.

TABLE 11.7.21-2 Airports Open to the Public in the Vicinity of the Proposed Millers SEZ

			Runway 1[a]			Runway 2[a]		
Airport	Location	Owner/Operator	Length (ft [m])	Type	Condition	Length (ft [m])	Type	Condition
Dyer	Southeast of Dyer, 64 mi (103 km) from the SEZ via U.S. 95, U.S. 6, and State Route 264	BLM	2,870 (875)	Dirt	Fair	NA[b]	NA	NA
Hawthorne Industrial	89 mi (143 km) northwest of the SEZ on U.S. 95 in Hawthorne	Mineral County	3,500 (1,067)	Dirt	Good	6,000 (1,829)	Asphalt	Good
Lida Junction	South–southeast of the SEZ on U.S. 95 at the junction with State Route 266, 58 mi (93 km) away	BLM	6,100 (1,859)	Dirt	Good	NA	NA	NA-
Mina	54 mi (87 km) northwest of the SEZ in Mina on U.S. 95	BLM	4,600 (1,402)	Dirt	Good	NA	NA	NA
Tonopah	East of Tonopah, 23 mi (37 km) east of the SEZ on U.S. 6	Nye County	6,196 (1,889)	Asphalt	Good	7,161 (2,183)	Asphalt	Good

[a] Source: FAA (2009).

[b] NA = not applicable.

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11.7.22 Cumulative Impacts

The analysis presented in this section addresses the potential cumulative impacts in the vicinity of the proposed Millers SEZ in Esmeralda 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 further than 5 to 10 years in the future.

The Millers SEZ is located 15 mi (24 km) northwest of Tonopah, Nevada. The land surrounding the Millers SEZ is undeveloped with few permanent residents living in the area. The nearest population center is the small community of Tonopah, population approximately 1,500. The NTTR is 30 mi (48 km) northeast of the SEZ. Several WAs in California are within 50 mi (80 km) of the SEZ. The BLM administers approximately 68% of the land in the Southern Nevada District, which contains the Millers SEZ, and about 56% of the land in Nye County.

The geographic extent of the cumulative impacts analysis for potentially affected resources near the Millers SEZ is identified in Section 11.7.22.1. An overview of ongoing and reasonably foreseeable future actions is presented in Section 11.7.22.2. General trends in population growth, energy demand, water availability, and climate change are discussed in Section 11.7.22.3. Cumulative impacts for each resource area are discussed in Section 11.7.22.4.

11.7.22.1 Geographic Extent of the Cumulative Impacts Analysis

The geographic extent of the cumulative impacts analysis for potentially affected resources evaluated near the Millers SEZ is provided in Table 11.7.22.1-1. These geographic areas define the boundaries encompassing potentially affected resources. Their extent may vary based on the nature of the resource being evaluated and the distance at which an impact may occur (thus, for example, the evaluation of air quality may have a greater regional extent of impact than visual resources). The BLM, USFS, and DoD administer most of the land around the SEZ; there are also some Tribal lands nearby at the Yomba Reservation 48 mi (77 km) to the north of the SEZ. The BLM administers approximately 76.6% of the lands within a 50-mi (80-km) radius of the SEZ.

11.7.22.2 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;

TABLE 11.7.22.1-1 Geographic Extent of the Cumulative Impacts Analysis by Resource Area: Proposed Millers SEZ

Resource Area	Geographic Extent
Land Use	Esmeralda County
Specially Designated Areas and Lands with Wilderness Characteristics	Esmeralda County
Rangeland Resources	
Grazing	Esmeralda County
Wild Horses and Burros	A 50 mi (80 km) radius from the center of the Millers SEZ
Recreation	Esmeralda County
Military and Civilian Aviation	Esmeralda and Nye Counties
Soil Resources	Areas within and adjacent to the Millers SEZ
Minerals	Esmeralda County
Water Resources	
Surface Water	Ione Wash, Peavine Creek, unnamed wash, Slime Wash, unnamed dry lake
Groundwater	Tonopah Flat Groundwater Basin
Air Quality and Climate	A 31-mi (50-m) radius from the center of the Millers SEZ
Vegetation, Wildlife and Aquatic Biota, Special Status Species	A 50-mi (80-km) radius from the center of the Millers SEZ, including portions of Esmeralda, Nye, and Mineral Counties in Nevada, and Inyo County in California
Visual Resources	Viewshed within a 25-mi (40-km) radius of the Millers SEZ
Acoustic Environment (noise)	Areas adjacent to the Millers SEZ
Paleontological Resources	Areas within and adjacent to the Millers SEZ
Cultural Resources	Areas within and adjacent to the Millers SEZ for archaeological sites; viewshed within a 25-mi (40-km) radius of the Millers SEZ for other properties, such as traditional cultural properties.
Native American Concerns	Areas within and adjacent to the Millers SEZ in the Big Smoky Valley viewshed within a 25-mi (40-km) radius of the Millers SEZ
Socioeconomics	Esmeralda and Nye Counties
Environmental Justice	Esmeralda and Nye Counties
Transportation	U.S. 95, U.S. 6

- 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 11.7.22.2.1); 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 11.7.22.2.2). Together, these actions have the potential to affect human and environmental receptors within the geographic range of potential impacts over the next 20 years.

11.7.22.2.1 Energy Production and Distribution

On February 16, 2007, Governor Gibbons signed an Executive Order to encourage the development of renewable energy resources in Nevada (Gibbons 2007a). The Executive Order requires all relevant state agencies to review their permitting processes to ensure the timely and expeditious permitting of renewable energy projects. On May 9, 2007, and June 12, 2008, the Governor signed Executive Orders creating the Nevada Renewable Energy Transmission Access Advisory Committee Phase I and Phase II, which will propose recommendations for improved access to the grid system for renewable energy industries (Gibbons 2007b, 2008). In May 28, 2009, the Nevada Legislature passed a bill modifying the Renewable Energy Portfolio Standards (Nevada Senate 2009). The bill requires that 25% of the electricity sold to be produced by renewable energy sources by 2025.

Reasonably foreseeable future actions related to energy production and distribution are identified in Table 11.7.22.2-1 and described in the following sections.

TABLE 11.7.22.2-1 Reasonably Foreseeable Future Actions Related to Energy Development and Distribution near the Proposed Millers SEZ[a]

Description	Status	Resources Affected	Primary Impact Location
Fast-Track Solar Energy Projects on BLM-Administered Land			
Crescent Dunes Solar Energy Project (NVN-86292); 180 MW, solar tower, 1,600 acres	NOI, Nov. 24, 2009	Terrestrial habitats, wildlife, vegetation, water, soils, cultural, visual, aviation, and land use	3 mi (5 km) east of the SEZ
Renewable Energy Development			
Darrough Hot Springs Geothermal Leasing Project; 27 MW, 160 acres	ROD issued Aug. 18, 2009	Terrestrial habitats, wildlife	45 mi (72 km) north of the SEZ
Transmission and Distribution Systems			
None			

[a] Projects in later stages of agency environmental review and project development.

Renewable Energy Development

Renewable energy ROW applications are considered as either foreseeable or potential projects. Fast-track applications are considered to represent foreseeable projects, since the environmental review and public participation process is completed or under way and the applications could be approved by December 2010. There is one fast-track solar project and one other foreseeable geothermal project within 50 mi (80 km) of the proposed Millers SEZ, the Crescent Dunes Solar Energy Project, and Darrough Hot Springs Geothermal Leasing Project, respectively. Regular-track applications are considered potential future projects, but not necessarily foreseeable projects, since not all applications would be expected to result in competed projects. These proposals are considered together as a general level of interest in development of renewable energy in the region. Identified foreseeable and potential (pending) renewable energy projects are discussed in the following sections.

Foreseeable Renewable Energy Projects

Crescent Dunes Solar Energy Project (NVN 86292). This proposed fast-track project would be a CSP/tower facility with an output of 180 MW. Tonopah Solar Energy proposed to construct and operate the facility. The project would be located about 3 mi (5 km) east of the SEZ on 1,600 acres (6.5 km^2) of the 7,680-acre (31-km^2) site on BLM-administered land 13 mi

(21 km) northwest of Tonopah, Nevada. The facility would include a circular array of 17,350 heliostats that reflect the sunlight onto a central 633-ft (193-m) tall receiver tower. A liquid salt circulating through the tubes of the receiver is heated to more than 1,000°F (538°C) and routed to a thermal storage tank. When electricity is to be generated, the hot salt passes through a heat exchanger to produce steam for use in a steam turbine/generator. A hybrid cooling system would consist of an air-cooled condenser augmented with a wet-cooling system. The facility would also include associated equipment, an 8-mi (13-km) transmission line, an operation and maintenance building, and access roads (Tonopah Solar Energy 2009; BLM 2009a).

Darrough Hot Springs Geothermal Leasing Project. Great America Energy is proposing to construct and operate a 27-MW geothermal plant on 160 acres (0.65 km^2) of Humboldt-Toiyabe National Forest land, 45 mi (72 km) north of the SEZ. The physical facilities comprise production and injection wells, a gathering and injection system, and a power generation plant on site, with a transmission line connecting it to the grid (Great American Energy 2010).

Pending Solar, Wind, and Geothermal ROW Applications on BLM-Administered Lands. Applications for ROWs that have been submitted to the BLM include one fast-track solar application, one pending solar project, one pending wind site testing application, four authorized wind site testing projects, and two authorized geothermal projects that would be located within 50 mi (80 km) of the Millers SEZ. Table 11.7.22.2-2 lists these applications and Figure 11.7.22.2-1 shows their locations.

There is a pending solar project that would be on private land adjacent to the Millers SEZ. In 2010, Altella Energy Corporation proposed to Esmeralda County the development of a 100-MW solar energy facility on private land. The proposed site is located within one mile south of the Millers SEZ, near Highways 6 and 95. The site is known as the Miller's Well site. The project's estimated cost is $500 million (Esmeralda County 2010a,b).

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 types of applications listed in Table 11.7.22.2-2 are an indication of the level of interest in the development of renewable energy in the region. Some number of these applications would be expected to result in actual projects. Thus, the cumulative impacts of these potential projects are analyzed in their aggregate effects.

Wind testing would involve some relatively minor activities that could have some environmental effects, mainly the erection of meteorological towers and monitoring of wind conditions. These towers may or may not employ guy wires and may be 200 ft (60 m) high.

TABLE 11.7.22.2-2 Pending Renewable Energy Project ROW Applications on BLM-Administered Land within 50 mi (80 km) of the Proposed Millers SEZ[a,b]

Serial Number	Applicant	Application Received	Size (acres)[c]	MW	Technology	Status	Field Office
Solar Applications							
NVN 85215	Luning Solar Energy	May 20, 2008	575	30	PV	Pending	Stillwater
Wind Applications							
NVN 85811	Wasatch Wind	June 4, 2008	6,023	–	Wind	Pending wind site testing	Stillwater
NVN 80354	Windqwest, LLC	June 10, 2005	1,248	–	Wind	Authorized wind site testing	Stillwater
NVN 84404	–[d]	–	–	–	Wind	Authorized wind site testing	Tonopah
NVN 86261	Greenwing Energy Management	Oct. 24, 2008	15,680	–	Wind	Authorized wind site testing	Tonopah
NVN 87324	Pacific Wind Development	March 23, 2009	4,280	–	Wind	Authorized wind site testing	Tonopah
Geothermal Leases							
NVN 56347X	Fish Lake Power	–	47,769	–	Geothermal	Authorized	Tonopah
NVN 85257X	Ormat Technologies	–	5,130	–	Geothermal	Authorized	Tonopah

a Source: BLM (2009b).

b Information for pending solar and pending wind (BLM and USFS 2010b) energy projects downloaded from GeoCommunicator.

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

d A dash indicates data not available.

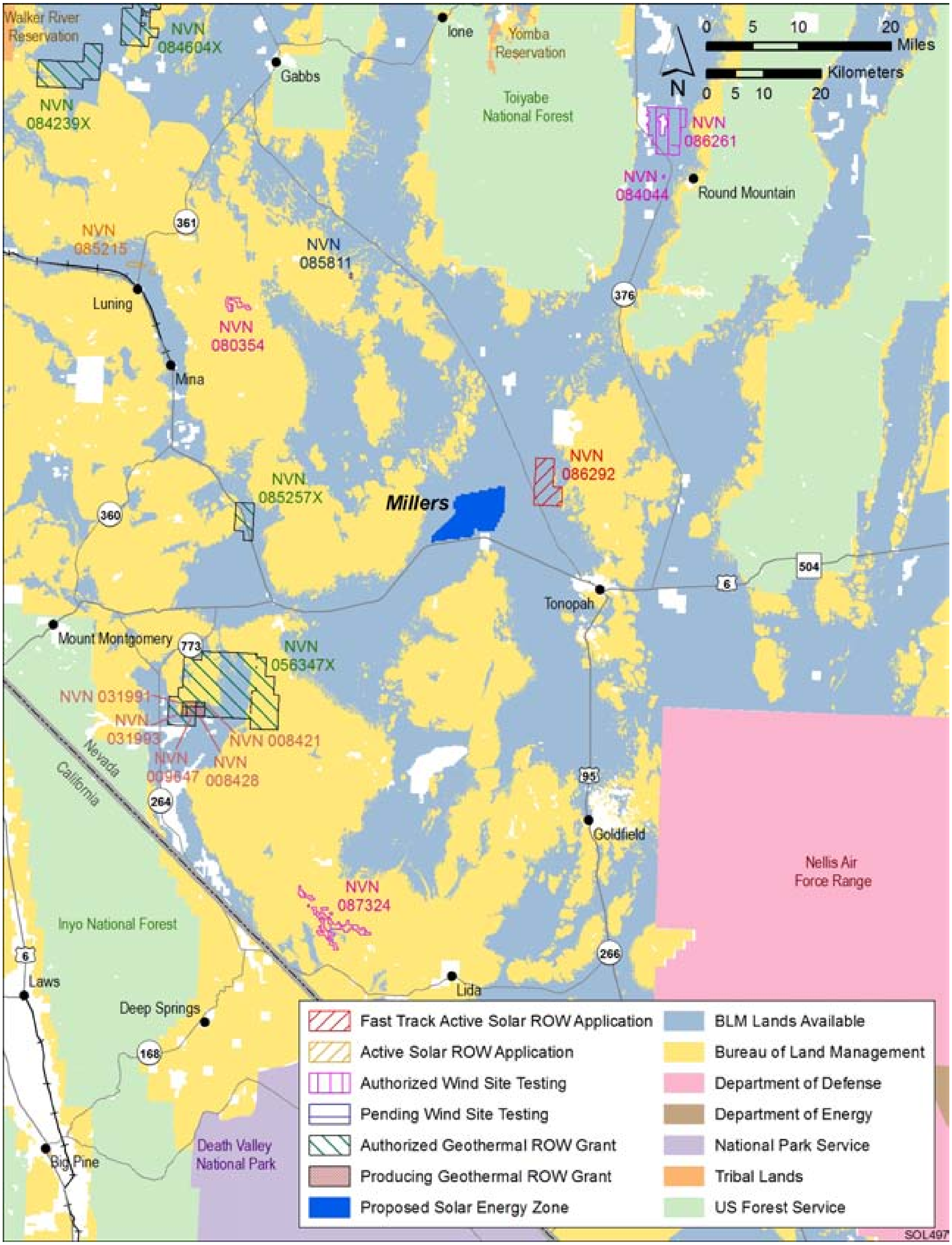

FIGURE 11.7.22.2-1 Locations of Renewable Energy Project ROW Applications on Public Land within a 50-mi (80-km) Radius of the Proposed Millers SEZ

11.7.22.2.2 Other Actions

Other major ongoing and foreseeable actions identified within 50 mi (80 km) of the proposed Millers SEZ are listed in Table 11.7.22.2-3 and are described in the following subsections. Producing geothermal leases are covered in the previous section.

Round Mountain Mine Expansion. The Round Mountain Gold Corporation proposes to expand its existing Round Mountain Mine, located east and southeast of the town of Carver and 45 mi (72 km) north of the SEZ, including expansion of the Round Mountain open pit, North Waste Rock Dump, mill facility, tailings impoundment, growth media and ore stockpiles, stormwater control and diversion structures, dewatering operations for the open pit, west and south dedicated leach pads, reusable pad, and process facilities. The proposed action would include the expansion and development of facilities and construction of new facilities in the Gold Hill area, 1.6 mi (2.4 km) north, and would include the construction of a 1.1-mi (1.8-km) long

TABLE 11.7.22.2-3 Other Major Actions near the Proposed Millers SEZ[a]

Description	Status	Resources Affected	Primary Impact Location
Round Mountain Mine Expansion	FEIS issued April 2010	Terrestrial habitats, wildlife, cultural resources	45 mi (72 km) north of the SEZ
Chemetall Foote Lithium Carbonate Facility Expansion	EA issued Sept 2010	Terrestrial habitats, wildlife, air quality	30 mi (48 km) south of the SEZ
Mineral Ridge Project	Restarting in 2011	Terrestrial habitats, groundwater, air quality	28 mi (45 km) south of the SEZ
Caliente Rail Realignment	FEIS June 2008	Terrestrial habitats, wildlife cultural resources	24 mi (38 km) southeast of the SEZ
Montezuma Peak Herd Management Area (HMA) and Paymaster HMA Wild Horse and Burro Gather	EA issued June 2010	Terrestrial habitats, wildlife	32 mi (51 km) and 8 mi (13 km) southeast of the SEZ
Five Producing Geothermal Leases: NVN 8421, 8428, 9647, 31991, and 31993	Operating	Terrestrial habitats, wildlife	32 mi (51 km) southwest of the SEZ

[a] Projects in latter stages of agency environmental review and project development.

Transportation/Utility Corridor between the Round Mountain and Gold Hill areas, which would include a haul road, electric transmission line, water pipeline, and communication lines. The total disturbed area would be 4,698 acres (19.0 km^2) The existing total employment level of approximately 730 workers would grow to a maximum of 1,140 during construction and would range between 760 and 940 through completion of surface mining in 2016 (BLM 2010a).

Chemetall Foote Lithium Carbonate Facility Expansion. The DOE is proposing to upgrade an existing brine field production system, brine evaporation pond system, and lithium carbonate plant at the Chemetall Foote facility adjacent to the unincorporated town of Silver Peak, Nevada and 30 mi (48 km) south of the SEZ. The site is about 15,000 acres (61 km^2), mostly occupied by large evaporation ponds. The plant and administrative offices occupy approximately 20 acres (0.08 km^2). Existing lithium brine ponds would be expanded through recovering old ponds and rebuilding the dikes. Construction of new brine production wells would require soil placement for drill pads (DOE 2010).

Mineral Ridge Project. Mineral Ridge, a formerly producing gold and silver mine, has both underground workings and open pits, with a six-acre (0.024-km^2) deep leach operation and a high volume crusher plant. It is currently not operational but engineering work is being performed for future operations. It is anticipated that active mining will commence in 2011. The site is 3 mi (3 km) northwest of the unincorporated town of Silver Peak and approximately 28 mi (45 km) south of the SEZ (Top Stock Picks 2010).

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 about 24 mi (38 km) southeast of the SEZ, to a location near the northwest corner of the Nevada Test and Training Range (labeled Nellis Air Force Range in Figure 11.7.22.2-1), 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, and would be restricted to DOE shipments. Over a 50-year period, 9,500 casks containing spent nuclear fuel and high-level 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 ROW for a total footprint of 40,600 acres (164 km^2) (DOE 2008).

Montezuma Peak HMA and Paymaster HMA Wild Horse and Burro Gather. The BLM Tonopah Field Office is proposing to conduct a wild horse and burro gather to remove approximately 182 wild horses and burros residing primarily outside the boundaries of the

HMAs. The Montezuma Peak HMA is located west of the town of Goldfield, 32 mi (51 km) southeast of the SEZ and encompasses approximately 77,931 acres (315 km^2). The Paymaster HMA is 7 mi (11 km) west of Tonopah, 8 mi (13 km) southeast of the SEZ and encompasses 100.500 acres (425 km^2) (BLM 2010b).

Existing Geothermal Leases. There is a small, contiguous cluster of five producing geothermal leases located about 32 mi (51 km) southwest of the proposed SEZ, shown in Figure 11.7.22.2-1.

Grazing

The Monte Cristo grazing allotment is in the immediate vicinity of the SEZ.

Mining

The existing Round Mountain gold mine and proposed expansion is discussed above in this section.

11.7.22.3 General Trends

General trends of population growth, energy demand, water availability, and climate change for the proposed Millers SEZ are presented in this section. Table 11.7.22.2-4 lists the relevant impacting factors for the trends.

11.7.22.3.1 Population Growth

Over the period 2000 to 2008, the population grew annually by 3.9% in Nye County but the population fell by –4.6% annually in Esmeralda County and by –1.1 in Mineral County, the ROI for the Millers SEZ (see Section 11.7.19.1.5). The population of the ROI in 2008 was 49,487, having grown at an average annual rate of 3.2% since 2000. The annual growth rate for the state of Nevada as a whole was 3.4%.

11.7.22.3.2 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

TABLE 11.7.22.2-4 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

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).

11.7.22.3.3 Water Availability

As described in Section 11.7.9.1.3, the perennial yield of the Tonopah Flat groundwater basin is set at 6,000 ac-ft/yr (7.4 million m^3/yr), and water rights in the basin are over-appropriated with a total of 19,588 ac-ft/yr (24.2 million m^3/yr) being allotted for irrigation, mining, municipal, and stockwater uses (95% of allotments used for irrigation and mining [NDWR 2010a]).

The general groundwater flow pattern in the Tonopah Flat basin is from northeast to southwest along the axis of the valley. The depth to groundwater ranges from 8 to 78 ft (2 to 24 m) below the land surface within a 5-mi (8-km) radius of the proposed SEZ (USGS 2010b). In general, depth to groundwater is greater in the northern portion of the Tonopah Flat basin and is near surface levels in the vicinity of the dry lake playas in the south portion of the basin (Meinzer 1917; Rush and Schroer 1971).

In 2005, water withdrawals from surface waters and groundwater in Esmeralda County were 46,786 million ac-ft/yr (57.7 million m^3/yr), of which 9% came from surface waters and 91% came from groundwater. The largest water use categories for groundwater were irrigation and mining at 28,235 and 14,202 ac-ft/yr (34.8 million and 17.5 million m^3/yr), respectively. The remaining groundwater withdrawals were used for domestic and livestock (Kenny et al. 2009). In the Tonopah Flat basin, groundwater extractions totaled 260 ac-ft/yr (320,700 m^3/yr) in 1968, which was primarily used for irrigation purposes (Rush and Schroer 1971).

11.7.22.3.4 Climate Change

Governor Jim Gibbons' Nevada Climate Change Advisory committee (NCCAC) conducted a study of climate change and its effects on Nevada (NCCAC 2008). The report summarized the present scientific understanding of climate change and its potential impacts on Nevada. A report on global climate change in the United States prepared by the U.S. Global Research Change 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, 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 (0.08ºC) compared to a 1960 to 1979 baseline, and by the end of the century, the average annual temperature is projected to rise 4ºF to 10ºF (2.2 to 5.5ºC).

- Warming climate and the 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.

11.7.22.4 Cumulative Impacts on Resources

This section addresses potential cumulative impacts in the proposed Millers SEZ on the basis of the following assumptions: (1) because of the moderate size of the proposed SEZ (10,000 to 30,000 acres [40.5 to 121 km^2]), up to two projects could be constructed at a time, and (2) maximum total disturbance over 20 years would be about 13,430 acres (54.4 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 120-kV transmission line runs through the SEZ, no analysis of impacts has been conducted for the construction of a new transmission line outside of the SEZ that might be needed to connect solar facilities to the regional grid (see Section 11.7.1.2). Regarding site access, because U.S. 95/U.S. 6 runs from east to west along the southern border of the SEZ, no major road construction activities outside of the SEZ would be needed to support solar development in the SEZ.

Cumulative impacts that would result from the construction, operation, and decommissioning of solar energy development projects within the proposed SEZ when added to other past, present, and reasonably foreseeable future actions described in the previous section in each resource area are discussed below. At this stage of development, because of the uncertain nature of the future projects in terms of size, number, location within the proposed SEZ, and the types of technology that would be employed, the impacts are discussed qualitatively or semi-quantitatively, with ranges given as appropriate. More detailed analyses of cumulative impacts would be performed in the environmental reviews for the specific projects in relation to all other existing and proposed projects in the geographic areas.

11.7.22.4.1 Lands and Realty

The area covered by the proposed Millers SEZ is largely isolated and undeveloped. In general, the areas surrounding the SEZ are rural in nature. Existing dirt roads from separate access points on U.S. 95/U.S. 6 provide access to the southern portion of the SEZ. Numerous dirt/ranch roads provide access throughout the SEZ (Section 11.7.2.1).

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 11.7.22.2-2 and Figure 11.7.22.2-1, there is one fast-track solar application, one pending solar application, one pending wind site testing application, four authorized wind site testing projects, two authorized geothermal projects, and five producing geothermal lease agreements within a 50-mi (80-km) radius of the proposed Millers SEZ. There are currently no solar applications within the SEZ. The Crescent Dunes Solar Energy Project fast-track solar application lies about 3 mi (5 km) northeast of the SEZ. The mix of renewable energy applications indicates modest interest in renewable energy development of all three major types within 50 mi (80 km) of the proposed SEZ, but only the fast-track solar application and the Darrough Hot Springs geothermal project are considered firmly foreseeable projects (Section 11.7.22.2.1).

The Round Mountain Mine Expansion project is the only other major foreseeable action identified within this distance. The mine is located 45 mi (72 km) north of the proposed SEZ (Section 11.7.22.2.2), and the expansion would have minimal impacts on land use near the SEZ.

The development of utility-scale solar projects in the proposed Millers SEZ in combination with other ongoing, foreseeable, and potential actions within the geographic extent of effects, nominally 50 mi (80 km), could have cumulative effects on land use in the vicinity of the proposed SEZ. Ongoing and foreseeable actions on or near the SEZ could result in small cumulative impacts on land use through impacts on land access, groundwater availability, and on visual resources, especially if the SEZ is fully developed with solar projects.

11.7.22.4.2 Specially Designated Areas and Lands with Wilderness Characteristics

There are no specially designated areas within 25 mi (40 km) of the proposed Millers SEZ in Nevada (Section 11.7.3.1). Thus, no potential exists for cumulative visual impacts on such areas from the construction of utility-scale solar energy facilities within the SEZ.

11.7.22.4.3 Rangeland Resources

The proposed Millers SEZ contains a small portion of one perennial grazing allotment (Section 11.7.4.1.1). 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, wind, and geothermal applications within 50 mi (80 km) of the SEZ that are ultimately developed, would not likely result in cumulative impacts on grazing due to the small number and distance of the proposed facilities from the proposed SEZ. Other foreseeable projects would likewise have minimal effects on grazing. However, any closure of county roads or interconnected roads on the SEZ could affect access to grazing areas outside the SEZ unless rerouted. Mitigations would minimize such effects.

A number of BLM HMAs and HAs occur within the 50-mi (80-km) SEZ region for the proposed Millers SEZ (Section 11.7.4.2.1), including two within the 5-mi (8-km) area of indirect effects. While such areas near the proposed SEZ contain wild horses, potential indirect impacts from development within the SEZ would be mitigated. Since foreseeable projects within this distance would have minimal effects on wild horses and burros, cumulative impacts are unlikely to occur.

11.7.22.4.4 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. While there are no current solar applications within the proposed 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 access to recreation both inside and outside the SEZ. OHV use in particular could be affected. Foreseeable and potential actions would also affect areas of low recreational use and would have minimal effects on current recreational activities. Thus, cumulative impacts on recreation within the geographic extent of effects are not expected.

11.7.22.4.5 Military and Civilian Aviation

The eastern two-thirds of the proposed SEZ is covered by MTRs with 50- and 100-ft (15- and 30-m) AGL operating limits. The area is located about 30 mi (48 km) northwest of the boundary of the NTTR. The closest civilian municipal aviation facility is the Tonopah Municipal Airport, which is located about 20 mi (32 km) southeast of the SEZ. The military has expressed serious concern over possible solar energy facilities within the SEZ and at the fast-track solar energy site east of the SEZ. Nellis Air Force Base has indicated that any facilities higher than 50 ft (15 m) AGL may present unacceptable electromagnetic compatibility concerns for their test mission (Section 11.7.6.2). Potential new solar, wind, and geothermal facilities and associated new transmission lines outside 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 Tonopah Airport is located at a distance where there would be no effect on airport operations by facilities in the SEZ.

11.7.22.4.6 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 potential renewable energy facilities, proposed transmission lines, proposed water line, and recreational uses. Cumulative impacts on soil resources from other foreseeable projects within the geographic extent of effects are possible. The proposed 1,600-acre (6.5-km^2) fast-track Crescent Dunes Solar Energy Project would be located 3 mi (5 km) east of the SEZ and would contribute incremental impacts on soils, as could some number of the pending geothermal projects located to the southwest. Such future impacts from renewable energy projects could produce small cumulative increases over those from any development in the SEZ.

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 foreseeable projects and other activities (e.g., OHV use, outside the SEZ). However, with the required programmatic design features in place, cumulative impacts would be small.

11.7.22.4.7 Minerals (Fluids, Solids, and Geothermal Resources)

As discussed in Section 11.7.8, about two-thirds of the proposed Millers SEZ is covered by placer mining claims, which would represent prior existing rights, as well as potential limitations on solar development. Conversely, additional mining claims could be foreclosed if the SEZ was identified for solar development. In addition, any road closures on the SEZ could affect access to mining areas outside the SEZ. There are currently no active oil and gas leases within the proposed SEZ, while there are proposals for geothermal energy development pending. Because of the expected low impact on mineral accessibility of other foreseeable actions within the geographic extent of effects, and minimization and mitigation of road access closures, cumulative impacts on mineral resources are not expected.

11.7.22.4.8 Water Resources

Section 11.7.9.2 describes the water requirements for various technologies if they were to be employed on the proposed SEZ to develop utility-scale solar energy facilities. The amount of water needed during the peak construction year for all evaluated solar technologies would be 2,288 to 3,300 ac-ft (2.8 million to 4.1 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 77 to 40,327 ac-ft/yr (95 thousand to 50 million m^3). The amount of water needed during decommissioning would be similar to or less than the amount used during construction. As discussed in Section 11.7.22.3.3, water withdrawals in 2005 from surface waters and groundwater in Esmeralda County were 46,786 ac-ft/yr (57.7 million m^3/yr), of which 9% came from surface waters and 91% came from groundwater. The largest water use categories for groundwater were irrigation and mining at 28,235 and 14,202 ac-ft/yr (34.8 million and 17.5 million m^3/yr), respectively. Therefore, cumulatively the additional water resources needed for solar facilities in the SEZ during operations would constitute from a relatively small (0.2%) to a very large (86%) increment (the ratio of the annual operations water requirement to the annual amount withdrawn in Esmeralda 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 11.7.9.1.3, very little water has been historically withdrawn from the Tonopah Flat basin, roughly 260 ac-ft/yr (320,700 m^3/yr). The perennial yield of the basin is set at 6,000 ac-ft/yr (7.4 million m^3/yr), and water rights in the basin are over-appropriated. Thus, even if water rights were available, solar facilities on the SEZ would have the capacity to far exceed the physically available groundwater in the basin using wet cooling, while full development with dry-cooled solar trough technologies could require two-thirds of estimated basin yields (Section 11.7.9.2.2).

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, excessive groundwater withdrawals could affect groundwater and surface water flows, cause drawdown of groundwater, modify natural drainage pathways, obstruct natural recharge zones, and alter surface water-wetland-groundwater connectivity in the Tonopah Flat basin (Section 11.7.9.2). Therefore the use of groundwater monitoring wells is encouraged in order to determine the actual impact of development within the SEZ on the water table. Small cumulative impacts could occur when combined with other future projects in the region. The proposed fast-track Crescent Dunes Solar Energy Project, which would be located 3 mi (5 km) east of the SEZ, would use hybrid cooling, which would minimize water use, while the authorized geothermal leases to the southwest would not likely contribute to groundwater impacts in the Tonopah Flats basin.

Small quantities of sanitary wastewater would be generated during the construction and operation of the potential utility-scale solar energy facilities. The amount generated from solar facilities would be in the range of 19 to 148 ac-ft (23 to 183 thousand m^3) during the peak construction year and would range from 2 to 38 ac-ft/yr (up to 47,000 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 424 to 763 ac-ft/yr (0.52 to 0.94 million m^3) of blowdown water from cooling towers. Blowdown water would need to be either treated on-site or sent to an off-site facility. Any on-site treatment of wastewater would have to ensure that treatment ponds are effectively lined in order to prevent any groundwater contamination. Thus, blowdown water would not contribute to cumulative effects on treatment systems or on groundwater.

11.7.22.4.9 Vegetation

The proposed Millers SEZ is located within the Tonopah Basin ecoregion, which primarily supports sparse shadscale communities. Lands within the SEZ are classified primarily as Inter-Mountain Basins Mixed Salt Desert Scrub. Much of the SEZ consists of north to south trending broad, barren, gravel-covered washes, with small scattered playa areas, with shadscale and fourwing saltbush along the margins or in isolated stands. In the 5-mi (8-km) area of indirect effects, the predominant cover type is Inter-Mountain Basins Mixed Salt Desert Scrub. If utility-scale solar energy projects were to be constructed within the SEZ, all vegetation within the footprints of the facilities would likely be removed during land-clearing and land-grading operations. Full development of the SEZ over 80% of its area would result in up to moderate impacts on certain cover types (Section 11.7.10.2.1). Wetlands and associated playa habitats could be affected by project development, while intermittently flooded areas downgradient from solar projects or access road could be affected by ground-disturbing activities. Alteration of surface drainage patterns or hydrology could adversely affect downstream dry wash communities. Wetland and riparian habitats 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, mining, agriculture, recreation, and transportation. The cumulative dust loading could result in reduced productivity or changes in plant community composition. Similarly, surface runoff from project areas after heavy rains could increase sedimentation and siltation in areas downstream. Programmatic design features would be used to reduce the impacts from solar energy projects and thus reduce the overall cumulative impacts on plant communities and habitats. While most of the cover types within the SEZ are relatively common in the greater SEZ region, at least one cover type, Mojave Mid-Elevation Mixed Desert Scrub, is relatively uncommon, representing 1% or less of the land area within the region. Thus, other ongoing and reasonably foreseeable future actions would have a cumulative effect on this and other rare cover types as well as on more abundant species. 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. However, the proposed fast-track Crescent Dunes Solar Energy Project covering 1,600 acres (174 km^2) and located about 3 mi (5 km) east of the proposed SEZ (Section 11.7.22.2.2), could contribute to cumulative effects on some rare cover types if they are present in the development area. In addition, cumulative effects on wetland species could occur from water use, drainage modifications, and stream sedimentation from this and any other future projects in the region. The magnitude of such effects is difficult to predict at the current time.

11.7.22.4.10 Wildlife and Aquatic Biota

Wildlife species that could potentially be affected by the development of utility-scale solar energy facilities in the proposed Millers SEZ include amphibians, reptiles, birds, and mammals. The construction of utility-scale solar energy projects in the SEZ and any associated transmission lines and roads in or near the SEZ would have an impact on wildlife through habitat disturbance (i.e., habitat reduction, fragmentation, and alteration), wildlife disturbance, and wildlife injury or mortality. In general, impacted species with broad distributions and a variety of habitats would be less affected than species with a narrowly defined habitat within a restricted area. The use of programmatic design features would reduce the severity of impacts on wildlife. These design features may include pre-disturbance biological surveys to identify key habitat areas used by wildlife, followed by avoidance or minimization of disturbance to those habitats.

As noted in Section 11.7.22.2, other ongoing, reasonably foreseeable and potential future actions within 50 mi (80 km) of the proposed SEZ include one fast-track solar application, one pending solar development application, one pending wind site testing application, four authorized wind site testing applications, two authorized geothermal lease agreements, and five producing geothermal lease agreements (Figure 11.7.22.2-1). While impacts from full build-out over 80% of the proposed SEZ would result in small to moderate impacts on some amphibian, reptile, and bird species and small impacts on mammal species (Section 11.7.11), 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 only one foreseeable solar and no foreseeable wind projects have been firmly identified within the geographic extent of effects. The pending solar, wind, and geothermal applications in the region could contribute to small cumulative effects, however, as would one foreseeable fast-track solar project. The proposed Crescent Dunes Solar Energy Project covering 1,600 acres (174 km^2) would be located about 3 mi (5 km) east of the proposed SEZ and could contribute to cumulative effects on some species from habitat disturbance.

There are no surface water bodies or perennial streams within the proposed Millers SEZ or within the 5-mi (8-km) area of indirect effects. One named intermittent/ephemeral wash (Ione Wash) runs for approximately 3 mi (5 km) through the center of the SEZ. This and other ephemeral washes in the SEZ are typically dry and flow only after precipitation, while identified wetlands present in the SEZ rarely contain water. Thus, no standing aquatic communities are likely to be present in the proposed SEZ. Aquatic communities do exist within the 50-mi (80-km) geographic extent of effects, but the nearest perennial surface water feature is more than 35 mi (56 km) from the SEZ (Section 11.7.11.2). Thus, potential contributions to cumulative impacts on aquatic biota and habitats resulting from water or airborne soil transport to surface streams from solar facilities within the SEZ and within the geographic extent of effects are unlikely. There is little foreseeable development within the geographic extent of effects that would affect the same aquatic habitats potentially affected by the proposed SEZ. Adverse impacts on aquatic habitats from groundwater drawdown are unlikely because groundwater is already fully appropriated, and solar energy developers would have to purchase and transfer existing water rights.

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

On the basis of recorded occurrences or suitable habitat, as many as 19 special status species could occur within the Millers SEZ. Of these species, two are known to occur within the affected area of the SEZ: Tonopah milkvetch and western small-footed bat. No groundwater-dependent species and no potentially suitable habitat for the desert tortoise, a species listed as threatened under the ESA, occurs within the affected area of the SEZ. Numerous additional species that occur on or in the vicinity of the SEZ are listed as threatened or endangered by the states of Nevada or California or listed as a sensitive species by the BLM (Section 11.7.12.1). Programmatic design features to be used to reduce or eliminate the potential for effects on these species from the construction and operation of utility-scale solar energy projects in the SEZs and related projects (e.g., access roads and transmission line connections) outside the SEZ include avoidance of habitat 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, the amount or foreseeable development within the geographic extent of effects is low, including mainly one foreseeable fast-track solar and several potential solar, wind and geothermal projects. Cumulative impacts on protected species are possible but are expected to be 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.

11.7.22.4.12 Air Quality and Climate

While solar energy generates minimal emissions compared with fossil fuels, the site preparation and construction activities associated with solar energy facilities would be responsible for some amount of air pollutants. Most of the emissions would be particulate matter (fugitive dust) and emissions from vehicles and construction equipment. When these emissions are combined with those from other nearby projects outside the proposed Millers 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 $\mu g/m^3$. The dust generation from the construction activities can 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, there are no significant industrial sources of air emissions 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, while such projects are unlikely to overlap in both time and affected area, cumulative air quality effects due to dust emissions during any overlapping 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 coal, oil, and natural gas. As discussed in Section 11.7.13.2.2, 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 Millers SEZ were fully developed (80% of its acreage) with solar facilities, the quantity of pollutants avoided could be as large as 12% of all emissions from the current electric power systems in Nevada.

11.7.22.4.13 Visual Resources

The proposed Millers SEZ is located in a flat treeless plain in the Big Smoky Valley. The SEZ is bounded by mountain ranges on the east, south and west, with open views to the northeast and southwest (Section 11.7.14.1). The area is sparsely inhabited, remote, and rural in character. Currently, there is a low level of cultural disturbance, including from existing transmission lines, fences and roads. 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. Other potential solar, wind, and geothermal projects and related roads and transmission lines outside the proposed SEZ would cumulatively affect the visual resources in 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.

Visual impacts resulting from solar energy development within the SEZ would be in addition to impacts caused by other potential projects in the area. There is currently only one foreseeable fast-track solar facility application, about 3 mi (5 km) east of the SEZ, and several pending solar, wind and geothermal applications within 50 mi (80 km) of the SEZ (Figure 11.7.22.2-1). While the contribution to cumulative impacts in the area of foreseeable and potential projects would depend on the location of facilities that are actually built, it may be concluded that the general visual character of the landscape within this distance could be significantly altered by the presence of solar facilities, transmission lines, and other new infrastructure. Because of the topography of the region, such projects, located in basin flats, would be visible at great distances from surrounding mountains, which include sensitive viewsheds. Given the proximity of the foreseeable fast-track solar project 3 mi (5 km) east of the proposed SEZ, it is possible that two or more facilities would be viewable from a single location. In addition, facilities would be located near major roads and thus would be viewable by motorists, who would also be viewing transmission lines, towns, and other infrastructure, as well as the road system itself.

As additional facilities are added, several projects might become visible from one location, or in succession, as viewers move through the landscape, as by driving on local roads. In general, the new projects 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 relatively few foreseeable and potential solar, wind, and geothermal projects have been identified, small cumulative visual impacts could occur within the geographic extent of effects from future solar, wind, geothermal, and other existing and future projects.

11.7.22.4.14 Acoustic Environment

The areas around the proposed Millers 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 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 the operation of solar facilities, except 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 11.7.22.2. Because proposed projects and the 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.

11.7.22.4.15 Paleontological Resources

The proposed Millers SEZ has unknown, but potentially high, potential for the occurrence of significant fossil material in 94% of its area, mainly lacustrine deposits, and low potential in about 6% of its area, mainly alluvial deposits (Section 11.7.16.1). Surveys of the lacustrine and playa deposits would likely be needed prior to project approval. Any paleontological resources encountered would be mitigated to the extent possible. No significant cumulative impacts on paleontological resources are expected, but such a determination would depend on the results of future paleontological investigations.

11.7.22.4.16 Cultural Resources

The proposed Millers SEZ is rich in cultural history, with settlements dating as far back as 12,000 years. The area covered by the SEZ has the potential to contain significant cultural resources. At least 4 surveys have been conducted within the boundaries of the SEZ, and 49 additional surveys have been conducted within 5 mi (8 km) of the SEZ, resulting in the recording of 30 sites within SEZ and at least 100 sites located within 5 mi (8 km) of the SEZ (Section 11.7.17.1). Areas with potential for significant sites within the proposed SEZ include dune areas near the former Lake Tonopah, related to exploitation of lacustrine resources, and historic resources associated with the Millers town site. 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, including one fast-track solar project and four authorized geothermal leases within the 25-mi (40-km) geographic extent of effects (Section 11.7.22.2). 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 Tribes, it is likely that many adverse effects on significant resources in the region could be mitigated to some degree. Because the proposed Millers SEZ occupies the area of a Late Pleistocene lakebed, it is possible that development of this SEZ could cumulatively cause an irretrievable loss of information on significant sites pertaining to this prehistoric lake system. Pre-disturbance surveys for cultural sites would identify areas for potential use or avoidance.

11.7.22.4.17 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 proposed Millers 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 jack rabbit, 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 under way with federally recognized Native American Tribes with possible traditional ties to the Millers area. All federally recognized Tribes with Western Shoshone, Northern Paiute, or Owens Valley Paiute 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 Millers SEZ. However, the Big Pine Paiute Tribe of the Owens Valley has commented on the scope of this PEIS, recommending that already disturbed lands be preferred for solar development while preserving undisturbed lands. Potential impacts on existing water supplies are also of concern to tribes (Section 11.7.18.2). Continued discussions with the area Tribes through government-to-government consultation is necessary to effectively consider and address the Tribes' concern tied to solar energy development in the proposed Millers SEZ.

11.7.22.4.18 Socioeconomics

Solar energy development projects in the proposed Millers 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 projects in the area, including other renewable energy development. Local, county, and state roads could be affected by traffic loads. The number of workers involved in the construction of solar projects in the peak construction year (including the transmission lines) could range from about 250 to 3,300 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 350 (solar PV) to as high as 4,600 (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 projects in the area, including from the fast-track Crescent Dunes Solar Energy Project, which would be located 3 mi (5km) east of the proposed SEZ. The number of workers needed at the solar facilities in the SEZ would be in the range of 30 to 600 with approximately 40 to 800 total jobs created in the region, assuming full build-out of the SEZ (Section 11.7.19.2.2). Population increases would contribute to general upward trends 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.

11.7.22.4.19 Environmental Justice

Any impacts from solar development could have cumulative impacts on minority and low-income populations within 50 mi (80 km) of the proposed SEZ in combination with other development in the area. Such impacts could be both positive, such as from increased economic activity, and negative, such as from visual impacts, noise, and exposure to fugitive dust. Actual impacts would depend on where low-income populations are located relative to solar and other proposed facilities and on the geographic range of effects. Overall, effects from facilities within the SEZ are expected to be small, while other foreseeable and potential actions would not likely combine with effects from the SEZ on minority and low-income populations. However, no minority or low-income populations have been identified within the 50-mi (80-km) region of interest around the SEZ (Section 11.7.20.2). Thus, it is not expected that the proposed Millers SEZ would contribute to cumulative impacts on minority and low-income populations.

11.7.22.4.20 Transportation

U.S. 95/U.S. 6 runs along the southern border of the proposed Millers SEZ. The nearest public airport is the Tonopah Airport, about 23 mi (37 km) east of the SEZ, and the closest railroad access is the UP Railroad stop at Thorne, 90 mi (145 km) northwest of the SEZ. During construction of utility-scale solar energy facilities, there could be up to 1,000 workers commuting to the construction site at the SEZ, which could increase the AADT on these roads by 2,000 vehicle trips for each facility under construction. With as many as two facilities assumed under construction at the same time, traffic on U.S. 95/U.S. 6 could experience slowdowns in the area of the SEZ (Section 11.7.21.2). 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 projects in the area, including from construction of the fast-track Crescent Dunes Solar Energy 3 mi (5 km) east of the SEZ, should construction schedules overlap. Local road improvements may be necessary on portions of U.S. 95/U.S. 6 near the SEZ. Any impacts during construction activities would be temporary. The impacts can also be mitigated to some degree by staggered work schedules and ride-sharing programs. Traffic increases during operation would be relatively small because of the low number of workers needed to operate the solar facilities and would have little contribution to cumulative impacts.

11.7.23 References

Note to Reader: This list of references identifies Web pages and associated URLs where reference data were obtained for the analyses presented in this PEIS. It is likely that at the time of publication of this PEIS, some of these Web pages may no longer be available or their URL addresses may have changed. The original information has been retained and is available through the Public Information Docket for this PEIS.

AECOM (Architectural Engineering, Consulting, Operations and Maintenance), 2009, *Project Design Refinements*. Available at http://energy.ca.gov/sitingcases/beacon/documents/applicant/refinements/002_WEST1011185v2_Project_Design_Refinements.pdf. Accessed Sept. 2009.

AMA (American Medical Association), 2009, *Physician Characteristics and Distribution in the U.S.*, Chicago, Ill. Available at http://www.ama-assn.org/ama/pub/category/2676.html.

Anderson, R.E., and R. Ernest (compilers), 1999, *Fault Number 1105—Paymaster Ridge Fault (Class A)*, in Quaternary Fault and Fold Database of the United States, U.S. Geological Survey Web site. Available at http://earthquakes.usgs.gov/regional/qfaults. Accessed July 15, 2010.

Anderson, R.E., and T.L. Sawyer (compilers), 1999, *Fault Number 1338—Lone Mountain Fault Zone (Class A)*, in Quaternary Fault and Fold Database of the United States, U.S. Geological Survey Web site. Available at http://earthquakes.usgs.gov/regional/qfaults. Accessed July 15, 2010.

Beacon Solar, LLC, 2008, *Application for Certification for the Beacon Solar Energy Project*, submitted to the California Energy Commission, March. Available at http://www.energy.ca.gov/sitingcases/beacon/index.html.

Beck, C., and G.T. Jones, 2008, “Archaic Times” in *The Great Basin*, C.S. Fowler and D.D. Fowler (editors), School for Advanced Research Press, Santa Fe, N.M.

Beranek, L.L., 1988, *Noise and Vibration Control*, rev. ed., Institute of Noise Control Engineering, Washington, D.C.

BLM (U.S. Bureau of Land Management), 1980, *Green River—Hams Fork Draft Environmental Impact Statement: Coal*, Denver, Colo.

BLM, 1983, *Final Supplemental Environmental Impact Statement for the Prototype Oil Shale Leasing Program*, Colorado State Office, Denver, Colo.

BLM, 1984, *Visual Resource Management*, BLM Manual Handbook 8400, Release 8-24, U.S. Department of the Interior.

BLM, 1986a, *Visual Resource Inventory*, BLM Manual Handbook 8410-1, Release 8-28, U.S. Department of the Interior, Jan.

BLM, 1986b, *Visual Resource Contrast Rating*, BLM Manual Handbook 8431-1, Release 8-30, U.S. Department of the Interior, Jan.

BLM, 1994, *Proposed Tonopah Resource Management Plan and Final Environmental Impact Statement*, Battle Mountain District, Tonopah Resource Area, Tonopah, Nev., Oct.

BLM, 1996*, White River Resource Area: Proposed Resource Management Plan and Final Environmental Impacts Statement*, White River Resource Area, Craig, Colo.

BLM, 1997, *Tonopah Resource Management Plan and Record of Decision*, Battle Mountain District. Available at http://www.blm.gov/pgdata/etc/medialib/blm/nv/field_offices/ battle_mountain_field/blm_information/nepa/rmp.Par.65317.File.dat/Tonopah%20RMP%20and %20Record%20of%20Decision%20-%20APPROVED.PDF.

BLM, 2001, *Nevada Water Rights Fact Sheet*. Available at http://www.blm.gov/nstc/WaterLaws/ nevada.html.

BLM, 2007, *Potential Fossil Yield Classification (PFYC) System for Paleontological Resources on Public Lands*, Instruction Memorandum No. 2008-009, with attachments, Washington, D.C., Oct. 15.

BLM, 2008a, *Assessment and Mitigation of Potential Impacts to Paleontological Resources*, Instruction Memorandum No. 2009-011, with attachments, Washington, D.C., Oct. 10.

BLM, 2008b, *Special Status Species Management*, BLM Manual 6840, Release 6-125, U.S. Department of the Interior, Dec. 12.

BLM, 2009a, *Notice of Intent to Prepare an Environmental Impact Statement for the Proposed Tonopah Solar Energy*, LLC Crescent Dunes Solar Energy Project, Nye County, Nev., Nov. 24, Available at http://edocket.access.gpo.gov/2009/pdf/E9-28089.pdf.

BLM, 2009b, *Nevada Energy Applications Table*, May. Available at http://www.blm.gov/pgdata/ etc/medialib/blm/nv/energy.Par.56189.File.dat/renewable_energy_project_table_may2010.pdf.

BLM, 2009c, *Multi-State Visual Resource Inventory; Existing Hard Copy Data*, U.S. Department of the Interior, Ariz. and Nev., Oct.

BLM, 2009d, *Nevada Herd Management Areas*, Nevada State Office, Reno, Nev. Available at http://www.blm.gov/pgdata/etc/medialib/blm/nv/wild_horse_burro/nevada_wild_horse.Par.1618 2.File.dat/hma_map_may2009.pdf. Accessed July 16, 2010.

BLM, 2010a, *Round Mountain Expansion Project Final Environmental Impact Statement Executive Summary*, April. Available at http://www.blm.gov/pgdata/etc/medialib/blm/nv/ field_offices/battle_mountain_field/blm_information/nepa/round_mountain_expansion0. Par.14040.File.dat/Executive%20Summary_508.pdf.

BLM, 2010b, *Montezuma Peak and Paymaster Herd Management Areas Wild Horse and Burro Gather Environmental Assessment*, June. Available at http://www.blm.gov/pgdata/etc/medialib/blm/nv/field_offices/battle_mountain_field/wild_horse_burro/montezuma-paymaster/mp_hma_documents.Par.45820.File.dat/FinalDraftMP_PM%20Gather%20061510-508.pdf.

BLM, 2010c, *Wild Horse and Burro Statistics and Maps*, U.S. Bureau of Land Management, Washington, D.C. Available at http://www.blm.gov/wo/st/en/prog/wild_horse_and_burro/wh_b_information_center/statistics_and_maps/ha_and_hma_data.html. Accessed June 25, 2010.

BLM, 2010d, *Solar Energy Interim Rental Policy,* U.S. Department of the Interior. Available at http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos and Bulletins/national instruction/2010/IM_2010-141.html.

BLM and USFS, 2010a, *GeoCommunicator: Mining Claim Map*. Available at http://www.geocommunicator.gov/GeoComm/index.shtm. Accessed June 21, 2010.

BLM and USFS, 2010b, *GeoCommunicator: Energy Map*. Available at http://www.geocommunicator.gov/GeoComm/index.shtm. Accessed Nov. 4, 2010.

Bryce, S.A., et al., 2003, *Ecoregions of Nevada* (color poster with map, descriptive text, summary tables, and photographs; map scale 1:1,350,000), U.S. Geological Survey, Reston, Va.

Byers, F.M., Jr., et al., 1989, "Volcanic Centers of Southwestern Nevada: Evolution of Understanding, 1960–1988," *Journal of Geophysical Research* 94(B5):5908–5924.

CalPIF (California Partners in Flight), 2009, *The Desert Bird Conservation Plan: A Strategy for Protecting and Managing Desert Habitats and Associated Birds in California, Ver. 1.0*. Available at http://www.prbo.org/calpif/plans.html. Accessed March 3, 2010.

CDC (Centers for Disease Control and Prevention), 2009, *Divorce Rates by State: 1990, 1995, 1999–2007*. Available at http://www.cdc.gov/nchs/data/nvss/Divorce%20Rates%2090%2095%20and%2099-07.pdf.

CDFG (California Department Fish and Game), 2008, *Life History Accounts and Range Maps—California Wildlife Habitat Relationships System*, California Department of Fish and Game, Sacramento, Calif. Available at http://dfg.ca.gov/biogeodata/cwhr/cawildlife.aspx. Accessed Feb. 19, 2010.

CEQ (Council on Environmental Quality), 1997, *Environmental Justice: Guidance under the National Environmental Policy Act*, Executive Office of the President, Dec. Available at http://ceq.hss.doe.gov/nepa/regs/ej/justice.pdf.

Chase, M.K., and G.R. Geupel, 2005, "The Use of Avian Focal Species for Conservation Planning in California," pp. 130–142 in *Bird Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight Conference*, C.J. Ralph and T.D. Rich (editors), March 20–24, 2002, Asilomar, Calif., Vol. 1, Gen. Tech. Rep. PSW-GTR-191, U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, Albany, Calif.

Cline, M., et al., 2005, *Potential Future Igneous Activity at Yucca Mountain, Nevada,* U.S. Department of Energy Technical Report, May 26.

Connelly, J.W., et al., 2000, "Guidelines to Manage Sage Grouse Populations and Their Habitats," *Wildlife Society Bulletin* 28:967–985.

Cowherd, C., et al., 1988, *Control of Open Fugitive Dust Sources*, EPA 450/3-88-008, U.S. Environmental Protection Agency, Research Triangle Park, N.C.

Creech, E., et al., 2010, *Nevada Noxious Weed Field Guide*, SP-10-01, University of Nevada Cooperative Extension.

Crowe, B.M., et al., 1983, *Status of Volcanic Hazard Studies for the Nevada Nuclear Waste Storage Investigations*, Report No. LA-9325-MS, Los Alamos National Laboratory, Los Alamos, N.M., March.

Crum, S.J., 1994, Po'i Pentun Tammen Kimmappeh *The Road on Which We Came: A History of the Western Shoshone*, University of Utah Press, Salt Lake City, Utah.

CSC (Coastal Services Center), 2010, *Historical Hurricane Tracks*, National Oceanic and Atmospheric Administration (NOAA). Available at http://csc-s-maps-q.csc.noaa.gov/hurricanes. Accessed May 22, 2010.

de DuFour, K., 2009, "Archaeological Site and Survey Data for Nevada," personal communication from de DuFour (NVCRIS, State Historic Preservation Office, Carson City, Nev.), to B. Cantwell (Argonne National Laboratory, Argonne, Ill.), Oct. 19. [was NV SHPO, wildlife]

DOE (U.S. Department of Energy), 2009, *Report to Congress, Concentrating Solar Power Commercial Application Study: Reducing Water Consumption of Concentrating Solar Power Electricity Generation*, Jan. 13.

DOE, 2010, *Final Environmental Assessment for Chemetall Foote Corporation Electric Drive Vehicle Battery and Component Manufacturing Initiative Kings Mountain, NC and Silver Peak, NV*, Sept. Available at http://nepa.energy.gov/documents/EA-1715.pdf. Accessed Oct. 1, 2010. [cum]

EIA (Energy Information Administration), 2009, *Annual Energy Outlook 2009 with Projections to 2030*, DOE/EIA-0383, March.

Eerkins, J.W., and M.D. Glascock, 2000, "Northern Fish Lake Valley and the Volcanic Tablelands of Owens Valley: Two Minor Sources of Obsidian in the Western Great Basin," *Journal of California and Great Basin Anthropology* 22(2):331–342.

Eldred, K.M., 1982, "Standards and Criteria for Noise Control—An Overview," *Noise Control Engineering* 18(1):16–23.

Elliott, R., 1973, *History of Nevada*, University of Nebraska Press, Lincoln, Neb.

EPA (U.S. Environmental Protection Agency), 1974, *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, EPA-550/9-74-004, Washington, D.C., March. Available at http://www.nonoise.org/library/levels74/levels74.htm. Accessed Nov. 17, 2008.

EPA, 2009a, *Energy CO_2 Emissions by State*. Available at http://www.epa.gov/climatechange/emissions/state_energyco2inv.html, last updated June 12, 2009. Accessed Sept. 11, 2009.

EPA, 2009b, *Preferred/Recommended Models—AERMOD Modeling System*. Available at http://www.epa.gov/scram001/dispersion_prefrec.htm. Accessed Nov. 8, 2009.

EPA, 2009c, *eGRID.* Available at http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html, last updated Oct. 16, 2008. Accessed Jan. 12, 2009.

EPA, 2010a, *National Ambient Air Quality Standards (NAAQS)*. Available at http://www.epa.gov/air/criteria.html, last updated June 3, 2010. Accessed June 4, 2010.

EPA, 2010b, *AirData: Access to Air Pollution Data*. Available at http://www.epa.gov/oar/data. Accessed May 22, 2010.

Esmeralda County, 2010a, *Esmeralda County Minutes from the September 7, 2010 Commissioner Meeting*. Available at http://www.accessesmeralda.com/Mi_C_9_7_10.pdf Accessed Nov. 1, 2010.

Esmeralda County, 2010b, *Esmeralda County Board of Commissioners Agenda*, *October 5, 2010*. Available at http://www.accessesmeralda.com/Ag_C_10_5_10.htm. Accessed Nov. 1, 2010.

FAA (Federal Aviation Administration), 2009, *Airport Data (5010) & Contact Information, Information Current as of 07/02/2009*. Available at http://www.faa.gov/airports/airport_safety/airportdata_5010/. Accessed Aug. 13, 2009.

FEMA (Federal Emergency Management Agency), 2009, *FEMA Map Service Center*. Available at http://www.fema.gov. Accessed Nov. 20.

Fire Departments Network, 2009, *Fire Departments by State*. Available at http://www.firedepartments.net.

Flint, A.L., et al., 2004, "Fundamental Concepts of Recharge in the Desert Southwest: A Regional Modeling Perspective," pp. 159–184 in *Groundwater Recharge in a Desert Environment: The Southwestern United States*, J.F. Hogan et al. (editors), Water Science and Applications Series, Vol. 9, American Geophysical Union, Washington, D.C.

Fowler, C.S., 1986, "Subsistence," pp. 64–97 in *Handbook of North American Indians, Vol. 11, Great Basin*, W.L. D'Azevedo (editor), Smithsonian Institution, Washington, D.C.

Fowler, C.S., and J. Leland, 1967, "Some Northern Paiute Categories," *Ethnology* 6(4):381–404.

Fowler, C.S., and S. Liljeblad, 1986, "Northern Paiute," pp. 435–465 in *Handbook of North American Indians, Vol. 11, Great Basin*, W.L. D'Azevedo (editor), Smithsonian Institution, Washington, D.C.

Fowler, D.D., and D.B. Madsen, 1986, "Prehistory of the Southeastern Area" in *Handbook of North American Indians, Vol. 11, Great Basin*, W. D'Azevedo (editor), Smithsonian Institution, Washington, D.C.

Fowler, D.D., et al., 1970, "The Life and Culture of the Washo and Paiutes," *Ethnohistory* 17(3/4):117–149.

GCRP (U.S. Global Change Research Program), 2009, *Global Climate Change Impacts in the United States*. Available at http://downloads.globalchange.gov/usimpacts/pdfs/climate-impacts-report.pdf.

Gibbons, J., 2007a, *Executive Order by the Governor Encouraging the Development of Renewable Energy Resources in Nevada*, State of Nevada, Executive Department, Feb. 16. Available at http://gov.state.nv.us/EO/2007/EO-Energy-2007-02-16.pdf.

Gibbons, J., 2007b, *Executive Order by the Governor Establishing the Nevada Renewable Energy Transmission Access Advisory Committee*, State of Nevada, Executive Department, May 9. Available http://gov.state.nv.us/EO/2007/EO-RenewableEnergy.pdf

Gibbons, J., 2008, *Executive Order by the Governor Establishing the Nevada Renewable Energy Transmission Access Advisory Committee (Phase II),* State of Nevada, Executive Department, June 12. Available at http://gov.state.nv.us/EO/2008/EO-2008-06-12_RETAACII.pdf.

Giffen, R., 2009, "Rangeland Management Web Mail," personal communication from Giffen (USDA Forest Service, Rangelands Management, Washington, D.C.) to W. Vinikour (Argonne National Laboratory, Argonne, Ill.), Sept. 22.

Great American Energy, 2010, *GAE Darrough Hot Springs Geothermal Leasing Project*. Available at http://greatae.com/files/2010_GAE_Darrough_-_Project_Description_for_Web.pdf.

Haarklau, L., et al., 2005, *Fingerprints in the Great Basin: The Nellis Air Force Base Regional Obsidian Sourcing Study*, Morgan Printing, Austin, Tex.

Handman, E.H., and K.C. Kilroy, 1997, *Ground-Water Resources of Northern Big Smoky Valley, Lander and Nye Counties, Central Nevada*, U.S. Geological Survey Water-Resources Investigations Report 96-4311.

Hanson, C.E., et al., 2006, *Transit Noise and Vibration Impact Assessment*, FTA-VA-90-1003-06, prepared by Harris Miller Miller & Hanson Inc., Burlington, Mass., for U.S. Department of Transportation, Federal Transit Administration, Washington, D.C., May. Available at http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf.

Harter, T., 2003, *Water Well Design and Construction*, University of California Division of Agriculture and Natural Resources, Publication 8086, FWQP Reference Sheet 11.3.

Hill, D.P., et al., 1998, *Future Eruptions in California's Long Valley Area—What's Likely?* U.S. Geological Survey Fact Sheet 073-97, Nov.

Hill, D.P., et al., 2000, *Living with a Restless Caldera—Long Valley California*, U.S. Geological Survey Fact Sheet 108-96, Version 2.1, May.

Huntington, J. L., and R. G. Allen, 2010, *Evapotranspiration and Net Irrigation Water Requirements for Nevada*. Available at http://water.nv.gov/NVET.

Hockett, B., et al., 2008, "The Early Peopling of the Great Basin," in *The Great Basin*, C. Fowler and D. Fowler (editors), School for Advanced Research Press, Santa Fe, N.M.

Kenny, J. F, et al., 2009, *Estimated Use of Water in the United States in 2005*, U.S. Geological Survey, Circular 1344. Available at http://pubs.usgs.gov/circ/1344. Accessed Jan. 4, 2010.

Lee, J.M., et al., 1996, *Electrical and Biological Effects of Transmission Lines: A Review*, Bonneville Power Administration, Portland, Ore., Dec.

Liljeblad, S., and C.S. Fowler, 1986, "Owens Valley Paiute," pp. 412-435 in *Handbook of North American Indians, Vol. 11, Great Basin*, W. D'Azevedo (editor), Smithsonian Institution, Washington, D.C.

Lovich, J., and D. Bainbridge, 1999, "Anthropogenic Degradation of the Southern California Desert Ecosystem and Prospects for Natural Recovery and Restoration," *Environmental Management* 24(3):309–326.

Ludington, S., et al., 2007, *Preliminary Integrated Geologic Map Databases for the United States—Western States: California, Nevada, Arizona, Washington, Oregon, Idaho, and Utah*, U.S. Geological Survey Open File Report 2005-1305, Version 1.3, original file updated in Dec. 2007. Available at http://pubs.usgs.gov/of/2005/1305/index.htm.

McGonagle, R.L., and L.L. Waski, 1978, *Archaeological Survey of Springs in the Tonopah Resource Area*, *Contributions to the Study of Cultural Resources, Technical Report Number 2*, Bureau of Land Management, Nevada, Reno, Feb. Available at http://www.blm.gov/pgdata/etc/medialib/blm/nv/cultural/reports/technical_reports.Par.90736.File.dat/02_Survey_Springs_Tonopah_Resource_Area.pdf.

Meinzer, O. E., 1917, *Geology and Water Resources of Big Smoky, Clayton, and Alkali Spring Valleys, Nevada*, U.S. Geological Survey, Water-Supply Paper 423.

MIG (Minnesota IMPLAN Group), Inc., 2010, *State Data Files*, Stillwater, Minn.

Miller, C.D., 1989, *Potential Hazards from Future Volcanic Eruptions in California*, U.S. Geological Survey Bulletin 1847.

Miller, N.P., 2002, "Transportation Noise and Recreational Lands," in *Proceedings of Inter-Noise 2002*, Dearborn, Mich., Aug. 19–21. Available at http://www.hmmh.com/cmsdocuments/N011.pdf. Accessed Aug. 30, 2007.

Miskow, E., 2009, "BLM, USFWS, USFS, State Protected, S1–S3, Listed, Protected, Sensitive, Special Status Taxa Data Set," personal communication with attachment from Miskow (Biologist/Data Manger, Department of Conservation and Natural Resources, Nevada Natural Heritage Program, Carson City, Nev.) to L. Walston (Argonne National Laboratory, Argonne, Ill.), July 13.

Moose, V., 2009, "Comments on Solar Energy Development Programmatic EIS," letter from Moose (Tribal Chairperson, Big Pine Paiute Tribe of the Owens Valley, Big Pine, Calif.) to Argonne National Laboratory (Argonne, Ill.), Sept. 14.

National Research Council, 1996, *Alluvial Fan Flooding*, Committee on Alluvial Fan Flooding, Water Science and Technology Boar, and Commission on Geosciences, Environment, and Resources, National Academies Press, Washington, D.C.

NatureServe, 2010, *NatureServe Explorer: An Online Encyclopedia of Life*. Available at http://www.natureserve.org/explorer. Accessed March 4, 2010.

NCCAC (Nevada Climate Change Advisory Committee), 2008, *Nevada Climate Change Advisory Committee Report*, May. Available at http://gov.state.nv.us/climate/FinalReport/ClimateChangeReport.pdf.

NCDC (National Climatic Data Center), 2010a, *Climates of the States (CLIM60): Climate of Nevada*, National Oceanic and Atmospheric Administration, Satellite and Information Service. Available at http://cdo.ncdc.noaa.gov/cgi-bin/climatenormals/climatenormals.pl. Accessed May 20, 2010.

NCDC, 2010b, *Integrated Surface Data (ISD), DS3505 Format*, database, Asheville, N.C. Available at ftp://ftp3.ncdc.noaa.gov/pub/data/noaa. Accessed May 21, 2010.

NCDC, 2010c, *Storm Events*, National Oceanic and Atmospheric Administration, Satellite and Information Service. Available at http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent ~Storms. Accessed Nov. 6, 2010.

NCES (National Center for Education Statistics), 2009, *Search for Public School Districts*, U.S. Department of Education. Available at http://www.nces.ed.gov/ccd/districtsearch.

NDA (Nevada Department of Agriculture), Plant Industry Division, 2010, *Noxious Weed List*. Available at http://agri.nv.gov/nwac/PLANT_NoxWeedList.htm#A. Accessed June 23, 2010.

NDCNR (Nevada Department of Conservation and Natural Resources), 2002, *Nevada Natural Heritage Program: Vertebrate Taxonomic Checklists.* Available at http://heritage.nv.gov/ spelists.htm. Accessed June 30, 2010.

NDCNR, 2004, *Nevada Natural Heritage Program: County and State-Shared Rare Species Lists—County Rare Species List (March 2004), State-Shared Rare Plant and Lichen Lists (March 2004)*. Available at http://heritage.nv.gov/spelists.htm. Accessed May 21, 2010.

NDCNR, 2005, *Nevada Natural Heritage Program: Data Request Form (July 2010)*. Available at http://www.heritage.nv.gov/reqintro.htm. Accessed July 9, 2010.

NDCNR, 2009a, *Nevada Natural Heritage Program: Summary Nevada Status Lists—Nevada At-Risk Species Tracking List (September 2009), Nevada Plants Fully Protected under NRS 527.260-.300 (September 2009)*. Available at http://heritage.nv.gov/spelists.htm. Accessed May 21, 2010.

NDCNR, 2009b, *Nevada Natural Heritage Program: Summary Federal Status Lists—Federally Endangered Taxa in Nevada (December 2009), Federally Threatened Taxa in Nevada (September 2009), Federal Candidate Taxa in Nevada (March 2010)*. Available at http://heritage.nv.gov/spelists.htm. Accessed May 21, 2010.

NDEP (Nevada Division of Environmental Protection), 2008, *Nevada Statewide Greenhouse Gas Emission Inventory and Projections, 1990–2020*, Dec. Available at http://ndep.nv.gov/baqp/ technical/NV_Statewide_GHG_Inventory2008.pdf. Accessed May 22, 2010.

NDEP, 2010. *Stormwater Discharge Permits*. Available at: http://ndep.nv.gov/bwpc/storm01.htm, Accessed Nov. 3, 2010.

NDWR (Nevada Department of Water Resources), 1971. *Water for Nevada 3: Nevada's Water Resources*, State of Nevada Water Planning Report, Oct. 1971.

NDOW (Nevada Department of Wildlife), 2010, *Big Game Distribution Geospatial Data*, Reno, Nev.

NDWR, 1979, *State Engineer's Order 725*, *May 14, 1979*. Available at http://water.nv.gov/ Orders&Rulings/Rulings/rulings_query.cfm.

NDWR, 1983a, *State Engineer's Order 827, Oct. 24, 1983*. Available at http://water.nv.gov/Orders&Rulings/Rulings/rulings_query.cfm.

NDWR, 1983b, State *Engineer's Order 828, Nov. 4, 1983*. Available at http://water.nv.gov/Orders&Rulings/Rulings/rulings_query.cfm.

NDWR, 2006, *Regulation for Water Well and Related Drilling*. Available at http://water.nv.gov/home/pdfs/WD%20regs.pdf.

NDWR, 2010a, *Hydrographic Area Summary: 137A, Big Smoky-Tonopah Flat*. Available at http://water.nv.gov/WaterPlanning/UGactive/index.cfm (Basin 137A). Accessed May 3, 2010.

NDWR, 2010b, *Nevada Water Law*. Available at http://water.nv.gov/Water%20Rights/Water%20Law/waterlaw.cfm. Accessed May 3, 2010.

Neusius, S.W., and G.T. Gross, 2007, "Mobility, Flexibility, and Persistence in the Great Basin," in *Seeking Our Past*, Oxford University Press, N.Y.

Nevada Senate, *Bill 358*, 2009. Available at http://www.leg.state.nv.us/75th2009/Bills/SB/SB358_EN.pdf.

Nevada State Demographers Office, 2008, *Nevada County Population Projections, 2008–2028*. Available at http://www.nsbdc.org/what/data_statistics/demographer/pubs/docs/NV_Projections_2008_Report.pdf.

NRCS (Natural Resources Conservation Service), 2008, *Soil Survey Geographic (SSURGO) Database for Esmeralda County, Nevada*. Available at: http://SoilDataMart.nrcs.usds.gov.

NRCS, 2010, *Custom Soil Resource Report for Esmeralda County (covering the proposed Millers SEZ), Nevada*, U.S. Department of Agriculture, Washington, D.C., Aug. 17.

NROSL (Northwest Regional Obsidian Sourcing Laboratory), 2009, *Nevada Obsidian Sources*. Available at http://www.obsidianlab.com/image_maps/map_obsidian_nevada.jpg.

NV DOT (Nevada Department of Transportation), 2010, *2009 Annual Traffic Report*, Traffic Information Division. Available at http://www.nevadadot.com/reports_pubs/traffic_report/2009/. Accessed July 14, 2010.

Paher, S.W., 1970, *Nevada Ghost Towns and Mining Camps*, Howell-North Books, Berkeley, Calif.

Perry, F.V., 2002, *The Geologic Basis for Volcanic Hazard Assessment for the Proposed High-Level Radioactive Waste Repository at Yucca Mountain, Nevada*, DOE Technical Report, U.S. Department of Energy, Oct. 15.

Planert, M., and J. S. Williams, 1995, *Ground Water Atlas of the United States: California, Nevada*, U.S. Geological Survey, HA 730-B. Available at http://pubs.usgs.gov/ha/ha730/ch_b/index.html.

Quinian, A.R., and A. Woody, 2003, "Marks of Distinction: Rock Art and Ethnic Identification in the Great Basin," *American Antiquity* 68(2):372–390.

Rigby, S., 2010, personal communication from Rigby (Bureau of Land Management, Tonopah Field Office, Tonopah, Nev.) to K.L. Wescott (Environmental Science Division, Argonne National Laboratory, Argonne, Ill.), July 15.

Royster, J., 2008, "Indian Land Claims," pp. 28–37 in *Handbook of North American Indians, Vol. 2, Indians in Contemporary Society*, G.A. Bailey (editor), Smithsonian Institution, Washington, D.C.

Rush, F.E., and C.V. Schroer, 1971, *Water Resources of Big Smoky Valley, Lander, Nye, and Esmeralda Counties, Nevada*, U.S. Geological Survey, Water Resources Bulletin 41.

SAMHSA (Substance Abuse and Mental Health Services Administration), 2009, *National Survey on Drug Use and Health, 2004, 2005, and 2006*, Office of Applied Studies, U.S. Department of Health and Human Services. Available at http://oas.samhsa.gov/substate2k8/StateFiles/TOC.htm#TopOfPage.

Sawyer, T.L. (compiler), 1999, *Fault Number 1340—Crescent Dunes Fault (Class A)*, in Quaternary Fault and Fold Database of the United States, U.S. Geological Survey Web site. Available at http://earthquakes.usgs.gov/regional/qfaults. Accessed July 15, 2010.

SES (Stirling Energy Systems) Solar Two, LLC, 2008, *Application for Certification*, submitted to the Bureau of Land Management, El Centro, Calif., and the California Energy Commission, Sacramento, Calif., June. Available at http://www.energy.ca.gov/sitingcases/solartwo/documents/applicant/afc/index.php. Accessed Oct. 1, 2008.

Smith, M.D., et al., 2001, "Growth, Decline, Stability and Disruption: A Longitudinal Analysis of Social Well-Being in Four Western Communities," *Rural Sociology* 66:425–450.

Soller, D.R. et al., 2009, *Map Database for Surficial Materials in the Conterminous United States (Scale 1:500,000)*, U.S. Geological Survey Data Series 425, Vol. 10 (for location of Lake Tonopah deposits).

Stebbins, R.C., 2003, *A Field Guide to Western Reptiles and Amphibians*, Houghton Mifflin Company, Boston and New York.

Stewart, J.H., and J.E. Carlson, 1978, *Geologic Map of Nevada (Scale 1:500,000)*, prepared by the U.S. Geological Survey in cooperation with the Nevada Bureau of Mines and Geology.

Stoffle, R.W., 2001, "Cultural Affiliation of American Indian Ethnic Groups within the Nevada Test Site," pp. 51–57 in *American Indians and the Nevada Test Site: A Model of Research and Consultation*, R.W. Stoffle et al. (editors), DOE/NV/13046-2001/001, U.S. Government Printing Office, Washington, D.C.

Stoffle, R.W., and H.F. Dobyns, 1983, *Nuvagantu: Nevada Indians Comment on the Intermountain Power Project, Cultural Resources Series No. 7*, Nevada State Office of the Bureau of Land Management, Reno, Nev.

Stoffle, R.W., and M.N. Zedeño, 2001a, "American Indian Worldviews I: The Concpet of 'Power' and Its Connection to People, Places, and Resources," pp. 58–76 in *American Indians and the Nevada Test Site: A Model of Research and Consultation*, R.W. Stoffle et al. (editors), DOE/NV/13046-2001/001, U.S. Government Printing Office, Washington, D.C.

Stoffle, R.W., and M.N. Zedeño, 2001b, "American Indian Worldviews II: Power and Cultural Landscapes on the NTS," pp. 139–152 in *American Indians and the Nevada Test Site: A Model of Research and Consultation*, R.W. Stoffle et al. (editors), DOE/NV/13046-2001/001, U.S. Government Printing Office, Washington, D.C.

Stoffle, R.W., et al., 1990, "Calculating the Cultural Significance of American Indian Plants: Paiute and Shoshone Ethnobotany at Yucca Mountain, Nevada," *American Anthropologist* 92(2):416–432.

Stoffle, R.W., et al., 1997, "Cultural Landscapes and Traditional Cultural Properties: A Southern Paiute View of the Grand Canyon and Colorado River," *American Indian Quarterly* 21(2):229–249.

Stoffle, R., et al., 1999, "*Puchuxwavaats Uapi* (To Know about Plants): Traditional Knowledge and the Cultural Significance of Southern Paiute Plants," *Human Organization* 58(4):416–429.

Stout, D., 2009, personal communication from Stout (Acting Assistant Director for Fisheries and Habitat Conservation, U.S. Fish and Wildlife Service, Washington, D.C.) to L. Jorgensen and L. Resseguie (Bureau of Land Management, Washington, D.C.), Sept. 14.

Stuckless, J.S., and D. O'Leary, 2007, "Geology of the Yucca Mountain Region," in *Yucca Mountain, Nevada—A Proposed Geologic Repository for High-Level Radioactive Waste*, J.S. Stuckless and R.A. Levich (editors), Geological Society of America Memoirs 199, Sept.

Thomas, D.H., et al., 1986, "Western Shoshone," pp. 262–283 in *Handbook of North American Indians, Vol. 11, Great Basin*, W. D'Azevedo (editor), Smithsonian Institution, Washington, D.C.

Tonopah Solar Energy, 2009, *UEPA Application for a Permit to Construct the Crescent Dunes Solar Energy Project*, July. Available at http://budget.state.nv.us/clearinghouse/Notice/2010/E2010-016.pdf.

Top Stock Picks, 2010, "Our New Mining Profile Is," press release, Aug. 23. Available at http://www.thetopstockpicks.com/2010/08/our-new-mining-profile-is/. Accessed Oct. 3, 2010.

UDWR (Utah Division of Wildlife Resources), 2002, *Strategic Management Plan for Sage-Grouse 2002*, Publication 02-20, June.

UP (Union Pacific) Railroad, 2009, *Allowable Gross Weight Map*. Available at http://www.uprr.com/aboutup/maps/attachments/allow_gross_full.pdf. Accessed March 4, 2010.

U.S. Air Force, 2010, *Nellis Air Force Base—Flying Operations*. Available at http://www.nellis.af.mil/library/flyingoperations.asp. Accessed June 9, 2010.

U.S. Bureau of the Census, 2009a, *County Business Patterns, 2006*, Washington, D.C. Available at http://www.census.gov/ftp/pub/epcd/cbp/view/cbpview.html.

U.S. Bureau of the Census, 2009b, *GCT-T1. Population Estimates*. Available at http://factfinder.census.gov/.

U.S. Bureau of the Census, 2009c, S1901. *Income in the Past 12 Months. 2006–2008 American Community Survey 3-Year Estimates.* Available at http://factfinder.census.gov/.

U.S. Bureau of the Census, 2009d, *GCT-PH1. GCT-PH1. Population, Housing Units, Area, and Density: 2000. Census 2000 Summary File (SF 1) – 100-Percent Data.* Available at http://factfinder.census.gov/.

U.S. Bureau of the Census, 2009e, *T1. Population Estimates*. Available at http://factfinder.census.gov/.

U.S. Bureau of the Census, 2009f, *GCT2510. Median Housing Value of Owner-Occupied Housing Units (Dollars). 2006–2008 American Community Survey 3-Year Estimates*. Available at http://factfinder.census.gov/.

U.S. Bureau of the Census, 2009g, *QT-H1. General Housing Characteristics, 2000. Census 2000 Summary File 1 (SF 1) 100-Percent Data*. Available at http://factfinder.census.gov/.

U.S. Bureau of the Census, 2009h, *GCT-T9-R. Housing Units, 2008. Population Estimates*. Available at http://factfinder.census.gov/.

U.S. Bureau of the Census, 2009i, *S2504. Physical Housing Characteristics for Occupied Housing Units 2006–2008 American Community Survey 3-Year Estimates*. Available at http://factfinder.census.gov/.

U.S. Bureau of the Census, 2009j, *Census 2000 Summary File 1 (SF 1) 100-Percent Data*. Available at http://factfinder.census.gov/.

U.S. Bureau of the Census, 2009k, *Census 2000 Summary File 3 (SF 3) – Sample Data.* Available at http://factfinder.census.gov/.

USDA (U.S. Department of Agriculture), 1980, *Soil Survey of Big Smoky Valley Area, Nevada, Part of Nye County*, Soil Conservation Service.

USDA (U. S. Department of Agriculture), 2004*, Understanding Soil Risks and Hazards—Using Soil Survey to Identify Areas with Risks and Hazards to Human Life and Property*, G.B. Muckel (editor).

USDA, 2009, *2007 Census of Agriculture: Nevada State and County Data, Vol. 1, Geographic Area Series*, National Agricultural Statistics Service, Washington, D.C. Available at http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_2_County_Level/Nevada/index.asp.

USDA, 2010, *Plants Database*, Natural Resources Conservation Service. Available at http://plants.usda.gov. Accessed June 23, 2010.

U.S. Department of Commerce, 2009, *Local Area Personal Income*, Bureau of Economic Analysis. Available at http://www.bea.doc.gov/bea/regional/reis.

U.S. Department of the Interior, 2010, *Native American Consultation Database*, National NAGPRA Online Databases, National Park Service. Available at http://grants.cr.nps.gov/nacd/index.cfm.

U.S. Department of Justice, 2008, "Table 80: Full-Time Law Enforcement Employees, by State by Metropolitan and Nonmetropolitan Counties, 2007," *2007 Crime in the United States*, Federal Bureau of Investigation, Criminal Justice Information Services Division, Sept. Available at http://www.fbi.gov/ucr/cius2007/data/table_80.html. Accessed June 17, 2010.

U.S. Department of Justice, 2009a, "Table 8: Offences Known to Law Enforcement, by State and City," in *2008 Crime in the United States*, Federal Bureau of Investigation, Criminal Justice Information Services Division. Available at http://www.fbi.gov/ucr/cius2008/data/table_08.html.

U.S. Department of Justice, 2009b, "Table 10: Offences Known to Law Enforcement, by State and by Metropolitan and Non-metropolitan Counties," *2008 Crime in the United States*, Federal Bureau of Investigation, Criminal Justice Information Services Division. Available at http://www.fbi.gov/ucr/cius2008/data/table_08.html.

U.S. Department of Labor, 2009a, *Local Area Unemployment Statistics: States and Selected Areas: Employment Status of the Civilian Noninstitutional Population, 1976 to 2007, Annual Averages*, Bureau of Labor Statistics. Available at http://www.bls.gov/lau/staadata.txt.

U.S. Department of Labor, 2009b, *Local Area Unemployment Statistics: Unemployment Rates for States*, Bureau of Labor Statistics. Available at http://www.bls.gov/web/laumstrk.htm.

U.S. Department of Labor, 2009c, *Local Area Unemployment Statistics: County Data*, Bureau of Labor Statistics. Available at http://www.bls.gov/lau.

U.S. Department of Labor, 2009d, *Consumer Price Index, All Urban Consumers—(CPI-U) U.S. City Average, All Items*, Bureau of Labor Statistics. Available at ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt.

USFS (U.S. Forest Service), 2005a, *Monitor Wild Horse Territory*, Rangelands, Washington, D.C. Available at http://www.fs.fed.us/rangelands/ecology/wildhorseburro/territories/Monitor.shtml. Accessed July 15, 2010.

USFS, 2005b, *Toiyabe Wild Horse Territory*, Rangelands, Washington, D.C. Available at http://www.fs.fed.us/rangelands/ecology/wildhorseburro/territories/Toiyabe.shtml. Accessed July 15, 2010.

USFS, 2007, *Wild Horse and Burro Territories*, Rangelands, Washington, D.C. Available at http://www.fs.fed.us/rangelands/ecology/wildhorseburro//territories/index.shtml. Accessed Oct. 20, 2009.

USFWS (U.S. Fish and Wildlife Service), 1994, *Desert Tortoise (Mojave Population) Recovery Plan*, Portland, Ore.

USFWS, 2009, *National Wetlands Inventory*. Available at http://www.fws.gov/wetlands.

USFWS, 2010, *Environmental Conservation Online System (ECOS)*. Available at http://www.fws.gov/ecos/ajax/ecos/indexPublic.do. Accessed May 28, 2010.

USGS (U.S. Geological Survey), 2004, *National Gap Analysis Program, Provisional Digital Land Cover Map for the Southwestern United States*, Ver. 1.0, RS/GIS Laboratory, College of Natural Resources, Utah State University. Available at http://earth.gis.usu.edu/swgap/landcover.html. Accessed March 15, 2010.

USGS, 2005a, *National Gap Analysis Program, Southwest Regional GAP Analysis Project—Land Cover Descriptions*, RS/GIS Laboratory, College of Natural Resources, Utah State University. Available at http://earth.gis.usu.edu/swgap/legend_desc.html. Accessed March 15, 2010.

USGS, 2005b, *Southwest Regional GAP Analysis Project,* National Biological Information Infrastructure. Available at http://fws-nmcfwru.nmsu.edu/swregap/habitatreview/Review.asp.

USGS, 2007, *National Gap Analysis Program, Digital Animal-Habitat Models for the Southwestern United States*, Version 1.0, Center for Applied Spatial Ecology, New Mexico Cooperative Fish and Wildlife Research Unit, New Mexico State University. Available at http://fws-nmcfwru.nmsu.edu/swregap/HabitatModels/default.htm. Accessed March 15, 2010.

USGS, 2008, *National Seismic Hazard Maps—Peak Horizontal Acceleration (%g) with 10% Probability of Exceedance in 50 Years (Interactive Map)*. Available at http://gldims.cr.usgs.gov/nshmp2008/viewer.htm. Accessed Aug. 2010.

USGS, 2010a, *Water Resources of the United States—Hydrologic Unit Maps*. Available at http://water.usgs.gov/GIS/huc.html. Accessed April 12, 2010.

USGS, 2010b, *National Water Information System*. Available at http://wdr.water.usgs.gov/nwisgmap. Accessed March 12.

USGS, 2010c, *National Earthquake Information Center (NEIC)—Circular Area Search (within 100-km of the Center of the Proposed Millers SEZ)*. Available at http://earthquake.usgs.gov/earthquakes/eqarchives/epic/epic_circ.php. Accessed July 15, 2010.

USGS and NBMG (Nevada Bureau of Mines and Geology), 2010, *Quaternary Fault and Fold Database for the United States*. Available at http://earthquake.usgs.gov/regional/qfaults. Accessed Oct. 10, 2010.

von Till Warren, E., 1980, "History of the Amargosa-Mojave Basin," in *A Cultural Resource Overview for the Amargosa-Mojave Basin Planning Units*, E. Ritter (editor), prepared by University of Nevada, Las Vegas, Nev., for Bureau of Land Management, Riverside, Calif.

Whitebread, D.H., and D.A. John, 1992, *Geologic Map of the Tonopah 1 Degree by 2 Degrees Quadrangle, Central Nevada*, U.S. Geological Survey, Miscellaneous Field Studies Map, 1877-A.

WRAP (Western Regional Air Partnership), 2009, *Emissions Data Management System (EDMS)*. Available at http://www.wrapedms.org/default.aspx. Accessed June 4, 2009.

WRCC (Western Regional Climate Center), 2010a, *Climate of Nevada*. Available at http://www.wrcc.dri.edu/narratives/NEVADA.htm. Accessed May 3.

WRCC, 2010b, *Monthly Climate Summary, Tonopah AP, Nevada (268170).* Available at http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?nv8170, Accessed July 8.

WRCC, 2010c, *Monthly Climate Summary, Montgomery Mountain Station, Nevada (265362),* Available at http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?nv5362. Accessed July 8.

WRCC, 2010d, *Average Pan Evaporation Data by State.* Available at http://www.wrcc.dri.edu/htmlfiles/westevap.final.html. Accessed Jan. 19.

WRCC, 2010e, *Western U.S. Climate Historical Summaries*. Available at http://www.wrcc.dri.edu/Climsum.html. Accessed May 20, 2010.