12.2 MASON DRAW

12.2.1 Background and Summary of Impacts

12.2.1.1 General Information

The proposed Mason Draw SEZ is located in Dona Ana County in southern New Mexico, 33 mi (53 km) north of the border with Mexico, and 3 mi (5 km) northwest of the proposed Afton SEZ (Figure 12.2.1.1-1). The SEZ has a total area of 12,909 acres (52 km^2). In 2008, the county population was 206,486. The towns of Dona Ana, Las Cruces, Mesilla, Picacho, and University Park are all beyond 12 mi (19 km) from the SEZ. Las Cruces is the largest, with a population of approximately 90,000.

The nearest major road access to the SEZ is via I-10, which runs east–west along the southern border. The BNSF railroad runs east of the SEZ; the closest railroad stop is in Las Cruces, about 20 mi (32 km) to the east. The nearest public airport is Las Cruces International Airport, located 9 mi (14 km) to the east of the SEZ. The airport does not have regularly scheduled passenger service. El Paso International Airport is approximately 70 mi (113 km) to the southeast of the SEZ

A 115-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 12.2.1.1.2).

As of March 2010, there were no ROW applications for solar projects within the SEZ; however, there was one ROW application for a solar project and one ROW application for a wind project within 50 mi (80 km) of the SEZ. These applications are discussed in Section 12.2.22.2.1.

The proposed Mason Draw SEZ is in an undeveloped rural area. The SEZ is located in the West Mesa of the Mesilla Basin, bordered on the north and west by the Sierra de Las Uvas; on the east by the Rough and Ready Hills, Sleeping Lady Hills, and Aden Hills; and is open to the south. Land within the SEZ is undeveloped scrubland, characteristic of a semiarid basin.

The proposed Mason Draw SEZ and other relevant information are shown in Figure 12.2.1.1-1. The criteria used to identify the SEZ as an appropriate location for solar energy development included proximity to existing transmission lines or designated corridors, proximity to existing roads, a slope of generally less than 2%, and an area of more than 2,500 acres (10 km^2). In addition, the area was identified as being relatively free of other types of conflicts, such as USFWS-designated critical habitat for threatened and endangered species, ACECs, SRMAs, and NLCS lands (see Section 2.2.2.2 for the complete list of exclusions). Although these classes of restricted lands were excluded from the proposed Mason Draw SEZ, other restrictions might be appropriate. The analyses in the following sections evaluate the affected environment and potential impacts associated with utility-scale solar energy

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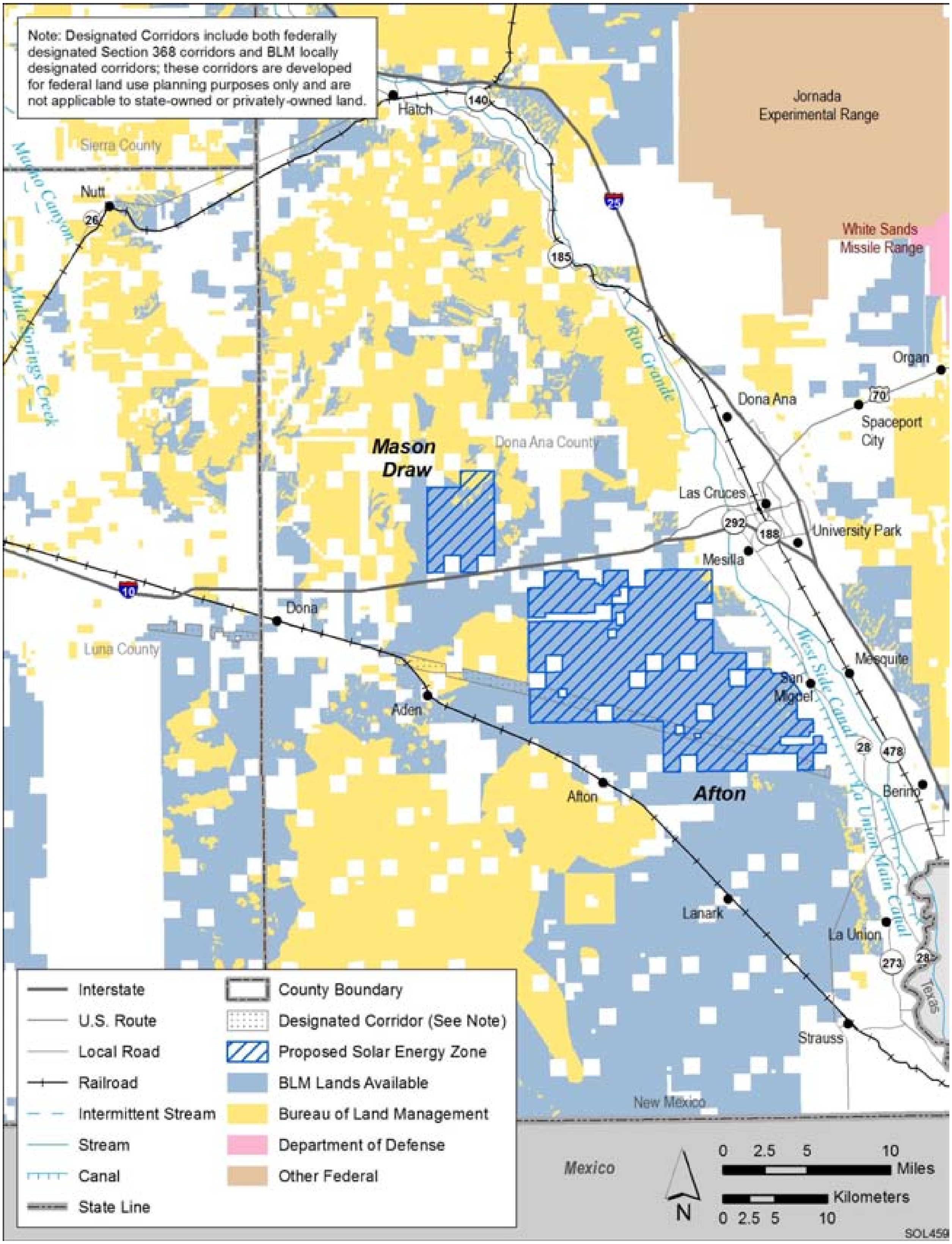

2 **FIGURE 12.2.1.1-1 Proposed Mason Draw SEZ**

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 Mason Draw SEZ encompassed 17,802 acres (72 km^2). Subsequent to the study area scoping period, the boundaries of the proposed Mason Draw SEZ were altered substantially to avoid potentially valuable habitat areas for Aplomado falcon and grasslands. The revised SEZ is approximately 4,893 acres (20 km^2) smaller than the original SEZ as published in June 2009.

12.2.1.2 Development Assumptions for the Impact Analysis

Maximum solar development of the Mason Draw SEZ is assumed to be 80% of the SEZ area over a period of 20 years; a maximum of 10,327 acres (42 km^2). These values are shown in Table 12.2.1.2-1, along with other development assumptions. Full development of the Mason Draw SEZ would allow development of facilities with an estimated total of 1,147 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 2,065 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 115-kV line that runs through the SEZ. It is possible that this existing line could be used to provide access from the SEZ to the transmission grid, but the 115-kV capacity of that line would be inadequate for 1,147 to 2,065 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, substantial new transmission lines and/or upgrades of existing transmission lines would be required to bring electricity from the proposed Mason Draw 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 this PEIS, it was assumed that the existing 115-kV transmission line that runs through the proposed SEZ could provide initial access to the transmission grid, and thus no additional acreage for transmission line access was assessed. Access to the existing transmission line was assumed, without additional information on whether this line would be available for connection of future solar facilities. If a connecting transmission line were constructed in the future to connect facilities within the SEZ to a different off-site grid location from the one assumed here, site developers would need to determine the impacts from construction and operation of that line. In addition, developers would need to determine the impacts of line upgrades if they are needed.

Existing road access to the proposed Mason Draw SEZ should be adequate to support construction and operation of solar facilities, because I-10 runs from east to west along the

TABLE 12.2.1.2-1 Proposed Mason Draw 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 ROW and Road ROW	Distance to Nearest Designated Corridor[d]
12,909 acres and 10,327 acres[a]	1,147 MW[b] and 2,065 MW[c]	I-10 0 mi[d]	0 mi and 115 kV	0 acres; 0 acres	25 mi[e]

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

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

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

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

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

southern border of the SEZ. Thus, no additional road construction outside of the SEZ was assumed to be required to support solar development.

12.2.1.3 Summary of Major Impacts and SEZ-Specific Design Features

In this section, the impacts and SEZ-specific design features assessed in Sections 12.2.2 through 12.2.21 for the proposed Mason Draw SEZ are summarized in tabular form. Table 12.2.1.3-1 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 12.2.22 discusses potential cumulative impacts from solar energy development in the proposed SEZ.

Only those design features specific to the proposed Mason Draw SEZ are included in Sections 12.2.2 through 12.2.21 and in the summary table. The detailed programmatic design features for each resource area to be required under BLM's Solar Energy Program are presented in Appendix A, Section A.2.2. These programmatic design features would also be required for development in this and other SEZs.

TABLE 12.2.1.3-1 Summary of Impacts of Solar Energy Development within the Proposed Mason Draw SEZ and SEZ-Specific Design Features[a]

Resource Area	Environmental Impacts—Proposed Mason Draw SEZ	SEZ-Specific Design Features
Lands and Realty	Full development of the SEZ could disturb up to 10,327 acres (42 km^2). Development of the SEZ for utility-scale solar energy production would establish a very large industrial area that would exclude many existing and potential uses of the land, perhaps in perpetuity. Utility-scale solar energy development would be a new and discordant land use in the area.	None.
Specially Designated Areas and Lands with Wilderness Characteristics	The historic setting of the route of the Butterfield Trail would be adversely affected by construction of solar facilities in the SEZ and would be difficult to mitigate. There would be minor adverse impacts on scenic and recreation resources in the Prehistoric Trackways National Monument and the Robledo Mountains WSA and ACEC.	The historic setting of the route of the Butterfield Trail could be adversely affected by construction of solar facilities in the SEZ and would be difficult to mitigate. Pending the outcome of the study of the significance of the trail, restrictions on solar facility development in the SEZ that might affect trail resources should be put in place. Consideration should be given to restricting the height of solar facilities in portions of the SEZ to minimize impacts on the Prehistoric Trackways National Monument and the Robledo Mountains WSA and ACEC.
Rangeland Resources: Livestock Grazing	The grazing permits for the Corralitos Ranch allotment would be reduced and a maximum of 970 AUMs would be lost.	Developing range improvements and/or changing existing grazing management to mitigate the loss of AUMs in the Corralitos allotment should be considered.
Rangeland Resources: Wild Horses and Burros	None.	None.

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TABLE 12.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Mason Draw SEZ	SEZ-Specific Design Features
Recreation	Areas developed for solar energy production would be closed to recreational use resulting in lost opportunities for back country driving, hiking/walking, bird-watching, and hunting.	None.
Military and Civilian Aviation	*Military aviation facilities:* Any structures in the SEZ taller than 100 ft (30 m) would adversely affect the use of military airspace.	None.
	Civilian aviation facilities	None.
Geologic Setting and Soil Resources	Impacts on soil resources would occur mainly as a result of ground-disturbing activities (e.g., grading, excavating, and drilling), especially during the construction phase. Impacts include soil compaction, soil horizon mixing, soil erosion and deposition by wind, soil erosion by water and surface runoff, sedimentation, and soil contamination. These impacts may be impacting factors for other resources (e.g., air quality, water quality, and vegetation).	None.
Minerals (fluids, solids, and geothermal resources)	None.	None.
Water Resources	Ground-disturbing activities (affecting 46% of the total area in the peak construction year) could affect surface water quality due to surface runoff, sediment erosion, and contaminant spills.	Water resource analysis indicates that wet-cooling options would not be feasible; other technologies should incorporate water conservation measures.
	Construction activities may require up to 3,581 ac-ft (4.4 million m^3) of water during the peak construction year.	Land disturbance activities should minimize impacts on ephemeral streams within the proposed SEZ.
	Construction activities would generate as high as 148 ac-ft (182,600 m^3) of sanitary wastewater.	

TABLE 12.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Mason Draw SEZ	SEZ-Specific Design Features
Water Resources *(Cont.)*	Assuming full development of the SEZ, operations would use the following amounts of water: • For parabolic trough facilities (2,065-MW capacity), 1,475 to 3,127 ac-ft/yr (1.8 million to 3.9 million m^3/yr) for dry-cooled systems; 10,365 to 31,011 ac-ft/yr (12.8 million to 38.3 million m^3/yr) for wet-cooled systems. • For power tower facilities (1,147-MW capacity), 816 to 1,734 ac-ft/yr (1 million to 2.1 million m^3/yr) for dry-cooled systems; 5,751 to 17,225 ac-ft/yr (7.1 million to 21.2 million m^3/yr) for wet-cooled systems. • For dish engine facilities (1,147-MW capacity), 587 ac-ft/yr (724,000 m^3/yr). • For PV facilities (1,147-MW capacity), 58 ac-ft/yr (71,500 m^3/yr). Assuming full development of the SEZ, operations would generate up to 29 ac-ft/yr (35,800 m^3/yr) of sanitary wastewater, and as much as 587 ac-ft/yr (724,000 m^3/yr) of blowdown water.	Siting of solar facilities and construction activities should avoid areas that are identified as within a 100-year floodplain of Kimble Draw that total 325 acres (1.3 km^2) within the proposed SEZ. Groundwater management/rights should be coordinated with the NMOSE with respect to the Rio Mimbres AWRM priority basin. Groundwater monitoring and production wells should be constructed in accordance with state standards. Stormwater management BMPs should be implemented according to the guidance provided by the New Mexico Environment Department. Water for potable uses would have to meet or be treated to meet water quality standards as defined by the EPA.
Vegetation[b]	Approximately 80% of the SEZ (62,098 acres) would be cleared of vegetation with full development of the SEZ; dune habitats would likely be affected; re-establishment of plant communities in disturbed areas would likely be very difficult because of the arid conditions. Indirect effects outside the SEZ boundaries would have the potential to degrade affected plant communities and may reduce biodiversity by promoting the decline or elimination of species sensitive to disturbance.	An Integrated Vegetation Management Plan, addressing invasive species control, and an Ecological Resources Mitigation and Monitoring Plan, addressing habitat restoration, should be approved and implemented to increase the potential for successful restoration of desert scrub, dune, steppe, riparian, playa, and grassland communities, and other affected habitats, and to minimize the potential for the spread of invasive species. Invasive species control should focus on biological and

TABLE 12.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Mason Draw SEZ	SEZ-Specific Design Features
Vegetation *(Cont.)*	Noxious weeds could become established in disturbed areas and colonize adjacent undisturbed habitats, thus reducing restoration success and potentially resulting in widespread habitat degradation. Grading could result in direct impacts on the wetlands within the SEZ and could potentially alter wetland plant communities and affect wetland function. In addition, project-related reductions in groundwater elevations could alter groundwater-dependent plant communities. Grading could affect dry wash and riparian communities within the SEZ. Alteration of surface drainage patterns or hydrology could adversely affect downstream communities.	mechanical methods where possible, to reduce the use of herbicides. All wetland, dry wash, dry wash woodland, riparian, playa, succulent, and dune communities within the SEZ should be avoided to the extent practicable, and any impacts should be minimized and mitigated. Any yucca, agave, ocotillo, and cacti (including *Opuntia* spp. *Cylindropuntia* spp. and *Echinocactus* spp.) and other succulent plant species that cannot be avoided should be salvaged. A buffer area should be maintained around wetland, dry wash, dry wash woodland, playa, and riparian habitats to reduce the potential for impacts. Appropriate engineering controls should be used to minimize impacts on wetland, dry wash, dry wash woodland, playa, and riparian habitats, including 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 groundwater-dependent communities, such as mesquite communities. Potential impacts to springs should be determined through hydrological studies.
Wildlife: Amphibians and Reptiles[b]	Direct impacts on representative amphibian and reptile species from SEZ development would be small (i.e., loss of ≤1% of potentially suitable habitat for each species).	Wash, riparian, and rock outcrop habitats, which could provide more unique habitats for some amphibian and reptile species, should be avoided.

TABLE 12.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Mason Draw SEZ	SEZ-Specific Design Features
Wildlife: Birds[b]	Direct impacts on representative bird species from SEZ development would be small (i.e., loss of ≤1% of potentially suitable habitats for each species). 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 NMDGF. A permit may be required under the Bald and Golden Eagle Protection Act. Wash and riparian habitats, which could provide more unique habitats for some bird species, should be avoided.
Wildlife: Mammals[b]	Direct impacts on representative mammal species from SEZ development would be small (i.e., loss of ≤1% of potentially suitable habitats for each species). 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.	The fencing around the solar energy development should not block the free movement of mammals, particularly big game species. Wash and riparian habitats, which could provide more unique habitats for some mammal species, should be avoided.
Aquatic Biota	No intermittent or perennial streams or water bodies are present within the area of direct or indirect effects associated with the Mason Draw SEZ. Intermittent or ephemeral wetlands are present, but are typically dry and not expected to contain aquatic habitat or biota. Therefore, no direct or indirect impacts on aquatic habitat or biota are expected to result from solar development activities. There is the potential that groundwater withdrawals could reduce surface water levels in streams and wetlands outside of the proposed SEZ.	Appropriate engineering controls should be implemented to minimize the amount of ground disturbance, contaminants, runoff and fugitive dust near wetlands located within the SEZ.

TABLE 12.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Mason Draw SEZ	SEZ-Specific Design Features
Special Status Species[b]	Potentially suitable habitat for 29 special status species occurs in the affected area of the Mason Draw SEZ. For all of these special status species, less than 1% of the potentially suitable habitat in the region occurs in the area of direct effects.	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 offset the impacts of development should be developed in coordination with the appropriate federal and state agencies. Consultations with the USFWS and NMDGF should be conducted to address the potential for impacts on the following species currently listed as threatened or endangered under the ESA: Sneed's pincushion cactus and northern aplomado falcon. Consultation would identify an appropriate survey protocol, avoidance and minimization measures, and, if appropriate, reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions for incidental take statements (if necessary). Avoiding or minimizing disturbance to desert grasslands, sand dune habitat, and sand transport systems on the SEZ could reduce or eliminate impacts to seven special status species.

TABLE 12.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Mason Draw SEZ	SEZ-Specific Design Features
Special Status Species[b] *(Cont.)*		Harassment or disturbance of special status species and their habitats in the affected area should be mitigated. This can be accomplished by identifying any additional sensitive areas and implementing necessary protection measures based upon consultation with the USFWS and NMDFG.
Air Quality and Climate	*Construction*: Temporary exceedances of AAQS for 24-hour and annual PM_{10} and $PM_{2.5}$ concentration levels at the SEZ boundaries and in the immediate surrounding areas during the construction of solar facilities. These concentrations would decrease quickly with distance. Modeling indicates that emissions from construction activities are not anticipated to exceed Class I PSD PM_{10} increments at the nearest federal Class I area (Gila WA). In addition, construction emissions from the engine exhaust of heavy equipment and vehicles could affect AQRVs (e.g., visibility and acid deposition) at nearby federal Class I areas. *Operations*: Positive impact due to avoided emissions of air pollutants from combustion-related power generation: 5.9 to 11% of total emissions of SO_2, NO_x, Hg, and CO_2 from electric power systems in the state of New Mexico avoided (up to 3,247 tons/yr SO_2, 8,080 tons/yr NO_x, 0.12 ton/yr Hg, and 3,601,000 tons/yr CO_2).	None.
Visual Resources	The SEZ is in an area of low scenic quality, with cultural disturbances already present. Residents, workers, and visitors to the area may experience visual impacts from solar energy facilities located within the SEZ (as well as any associated access roads and transmission lines) as they travel area roads. There would be large visual impacts on the SEZ and surrounding lands within the SEZ viewshed due to major modification of the character of the existing landscape.	None.

TABLE 12.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Mason Draw SEZ	SEZ-Specific Design Features
Visual Resources *(Cont.)*	The SEZ is located 2.4 mi (3.9 km) from Aden Hills SRMA. Because of the open views of the SEZ, moderate to strong visual contrasts could be observed by SRMA visitors. Approximately 17 mi (27 km) of the Butterfield Trail are within the SEZ viewshed. Strong visual contrast would be expected for some viewpoints on the Trail. Approximately 53 mi (85 km) of I-10 are within the SEZ viewshed. Because of the close proximity of I-10 to the SEZ on West Mesa, strong visual contrasts would be expected for some viewpoints on I-10. Approximately 23 mi (37 km) of I-25 are within the SEZ viewshed. Because of the open views of the SEZ along the rim of West Mesa, and the elevated position of the SEZ with respect to the Mesilla Valley, strong visual contrast would be expected for some viewpoints on I-25. Approximately 52 mi (83 km) of U.S. 70 are within the SEZ viewshed. Because of the close proximity of U.S. 70 to the SEZ on West Mesa where it shares the route with I-10, strong visual contrasts would be expected for some viewpoints on the U.S. 70, where it shares the route with I-10.	
Acoustic Environment	*Construction:* For construction of a solar facility located near the eastern SEZ boundary, estimated noise levels at the nearest residences located about 3.1 mi (5.0 km) from the SEZ boundary would be about 29 dBA, which is well below the typical daytime mean rural background level of 40 dBA. In addition, an estimated 40 dBA L_{dn} at these residences (i.e., no contribution from construction activities) is well below the EPA guidance of 55 dBA L_{dn} for residential areas.	None.

TABLE 12.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Mason Draw SEZ	SEZ-Specific Design Features
Acoustic Environment *(Cont.)*	*Operations:* For operation of a parabolic trough or power tower facility located near the eastern SEZ boundary, the predicted noise level would be about 32 dBA at the nearest residences, which is below the typical daytime mean rural background level of 40 dBA. If the operation were limited to daytime, 12 hours only, a noise level of about 40 dBA L_{dn} (i.e., no contribution from facility operation) would be estimated for the nearest residences, which is well below the EPA guideline of 55 dBA L_{dn} for residential areas. However, in the case of 6-hour TES, the estimated nighttime noise level at the nearest residences would be 42 dBA, which is higher than the typical nighttime mean rural background level of 30 dBA. The day-night average noise level is estimated to be about 45 dBA L_{dn}, which is still 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 would be about 43 dBA, which is a little higher than the typical daytime mean rural background level of 40 dBA. On the basis of 12-hour daytime operation, the estimated 43 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 the proposed Mason Draw SEZ is relatively unknown but could be high. A paleontological survey will be needed for the PFYC Class 4/5 areas.	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 Mason Draw SEZ, especially in dune areas; however, further investigation is needed. A cultural resources survey of the entire area of potential effects of any project proposed would first need to be conducted to identify archaeological sites, historic structures and features, and traditional cultural properties. An evaluation would need to follow to determine whether any are eligible for listing in the NRHP.	SEZ-specific design features would be determined during consultations with the New Mexico SHPO and affected Tribes and would depend on the results of future investigations. Coordination with trails associations and historical societies regarding impacts on El Camino Real de Tierra Adentro, the Butterfield Trail, and Mesilla Plaza, as well as other NRHP-listed properties, is also recommended.

TABLE 12.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Mason Draw SEZ	SEZ-Specific Design Features
Cultural Resources *(Cont.)*	Visual impacts on two trail systems, including a National Historic Trail, would occur. The trails would need to be evaluated for high-potential segments to determine the level of impact.	
Native American Concerns	The proposed Mason Draw SEZ falls primarily within the traditional use area of the Chiricahua Apache and elements of the Pueblo of Ysleta del Sur. The SEZ supports plants and habitats of animals traditionally important to these Tribes; however, these plants and habitats are abundant in surrounding areas. The nearby Potrillo Mountains provided home bases for some Chiricahua groups. Views from these mountains may be of cultural importance. The Pueblo of Ysleta del Sur has expressed a wish to be informed if human burial sites or other NAGPRA objects are encountered during development of the SEZ.	The need for and nature of SEZ-specific design features would be determined during government-to-government consultation with the affected Tribes.
Socioeconomics	*Livestock grazing:* Construction and operation of solar facilities could decrease the amount of land available for livestock grazing in the SEZ, resulting in the loss of less than 1 job and less than $0.1 million in income in the ROI. *Construction:* 806 to 10,676 total jobs; $44.4 million to $588.2 million income in ROI for construction of solar facilities in the SEZ. *Operations:* 32 to 754 annual total jobs; $1.0 million to $25.9 million annual income in the ROI.	None.
Environmental Justice	There are minority populations, as defined by CEQ guidelines, within the 50-mi (80-km) radius around the boundary of the SEZ. Therefore, any adverse impacts of solar projects, although likely to be small, could disproportionately affect minority populations.	None.

TABLE 12.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Mason Draw SEZ	SEZ-Specific Design Features
Transportation	The primary transportation impacts are anticipated to result from commuting worker traffic. I-10 provides a regional traffic corridor that would experience small impacts for single projects that may have up to 1,000 workers each day, with an additional 2,000 vehicle trips per day (maximum). Such an increase is less than 15% of the current traffic on I-10 as it passes the southern section of the SEZ. However, the exits on I-10 might experience moderate impacts with some congestion. If construction of up to two large projects were to occur over the same period of time, there could be up to 4,000 additional vehicle trips per day, assuming no ride-sharing or other mitigation measures. If all site access occurred from I-10, this would result in a about a 25% increase in traffic on I-10 near the southern portion of the SEZ. Such an increase could have a moderate impact on traffic flow during peak commuter times.	None.

Abbreviations: AAQS = ambient air quality standards; ACEC = Area of Critical Environmental Concern; AQRV = air quality-related value; AUM = animal unit month; BLM = Bureau of Land Management; BMP = best management practice; CEQ = Council on Environmental Quality; CO_2 = carbon dioxide; dBA = A-weighted decibel; EPA = U.S. Environmental Protection Agency; ESA = Endangered Species Act; Hg = mercury; L_{dn} = day-night average sound level; NAGRPA = Native American Graves Protection and Repatriation Act; NHNM = National Heritage New Mexico; NMDGF = State of New Mexico Department of Game and Fish; NO_x = nitrogen oxides; NRHP = *National Register of Historic Places*; PFYC = potential fossil yield classification system; $PM_{2.5}$ = 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; SRMA = Special Recreation Management Area; TES = thermal energy storage; USFWS = U.S. Fish and Wildlife Service; WSA = Wilderness Study Area.

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

[b] The scientific names of all plants, wildlife, and aquatic biota are provided in Sections 12.2.10 through 12.2.12.

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12.2.2 Lands and Realty

12.2.2.1 Affected Environment

The proposed Mason Draw SEZ is in a rural and undeveloped area about 14 mi (23 km) west of Las Cruces, New Mexico. The SEZ is part of a large block of undeveloped public and state land located north of I-10. Located on the SEZ are two county roads that provide access through the area, a 115-kV transmission line, and an underground telephone cable. Livestock fences and watering places also are present. Seven sections of state land abut the SEZ. The area can be accessed from I-10 via a freeway interchange about 5 mi (8 km) west of the SEZ.

As of March 2010, there were no applications for solar energy development within the SEZ.

12.2.2.2 Impacts

12.2.2.2.1 Construction and Operations

Full development of the proposed Mason Draw SEZ could disturb up to 10,327 acres (42 km^2) of BLM-administered lands (Table 12.2.1.2-1) and would establish a large industrial area that would exclude many existing and potential uses of the land, perhaps in perpetuity. Since the SEZ is located in an undeveloped area, utility-scale solar energy development would be a new and discordant land use in the area. It also is possible that the state-owned lands located adjacent to the SEZ could be developed, with the state's permission, in the same or a complementary manner as the BLM-administered lands within the SEZ. Development of industrial or support activities also could be induced on private and other state lands near the SEZ.

Current ROW authorizations in the SEZ would not be affected by solar energy development since they are prior rights. Should the proposed SEZ be identified as an SEZ in the ROD for this PEIS, the BLM would still have discretion to authorize additional ROWs in the area until solar energy development was authorized, and then future ROWs would be subject to the rights granted for solar energy development. It is not anticipated that approval of solar energy development within the SEZ would have a significant impact on the amount of public lands available for future ROWs near the area.

12.2.2.2.2 Transmission Facilities and Other Off-Site Infrastructure

An existing 115-kV transmission line runs through the SEZ; this line might be available to transport the power produced in this SEZ. Establishing a connection to the existing line would not involve the construction of a new transmission line outside of the SEZ. If a connecting transmission line were constructed in a different location outside of the SEZ in the future, site developers would need to determine the impacts from construction and operation of that line. In addition, developers would need to determine the impacts of line upgrades if they were needed.

Road access to the SEZ is readily available from I-10 in the southern portion of the SEZ, so it is anticipated there would be no additional land disturbance outside the SEZ associated with road construction to provide access to the SEZ.

12.2.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features were identified. Implementing the programmatic design features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program would provide adequate mitigation for identified impacts.

12.2.3 Specially Designated Areas and Lands with Wilderness Characteristics

12.2.3.1 Affected Environment

Sixteen specially designated areas within 25 mi (40 km) of the proposed Mason Draw SEZ potentially could be affected by solar energy development within the SEZ, principally from impacts on scenic, recreation, and/or wilderness resources. Largely because of the proximity to the Las Cruces area, recreational use of many of these specially designated areas is an important function. Several of these areas overlap one another in various degrees. For example, a portion of the Robledo Mountains WSA is also an ACEC and also overlaps part of the Prehistoric Trackways National Monument. Four additional ACECs—Los Tules, San Diego Mountain, Rincon, and Uvas Valley—that are within 25 mi (40 km) of the SEZ are not considered in this analysis because they were designated to protect either cultural or biological resource values and do not have a scenery component to their designation so they would not be affected by development in the SEZ. Additionally, it is not anticipated that these areas would experience visitation impacts associated with SEZ development. The ACECs listed below all have scenic values as one of the components supporting the ACEC designation (BLM 1993). The areas include the following:

- Wilderness Study Areas (WSA)
  - Aden Lava Flow
  - Las Uvas Mountains
  - Robledo Mountains
  - West Potrillo Mountains/Mt. Riley

- Areas of Critical Environmental Concern (ACEC)
  - Dona Ana Mountains
  - Organ/Franklin Mountains
  - Robledo Mountains

- Special Recreation Management Areas (SRMA)
  - Aden Hills OHV Area
  - Butterfield Trail Special Management Area (SMA)
  - Dona Ana Mountains
  - Organ/Franklin Mountains

- National Monument
  - Prehistoric Trackways

- National Natural Landmark
  - Kilbourne Hole

- National Historic Landmark
  - Mesilla Plaza

- National Historic Trail/Scenic Byway
  - El Camino Real de Tierra Adentro
  - El Camino Real de Tierra Adentro National Scenic Byway

The locations of these features are shown in Figure 12.2.3.1-1.

No lands near the SEZ and outside of designated WSAs have been identified by BLM to be managed to protect wilderness characteristics.

12.2.3.2 Impacts

12.2.3.2.1 Construction and Operations

The primary potential impact on the specially designated areas near the SEZ would be from visual impacts of solar energy development that could affect scenic, recreation, or wilderness characteristics of the areas. The visual impact could be associated with direct views of the solar facilities, including transmission facilities, glint and glare from reflective surfaces, steam plumes, hazard lighting of tall structures, and night lighting of the facilities. For WSAs, visual impacts from solar development would be most likely to cause the loss of outstanding opportunities for solitude and primitive and unconfined recreation.

While the visibility of solar facilities from specially designated areas is relatively easy to determine, the impact of this visibility is difficult to quantify and would vary by solar technology employed, the specific area being affected, and the perception of individuals viewing solar facilities while visiting areas within sight of the SEZ. Development of the SEZ, especially full development, would be an important visual component in the viewshed from portions of some of these specially designated areas, as summarized in Table 12.2.3.2-1. The data provided in the table, which shows the area with visibility of development within the SEZ, assumes the use of power tower solar energy technology, which because of the potential height of these facilities, could be visible from the largest amount of land of all the technologies being considered in the PEIS. Viewshed analysis for this SEZ has shown that the visibility of shorter solar energy facilities would be considerably less than power tower technology in some areas. Section 12.2.14 provides details on all viewshed analyses discussed in this section. Potential impacts included below are general, and assessment of the visual impact of solar energy projects must be conducted on a site-specific and technology-specific basis to accurately identify impacts.

In general, the closer a viewer is to solar development, the greater the effect on that individual's perception of impact. From a visual analysis perspective, the most sensitive viewing distances generally are from 0 to 5 mi (0 to 8 km) but could be farther, depending on other factors. The viewing height above or below a solar energy development area, the size of the solar development area, and the purpose for which people visit an area are also important. Individuals seeking a wilderness or scenic experience within these specially designated areas could be expected to be more adversely affected than those simply traveling along roadways with another destination in mind. In the case of the proposed Mason Draw SEZ, the low-lying location of the

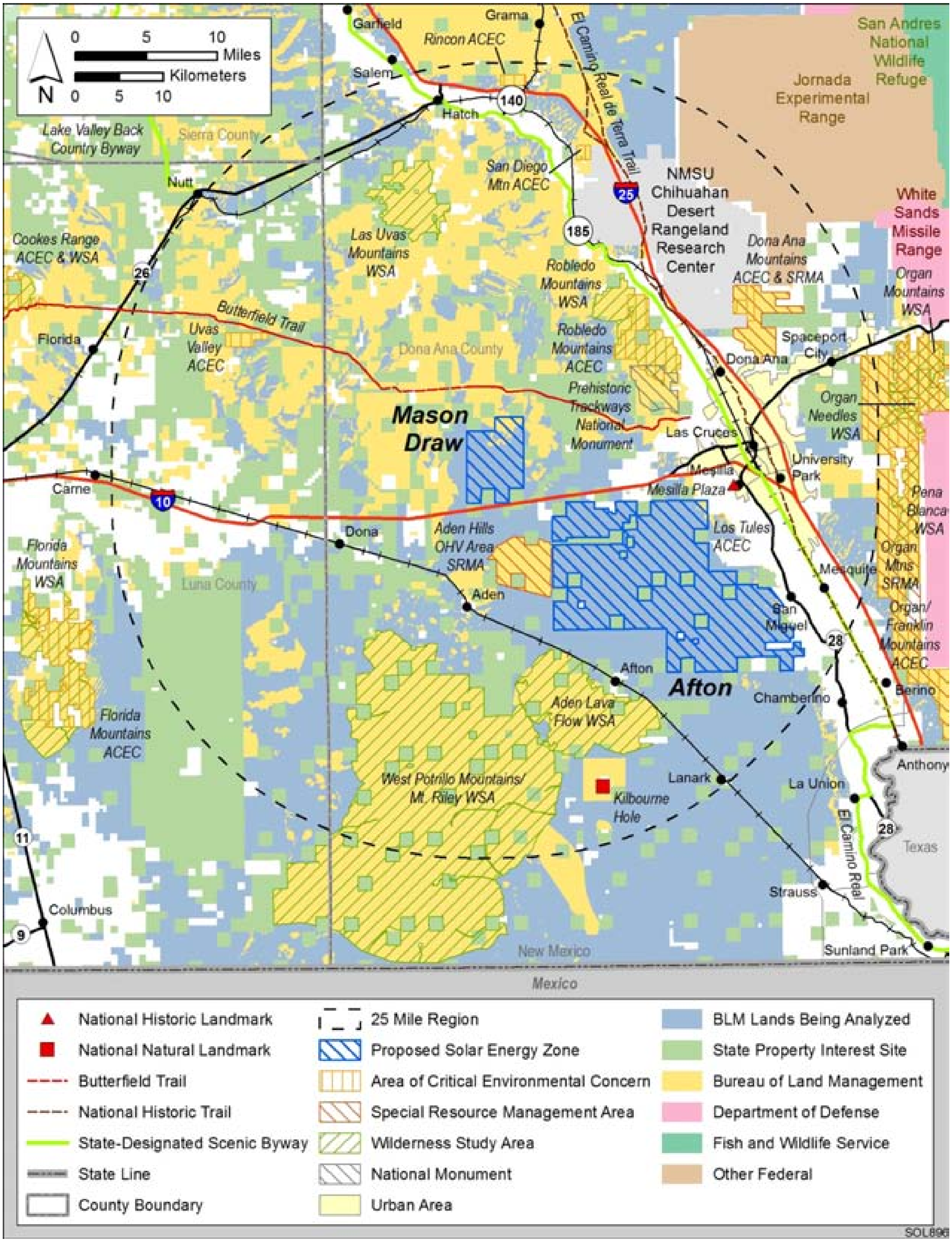

FIGURE 12.2.3.1-1 Specially Designated Areas in the Vicinity of the Proposed Mason Draw SEZ

TABLE 12.2.3.2-1 Potentially Affected Sensitive Visual Resources within a 25-mi (40-km) Viewshed of the Proposed Mason Draw SEZ, Assuming Power Tower Technology with a Target Height of 650 ft (198.1 m)

		Feature Area or Linear Distance		
			Visible between	
Feature Type	Feature Name (Total Acreage/ Highway Linear Distance)	Visible within 5 mi	5 and 15 mi	15 and 25 mi
National Monument	Prehistoric Trackways (5,255 acres)[a]	0 acres	1,226 acres (23%)[b]	0 acres
WSAs	Aden Lava Flow (25,978 acres)	0 acres	8,962 acres (35%)	12,920 acres (50%)
	Las Uvas Mountains (11,084 acres)	0 acres	135 acres (1%)	356 acres (3%)
	Robledo Mountains (13,049 acres)	0 acres	2,534 acres (19%)	7 acres (0.05%)
	West Potrillo Mountains/ Mt. Riley (159,323 acres)	0 acres	13,544 acres (9%)	29,773 acres (19%)
SRMAs	Aden Hills OHV Area (8,054 acres)	4,605 acres (57%)	2,518 acres (31%)	2 acres (0.03%)
	Butterfield Trail SMA	13 mi	2.2 mi	0 mi
	Dona Ana Mountain (8,345 acres)	0 acres	0 acres	3,117 acres (37%)
	Organ/Franklin Mountains (60,793 acres)	0 acres	0 acres	3,453 acres (6%)
ACECs designated for outstanding scenic values	Dona Ana Mountains (1,427 acres)	0 acres	0 acres	524 acres (37%)
	Organ/Franklin Mountains (58,512 acres)	0 acres	0 acres	3,504 acres (6%)
	Robledo Mountains (8,659 acres)	0 acres	1,227 acres (14%)	5 acres (0.06%)

TABLE 12.2.3.2-1 (Cont.)

Feature Type	Feature Name (Total Acreage/ Highway Linear Distance)	Feature Area or Linear Distance: Visible within 5 mi	Visible between 5 and 15 mi	Visible between 15 and 25 mi
National Historic Landmark	Mesilla Plaza		Yes	
National Historic Trail	El Camino Real de Tierra Adentro	0 mi	0.7 mi	25.6 mi
National Natural Landmark	Kilbourne Hole			Yes
Scenic Byway	El Camino Real (299 mi)	0 mi	2.2 mi	16.7 mi

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

[b] Values in parentheses are percentage of feature acreage or length viewable.

SEZ in relation to portions of some of the surrounding specially designated areas would highlight the industrial-like development in the SEZ.

Prehistoric Trackways National Monument

The BLM-administered Prehistoric Trackways National Monument was created in 2009 to conserve, protect, and enhance the unique and nationally important paleontological, scientific, educational, scenic, and recreational resources and values of the Robledo Mountains in southern New Mexico. The monument includes a major deposit of Paleozoic Era fossilized footprint megatrackways within about 5,280 acres (21 km^2) (BLM 2009c). The monument also overlaps the southwestern portion of the Robledo Mountains WSA and ACEC. The monument receives about 3,000 visitors per year.

Based on viewshed analysis, solar energy facilities within the SEZ could be visible from 23% (1,226 acres [5.0 km^2]) of the national monument. Because of the topographic screening of the Sleeping Lady Hills east of the SEZ, only taller solar facility components at some locations within the SEZ would be visible from scattered viewpoints on peaks and high southwest-facing ridges in the national monument. From some of these viewpoints, the upper portions of transmission towers and power towers might just be visible, but might not be noticed by casual viewers. None of the monument is within the 24.6-ft (7.5-m) tall solar facility viewshed.

Because of the near-complete screening of the SEZ from the monument, only very weak levels of visual contrast caused by solar facilities would be seen from viewpoints within the monument. For this reason, it is anticipated there would be no significant impact on the National Monument. Restricting solar technologies in the SEZ to the technologies with shorter structures would completely remove development in the SEZ from the viewshed of the monument.

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

Wilderness Study Areas

Aden Lava Flow

The nearest boundary of the Aden Lava Flow WSA is 10.8 mi (17.4 km) south of the SEZ, and the area of the WSA with views of the SEZ extends to about 18.5 mi (29.8 km) from the southern boundary of the SEZ. Solar energy facilities within the SEZ could be visible from about 21,882 acres (88.6 km^2), or 84%, of the WSA; however, because of the distance, the fact that the elevation of the WSA is lower than the SEZ, and the very low viewing angle of the SEZ, contrast levels associated with solar facilities would be very weak as seen from the WSA. Therefore, there would likely be minimal to no impact on wilderness characteristics within the WSA. Restricting solar technology in the SEZ to lower height facilities would reduce the impact on the WSA, but the near presence of the proposed Afton SEZ, if developed for solar energy, would have a much greater impact on the WSA than would development at the proposed Mason Draw SEZ.

Las Uvas Mountains

The Las Uvas Mountains WSA is 13.4 mi (21.6 km) northwest of the SEZ and is partially screened from the SEZ by intervening topography. Views of the SEZ extend to 16.5 mi (26.6 km) from the northern boundary of the SEZ and would include only about 491 acres (2.0 km^2), or 4.4% of the total WSA acreage. Solar facilities within the SEZ would be expected to cause very weak visual contrast. Because of the distance and the limited views of the SEZ, it is anticipated there would be minimal to no impact on wilderness characteristics in this WSA.

Robledo Mountains

The southwestern boundary of the Robledo Mountains WSA is about 7.8 mi (12.6 km) northeast of the SEZ, and the area of the WSA with visibility of the SEZ extends to about 11 mi

(23 km) from the northeastern border of the SEZ. About 2,541 acres (10.3 km^2), or 20%, of the WSA located on the high peaks and some southwestern-facing slopes would have visibility of solar development within the SEZ. The Sleeping Lady Hills east of the SEZ would partially screen views of the SEZ from many locations in the WSA, especially lower elevation viewpoints. Overall contrast levels associated with solar facilities are expected to be weak and are not anticipated to result in significant adverse impacts to wilderness characteristics. Because of the presence of the Sleeping Lady Hills, restricting solar technologies to those that have a lower height would reduce the acreage of the WSA with visibility of solar facilities to about 3% of the total area.

West Potrillo Mountains/Mt. Riley

At its closest point, the West Potrillo Mountains/Mt. Riley WSA is located 10.2 mi (16.4 km) from the southwestern border of the SEZ. Areas within the WSA that would have views of solar development within the SEZ extend out 24 mi (38.6 km) from the southern boundary of the SEZ. The primarily affected area of the WSA is in the northern portion of the WSA and includes about 43,317 acres (175 km^2), or 27% of the WSA. Visitors at a few higher elevation viewpoints in the northern portion of the area may perceive weak to moderate visual contrast associated with solar facilities while the bulk of the area within the WSA, which is at a lower elevation, would experience no more than weak levels of contrast. Overall it is anticipated there would not be a significant impact on wilderness characteristics within the WSA associated with solar development in Mason Draw. Restricting solar development to those technologies with lower-height facilities would reduce the acreage affected within the WSA to as little as about 13% of the total area; however, since the WSA is located much closer to the Afton SEZ, if Afton were developed, there would be little benefit to restricting technologies in Mason Draw to benefit this WSA.

Special Recreation Management Areas

Aden Hills OHV. The area was established as an “open” area for off-highway vehicle use and is located about 2.4 mi (3.9 km) south of the SEZ. Most of the area is located at an elevation equal to or higher elevation than the SEZ and visitors in about 7,125 acres (28.8 km^2) or 89% of the area would have good visibility of solar development within the SEZ. The area receives about 10,000 visitor days of use annually (Montoya 2010). Use of an OHV open area is not generally dependent upon scenic quality, rather attributes like access, challenging terrain, and availability of trails are most important therefore it is not anticipated that solar development in the SEZ would have any effect on the use of the OHV area.

Butterfield Trail SMA. The Butterfield Overland Mail Route, which connected the eastern U.S. with San Francisco, was designated as an SMA in the Mimbres RMP in 1993 and is currently being studied for possible designation as a national historic trail (NHT). The trail comes within 1.8 mi (2.9 km) of the northern border of the SEZ and visitors on about 15.2 mi

(24.4 km) of the trail route potentially would have visibility of solar facilities within the SEZ. About 13 mi (21 km) of the trail would be within 5 mi (8 km) of the SEZ. Because of the proximity of solar facilities to the trail, the historical setting of the trail likely could be adversely affected. The potential impact of solar energy development in the SEZ on the historic setting of the trail and on future management options is currently unknown and would require site and project specific analysis. Portions of the trail also are within the viewshed of the Afton SEZ and views of development within both SEZs would likely occur.

Dona Ana Mountains Special Recreation Management Area. This is an 8,345-acre (34-km^2) area with maintained trails used by a wide array of recreationists including hikers, horseback riders, mountain bikers and OHV enthusiasts whose closest boundary is about 15.8 mi (25.4 km) northeast of the SEZ. The area of the SRMA with visibility of the SEZ extends out to about 18 mi (29 km) from the SEZ. About 3,117 acres (12.6 km^2) or 37% of the SRMA has distant views of the SEZ. Because of the distance and topographic screening only the tops of power tower facilities would be visible from the SRMA and minimal visual contrast levels would be expected. Because of this it is anticipated there would be no impact on visitor use in the SRMA.

Organ/Franklin Mountains Special Recreation Management Area. The SRMA is a 60,793-acre (246-km^2) area that extends 29 mi (47 km) north to south along the western slope of the Organ Mountains and includes the gap between the Organ and Franklin Mountains and all but the northernmost portions of the Franklin Mountains. The eastern border of the SRMA is the Ft. Bliss Military Reservation. The area is near Las Cruces, NM and the communities of the Mesilla Valley and is a well established and important recreation area for these communities, receiving about 102,000 visitors a year (Montoya 2010). The area contains developed camping and picnic areas, a visitor center, scenic roads, developed trails, and also includes the Organ, Organ Needles, and Pena Blanca WSAs that are outside of the analysis area for the Mason Draw SEZ. The nearest boundary of the SRMA is 23.9 mi (38.5 km) east of the SEZ and about 6% of the SRMA is within the 25-mi (40-km) viewshed of the SEZ although views of the SEZ from the SRMA would extend beyond this analysis area. Only the lower, western slopes of the SRMA are within the viewshed of the Mason Draw SEZ. Because of the very long distance to the SEZ, a very low angle of view, and partial topographic screening of the SEZ, solar facilities within the SEZ would cause minimal visual contrast and are not expected to adversely impact recreation use within the SRMA.

Areas of Critical Environmental Concern

Dona Ana Mountains. This 1,427-acre (5.8-km^2) ACEC was designated to protect biological, cultural, scenic and recreation resources. The ACEC is located 16.5 mi (26.6 km) northeast of the SEZ. The area within the viewshed of the SEZ extends to 18.1 mi (29.1 km) northeast of the SEZ and includes about 37% of the area. The scenic component of the ACEC described in the Mimbres RMP (BLM 1993) focuses almost solely on the scenic values as seen from outside the ACEC, however the ACEC is completely included within the Dona Ana SRMA which supports a variety of recreation uses which also benefit from the scenery component of the ACEC. Impacts to the ACEC would be similar to those identified in the analysis of the SRMA, above. There are expected to be no impacts on the ACEC.

Organ/Franklin Mountains. The ACEC consists of 58,512 acres (237 km^2) and was designated for the protection of a wide array of resources including biological, scenic, cultural, special status species, riparian, and recreation resources (BLM 1993). The ACEC is completely included within the boundaries of the SRMA discussed above and the anticipated impacts on the scenic and recreation resources in the ACEC from solar facilities within the Mason Draw SEZ would be minimal, the same as the impacts identified for the SRMA. The other resource values for which the area is designated would not be affected.

Robledo Mountains. The 8,659-acre (35-km^2) ACEC was designated to protect biological, scenic, and recreation resources. The area is 7.7 mi (12.4 km) northeast of the SEZ is completely contained within the southern portion of the Robledo Mountains WSA. About 1,232 acres (5.0 km^2) or 14% of the area is within the viewshed of the SEZ and the impacts to scenic resources of the ACEC would be similar or slightly less than those discussed for the WSA and would result in minimal impacts to scenic and recreation resources. Because of the presence of the Sleeping Lady Hills, restricting solar technologies to those of a lower height would reduce the acreage of the ACEC with visibility of solar facilities to about 3% of the total area.

National Historic Landmark

Mesilla Plaza. The plaza is located about 14.7 mi (23.7 km) from the eastern border of the SEZ. While there could be some visibility of the tops of power tower facilities from the Plaza, topographic screening would block the view of most types of solar facilities within the SEZ. Because of the distance from the SEZ and the topographic screening it is anticipated there would be minimal impact on the historic setting of the plaza and there would be no impact on visitation to the area.

National Historic Trail

El Camino Real de Tierra Adentro. This congressionally designated trail stretches from Mexico City to Santa Fe, New Mexico and in the vicinity of the SEZ generally parallels the Rio Grande River. In use from 1598 to 1885, this was the oldest and longest continuously used road in the United States and portions of it are still used today (see Section 12.1.17 for a complete discussion of the national historic trail). At its nearest approach, the trail passes within 13 mi (20.9 km) northeast of the SEZ and within the 25 mi (40 km) zone surrounding the SEZ people following the trail could have visibility of taller solar facilities within the SEZ along about 27 mi (43 km) of the trail route. While taller types of solar facilities within the SEZ could be visible they would not be an important part of the viewshed of the trail. The route of the trail currently passes largely through lands developed for agriculture, residential, and commercial uses and the historic context of the trail has been degraded. It is anticipated there would be minimal impact on the historic setting of the trail caused by solar facilities within the SEZ.

National Natural Landmark

Kilbourne Hole. The landmark was designated to protect geologic and recreation use of an area of about 5,480 acres (22.2 km^2) that surrounds Kilbourne Hole. The hole is a crater that formed when a volcanic bubble burst on the surface of the earth (BLM 1993, Section 5, page 5-56). While the designated area surrounding the landmark is about 20 mi (32 km) southeast of the SEZ and is within the viewshed of the SEZ, much of the area in the bottom of the crater is shielded from the view of the SEZ. A trail runs around much of the ridge that surrounds the crater and visitors on the trail would have distant visibility of the development within the SEZ. Development of the SEZ would not affect the geologic resource which is the main attraction of the area and it is anticipated that recreation use of the area would also not be affected.

National Scenic Byway

El Camino Real. The byway generally traces the route of the National Historic Trail described above for 299 mi (481 km) from the Mexican border to Santa Fe, New Mexico and its nearest approach to the boundary of the SEZ is about 12 mi (19.3 km) in the area northeast of the SEZ. Within the 25-mi (40-km) zone surrounding the SEZ people following the trail could have visibility of solar facilities within the SEZ for only about 15 mi (60 km) since much of the byway is topographically screened from views of the SEZ. While taller types of solar facilities within the SEZ could be visible they would not be an important portion of the viewshed of the byway. The route of the byway follows existing highways and passes largely through lands developed for agriculture, residential, and commercial uses and the scenic context of the byway has been degraded. It is anticipated there would be minimal impact on the setting of the byway caused by solar facilities within the SEZ.

12.2.3.2.2 Transmission Facilities and Other Off-Site Infrastructure

Because of the availability of an existing transmission line and I-10 on the southern edge of the SEZ, no additional construction of transmission or road facilities was assessed. Should additional transmission lines be required outside of the SEZ, there may be additional impacts on specially designated areas. See Section 12.2.1.2 for the development assumptions underlying this analysis.

12.2.3.3 SEZ-Specific Design Features and Design Feature Effectiveness

Implementing the programmatic design features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would provide adequate mitigation for some identified impacts.

Proposed design features specific to the Mason Draw SEZ include the following:

- The historic setting of the route of the Butterfield Trail could be adversely affected by construction of solar facilities in the SEZ and would be difficult to mitigate. Pending outcome of the study of the significance of the trail, restrictions on solar facility development in the SEZ that might affect trail resources should be put in place.

- Consideration should be given to restricting the height of solar facilities in portions of the SEZ to minimize impact to the Prehistoric Trackways National monument and the Robledo Mountains WSA and ACEC.

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12.2.4 Rangeland Resources

Rangeland resources managed by the BLM on BLM-administered lands include livestock grazing and habitat for wild horses and burros. These resources and possible impacts on them from solar development within the proposed Mason Draw SEZ are discussed in Sections 12.2.4.1 and 12.2.4.2.

12.2.4.1 Livestock Grazing

12.2.4.1.1 Affected Environment

The proposed Mason Draw SEZ overlays part of one grazing allotment, the Corralitos Ranch allotment, which covers a total of 183,957 acres (744 km^2). The permitted use for the allotment is 13,860 AUMs, and there is one permittee (BLM 2008a). The SEZ would include 12,909 acres (52.2 km^2), about 7%, of the allotment. The same allotment also overlays a portion of the proposed Afton SEZ, and in that SEZ about 4% of the allotment would be affected.

12.2.4.1.2 Impacts

Construction and Operations

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

Quantification of the impact on the Corralitos allotment would require, at a minimum, consideration of the three factors identified above; however, for purposes of this PEIS, the simplified assumption is being made that the percentage reduction in authorized AUMs would be the same as the percentage reduction in land area. Using this assumption, there would be a reduction of a total of 970 AUMs.

The Corralitos Ranch allotment it is large enough that it likely would be possible to restore the 7% loss elsewhere through a change in grazing management, installation of new range improvements, or a combination of the two. If it would not be possible to mitigate the anticipated loss, there would be a minor adverse impact to the allotment permittee.

On the basis of an assumed loss of a total of 970 AUMs in the SEZ, as described above, the impact on livestock use within the Las Cruces District from solar development of the proposed Mason Draw SEZ would be negligible. This conclusion is based on the comparison of the loss of the 970 AUMs with the total BLM-authorized AUMs in the district for grazing year 2009, which totaled 413,702 AUMs (BLM 2008a). This loss is less than one-quarter of a percent. The level of impact on the permittee could be reduced by any mitigation of the anticipated losses that could be accomplished on the remaining public lands in the allotment.

Transmission Facilities and Other Off-Site Infrastructure

Because of the availability of a major transmission line in the SEZ and I-10 near the SEZ, and based on the assumption 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 12.2.1.2).

12.2.4.1.3 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.

A proposed design feature specific to the Mason Draw SEZ is as follows:

- Developing range improvements and/or changing existing grazing management to mitigate the loss of AUMs in the Corralitos allotment should be considered.

12.2.4.2 Wild Horses and Burros

12.2.4.2.1 Affected Environment

Section 4.4.2 discusses wild horses (*Equus caballus*) and burros (*E. asinus*) located within the six-state study area. Two wild horse and burro HMAs occur within New Mexico (BLM 2010a). The Bordo Atravesado HMA in Socorro County, the closest HMA to the proposed Mason Draw SEZ, is more than 120 mi (193 km) north of the SEZ.

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). USFS territories in New Mexico occur primarily in the northern portion of the state, 235 mi (378 km) or more from the proposed Mason Draw SEZ region.

12.2.4.2.2 Impacts

Because the proposed Mason Draw SEZ is about 120 mi (193 km) or more from any wild horse and burro HMA managed by BLM and about 235 mi (378 km) from any wild horse and burro territory administered by the USFS, solar energy development within the SEZ would not directly or indirectly affect wild horses and burros that are managed by these agencies.

12.2.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

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12.2.5 Recreation

12.2.5.1 Affected Environment

Access to the proposed SEZ is provided via an interchange from I-10 that connects to a frontage road and then to a series of county and other dirt roads that serve the area and provide access to public lands to the north and east. There are portions of two county roads within the SEZ and numerous dirt roads and trails. While the area tends to be flat and without remarkable natural features, its location within 14 mi (23 km) of Las Cruces and the fact that it is public land are important attributes, making the land available for recreation use. Although there are no estimates of the level of recreation use, the area supports various recreation uses including back country driving, hiking/walking, bird-watching, and hunting. In the Mimbres RMP (BLM 1993; see page 2-50 and Map 2-13 in Appendix F) the SEZ area is included in the group of lands designated as “Limited, existing roads and trails” indicating that existing roads and trails are available for vehicle and OHV use.

12.2.5.2 Impacts

12.2.5.2.1 Construction and Operations

Recreational users would lose the use of any portions of the SEZ developed for solar energy production. Although there are no recreation statistics for this area, it is not anticipated that there would be a significant loss of recreational use caused by development of the proposed SEZ. Public access, both vehicular and foot, into and through areas developed for solar power production would be closed or rerouted but because of the extensive county road system in the area it is anticipated there would be only minor impacts on public access to lands surrounding the SEZ.

Based on viewshed analysis (see Section 12.2.17), the Afton SEZ would be visible from a wide area but is anticipated to have a minimal impact on recreation use on most specially designated areas within the 25-mi (40-km) analysis area. An exception to this would be recreation use along the route of the Butterfield Trail where, because of the proximity to the trail development in the SEZ, would dominate a substantial portion of the viewshed of the trail. At this time, studies are ongoing to identify significant segments of the trail and until those studies are complete it will not be possible to accurately assess possible impacts to the trail and trail recreation use.

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

12.2.5.2.2 Transmission Facilities and Other Off-Site Infrastructure

Because of the availability of an existing transmission line and I-10 on the southern edge of 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 12.2.1.2 for the development assumptions underlying this analysis.

12.2.5.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features were identified. 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 impacts on recreation.

12.2.6 Military and Civilian Aviation

12.2.6.1 Affected Environment

One military training route (MTR), Visual Flight Rule (VFR) 176, overlaps the SEZ. This MTR has a minimum altitude level of 100 ft (30 m) above ground level.

The eastern boundary of the SEZ is within 8 mi (13 km) of the Las Cruces International Airport. One of the field's three runways is oriented east–west, and planes using that runway could pass over the SEZ. There is no regularly scheduled passenger service from this airport.

12.2.6.2 Impacts

Any solar energy facility, including transmission towers higher than 100 ft (30 m), would penetrate into the low-level military airspace and could pose a hazard to pilots operating in the MTR.

The SEZ is far enough from the Las Cruces airport to not pose any conflict with airport operations, but FAA regulations would be applicable to the construction and marking of solar energy facilities in the SEZ and solar developers would be required to consult with the FAA to ensure there would be no conflicts.

12.2.6.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features were identified. The programmatic design features described in Appendix A, Section A.2.2, would require early coordination with the DoD to identify and mitigate, if possible, potential impacts on the use of MTRs.

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12.2.7 Geologic Setting and Soil Resources

12.2.7.1 Affected Environment

12.2.7.1.1 Geologic Setting

Regional Setting

The proposed Mason Draw SEZ is located in a small valley along the eastern edge of the Mimbres Basin, an alluvium-filled structural basin within the Basin and Range physiographic province in south-central New Mexico (Figure 12.2.7.1-1). The valley is bordered on the north and west by the Sierra de las Uvas; on the east by the Rough and Ready Hills, Sleeping Lady Hills, and Aden Hills; and is open to the south. Mason Draw, which flows to the south from the Sierra de las Uvas, is located a few miles to the west of the SEZ.

The Mimbres Basin is an axial basin of the Rio Grande rift, a north-trending tectonic feature that extends from south-central Colorado to northern Mexico, crossing (and bisecting) the length of New Mexico. Basins in the rift zone generally follow the course of the Rio Grande River and are bounded by normal faults that occur along the rift zone margins. The Mimbres Basin lies between the mountains of the Continental Divide on the north and west—extending from the Black Range southward to the Pinos Altos Range, the Big Burro Mountains, and the Cedar Mountain Range to the Carizalillo Hills just north of the international border.—and the north-trending surface features of the Potrillo Horst (Sleeping Lady Hills, Aden Hills, and the West Potrillo Mountains) on the east. The southern boundary of the basin is less well defined (Hanson et al. 1994). The Mason Draw SEZ sits above the Potrillo Horst where basin fill sediments of the Santa Fe Group are shallow (1,000 ft [300 m] or less) relative to those in the Mesilla Basin to the east (Chapin 1988; Frenzel et al. 1992; Myers and Orr 1985).

Exposed sediments near the proposed Mason Draw SEZ consist mainly of basin fill deposits of the Upper Santa Fe Group (QTs) (Figure 12.2.7.1-2). Post-Santa Fe Group alluvial fan piedmont deposits (Qp) of silt, sand, and gravel occur along mountain fronts on both sides of the valley and cover a small portion of the SEZ. Tertiary volcanic rocks and volcaniclastic sedimentary rocks are exposed in the Rough and Ready Hills and the Sierra de las Uvas to the north and Sleeping Lady Hills to the east. These rocks also underlie the northwest portion of the SEZ. The oldest exposed rocks in the region are the Paleozoic carbonates (Hueco Formation) in the Robledo Mountains. These rocks have been intruded by Tertiary monzonitic and granitic plutons and dikes (Ti) (Hawley and Lozinsky 1992; Scholle 2003).

Topography

The Mimbres Basin is a large basin, covering an area of about 3.3 million acres (13,300 km^2) in the U.S. and Mexico, of which about 2.8 million acres (11,400 km^2) are in

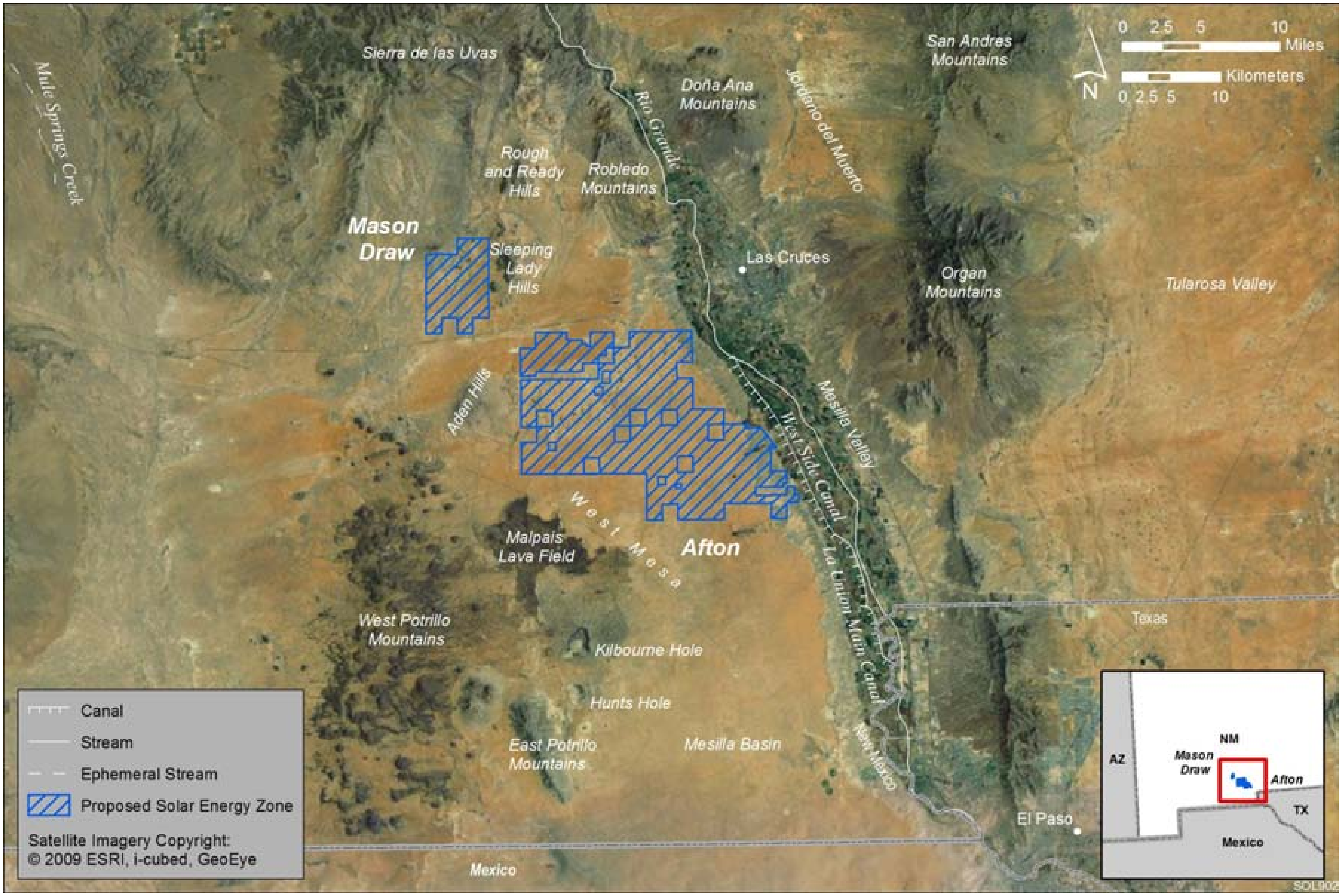


FIGURE 12.2.7.1-1 Physiographic Features along the Eastern Edge of the Mimbres Basin near the Proposed Mason Draw SEZ

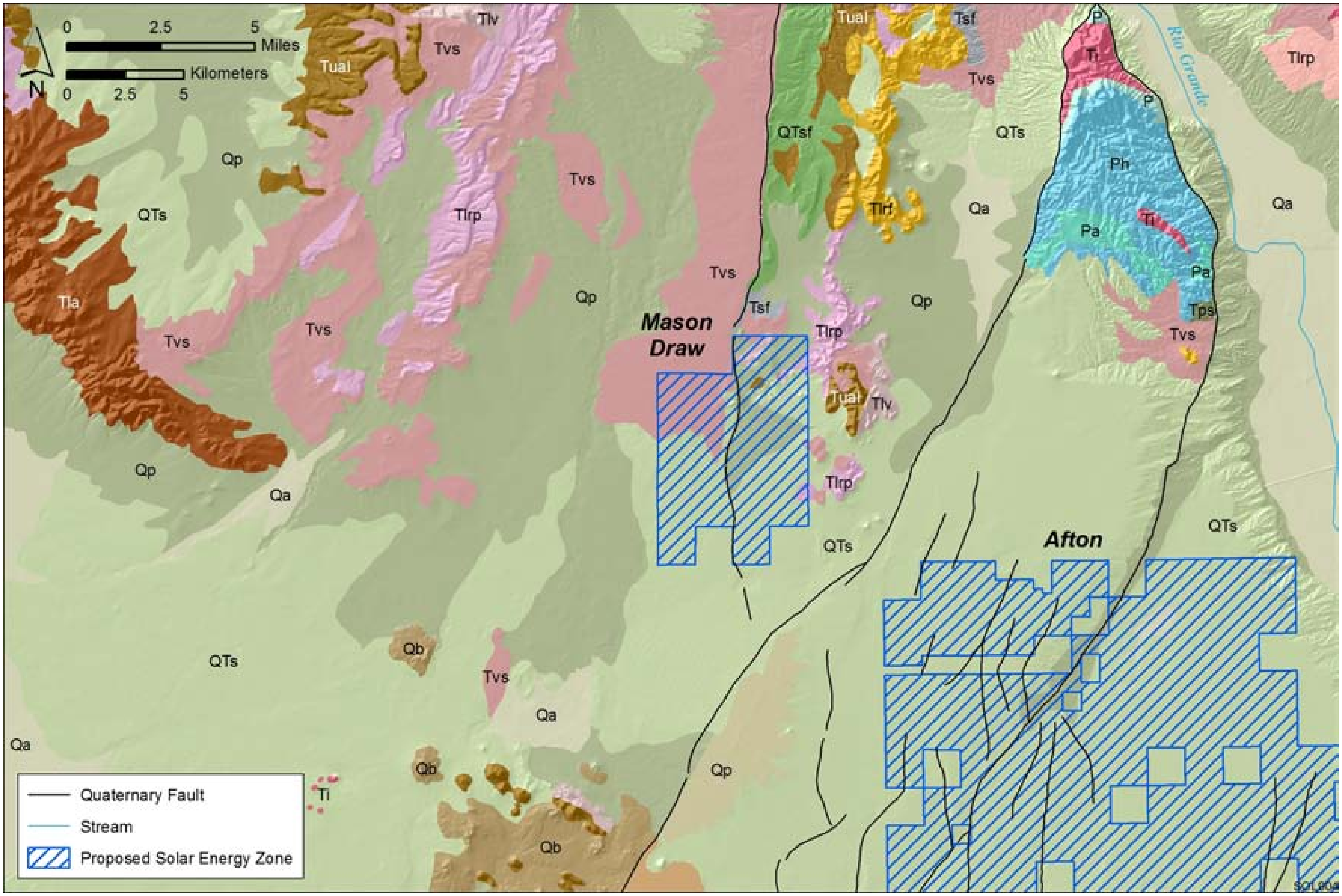


FIGURE 12.2.7.1-2 Geologic Map of the Eastern Edge of the Mimbres Basin near the Proposed Mason Draw SEZ (Sources: Stoeser et al. 2007; Scholle 2003)

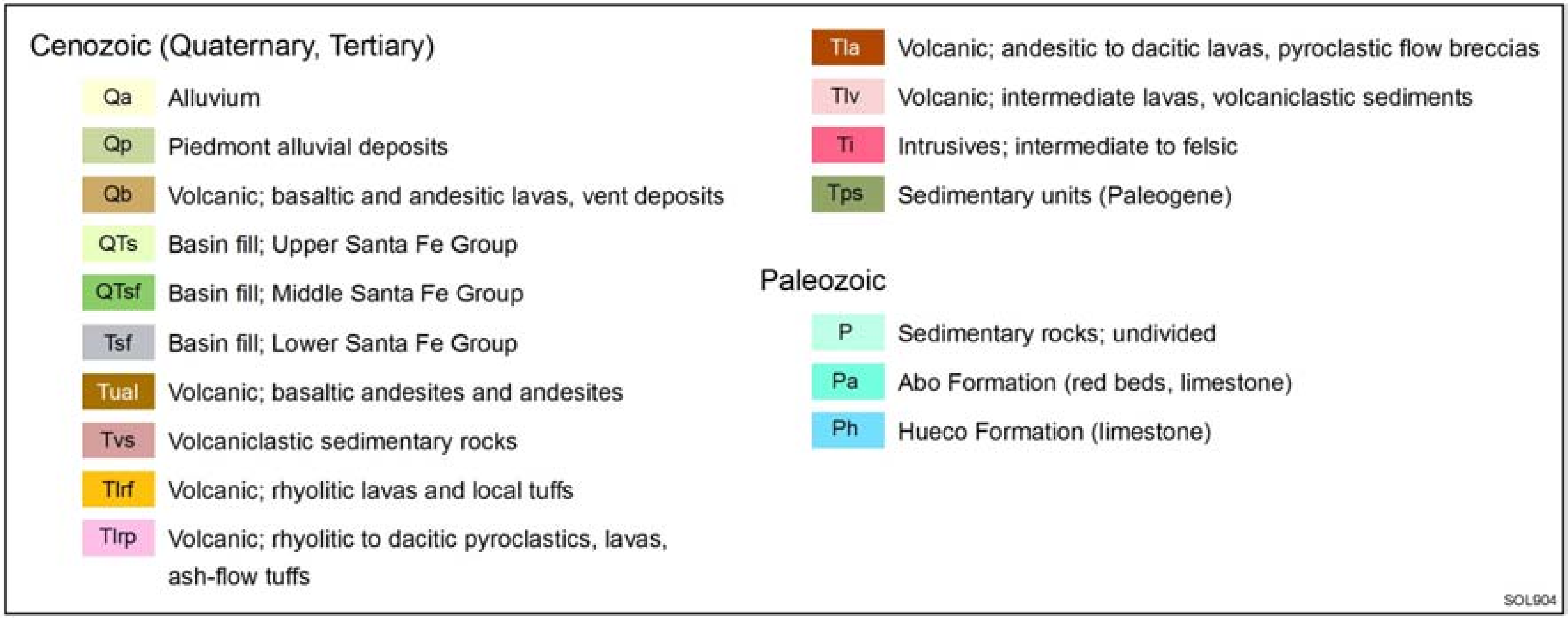


FIGURE 12.2.7.1-2 (Cont.)

southwestern New Mexico. The basin is drained by the San Vicente Arroyo, a major tributary of the Mimbres River, which flows to the southeast toward Black Mountain turning east to flow north of Deming and the Little Florida Mountains. The river is perennial along stretches close to its headwaters to the northwest, but beyond the Grant-Luna county line flows only during intense rainfall events (Hanson et al. 1994).

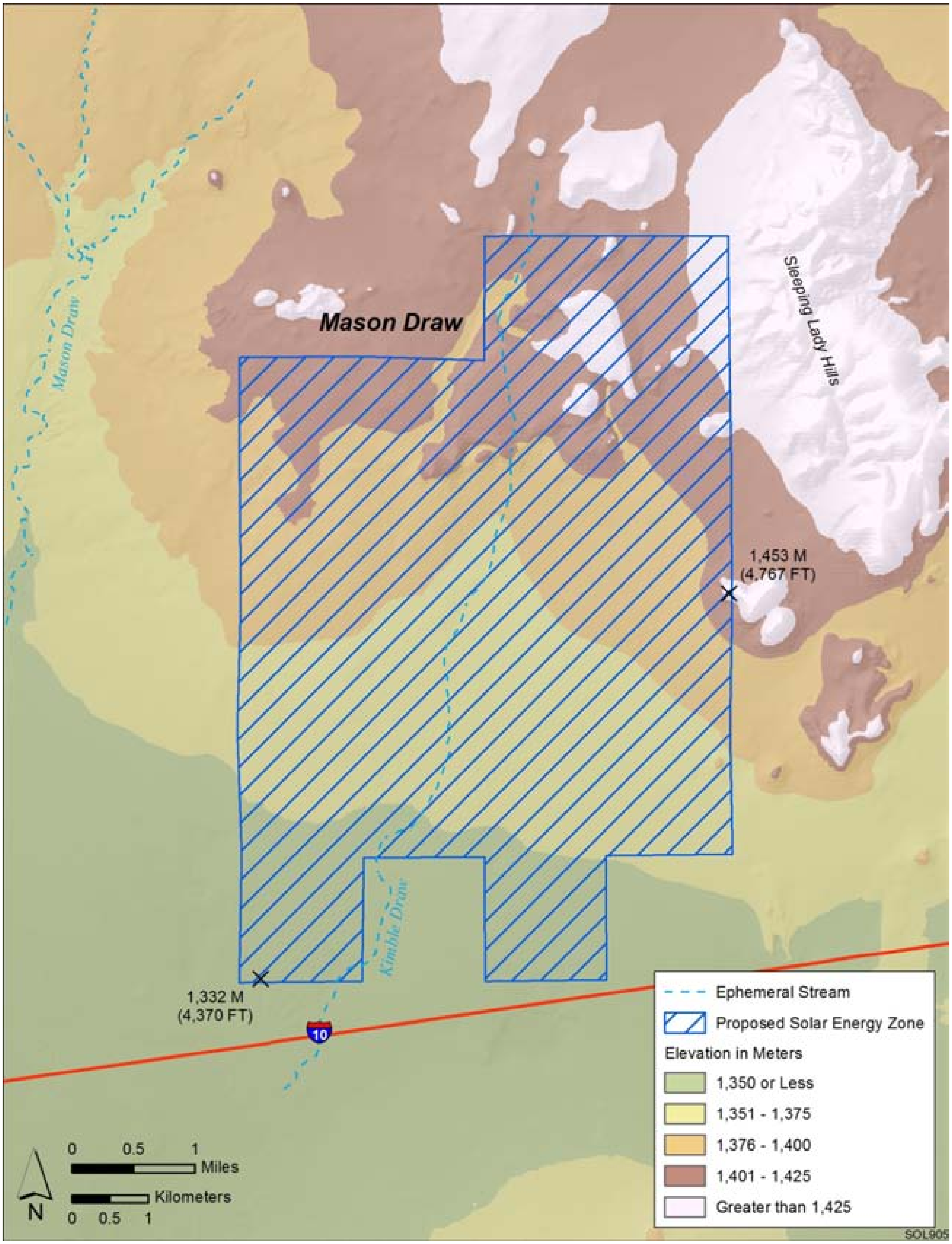
The proposed Mason Draw SEZ is located in a small north-south trending valley along the eastern edge of the Mimbres Basin in Dona Ana County (Figure 12.2.7.1-1). Elevations along the valley axis range from about 5,000 ft (1,525 m) at the north end and along the valley sides to about 4,330 ft (1,320 m) at the south end near U.S. 10. Gently sloping piedmont surfaces and alluvial fan deposits occur along the Sierra de las Uvas, to the west, and the Sleeping Lady Hills, to the east. Small reservoirs (or tanks) occur throughout the region. The valley is drained by the Mason Draw, an ephemeral stream that terminates at Muzzle Lake, about 1 mi (0.6 km) south of the highway. The SEZ is located on the eastern side of the valley immediately west of the Sleeping Lady Hills. Its terrain is fairly flat and slopes gently to the south (Figure 12.2.7.1-3). Elevations range from about 4,700 ft (1,430 m) at the northeast corner of the site to about 4,380 ft (1,335 m) at the southern end. Kimble Draw and several unnamed ephemeral stream drain the site; drainage from the site flows to the south toward Daley Dry Lake just south of U.S. 10. In the north half of the site, Kimble Draw follows the trace of the Ward Tank fault.

Geologic Hazards

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

Seismicity. Seismicity in New Mexico is concentrated in the Rio Grande rift valley near Socorro, an area referred to as the Socorro Seismic Anomaly (SSA). The SSA covers an area of about 1.2 million acres (5,000 km^2) and accounts for about 23% of earthquakes in New Mexico with magnitudes greater than 2.0. The SSA is thought to be caused by crustal extension occurring above an upwelling magma body about 12 mi (19 km) below the ground surface. Seismic activity outside of the SSA shows some concentration of earthquakes along a prominent topographic lineation (the Socorro fracture zone) that extends from the SSA to the north-northeast into eastern New Mexico. The strongest earthquakes in New Mexico tend to occur near Socorro along the rift valley (Sanford et al. 2002, 2006; Sanford and Lin 1998; Balch et al. 2010).

Several Quaternary faults occur within and adjacent to the proposed Mason Draw SEZ (USGS and NMBGMR 2010). These faults include the Ward Tank fault, extending across the SEZ; the West Robledo, East Robledo, Fitzgerald, and unnamed faults, to the east; and the East Potrillo fault, to the south (Figure 12.2.7.1-4). The north-trending Ward Tank fault crosses and



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2 **FIGURE 12.2.7.1-3 General Terrain of the Proposed Mason Draw SEZ**

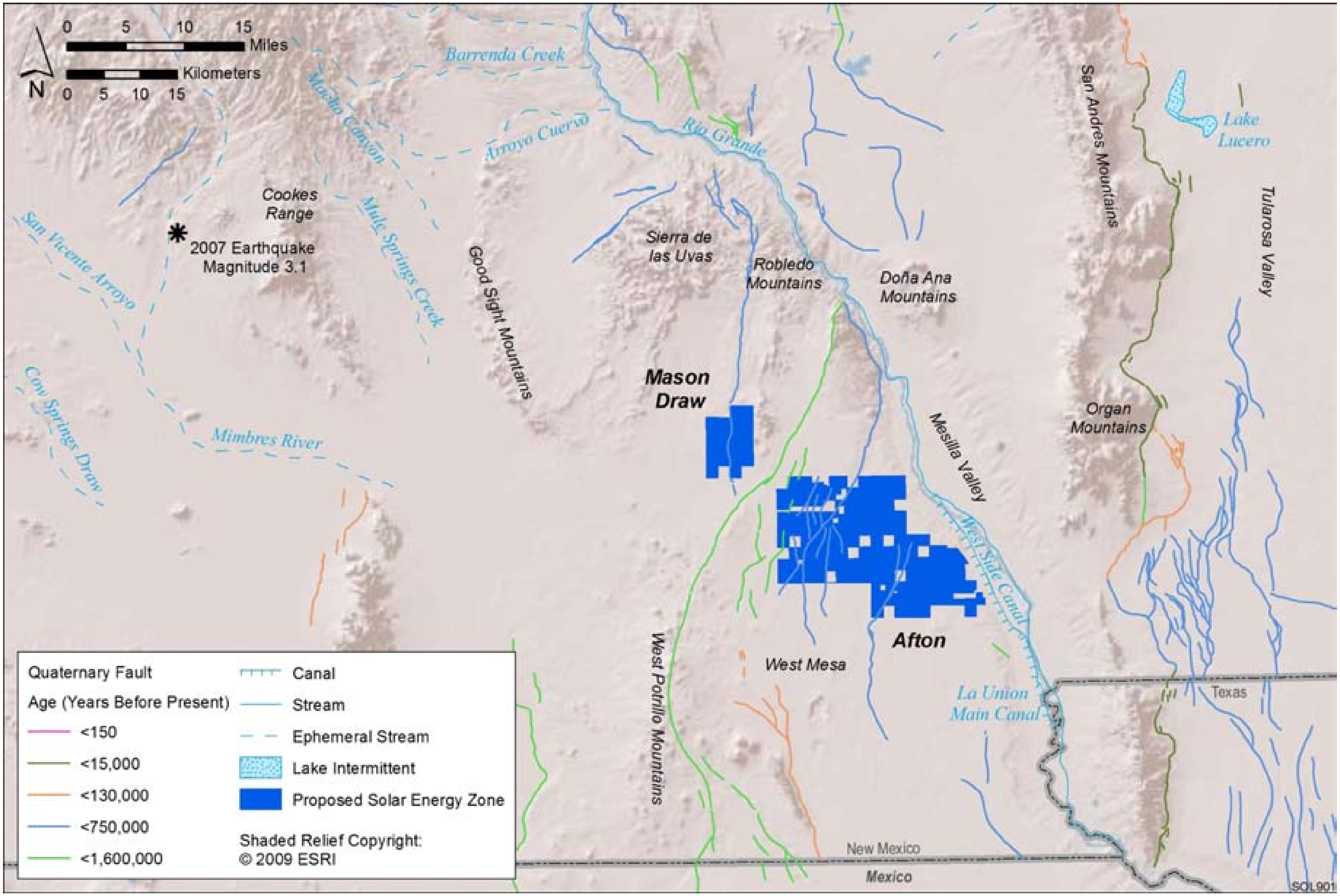

FIGURE 12.2.7.1-4 Quaternary Faults along the Eastern Edge of the Mimbres Basin (USGS and NMBGMR 2010; USGS 2010a)

bisects the proposed Mason Draw SEZ (Figure 12.2.7.1-4). Most of the movement along the high-angle normal fault occurred in the Tertiary, but offsets of Quaternary surfaces suggest it was reactivated less than 750,000 years ago. The Ward Tank fault bounds the east side of the Sierra de las Uvas Mountains; movement along the fault uplifted and tilted the mountains. Stratigraphic offsets of 2,000 to 2,490 ft (610 to 760 m) occur near Rattlesnake Hills (Machete 1996a).

The West Robledo fault and a group of unnamed faults and folds (monoclines) occur about 5 mi (7 km) the east of SEZ (crossing portions of the northwest corner of the Afton SEZ). The northeast-trending West Robledo fault extends southwestward from the northern edge of Robledo Mountain along its west side past Aden Hills and then south through the basalt hills of the West Potrillo Mountains on into Mexico (Figure 12.2.7.1-4). The unnamed faults are high-angle normal faults located within the down-dropped basin between the East and West Robledo faults. There are no detailed studies of these faults, but offsets of the upper West Mesa surface suggest movement along them has not occurred since the early Quaternary, less than 1.6 million years ago (Machete 1996b,c).

The East Robledo fault is a north–northeast trending normal fault that crosses the western portion of the Afton SEZ east of the site (Figure 12.2.7.1-4). To the north, the fault bounds the east side of the Robledo Mountain, an uplifted block (horst) west of the Rio Grande Valley, with offsets of about 294 ft (90 m). It splays to the south where displacements of the upper Camp Rice Formation of the Santa Fe Group (early to middle Pleistocene), the upper and lower West Mesa (referred to as “La Mesa” in earlier reports) piedmont surfaces (middle Pleistocene), and older alluvial fan and terrace deposits (middle Pleistocene) place movement along the fault at less than 750,000 years ago. The Fitzgerald fault crosses the southeastern portion of the site and extends to the south. Its strike is inferred from small west-facing scarps and from a linear series of closed basins. Scarp heights on the lower West Mesa surface are estimated to be as much as 65 ft (20 m) in discrete locales, but most of the fault trace is buried by thick eolian deposits. As with the East Robledo fault, displacements of lower West Mesa surface (middle Pleistocene) indicate that movement along the Fitzgerald fault occurred less than 750,000 years ago (Machete 1996d,e).

The East Potrillo fault is located about 23 mi (37 km) to the south of the Mason Draw SEZ. The high-angle normal fault bounds the east side of the East Potrillo Mountains and forms east-facing intrabasin scarps on sediment of the Camp Rice Formation (upper Santa Fe Group) and younger alluvial fan and piedmont slope deposits on the West Mesa surface. Such displacements place the most recent movement along the fault at less than 130,000 years ago (Machete 1996f).

From June 1, 2000, to May 31, 2010, only one earthquake was recorded within a 61-mi (100-km) radius of the proposed Mason Draw SEZ (USGS 2010a). The earthquake occurred on November 3, 2007. It was located about 50 mi (80 km) to the northwest of the SEZ west of

Cookes Range near the Mimbres River and registered a Richter magnitude (ML)[1] of 3.1 (Figure 12.2.7.1-4). The largest earthquake in the region occurred on April 1, 1977, about 9 mi (14 km) east–northeast of the Mason Draw SEZ. The earthquake registered a magnitude (ML) of 3.2. Four other earthquakes have occurred in the region since 1977; only the 2007 earthquake had a magnitude greater than 3.0 (USGS 2010a).

Liquefaction. The proposed Mason Draw SEZ lies within an area where the peak horizontal acceleration with a 10% probability of exceedance in 50 years is between 0.04 and 0.05 g. Shaking associated with this level of acceleration is generally perceived as moderate; however, potential damage to structures is very light (USGS 2008). Given the very low intensity of ground shaking estimated for the area and the low incidence of historical seismicity in the region, the potential for liquefaction in sediments within and around the SEZ is also likely to be low.

Volcanic Hazards. The major volcanic fields in New Mexico are associated with mantle upwelling within two zones of crustal weakness: the Jemez lineament and the Rio Grande rift. The Jemez lineament is defined by a series of Tertiary to Quaternary volcanic vents with a northeast alignment in northern New Mexico. These fields include the Zuni-Bandera volcanic field, Mount Taylor, the Jemez volcanic field, and the Raton-Clayton volcanic field. Eruptions from vents along the Jemez lineament have occurred within the past 10,000 years. The Jemez Mountains (near Los Alamos) are located at the intersection of the Jemez lineament and the north-trending Rio Grande rift. Rift valley vents nearest the Mason Draw SEZ include Sierra Blanca on the eastern edge of the Tularosa Basin near Mescalero, about 100 mi (160 km) northeast; and Jornado del Muerto, near Socorro, about 120 mi (195 km) north. The Mogollon-Datil volcanic field is about 95 mi (150 km) northwest. Except for the Valles caldera in the Jemez Mountains, all these volcanoes are considered extinct and unlikely to erupt again. The most likely location of new volcanism in New Mexico is near Socorro, where an extensive magma body 12 mi (19 km) below the ground surface has created a zone of intense seismic activity (the Socorro Seismic Anomaly) (NMBGMR 2006; Wolf and Gardner 1995).

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

Earth fissures have been documented in the Mimbres Basin about 40 mi (65 km) west of the proposed Mason Draw SEZ. The fissures are likely the result of land subsidence caused by compaction of unconsolidated alluvial sediments due to groundwater withdrawal. The maximum

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

subsidence measured was about 14 in. (36 cm) in areas where groundwater levels had declined at least 98 ft (30 m) (Contaldo and Mueller 1991).

Other Hazards. Other potential hazards at the proposed Mason Draw SEZ include those associated with soil compaction (restricted infiltration and increased runoff), expanding clay soils (destabilization of structures), and hydro-compactable or collapsible soil (settlement). Disturbance of soil crusts and desert pavement on soil surfaces may increase the likelihood of soil erosion by wind.

Alluvial fan surfaces, such as those found around and within and around the SEZ, can be the sites of damaging high-velocity "flash" floods and debris flows during periods of intense and prolonged rainfall. The nature of the flooding and sedimentation processes (e.g., stream flow versus debris flow fans) will depend on the specific morphology of the fan (National Research Council 1996). Section 12.2.9.1.1 provides further discussion of flood risks within the Mason Draw SEZ.

12.2.7.1.2 Soil Resources

Soils within the Mason Draw SEZ are predominantly loamy fine sands and sandy loams of the Onite-Pintura complex, Simona-Harrisburg, Masonfort-Nickel, and Berino-Bucklebar associations, which together make up about 84% of the soil coverage at the site (Figure 12.2.7.1-5). Soil map units within the proposed Mason Draw zone are described in Table 12.2.7.1-1. These level to moderately rolling soils are derived from eolian sediments and wind-worked alluvium from mixed sources, typical of soils on the fan piedmonts in the region. They are characterized as shallow to deep and well-drained. Most of the soils on the site have low to high surface-runoff potential (depending on slope) and moderately rapid to rapid permeability. The water erosion potential is very low to low for all soils at the site, except those of the Nickel-Upton association which have a moderate potential. These soils occur along the slopes of small ridges and hills in the northeast corner and cover about 4% of the site. The susceptibility to wind erosion is very high for all soils (except for those on rock outcrops, which were not rated), with as much as 134 tons (122 metric tons) of soil eroded by wind per acre (4,000 m^2) each year. All soils within the SEZ have features that are favorable for fugitive dust formation. Outcrops of basalt (RT) cover about 216 acres (0.87 km^2), about 2% of the site (NRCS 2010). Biological soil crusts and desert pavement have not been documented in the SEZ but may be present.

None of the soils within the proposed Mason Draw SEZ is rated as hydric.[2] Flooding is not likely for soils at the site, occurring with a frequency of less than once in 500 years. None of the soils is classified as prime or unique farmland (NRCS 2010).

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

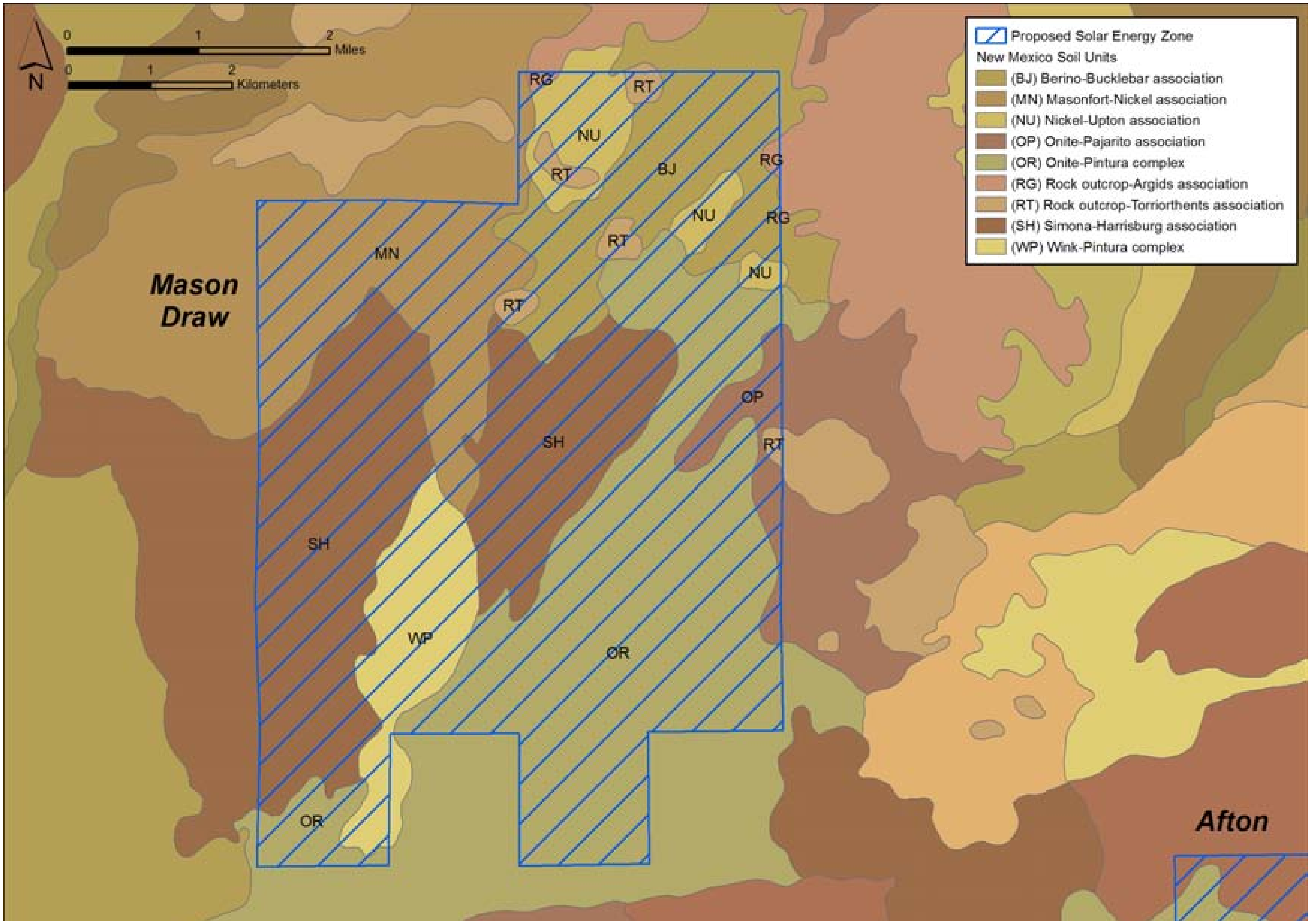

FIGURE 12.2.7.1-5 Soil Map for the Proposed Mason Draw SEZ (NRCS 2008)

TABLE 12.2.7.1-1 Summary of Soil Map Units within the Proposed Mason Draw SEZ

Map Unit Symbol	Map Unit Name	Water Erosion Potential[a]	Wind Erosion Potential[b]	Description	Area (% of SEZ)
OR	Onite-Pintura complex (0 to 5% slope)	Very low	Very high (WEG 2)[c]	Consists of about 50% Onite loamy fine sand and 25% Pintura loamy fine sand. Level to nearly level soils on and between dunes on alluvial fan piedmonts. Parent material includes both eolian deposits (from sandstone) and alluvium. Deep and well-drained, with a moderate surface-runoff potential and moderately rapid to rapid permeability. Shrink-swell potential is low. Available water capacity is low to moderate. Used mainly as rangeland, forestland, or wildlife habitat.	4,334 (34)
SH	Simona-Harrisburg association (1 to 5% slope)	Low	Very high (WEG 3)	Consists of about 50% Simona sandy loam and 25% Simona sandy loam. Gently undulating to moderately rolling soils on broad fans, fan piedmonts, and desert mesas. Parent material includes eolian deposits from sandstone, volcanic ash, and shale. Shallow to moderately deep and well-drained, with high surface-runoff potential (slow infiltration rate) and moderately rapid permeability (above caliche hardpan). Shrink-swell potential is low. Available water capacity is very low. Used mainly as rangeland, forestland, or wildlife habitat.	3.525 (27)
MN	Masonfort-Nickel association	Low	Very high (WEG 3)	Consists of about 40% Masonfort sandy loam and 30% Nickel gravelly sandy loam, on 3 to 15% slopes. Undulating to moderately rolling soils on the sides of strongly dissected terraces. Parent material includes calcareous and gravelly alluvium. Shallow to deep and well-drained, with low surface-runoff potential (high infiltration rate) and moderately slow to moderately rapid permeability. Shrink-swell potential is low. Available water capacity is low. Used mainly as rangeland, forestland, or wildlife habitat.	1,728 (13)
BJ	Berino-Bucklebar association	Low	Very high (WEG 3)	Consists of about 35% Berino loamy fine sand, 25% Bucklebar sandy loam, and 25% Dona Ana sandy loam, on 1 to 5% slopes. Gently sloping soils on broad fans and piedmont slopes. Parent material is mixed fine-loamy alluvium, modified by wind. Deep and well-drained, with low surface-runoff potential (high infiltration rate) and moderate permeability. Shrink-swell potential is low to moderate. Available water capacity is high. Used mainly as rangeland, forestland, or wildlife habitat.	1,341 (10)

1

TABLE 12.2.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential[a]	Wind Erosion Potential[b]	Description	Area (% of SEZ)
WP	Wink-Pintura complex (1 to 5% slope)	Very low	Very high (WEG 2)	Consists of about 45% Wink loamy fine sand and 35% Pintura fine sand. Gently undulating to undulating soils between and on dunes on fan piedmonts. Parent material includes eolian deposits and alluvium modified by wind. Deep and well-drained, with moderate surface runoff potential and moderately rapid to rapid permeability. Shrink-swell potential is low. Available water capacity is low. Used mainly as rangeland, forestland, or wildlife habitat.	866 (7)
NU	Nickel-Upton association	Moderate	Low (WEG 6)	Consists of about 50% Nickel very gravelly fine sandy loam and 25% Upton gravelly sandy loam, on 3 to 15% slopes. Undulating to moderately rolling soils on alluvial fans, terraces, ridges, and piedmonts. Parent material is mixed extremely gravelly coarse-loamy alluvium. Shallow or deep and well-drained, with low surface-runoff potential (high infiltration rate) and moderately rapid to rapid permeability. Available water capacity is low to very low. Used mainly as rangeland, forestland, or wildlife habitat.	526 (4)
OP	Onite-Pajarito association (0 to 5% slope)	Very low	Very high (WEG 2)	Consists of about 40% Onite loamy sand, 30% Pajarito fine sandy loam, and 15% Pintura fine sand. Level to nearly level soils between and on dunes on fan piedmonts. Parent material includes eolian deposits on dunes and mixed alluvium between dunes. Deep and well- to excessively well-drained, with moderate surface-runoff potential and moderately rapid to rapid permeability. Shrink-swell potential is low. Available water capacity is very low to high. Used mainly as rangeland, forestland, or wildlife habitat.	338 (3)

TABLE 12.2.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential[a]	Wind Erosion Potential[b]	Description	Area (% of SEZ)
RT	Rock outcrop-Torriorthents association	Not rated	Not rated	Consists of about 40% rock outcrop, on 15 to 99% slopes; and 30% Torriorthents, on 15 to 50% slopes. Moderately rolling to extremely steep (at rock outcrops) soils on mountains and interspersed between rock outcrops (extrusions, escarpments, ledges, ridges, and cliffs). Parent material is basalt. Shallow to deep and well-drained, with high surface-runoff potential (low infiltration rate); permeability not rated. Available water capacity is very low. Used mainly for recreational purposes, rangeland, wildlife habitat, watershed, military, or esthetic purposes.	216 (2)

[a] Water erosion potential is a qualitative interpretation based on soil properties, or a combination of properties, that contribute to runoff and have low resistance to water erosion processes. The ratings are on a 1.0 scale and take into account soil features such as surface layer particle size, saturated hydraulic conductivity, and high runoff landscapes. A rating of "very high" (>0.9 to ≤1.0) indicates that the soil has the greatest relative vulnerability to water erosion; a rating of "very low" (<0.10) indicates that the soil has little or no relative water erosion vulnerability. A rating of "moderate" (>0.35 to ≤0.65) indicates that the soil has medium relative water erosion vulnerability.

[b] Wind erosion potential is a qualitative interpretation based on surface soil properties or a combination of properties that contribute to the soil's potential wind erosivity. The ratings are on a 1.0 scale and assume that the affected area is bare, smooth, and has a long distance exposed to the wind. It is not a measure of actual soil loss from erosion. A rating of "very high" (>0.9 to ≤1.0) denotes a soil with a surface layer of sandy particles, high carbonate content, low organic matter content, or no coarse fragment protection. A rating of "low" (>0.2 to ≤0.4) is given to soils with favorable surface particle size, high organic matter content, or protective coarse fragments.

[c] 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 2, 134 tons (122 metric tons) per acre (4,000 m^2) per year; WEGs 3, 86 tons (78 metric tons) per acre (4,000 m^2) per year; and WEG 6, 48 tons (43 metric tons) per acre (4,000 m^2) per year.

Sources: NRCS (2010); Bolluch and Neher (1980).

12.2.7.2 Impacts

Impacts on soil resources would occur mainly as a result of ground-disturbing activities (e.g., grading, excavating, and drilling), especially during the construction phase of a solar project. These 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 development in varying degrees and are described in more detail for the four phases of development in Section 5.7 1.

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

12.2.7.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features were identified for soil resources at the proposed Mason Draw 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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12.2.8 Minerals (fluids, solids, and geothermal resources)

12.2.8.1 Affected Environment

As of August 31, 2010, there were no locatable mining claims within the proposed Mason Draw SEZ, nor have there been any claims in the past (BLM and USFS 2010a). The public land within the SEZ has been closed to locatable mineral entry since June 2009, pending the outcome of this solar energy PEIS. Although the area currently has no active oil and gas leases, most of the area in and around the SEZ has been leased in the past but the leases have expired (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 previously been leased for that purpose (BLM and USFS 2010b).

12.2.8.2 Impacts

If the area were identified as a solar energy zone, it would continue to be closed to all incompatible forms of mineral development. For the purpose of this analysis, it was assumed that future development of oil and gas resources, should any be found, would 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 the development of geothermal resources.

12.2.8.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features were identified to protect mineral resources.

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12.2.9 Water Resources

12.2.9.1 Affected Environment

The proposed Mason Draw SEZ is located within the Rio Grande–Mimbres subbasin of the Rio Grande Hydrologic Region (USGS 2010f) and the Basin and Range physiographic province characterized by north–south trending basins flanked by small mountain ranges (Robson and Banta 1995). The proposed SEZ has surface elevations ranging between 4,370 and 4,720 ft (1,332 and 1,439 m), with a general northeast to southwest drainage pattern coming off the slopes of the Sleeping Lady Hills to the northeast and the Sierra de las Uvas to the north (Figure 12.2.9.1-1). Annual precipitation is estimated to be 10 in./yr (25.4 cm/yr), with average annual snowfalls of 3 in./yr (7.6 cm/yr) in the low-lying areas near the proposed SEZ (WRCC 2010a). In the higher elevations of the Sierra de las Uvas, annual precipitation amounts range from 15 to 30 in./yr (38 to 76 cm/yr) with average annual snowfalls of 14 in./yr (35.6 cm/yr) (Hawley et al. 2000; WRCC 2010b). Evapotranspiration rates within the Mimbres basin have been estimated at 16 in./yr (Hanson et al. 1994), and pan evaporation rates in the vicinity of the proposed SEZ were estimated to be 102 in./yr (259 cm/yr) (Cowherd et al. 1988; WRCC 2010c).

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

There are no perennial surface water features located in the proposed Mason Draw SEZ. Several ephemeral washes drain in a general north to south pattern across the proposed SEZ, with the majority of these washes draining the Sleeping Lady Hills to the northeast of the site. Several of these washes converge to form Kimble Draw, which is a significant ephemeral wash that runs north to south across the middle of the site and eventually drains into Daley Lake, a dry lake located approximately 2 mi (3 km) south of the proposed SEZ. Mason Draw is another significant ephemeral wash located 2 mi (3.2 km) west of the proposed SEZ. It is fed by several washes draining the Sierra de las Uvas and drains from north to south toward Muzzle Lake, a dry lake located 4 mi (6 km) southwest of the proposed SEZ (Figure 12.2.9.1-1). The Rio Grande is located 14 mi (22.5 km) to the west of the proposed SEZ, and the Mimbres River, which is an intermittent stream, is located 27 mi (43.5 km) west of the site.

Flood hazards have been mapped in the proposed Mason Draw SEZ (FEMA 2009) with the majority of the site being identified as being beyond the 500-year floodplain (Zone X). Riparian areas along Kimble Draw have been identified as being within the 100-year floodplain (Zone A), which covers an area of 325 acres (1.3 km^2) within the proposed SEZ. The ephemeral channel and riparian areas of Mason Draw just to the west of the proposed SEZ have also been identified as being within the 100-year floodplain. During storm events, intermittent flooding may occur in these ephemeral wash features, and temporary ponding of water along with channel erosion and deposition may take place.

Within the proposed Mason Draw SEZ, only a small riverine wetland is located in the riparian region of Kimble Draw, with other small riverine wetlands located along the riparian

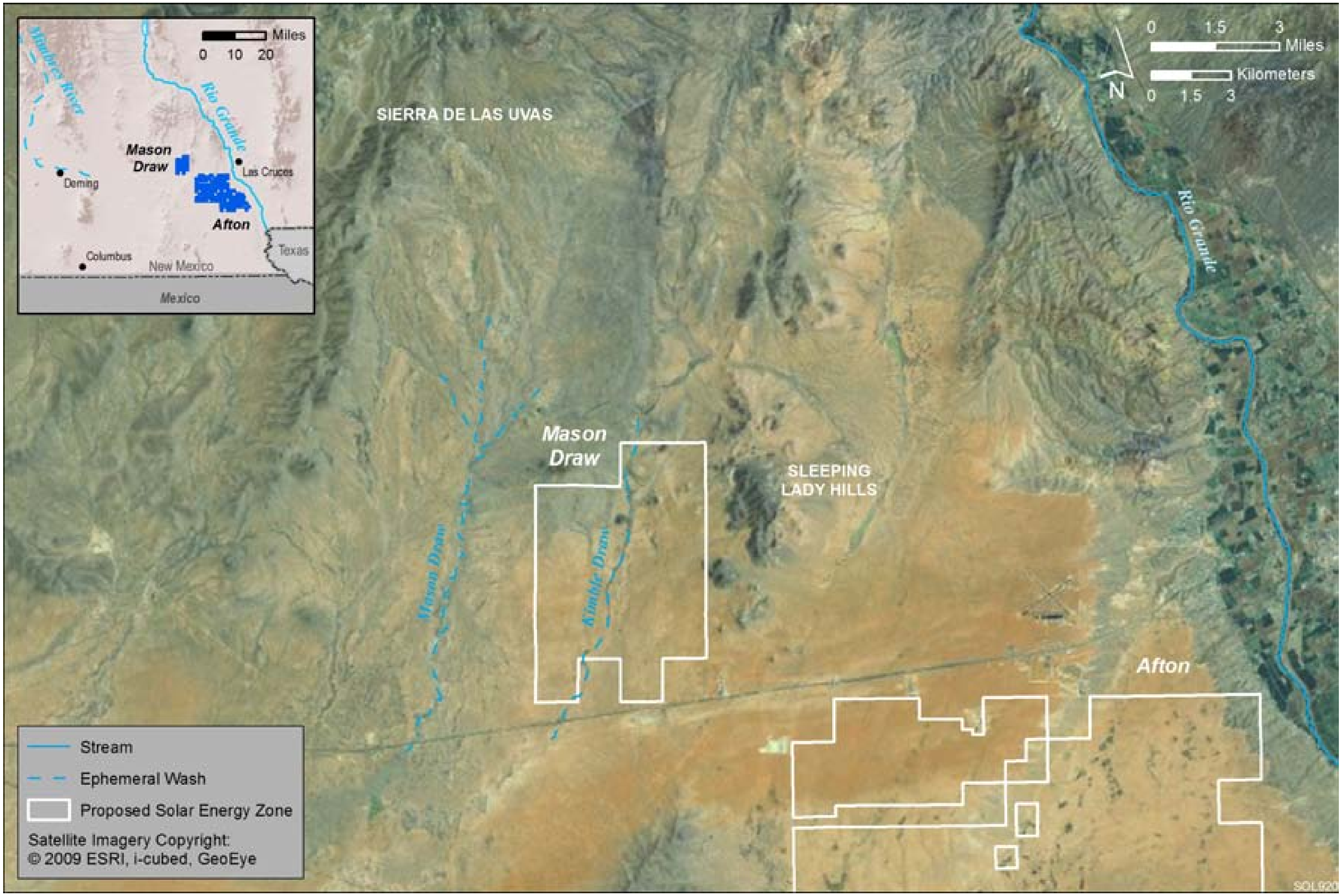

FIGURE 12.2.9.1-1 Surface Water Features near the Proposed Mason Draw SEZ (Note: Digital data for wetland features were not available during analysis and features are not shown)

areas of Mason Draw to the west of the site (USFWS 2009). Several small (typically less than 1 acre [0.004 km^2]) palustrine wetlands are located 25 mi (40 km) north of the proposed SEZ. In addition, riverine wetland areas have been identified in the riparian areas of the Rio Grande approximately 15 mi (24 km) northeast of the proposed SEZ. Further information regarding the wetlands near the proposed Mason Draw SEZ is described in Section 12.2.10.1.

12.2.9.1.2 Groundwater

The proposed Mason Draw SEZ is located on the eastern edge of the Mimbres Groundwater Basin, which is a transboundary basin that is shared jointly by the United States and Mexico. The Mimbres Basin is a large basin comprised of several connected north- and northwest-trending structural units that cover an area of 3.3 million acres (13,300 km^2), and groundwater is primarily found in the basin-fill aquifers that range from 0 to 3,700 ft (0 to 1,128 m) in thickness (Hawley et al. 2000; Heywood 2002). The dominant groundwater flow paths in the Mimbres Basin are along the central portion of the Mimbres Basin, and the proposed SEZ is on the eastern edge within the topographically raised Potrillo Horst structural unit (Hanson et al. 1994; Hawley et al. 2000). This eastern boundary region of the Mimbres Groundwater Basin consists of a thin layer of alluvium sediments, as well as Quaternary and Tertiary age volcanic rocks that overlie Mesozoic and Paleozoic bedrock features (Frenzel et al. 1992; Hanson et al. 1994). While surface water drainage is primarily to the south and southwest within the Mimbres Basin, groundwater potentially flows to the south and east towards the Mesilla Groundwater Basin (the north–south boundary between the basins is along the Sleeping Lady Hills shown in Figure 12.2.9.1-1) described in Section 12.1.9.1.2 for the proposed Afton SEZ (Frenzel et al. 1992; Hanson et al. 1994; Hawley et al. 2000).

The basin-fill sediments within the region of the proposed Mason Draw SEZ range between 50 and 150 ft (15 and 45 m) in thickness and are typically under unconfined conditions (Hanson et al. 1994; Heywood 2002). These basin-fill sediments are a part of the upper unit of the Santa Fe Group, and contain interbedded volcanic rocks with unconsolidated sands and gravels (Frenzel et al. 1992; Hawley et al. 2000). Transmissivity values within the basin-fill sediments of the Mimbres Basin are highly variable and range between 1,873 and 25,381 ft^2/day (174 and 2,358 m^2/day) (Contaldo and Mueller 1991); however, the basin-fill sediments near the proposed SEZ have not been fully characterized. Groundwater may potentially be stored in deeper bedrock units in the vicinity of the proposed SEZ. Hanson et al. (1994) described one well drilled to a depth of 3,000 ft (914 m) that yielded 11 ac-ft/yr (13,600 m^3/yr) of low salinity groundwater and did not experience any significant drawdown.

The location of the proposed Mason Draw SEZ near the boundary between the Mimbres Basin and Mesilla Basin, along with its potential to exchange groundwater between basins, makes it difficult to assess groundwater flow, as well as recharge and discharge processes. Groundwater flow in the Mesilla Basin is toward the southeast (see Section 12.1.9.1.2), while groundwater flow in the Mimbres Basin is toward the south and southwest (Hawley et al. 2000). Groundwater recharge for both basins is primarily by mountain front runoff and infiltration, seepage from streams, and subsurface underflow processes (Frenzel et al. 1992; Hanson et al. 1994). Total groundwater recharge for the

Mesilla Basin was estimated to be less than 10,000 ac-ft/yr (12.3 million m^3/yr) (Section 12.1.9.1.2), and estimates for the total groundwater recharge in the Mimbres Basin range between 39,940 and 55,300 ac-ft/yr (49.3 million and 68.2 million m^3/yr) (Hawley et al. 2000; NMOSE 2003). Because the proposed Mason Draw SEZ lies on the boundary between the Mimbres Basin and Mesilla Basin and there are no perennial streams nearby, a more applicable measure of groundwater recharge can be estimated using the sum of modeled mountain front recharge values for the region around the proposed SEZ in Hanson et al. (1994) that total approximately 1,740 ac-ft/yr (2.1 million m^3/yr).

Groundwater discharge processes in Mimbres Basin are predominately groundwater extractions, discharge to springs, evapotranspiration, and subsurface underflow. Prior to extensive development in the Mimbres Basin, evapotranspiration discharges were as much as 71,000 ac-ft/yr (87.6 million m^3/yr) in the alluvial flat and playa portions of the basin; however, a significant portion of this pre-development evapotranspiration discharge is currently captured by groundwater extractions focused around the cities of Deming and Columbus (Hawley et al. 2000). Discharges to springs in the vicinity of the Mason Draw SEZ are typically less than 32 ac-ft/yr (39,500 m^3/yr) (Hanson et al. 1994). In addition, for the region of the Mimbres Basin near the proposed SEZ, estimates of subsurface underflow to the Mesilla Basin range from 145 ac-ft/yr (178,900 m^3/yr) (Frenzel et al. 1992) to 500 ac-ft/yr (616,700 m^3/yr) (Hanson et al. 1994). It should be noted that the Hanson et al. (1994) model did not account for up to 500 ac-ft/yr (616,700 m^3/yr) of subsurface underflow to the Mesilla Basin, which suggests that the modeled estimates of mountain front recharge for the region of the proposed SEZ may actually be as much as 2,240 ac-ft/yr (2.8 million m^3/yr).

Groundwater monitoring well information in the vicinity of the proposed Mason Draw SEZ is sparse. Wells in the Mimbres Basin that are more than 9 mi (14 km) west of the proposed SEZ show depth to groundwater values ranging from 15 to 75 ft (4.5 to 23 m) below the land surface, and have been fairly steady over time (USGS 2010c; well numbers 321429107311401 and 321828107165501). Wells in the Mesilla Basin that are located more than 3 mi (5 km) to the east of the proposed SEZ have depth to groundwater values ranging between 185 and 320 ft (56 and 98 m) below the land surface (USGS 2010c; well numbers 321945106595001 and 321104107001701). Groundwater extractions are greater towards the town of Deming, which is located 25 mi (40 km) west of the proposed SEZ near the center of the Mimbres Basin, and groundwater surface elevations in this area have been decreasing at an average rate of 0.8 ft/yr (0.2 m/yr) since the 1940s. In addition, groundwater surface elevations have declined near the U.S.–Mexico border near the town of Columbus (Hanson et al. 1994).

Groundwater quality varies by location in the Mimbres Basin. TDS concentrations are less than 500 mg/L in the northern portion of the basin, but increase to more than 1,000 mg/L near the U.S.–Mexico border (Hawley et al. 2000). Water quality data in the vicinity of the proposed Mason Draw SEZ is sparse, but the basin-wide analysis of groundwater quality showed that elevated TDS concentrations associated with drinking water quality concerns and alkali hazards for crop irrigation exist farther south in the basin than the location of the proposed SEZ (Hanson et al. 1994).

12.2.9.1.3 Water Use and Water Rights Management

In 2005, water withdrawals from surface waters and groundwater in Dona Ana County were 521,000 ac-ft/yr (642 million m^3/yr), of which 61% came from surface waters and 39% came from groundwater. The largest water use category was agricultural irrigation, at 470,000 ac-ft/yr (580 million m^3/yr). Public supply water use accounted for 42,000 ac-ft/yr (52 million m^3/yr), with livestock water use on the order of 6,900 ac-ft/yr (8.5 million m^3/yr) (Kenny et al. 2009).

Water rights in New Mexico are managed using the doctrine of prior appropriation. All waters (both groundwater and surface water) are public and subject to appropriation by a legal entity with plans of beneficial use for the water (BLM 2001). A water right in New Mexico is a legal entity's right to appropriate water for a specific beneficial use and is defined by seven major elements: owner, point of diversion, place of use, purpose of use, priority date, amount of water, and periods of use. Water rights in New Mexico are administered through the Water Resources Allocation Program (WRAP) under the Office of the State Engineer (NMOSE) (NMOSE 2010a). The WRAP and the NMOSE are responsible for both surface and groundwater appropriations (both novel and transfer of existing water rights). The extent of the NMOSE's authority to regulate groundwater applies only to those groundwater basins that are "declared" as underground water basins; however, as of 2005, all groundwater basins within the state have been declared. When assessing water right applications, the WRAP considers the following: the existence of unappropriated waters within the basin, the possibility of impairing existing water rights, whether granting the application would be contrary to the conservation of water within the state, and whether the application will be detrimental to public welfare (BLM 2001).

In most regions of the state, groundwater and surface water appropriation application procedures are handled in a similar fashion. The criteria for which the applications are evaluated and administered can vary by region or case (NMOSE 2005a, 2006). For select basins, in addition to the routine evaluations described above, groundwater and surface water rights applications may be subject to water management plans to ensure that the proposed junior water rights will not be detrimental to more senior water rights or impair water conservation efforts in their specific regions (NMOSE 2004). Under the WRAP is the Active Water Resource Management (AWRM) initiative, which is responsible for administering the water management plans in specific basins and regions (NMOSE 2010b). The AWRM is also responsible for prioritizing basins that are in need of conservation and water management plans. For basins deemed "priority," there are policies set in place that mandate junior water rights be temporarily curtailed in favor of more senior water rights in times of drought or shortage. These priority basins are generally more restrictive in terms of awarding novel water rights and transferring existing water rights (NMOSE 2004). Specific tools to be used in the AWRM initiative are associated with (1) detailed accounting of water use, (2) implementing new or existing regulations, (3) creating water districts for management purposes, and (4) assigning water masters to those districts (NMOSE 2004). The water masters are tasked with prioritizing water rights. This effort is necessary to accurately determine which rights will be curtailed and which will not, in a time of water shortage. The process of curtailing junior water rights in favor of more senior ones is called "priority administration" (NMOSE 2010c).

The proposed Mason Draw SEZ is located in Rio Mimbres AWRM priority basin, which overlaps the Mimbres Groundwater Basin. Some areas of this management basin are closed to new appropriations (mostly centered around the towns of Deming and Columbus, as well as along the Mimbres River), while water rights in the remaining portions of the basin are assessed and managed based on a groundwater model developed by the NMOSE and the USGS (NMOSE 2003). The location of the proposed Mason Draw SEZ is outside the area that is closed for new appropriations, so any new water appropriations or water right transfers would be subject to the rules and regulations established by the Rio Mimbres watermaster under the AWRM priority basin initiative. The groundwater model used to administer water rights in the Rio Mimbres management basin compares predicted levels of groundwater drawdown to established criteria governing the rate of drawdown and absolute depth to groundwater values that are allowed over administrative blocks that cover an area of 2,560 acres (10 km^2) (NMOSE 2003).

12.2.9.2 Impacts

Potential impacts on water resources related to utility-scale solar energy development include direct and indirect impacts on surface waters and groundwater. Direct impacts occur at the place of origin and at the time of the proposed activity, while indirect impacts occur away from the place of origin or later in time. Impacts on water resources considered in this analysis are the result of land disturbance activities (i.e., construction, final developed site plan, off-site activities: 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).

12.2.9.2.1 Land Disturbance Impacts on Water Resources

Impacts related to land disturbance activities are common to all utility-scale solar energy development, 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 impacts in the vicinity of the Mason Draw SEZ should be minimized near the unnamed ephemeral wash running north to south across the center of the site and along the western boundary near Mason Draw to prevent channel incision and erosion in these ephemeral streams.

12.2.9.2.2 Water Use Requirements for Solar Energy Technologies

Analysis Assumptions

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

- On the basis of a total area of 12,909 acres (52 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 results in the potential to disturb up to 46% of the SEZ's total area during the peak construction year; and
- Water use requirements for hybrid cooling systems are assumed to be on the same order of magnitude as those using dry cooling (see Section 5.9.2.1).

Site Characterization

During site characterization, water would be used mainly for controlling fugitive dust and for providing the workforce's 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 fugitive dust suppression and the workforce's potable supply. Because there are no significant surface water bodies on the proposed Mason Draw 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 the peak construction year, shown in Table 12.2.9.2-1, could be as high as 3,581 ac-ft (4.8 million m^3). Groundwater wells would have to yield an estimated 2,219 gpm (8,059 L/min) to meet the estimated construction water requirements, which is of the same order of magnitude as large agricultural and municipal production wells (Harter 2003). In addition, the estimated total water needs for the peak

TABLE 12.2.9.2-1 Estimated Water Requirements during the Peak Construction Year for the Proposed Mason Draw SEZ

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Water use requirements[a]				
Fugitive dust control (ac-ft)[b,c]	2,328	3,491	3,491	3,491
Potable supply for workforce (ac-ft)	148	90	37	19
Total water use requirements (ac-ft)	2,466	3,581	3,528	3,510
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 102 in./yr (259 cm/yr) (Cowherd et al. 1988; WRCC 2010d).

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

construction year are on the same order of magnitude as the local groundwater recharge estimate. The availability of groundwater and the impacts of groundwater withdrawal would need to be assessed during the site characterization phase of a solar development project.

In addition to groundwater withdrawals, up to 148 ac-ft (182,600 m^3) of sanitary wastewater would be generated annually and would need to be either treated on-site or sent to an off-site facility. Groundwater quality in the vicinity of the SEZ would need to be tested to verify that the quality would comply with drinking water standards.

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 12.2.9.2-2). Water needs for cooling are a function of the type of cooling used (i.e., dry, hybrid, wet). Further refinements to water requirements for cooling would result from the percentage of time the option was employed (30 to 60% range assumed) and the power of the system. The differences between the water requirements reported in Table 12.2.9.2-2 for the parabolic trough and power tower technologies are attributable to the assumptions of acreage per megawatt. As a result, the water usage for the more energy-dense parabolic trough technology is estimated to be almost twice as large as that for the power tower technology.

Water use requirements among the solar energy technologies are a factor of the full build-out capacity for the SEZ, as well as assumptions on water use and technology operations discussed in Appendix M. Table 12.2.9.2-2 lists the quantities of water needed for mirror/panel washing, potable water supply, and cooling activities for each solar energy technology. At full

TABLE 12.2.9.2-2 Estimated Water Requirements during Operations at the Proposed Mason Draw SEZ

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Full build-out capacity (MW)[a,b]	2,065	1,147	1,147	1,147
Water use requirements				
Mirror/panel washing (ac-ft/yr)[c,d]	1,033	574	574	57
Potable supply for workforce (ac-ft/yr)	29	13	13	1
Dry-cooling (ac-ft/yr)[e]	413–2,065	229–1,147	NA[f]	NA
Wet-cooling (ac-ft/yr)[e]	9,294–29,949	5,164–16,638	NA	NA
Total water use requirements				
Non-cooled technologies (ac-ft/yr)	NA	NA	587	58
Dry-cooled technologies (ac-ft/yr)	1,475–3,127	816–1,734	NA	NA
Wet-cooled technologies (ac-ft/yr)	10,356–31,011	5,751–17,225	NA	NA
Wastewater generated				
Blowdown (ac-ft/yr)[g]	587	326	NA	NA
Sanitary wastewater (ac-ft/yr)	29	13	13	1

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

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

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

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

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

[f] NA = not applicable.

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

build-out capacity, the estimated total water use requirements for non-cooling technologies (i.e., technologies that do not use water for cooling) during operations are 58 and 587 ac-ft/yr (71,500 and 724,000 m^3/yr) for the PV and dish engine technologies, respectively. For technologies that use water for cooling (i.e., parabolic trough and power tower), total water needs range from 816 ac-ft/yr (1.0 million m^3/yr) (power tower for an operating time of 30% using dry cooling) to 31,011 ac-ft/yr (38.3 million m^3/yr) (parabolic trough for an operating time of 60% using wet cooling). Operations would generate up to 29 ac-ft/yr (35,800 m^3/yr) of sanitary wastewater. In addition, for wet-cooled technologies, 326 to 587 ac-ft/yr (402,000 to 724,000 m^3/yr) of cooling system 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.

Groundwater in the basin-fill aquifer is the primary water source available in the vicinity of the proposed Mason Draw SEZ. The relatively shallow depth of the basin-fill aquifer and the estimated value of local groundwater recharge limit the amount of usable groundwater for solar energy facilities. Given the estimates of needed water resources for the full build-out scenario (Table 12.2.9.2-2), technologies using wet cooling are not feasible because their water needs far exceed estimates of local groundwater recharge and are of similar magnitude to the total groundwater recharge for either the Mimbres Basin or the Mesilla Basin. Technologies using dry cooling have water needs of similar magnitude to the estimated local groundwater recharge rate, so impacts associated with potential groundwater drawdown effects would need to be assessed during the site characterization phase. PV and dish engine technologies have water use requirements that are reasonable, considering the information currently known about groundwater in the vicinity of the proposed SEZ. Further characterization of the effects of groundwater withdrawal rates on potential groundwater elevations and flow directions would need to be assessed during the site characterization phase of a solar project and during the development of water supply wells. As mentioned in Section 12.2.9.1.2, limited groundwater resources may exist in bedrock aquifers more than 3,000 ft (914 m) below the surface, but further characterization is needed. In addition, groundwater quality in the vicinity of the SEZ would need to be tested to verify the quality would comply with drinking water standards for any potable water supply sources.

Decommissioning/Reclamation

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

12.2.9.2.3 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 Mason Draw SEZ is located within 1 mi (1.6 km) of I-10 and adjacent to existing transmission lines, so impacts on water resources would be minimal.

12.2.9.2.4 Summary of Impacts on Water Resources

The impacts on water resources associated with developing solar energy at the proposed Mason Draw SEZ are associated with land-disturbance effects on the natural hydrology, water quality concerns, and water use requirements for the various solar energy technologies. Land disturbance activities can cause localized erosion and sedimentation issues, as well as altering groundwater recharge and discharge processes. The Mason Draw SEZ contains Kimble Draw and other ephemeral wash features, some riparian wetland features, and areas within the 100-year floodplain. These areas are susceptible to increased erosion and sedimentation as a result of solar energy development.

Impacts related 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 Mason Draw SEZ. The location of the proposed SEZ is on the boundary between the Mimbres Basin and the Mesilla Basin. Both of these groundwater basins have substantial basin-fill aquifers, but the area around the proposed SEZ consists of a shallow basin-fill aquifer that is not fully characterized. Given the data from previous studies on the Mimbres and Mesilla basins (e.g., Frenzel et al. 1992; Hanson et al. 1994; Hawley et al. 2000), this boundary area between the two basins does not have substantial groundwater resources available and it potentially only receives a limited amount of groundwater recharge through localized mountain front infiltration. Comparing the estimates of water use needs presented in Table 12.2.9.2-2 with the estimates of groundwater recharge in the vicinity of the proposed SEZ (Section 12.2.9.1.2) suggests that wet-cooling technologies would not be feasible for the full build-out scenario at the proposed Mason Draw SEZ. Dry-cooled, dish engine, and PV technologies would need to implement water conservation measures in order to limit water needs, given the limited water resources that are available at the proposed Mason Draw SEZ. In addition, water rights for potential solar energy facilities would need to be secured in compliance with the procedures set forth by the Rio Mimbres management basin's watermaster and the policies set by the AWRM priority basins initiative.

12.2.9.3 SEZ-Specific Design Features and Design Feature Effectiveness

The program for solar energy development on BLM-administered lands will require the programmatic design features given in Appendix A, Section A.2.2, to be implemented, mitigating some impacts on water resources. Design features would focus on coordinating with federal, state, and local agencies that regulate the use of water resources to meet the requirements of permits and approvals needed to obtain water for development, and conducting hydrological studies to characterize the aquifer from which groundwater would be obtained. This includes 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 Mason Draw 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 ephemeral streams located within the proposed SEZ;

- Siting of solar facilities and construction activities should avoid areas that are identified as within a 100-year floodplain of Kimble Draw that total 325 acres [1.3 km^2] within the proposed SEZ;

- Groundwater management/rights should be coordinated with the NMOSE with respect to the Rio Mimbres AWRM priority basin;

- Groundwater monitoring and production wells should be constructed in accordance with state standards (NMOSE 2005b);

- Stormwater management BMPs should be implemented according to the guidance provided by the New Mexico Environment Department (NMED 2010); and

- Water for potable uses would have to meet or be treated to meet water quality standards as defined by the EPA (2009d).

12.2.10 Vegetation

This section addresses vegetation that could occur or is known to occur within the potentially affected area of the proposed Mason Draw SEZ. The affected area considered in this assessment includes 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 includes only the SEZ. The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ boundary where ground-disturbing activities would not occur but that could be indirectly affected by activities in the area of direct effects.

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

12.2.10.1 Affected Environment

The proposed Mason Draw SEZ is located within the Chihuahuan Basins and Playas Level IV ecoregion (EPA 2007), which supports communities of desert shrubs and grasses on alluvial fans, flat to rolling internally drained basins, and river valleys and includes areas of saline and alkaline soils, salt flats, sand dunes, and areas of wind-blown sand (Griffith et al. 2006). The dominant species of the desert shrubland is creosotebush (*Larrea tridentata*), with tarbush (*Flourensia cernua*), yuccas (*Yucca* spp.), sand sage (*Artemisia filifolia*), viscid acacia (*Acacia neovernicosa*), tasajillo (*Cylindropuntia leptocaulis*), lechuguilla (*Agave lechuguilla*), and mesquite (*Prosopis* sp.) also frequently occurring. Gypsum areas support gyp grama (*Bouteloua breviseta*), gyp mentzelia (*Mentzelia humulis*), and Torrey ephedra (*Ephedra torreyana*). Fourwing saltbush (*Atriplex canescens*), seepweed (*Suaeda* sp.), pickleweed (*Allenrolfea occidentalis*), and alkali sacaton (*Sporobolus airoides*) occur on saline flats and along alkaline playa margins. Cacti, including horse crippler (*Echinocactus texensis*), are common in this ecoregion. This ecoregion is located within the Chihuahuan Deserts Level III ecoregion, which is described in Appendix I. Annual precipitation in the Chihuahuan Desert occurs mostly in summer (Brown 1994), and is low in the area of the SEZ, averaging about 9.4 in. (24 cm) at Las Cruces, New Mexico (see Section 12.2.13).

Areas surrounding the SEZ include this ecoregion as well as the Low Mountains and Bajadas Level IV ecoregion, which includes desert shrub communities with a sparse cover of grasses, with scattered trees at higher elevations (Griffith et al. 2006).

Land cover types described and mapped under the Southwest Regional Gap Analysis Project (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 Mason Draw SEZ are shown in

Figure 12.2.10.1-1. Table 12.2.10.1-1 lists the surface area of each cover type within the potentially affected area.

Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe, Apacherian-Chihuahuan Mesquite Upland Scrub, and Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub are the predominant cover types within the proposed Mason Draw SEZ. Additional cover types within the SEZ are given in Table 12.2.10.1-1. During a July 2009 visit to the site, creosotebush was the dominant species observed in the desert scrub communities present within the northern portions of the SEZ, with banana yucca (*Yucca baccata*), Torrey's yucca (*Yucca torreyi*), and soaptree yucca (*Yucca elata*) frequently occurring. The dominant species in the desert grassland areas present on the SEZ include tobosagrass (*Pleuraphis mutica*), alkali sakaton, and mesa dropseed (*Sporobolus flexuosus*). Shrub-steppe communities included these species as well as honey mesquite (*Prosopis glandulosa*) and snakeweed (*Gutierrezia* sp.). Honey mesquite thickets occur in depressions. Cacti observed on the SEZ included purple prickly pear (*Opuntia macrocentra*). Sensitive habitats on the SEZ include wetland, desert dry wash, dry wash woodland, riparian, playa, and sand dune habitat. The area has a history of livestock grazing, and the plant communities on the SEZ have likely been affected by grazing.

The area of indirect effects, including the area within 5 mi (8 km) around the SEZ, includes 23 cover types, which are listed in Table 12.2.10.1-1. The predominant cover types are Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe, Apacherian-Chihuahuan Mesquite Upland Scrub, and Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub.

One palustrine wetland, approximately 2.5 acres (0.01 km^2) in size, and seven riverine wetlands, totaling 14.2 mi (22.9 km), mapped by the NWI occurs in the proposed Mason Draw SEZ (USFWS undated). NWI maps are produced from high-altitude imagery and are subject to uncertainties inherent in image interpretation (USFWS 2009). The riverine wetlands are associated with Kimble Draw and its tributaries. The palustrine wetland is classified as open water. Cover types occurring on the SEZ, which are typically associated with wetland or riparian areas, include North American Warm Desert Riparian Woodland and Shrubland, and North American Warm Desert Playa.

Numerous ephemeral dry washes occur within the SEZ, generally flowing to the south. These dry washes typically contain water for short periods during or following precipitation events, and likely include temporarily flooded areas. Although these washes generally do not support wetland habitats, woodlands occur along the margins of a number of the larger washes.

Numerous riverine wetlands occur outside the SEZ, within the indirect impact area. Many of these are associated with Mason Draw. Scattered palustrine open water wetlands and palustrine flats wetlands occur within the indirect impact area, including several locations just outside the SEZ boundary. Several springs also occur in the vicinity of the SEZ.

The State of New Mexico maintains an official list of weed species that are designated noxious species (NMDA 2009). Table 12.2.10.1-2 provides a summary of the noxious weed species regulated in New Mexico that are known to occur in Dona Ana County (USDA 2010;

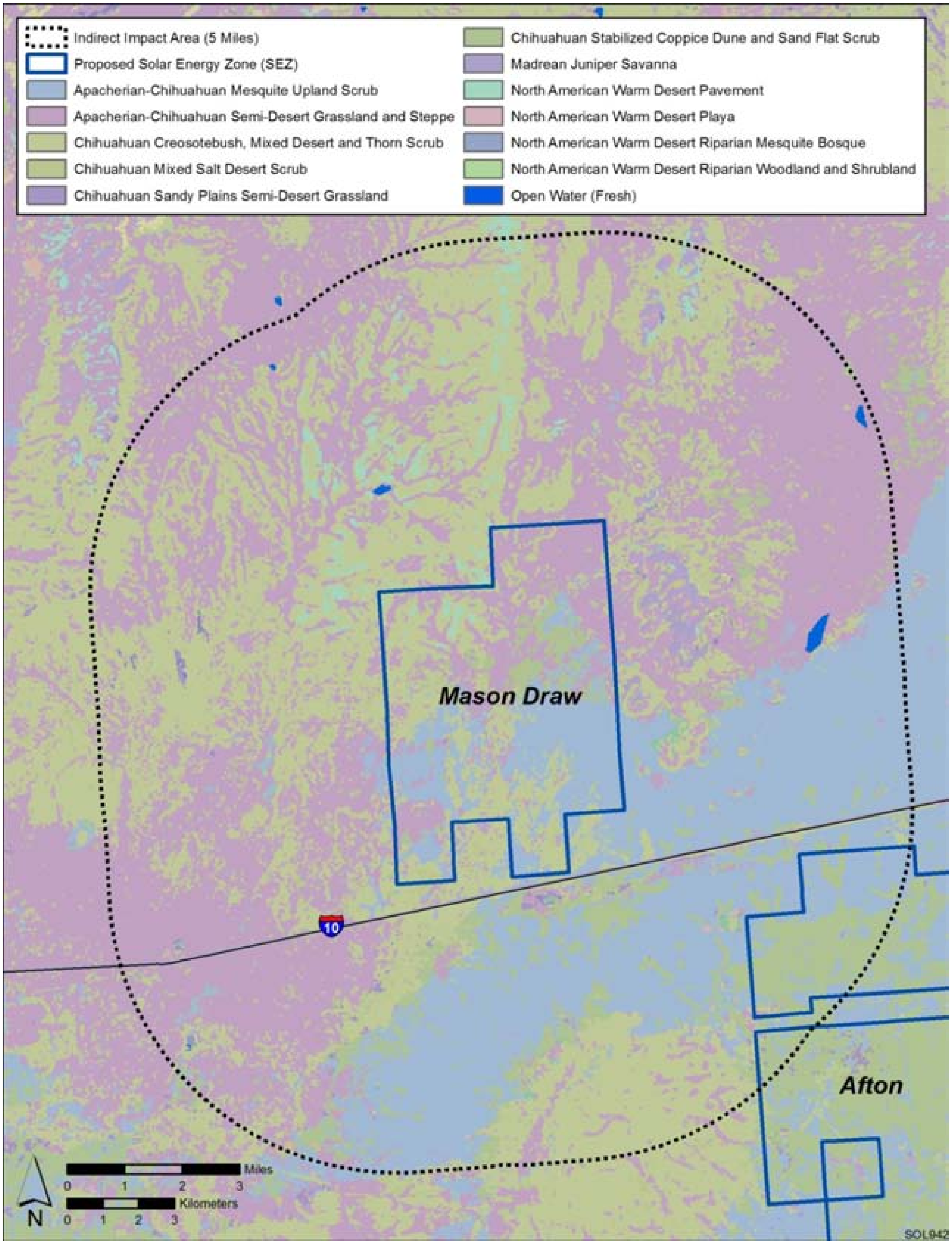

FIGURE 12.2.10.1-1 Land Cover Types within the Proposed Mason Draw SEZ (Source: USGS 2004)

TABLE 12.2.10.1-1 Land Cover Types within the Potentially Affected Area of the Proposed Mason Draw SEZ and Potential Impacts

Land Cover Type[a]	Area of Cover Type Affected (acres)[b]		
	Direct Effects (Within SEZ)[c]	Indirect Effects (Outside SEZ)[d]	Overall Impact Magnitude[e]
Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe: Occurs on gently sloping bajadas, as well as on mesas and steeper piedmont and foothill slopes. Consists of grassland, steppe, and savanna characterized by a high diversity of perennial grasses as well as succulents, such as *Agave*, sotol (*Dasylirion* spp.) and *Yucca*, and tall shrub/short tree species.	3,998 acres[f] (0.3%, 1.1%)	41,673 acres (3.2%)	Small
Apacherian-Chihuahuan Mesquite Upland Scrub: Occurs on foothills where deeper soil layers store winter precipitation. Dominant species are western honey mesquite (*Prosopis glandulosa*) or velvet mesquite (*P. velutina*) along with succulents and other deep-rooted shrubs. Cover of grasses is low.	3,817 acres (0.7%, 1.3%)	21,581 acres (4.2%)	Small
Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub: Occurs in basins and plains as well as the foothill transition zone. Consists of creosotebush (*Larrea tridentata*) alone or with thornscrub or other desertscrub species, including succulents such as *Agave* and cacti. Although grasses may be common, shrubs generally have greater cover.	3,785 acres (0.3%, 0.7%)	36,486 acres (2.9%)	Small
Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub: Consists of vegetated dunes and sandsheets with open shrublands (generally 10 to 30% plant cover) which include grasses.	979 acres (0.1%, 0.3%)	7,074 acres (1.0%)	Small
Chihuahuan Mixed Salt Desert Scrub: Occurs in saline basins, often on alluvial flats and around playas. Consists of one or more species of *Atriplex* along with other halophytic plant species. Grasses are present in varying densities.	186 acres (0.3%, 0.8%)	1,084 acres (1.6%)	Small
North American Warm Desert Pavement: Consists of unvegetated to very sparsely vegetated (<2% plant cover) areas, usually in flat basins, with ground surfaces of fine to medium gravel coated with "desert varnish." Desert scrub species are usually present. Herbaceous species may be abundant in response to seasonal precipitation.	101 acres (0.9%, 2.4%)	1,272 acres (11.2%)	Small
Madrean Juniper Savanna: Occurs on lower foothills and plains. Consists of widely spaced Madrean juniper (*Juniperus* spp.) trees, with a moderate to high density of grasses (exceeding 25% cover). Succulents such as *Yucca*, *Agave*, or cacti are generally present.	11 acres (0.1%, 0.1%)	312 acres (1.6%)	Small

TABLE 12.2.10.1-1 (Cont.)

Land Cover Type[a]	Area of Cover Type Affected (acres)[b] Direct Effects (Within SEZ)[c]	Indirect Effects (Outside SEZ)[d]	Overall Impact Magnitude[e]
North American Warm Desert Riparian Woodland and Shrubland: Occurs along medium to large perennial streams in canyons and desert valleys. Consists of a mix of riparian woodlands and shrublands. Vegetation is dependent upon annual or periodic flooding, along with substrate scouring, and/or a seasonally shallow water table.	6 acres (0.1%, 0.2%)	2 acres (<0.1%)	Small
Chihuahuan Sandy Plains Semi-Desert Grassland: Occurs on sandy plains and sandstone mesas. Consists of grassland and steppe, and includes scattered desert shrubs and stem succulents such as *Yucca* spp.	3 acres (<0.1%, <0.1%)	263 acres (0.6%)	Small
North American Warm Desert Playa: Consists of barren and sparsely vegetated areas (generally <10% plant cover) that are intermittently flooded; salt crusts are common. Sparse shrubs occur around the margins, and patches of grass may form in depressions. In large playas, vegetation forms rings in response to salinity. Herbaceous species may be periodically abundant.	1 acres (<0.1%, 0.1%)	50 acres (0.5%)	Small
Developed, Medium-High Intensity: Includes housing and commercial/industrial development. Impervious surfaces compose 50–100% of the total land cover.	0 acres	502 acres (1.0%)	Small
Madrean Encinal: Occurs on foothills, bajadas, and plateaus and in canyons. Consists of evergreen oak (*Quercus* spp.) woodlands, which include open woodlands and savannas at lower elevations. Conifers and shrubs may be present. Grasses may be prominent in some areas.	0 acres	394 acres (0.7%)	Small
North American Warm Desert Wash: Consists of intermittently flooded linear or braided strips within desert scrub or grassland landscapes on bajadas, mesas, plains, and basin floors. Although often dry, washes are associated with rapid sheet and gully flow. The vegetation varies from sparse and patchy to moderately dense and typically occurs along the banks, but may occur within the channel. Shrubs and small trees are typically intermittent to open. Common upland shrubs often occur along the edges.	0 acres	240 acres (7.1%)	Small

TABLE 12.2.10.1-1 (Cont.)

Land Cover Type[a]	Area of Cover Type Affected (acres)[b] Direct Effects (Within SEZ)[c]	Indirect Effects (Outside SEZ)[d]	Overall Impact Magnitude[e]
North American Warm Desert Active and Stabilized Dune: Consists of unvegetated to sparsely vegetated (generally <10% plant cover) active dunes and sandsheets. Vegetation includes shrubs, forbs, and grasses. Includes unvegetated "blowouts" and stabilized areas.	0 acres	160 acres (0.2%)	Small
Open Water: Plant or soil cover is generally less than 25%.	0 acres	141 acres (1.6%)	Small
North American Warm Desert Bedrock Cliff and Outcrop: Occurs on subalpine to foothill steep cliff faces, narrow canyons, rock outcrops, and unstable scree and talus slopes. Consists of barren and sparsely vegetated areas (generally <10% plant cover) with desert species, especially succulents. Lichens are predominant in some areas.	0 acres	98 acres (1.4%)	Small
North American Warm Desert Volcanic Rockland: Consists of barren and sparsely vegetated (<10% plant cover) areas. Vegetation is variable and typically includes scattered desert shrubs.	0 acres	75 acres (0.4%)	Small
Chihuahuan Succulent Desert Scrub: Occurs on hot, dry colluvial slopes, upper bajadas, sideslopes, ridges, canyons, hills, and mesas. Includes an abundance of succulent species such as cacti, *Agave*, *Yucca*, and others. Shrubs are generally present and perennial grasses are sparse.	0 acres	58 acres (0.4%)	Small
Inter-Mountain Basins Semi-Desert Shrub Steppe: Generally consists of perennial grasses with an open shrub and dwarf shrub layer.	0 acres	56 acres (0.7%)	Small
Madrean Pinyon-Juniper Woodland: Occurs on foothills, mountains, and plateaus. Mexican pinyon (*Pinus cembroides*), border pinyon (*P. discolor*), or other trees and shrubs of the Sierra Madres are present. Dominant species may include redberry juniper (*Juniperus coahuilensis*), alligator juniper (*J. deppeana*), Pinchot's juniper (*J. pinchotii*), oneseed juniper (*J. monosperma*), or twoneedle pinyon (*P. edulis*). Oaks (*Quercus* sp.) may be codominant. Understory shrub or graminoid layers may be present.	0 acres	17 acres (<0.1%)	Small

TABLE 12.2.10.1-1 (Cont.)

	Area of Cover Type Affected (acres)[b]		
Land Cover Type[a]	Direct Effects (Within SEZ)[c]	Indirect Effects (Outside SEZ)[d]	Overall Impact Magnitude[e]
Mogollon Chaparral: Occurs on dry mid-elevation foothills, mountain slopes, and in canyons. Consists of moderate to dense shrubs that are fire-adapted.	0 acres	6 acres (<0.1%)	Small
Chihuahuan Gypsophilous Grassland and Steppe: Occurs on gypsum outcrops and on basins and slopes with sandy gypsiferous and/or alkaline soils. Consists of generally sparse grassland, steppe, or dwarf shrubland.	0 acres	2 acres (<0.1%)	Small
North American Warm Desert Lower Montane Riparian Woodland and Shrubland: Occurs along perennial and seasonally intermittent streams in mountain canyons and valleys. Consists of a mix of woodlands and shrublands.	0 acres	1 acre (<0.1%)	Small

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

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

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

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

[e] Overall impact magnitude categories were based on professional judgment and include (1) *small*: a relatively small proportion (≤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.

NMSU 2007), which includes the proposed Mason Draw SEZ. No species included in Table 12.2.10.1-2 was observed on the SEZ in July 2009.

The New Mexico Department of Agriculture classifies noxious weeds into one of four categories (NMDA 2009):

- “Class A species are currently not present in New Mexico, or have limited distribution. Preventing new infestations of these species and eradicating existing infestations is the highest priority.”
- “Class B species are limited to portions of the state. In areas with severe infestations, management should be designed to contain the infestation and stop any further spread.”
- “Class C species are widespread in the state. Management decisions for these species should be determined at the local level, based on feasibility of control and level of infestation.”
- “Watch List species are species of concern in the state. These species have the potential to become problematic. More data is needed to determine if these species should be listed. When these species are encountered please document their location and contact appropriate authorities.”

12.2.10.2 Impacts

The construction of solar energy facilities within the proposed Mason Draw SEZ would result in direct impacts on plant communities due to the removal of vegetation within the facility

TABLE 12.2.10.1-2 Designated Noxious Weeds of New Mexico Occurring in Dona Ana County

Common Name	Scientific Name	Category
African rue	*Peganum harmala*	Class B
Camelthorn	*Alhagi pseudalhagi*	Class A
Hoary cress	*Cardaria* spp.	Class A
Jointed goatgrass	*Aegilops cylindrica*	Class C
Malta starthistle	*Centaurea melitensis*	Class B
Perennial pepperweed	*Lepidium latifolium*	Class B
Russian knapweed	*Acroptilon repens*	Class B
Russian olive	*Elaeagnus angustifolia*	Class C
Sahara mustard	*Brassica tournefortii*	Watch List
Saltcedar	*Tamarix* spp.	Class C
Siberian elm	*Ulmus pumila*	Class C

Sources: NMDA (2009); NMSU (2007); USDA (2010).

footprint during land-clearing and land-grading operations. Approximately 80% of the SEZ (10,327 acres [41.8 km^2]) would be expected to be cleared with full development of the SEZ. The plant communities affected would depend on facility locations, and could include any of the communities occurring on the SEZ. Therefore, for the purposes of this analysis, all the area of each cover type within the SEZ is considered to be directly affected by removal with full development of the SEZ.

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

Because of the proximity of the Mason Draw and Afton SEZs, a large area of overlap of the areas of indirect effects exists, with a portion of the Mason Draw SEZ lying within area of indirect effects of the Afton SEZ, and a portion of the Afton SEZ lying within the area of indirect effects of the Mason Draw SEZ. The potential for impacts could increase in the area of overlap. 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 encountered 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 through any additional mitigation applied. Section 12.2.10.2.3, below, identifies design features of particular relevance to the proposed Mason Draw SEZ.

12.2.10.2.1 Impacts on Native Species

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

Solar facility construction and operation in the proposed Mason Draw SEZ would primarily affect communities of the Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe, Apacherian-Chihuahuan Mesquite Upland Scrub, and Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub cover types. Additional cover types that would be affected within the SEZ include Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub, Chihuahuan Mixed Salt Desert Scrub, North American Warm Desert Pavement, Madrean Juniper Savanna, North American Warm Desert Riparian Woodland and Shrubland, Chihuahuan Sandy Plains Semi-Desert Grassland, and North American Warm Desert Playa. Table 12.2.10.1-1 summarizes the potential impacts on land cover types resulting from solar energy facilities in the proposed Mason Draw SEZ. Many of these cover types are relatively common in the SEZ region; however, several are relatively uncommon, representing 1% or less of the land area within the

SEZ region: Chihuahuan Sandy Plains Semi-Desert Grassland (1.0%), Madrean Juniper Savanna (0.4%), North American Warm Desert Pavement (0.2%), North American Warm Desert Playa (0.2%), and North American Warm Desert Riparian Woodland and Shrubland (0.2%). The construction, operation, and decommissioning of solar projects within the proposed Mason Draw SEZ would result in small impacts on all cover types in the affected area. Wetland, desert dry wash, dry wash woodland, riparian, playa, and sand dune habitats are important sensitive habitats on the SEZ.

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

The deposition of fugitive dust from large areas of disturbed soil onto habitats outside a solar project area could result in reduced productivity or changes in plant community composition. Fugitive dust deposition could affect plant communities of each of the cover types occurring within the area of indirect effects identified in Table 12.2.10.1-1.

Approximately 2.5 acres (0.01 km^2) of palustrine wetlands and about 14.2 mi (22.9 km) of riverine wetlands occur within the Mason Draw SEZ. Grading could result in direct impacts on these wetlands if fill material is placed within wetland areas. Grading near the wetlands in the SEZ could disrupt surface water or groundwater flow characteristics, resulting in changes in the frequency, duration, depth, or extent of inundation or soil saturation, and could potentially alter wetland plant communities and affect wetland function. Increases in surface runoff from a solar energy project site could also affect wetland hydrologic characteristics. The introduction of contaminants into wetlands in or near the SEZ could result from spills of fuels or other materials used on a project site. Soil disturbance could result in sedimentation in wetland areas, which could degrade or eliminate wetland plant communities. Sedimentation effects or hydrologic changes could also extend to wetlands outside of the SEZ, such as those in or near Mason Draw.

Grading could also affect dry washes within the SEZ. Some desert dry washes in the SEZ support riparian woodland communities. 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. Communities associated with intermittently flooded areas downgradient from solar projects in the SEZ, such as Daley Lake south of the SEZ, could be affected by ground-disturbing activities. Site clearing and grading could result in hydrologic changes, and could potentially alter 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. See Section 12.2.9 for further discussion of impacts on washes.

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

12.2.10.2.2 Impacts from Noxious Weeds and Invasive Plant Species

E.O. 13112, "Invasive Species," directs federal agencies to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts of invasive species (*Federal Register*, Volume 64, page 61836, Feb. 8, 1999). Potential impacts of noxious weeds and invasive plant species resulting from solar energy facilities are described in Section 5.10.1. Species designated as noxious weeds in New Mexico and known to occur in Dona Ana County are given in Table 12.2.10.1-2. 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 Mason Draw SEZ, such that weeds could be transported into areas that were previously relatively weed-free, which could result in reduced restoration success and possible widespread habitat degradation.

Past or present land uses may affect the susceptibility of plant communities to the establishment of noxious weeds and invasive species. Existing roads, grazing, and recreational OHV use within the SEZ area of potential impact are also likely to contribute to the susceptibility of plant communities to the establishment and spread of noxious weeds and invasive species. Disturbed areas, including 502 acres (2 km^2) of Developed, Medium-High Intensity occur within the area of indirect effects and may contribute to the establishment of noxious weeds and invasive species.

12.2.10.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

- An Integrated Vegetation Management Plan, addressing invasive species control, and an Ecological Resources Mitigation and Monitoring Plan, addressing habitat restoration, should be approved and implemented to increase the potential for successful restoration of desert scrub, dune, steppe, riparian, playa, and grassland communities, and other affected habitats, and to 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.

- All wetland, dry wash, dry wash woodland, riparian, playa, succulent, and dune communities within the SEZ should be avoided to the extent practicable, and any impacts minimized and mitigated. Any yucca, agave, ocotillo, and cacti (including *Opuntia* spp., *Cylindropuntia* spp., and *Echinocactus* spp.) and other succulent plant species that cannot be avoided should be salvaged. A buffer area should be maintained around wetland, dry wash, dry wash woodland, playa, and riparian habitats to reduce the potential for impacts.

- Appropriate engineering controls should be used to minimize impacts on wetland, dry wash, dry wash woodland, playa, and riparian habitats, including 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 groundwater-dependent communities, such as mesquite communities. Potential impacts to springs should be determined through hydrological studies.

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

12.2.11 Wildlife and Aquatic Biota

This section addresses wildlife (amphibians, reptiles, birds, and mammals) and aquatic biota that could occur within the potentially affected area of the proposed Mason Draw SEZ. Wildlife known to occur within 50 mi (80 km) of the SEZ (i.e., the SEZ region) were determined from SWReGAP (USGS 2007) and the Biota Information System of New Mexico (BISON-M) (NMDGF 2010). Land cover types suitable for each species were determined from SWReGAP (USGS 2004, 2005a, 2007) and the South Central GAP Analysis Program (USGS 2010d). The amount of aquatic habitat within the SEZ region was determined by estimating the length of linear perennial stream and canal features and the area of standing water body features (i.e., ponds, lakes, and reservoirs) within 50 mi (80 km) of the SEZ using available GIS surface water datasets.

The affected area considered in this assessment included the areas of direct and indirect effects. The area of direct effects was defined as the area that would be physically modified during project development (i.e., where ground-disturbing activities would occur) within the SEZ. The maximum developed area within the SEZ would be 10,327 acres (41.8 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). If a species within the SEZ had more potentially suitable habitat than the maximum of 10,327 acres (41.8 km^2) of direct effects, this area was also included as part of the area of indirect effects. The potential degree of indirect effects would decrease with increasing distance away from the SEZ. The area of indirect 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 types within the affected area are Chihuahuan piedmont semidesert grassland and Chihuahuan desert creosote-scrub (see Section 12.2.10). Potentially unique habitats in the affected area include grasslands, woodlands, cliff and rock outcrops, desert dunes, playas, washes, and riparian and aquatic habitats. There are no perennial aquatic habitats known to occur on the SEZ or within the area of indirect effects. The nearest permanent surface water feature is the Rio Grande, which is approximately 12 mi (19 km) east of the SEZ. Kimble Draw, a large ephemeral wash, runs north to south through the middle of the SEZ Another ephemeral wash, Mason Draw, occurs with the area of indirect effects west of the SEZ (Figure 12.2.9.1-1). Small areas of riparian wetlands are associated with these washes (Section 12.2.9.1.1).

12.2.11.1 Amphibians and Reptiles

12.2.11.1.1 Affected Environment

This section addresses amphibian and reptile species that are known to occur, or for which potentially suitable habitat occurs, on or within the potentially affected area of the proposed Mason Draw SEZ. The list of amphibian and reptile species potentially present in the SEZ area was determined from species lists available from (BISON-M) (NMDGF 2010) and range maps and/or habitat information available from CDFG (2008), NatureServe (2010), and SWReGAP (USGS 2007). Land cover types suitable for each species were determined from SWReGAP (USGS 2004, 2005a, 2007) and the South Central GAP Analysis Program (USGS 2010d). See Appendix M for additional information on the approach used.

More than 10 amphibian species occur in Dona Ana County. Based on species distributions within the area of the SEZ and habitat preferences of the amphibian species, Couch's spadefoot (*Scaphiopus couchii*), Great Plains toad (*Bufo cognatus*), plains spadefoot (*Spea bombifrons*), and red-spotted toad (*Bufo punctatus*) would be expected to occur within the SEZ (NMDGF 2010; USGS 2007; Stebbins 2003).

More than 50 reptile species occur within Dona Ana County (NMDGF 2010; USGS 2007; Stebbins 2003). Lizard species expected to occur within the proposed Mason Draw SEZ include the collared lizard (*Crotaphytus collaris*), eastern fence lizard (*Sceloporus undulatus*), Great Plains skink (*Eumeces obsoletus*), long-nosed leopard lizard (*Gambelia wislizenii*), round-tailed horned lizard (Phrynosoma modestum), side-blotched lizard (*Uta stansburiana*), and western whiptail (*Cnemidophorus tigris*). Snake species expected to occur within the proposed Mason Draw SEZ are the coachwhip (*Masticophis flagellum*), common kingsnake (*Lampropeltis getula*), glossy snake (*Arizona elegans*), gophersnake (*Pituophis catenifer*), groundsnake (*Sonora semiannulata*), long-nosed snake (*Rhinocheilus lecontei*), and nightsnake (*Hypsiglena torquata*). The most common poisonous snakes that could occur on the SEZ would be the western diamond-backed rattlesnake (*Crotalus atrox*) and western rattlesnake (*Crotalus viridis*).

Table 12.2.11.1-1 provides habitat information for representative amphibian and reptile species that could occur within the proposed Mason Draw SEZ. Special status amphibian and reptile species are addressed in Section 12.2.12.

12.2.11.1.2 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 the application of any additional mitigation measures. Section 12.2.11.1.3, below, identifies SEZ-specific design features of particular relevance to the proposed Mason Draw SEZ.

TABLE 12.2.11.1-1 Habitats, Potential Impacts, and Potential Mitigation for Representative Amphibian and Reptile Species That Could Occur on or in the Affected Area of the Proposed Mason Draw 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				
Couch's spadefoot (*Scaphiopus couchii*)	Desert wash, desert riparian, palm oasis, desert succulent shrub, and desert scrub habitats. Requires pools or potholes with water that lasts longer than 10 to 12 days for breeding sites. About 3,146,300 acres[g] of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	101,279 acres of potentially suitable habitat (3.2% of available suitable habitat)	Small overall impact. Avoidance of wash and riparian habitats could reduce impacts. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Great Plains toad (*Bufo cognatus*)	Prefers desert, grassland, and agricultural habitats. Breeds in shallow temporary pools, quiet areas of streams, marshes, irrigation ditches, and flooded fields. In cold winter months, it burrows underground and becomes inactive. About 1,348,200 acres of potentially suitable habitat occurs within the SEZ region.	3,998 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	41,872 acres of potentially suitable habitat (3.1% of available suitable habitat)	Small overall impact. Avoidance of wash and riparian habitats could reduce impacts.
Plains spadefoot (*Spea bombifrons*)	Common in areas of soft sandy/gravelly soils along stream floodplains. Also occurs in semidesert shrublands. Breeds in deep open-water playa habitats. Usually remains in underground burrows until it rains. About 1,303,400 acres of potentially suitable habitat occurs within the SEZ region.	3,786 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	36,538 acres of potentially suitable habitat (2.8% of available suitable habitat)	Small overall impact. Avoidance of wash and riparian habitats could reduce impacts.

TABLE 12.2.11.1-1 (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]
Amphibians (Cont.)				
Red-spotted toad (*Bufo punctatus*)	Dry, rocky areas at lower elevations near desert springs and persistent pools along rocky arroyos; desert streams and oases; open grassland; scrubland oaks; and dry woodlands. About 4,097,000 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	110,679 acres of potentially suitable habitat (2.7% of available suitable habitat)	Small overall impact. Avoidance of wash and riparian habitats could reduce impacts. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Lizards				
Collared lizard (*Crotaphytus collaris*)	Level or hilly rocky terrain in a variety of vegetative communities. Typical habitats include lava fields, rocky canyons, slopes, and gullies. About 3,395,200 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	104,229 acres of potentially suitable habitat (3.1% of available 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.
Eastern fence lizard (*Sceloporus undulatus*)	Sunny, rocky habitats of cliffs, talus, old lava flows and cones, canyons, and outcrops. Various vegetation adjacent or among rocks including montane forests, woodlands, semidesert shrubland, and various forbs and grasses. About 3,650,800 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	106,115 acres of potentially suitable habitat (2.9% of available suitable habitat)	Small overall impact. Avoid rock outcrops. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 12.2.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Lizards (Cont.)				
Great Plains skink (*Eumeces obsoletus*)	Creosotebush desert, desert-grasslands, riparian corridors, pinyon-juniper woodlands, and pine-oak woodlands. About 3,527,000 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	103,515 acres of potentially suitable habitat (2.9% of available suitable habitat)	Small overall impact. Avoid riparian areas. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Long-nosed leopard lizard (*Gambelia wislizenii*)	Desert and semidesert areas with scattered shrubs. Prefers sandy or gravelly flats and plains. Also prefers areas with abundant rodent burrows that they occupy when inactive. About 2,582,100 acres of potentially suitable habitat occurs in the SEZ region.	8,767 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	66,283 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	Small overall impact.
Round-tailed horned lizard (*Phrynosoma modestum*)	Desert-grassland and desert shrubland habitats with scrubby vegetation and sandy or gravelly soil. About 3,406,900 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	103,173 acres of potentially suitable habitat (4.5% of available 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 12.2.11.1-1 (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.)				
Side-blotched lizard (*Uta stansburiana*)	Arid and semiarid locations with scattered bushes or scrubby trees. Often occurs in sandy washes with scattered rocks and bushes. About 3,410,300 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	103,413 acres of potentially suitable habitat (3.0% of available suitable habitat)	Small overall impact. Avoid wash habitats. No other 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 2,793,300 acres of potentially suitable habitat occurs within the SEZ region.	8,601 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	66,098 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	Small overall impact.
Snakes				
Coachwhip (*Masticophis flagellum*)	Creosotebush desert, shortgrass prairie, shrub-covered flats and hills. Sandy to rocky substrates. Avoids dense vegetation. About 3,517,900 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	103,391 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 12.2.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Snakes (Cont.)				
Common kingsnake (*Lampropeltis getula*)	Coniferous forests, woodlands, swampland, coastal marshes, river bottoms, farmlands, prairies, chaparral, and deserts. Uses rock outcrops and rodent burrows for cover. About 4,514,400 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	113,406 acres of potentially suitable habitat (2.5% of available suitable habitat)	Small overall impact. Avoid rock outcrops. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
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 3,993,400 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	110,850 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.
Gophersnake (*Pituophis catenifer*)	Plains, grasslands, sandhills, riparian areas, marshes, edges of ponds and lakes, rocky canyons, semidesert and mountain shrublands, montane woodlands, rural and suburban areas, and agricultural areas. Likely inhabits pocket gopher burrows in winter. About 4,580,000 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	112,364 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. Avoid riparian areas. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 12.2.11.1-1 (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]	
Snakes (Cont.)				
Groundsnake (*Sonora semiannulata*)	Arid and semiarid regions with rocky to sandy soils. River bottoms, desert flats, sand hummocks, and rocky hillsides. About 4,135,900 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	110,191 acres of potentially suitable habitat (2.7% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Long-nosed snake (*Rhinocheilus lecontei*)	Typically inhabits deserts, dry prairies and river valleys. Occurs by day and lays eggs underground or under rocks. Burrows rapidly in loose soil. Common in desert regions. About 3,361,900 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	103,467 acres of potentially suitable habitat (3.1% of available 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.
Nightsnake (*Hypsiglena torquata*)	Arid and semiarid desert flats, plains, and woodlands; areas with rocky and sandy soils are preferred. During cold periods of the year, it seeks refuge underground, in crevices, or under rocks. About 3,594,200 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	103,663 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 12.2.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Snakes (Cont.)				
Western diamond-backed rattlesnake (*Crotalus atrox*)	Dry and semi-dry lowland areas. Usually found in brush-covered plains, dry washes, rock outcrops, and desert foothills. About 4,498,400 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	113,069 acres of potentially suitable habitat (2.5% of available suitable habitat)	Small overall impact. Avoid wash and rock outcrop habitats. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Western rattlesnake (*Crotalus viridis*)	Most terrestrial habitats. Typically inhabits plains, grasslands, sandhills, semidesert and mountain shrublands, riparian areas, and montane woodlands. About 4,519,100 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	113,463 acres of potentially suitable habitat (2.5% of available suitable habitat)	Small overall impact. Avoid riparian habitats. No other 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 10,327 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.

Footnotes continued on next page.

TABLE 12.2.11.1-1 (Cont.)

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[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 10,327 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); NMDGF (2010); USGS (2004, 2005a, 2007).

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 12.2.11.1.1 following the analysis approach described in Appendix M. Additional NEPA assessments and coordination with state natural resource agencies may be needed to address project-specific impacts more thoroughly. These assessments and consultations could result in additional required actions to avoid or mitigate impacts on amphibians and reptiles (see Section 12.2.11.1.3).

In general, impacts on amphibians and reptiles would result from habitat disturbance (i.e., habitat reduction, fragmentation, and alteration) and from disturbance, injury, or mortality to individual amphibians and reptiles. On the basis of the magnitude of impacts on amphibians and reptiles summarized in Table 12.2.11.1-1, direct impacts on amphibian and reptile species would be small for all species, as 0.2 to 0.3% of potentially suitable habitats identified for representative species in the SEZ region would be lost. Larger areas of potentially suitable habitats for the amphibian and reptile species occur within the area of potential indirect effects (e.g., up to 4.5% of available habitat for the round-tailed horned lizard). 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.

12.2.11.1.3 SEZ-Specific Design Features and Design Feature Effectiveness

The implementation of required programmatic design features described in Appendix A, Section A.2.2, would reduce the potential for effects on amphibians and reptiles, especially for species using habitat types that can be avoided (e.g., rock outcrops, washes and riparian areas). 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 project details are being considered, one design feature that can be identified at this time is:

- Wash, riparian, and rock outcrop habitats, which could provide more unique habitats for some amphibian and reptile species, should be avoided.

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

12.2.11.2 Birds

12.2.11.2.1 Affected Environment

This section addresses bird species that are known to occur, or for which potentially suitable habitat occurs, on or within the potentially affected area of the proposed Mason Draw SEZ. The list of bird species potentially present in the SEZ area was determined from species lists available from BISON-M (NMDGF 2010) and range maps and habitat information available from CDFG (2008), NatureServe (2010), and SWReGAP (USGS 2007). Land cover types suitable for each species were determined from SWReGAP (USGS 2004, 2005a, 2007) and the South Central GAP Analysis Program (USGS 2010d). See Appendix M for additional information on the approach used.

Almost 300 species of birds are reported from Dona Ana County (NMDGF 2010); however, suitable habitats for a number of these species are limited or nonexistent within the proposed Mason Draw SEZ (USGS 2007). Similar to the overview of birds provided for the six-state solar energy study area (Section 4.10.2.2), the following discussion for the SEZ emphasizes the following bird groups: (1) waterfowl, wading birds, and shorebirds; (2) neotropical migrants; (3) birds of prey; and (4) upland game birds.

Waterfowl, Wading Birds, and Shorebirds

As discussed in Section 4.10.2.2.2, waterfowl (ducks, geese, and swans), wading birds (herons and cranes), and shorebirds (avocets, gulls, plovers, rails, sandpipers, stilts, and terns) are among the most abundant groups of birds in the six-state solar study area. However, within the proposed Mason Draw SEZ, waterfowl, wading birds, and shorebird species would be mostly absent to uncommon. Wash habitats within the SEZ may attract shorebird species, but the Rio Grande, La Union Main Canal, West Side Canal, various intermittent streams, the Caballo Reservoir, and the intermittent Lake Lucero located within 50 mi (80 km) of the SEZ would provide more viable habitat for this group of birds. The killdeer (*Charadrius vociferus*) and least sandpiper (*Calidris minutilla*) are among the shorebird species that could occur within the SEZ.

Neotropical Migrants

As discussed in Section 4.10.2.2.3, neotropical migrants represent the most diverse category of birds within the six-state solar energy study area. Species expected to occur within the proposed Mason Draw SEZ include the ash-throated flycatcher (*Myiarchus cinerascens*), black-tailed gnatcatcher (*Polioptila melanura*), black-throated sparrow (*Amphispiza bilineata*), Brewer’s blackbird (*Euphagus cyanocephalus*), cactus wren

(*Campylorhynchus brunneicapillus*), common poorwill (*Phalaenoptilus nuttallii*), common raven (*Corvus corax*), Costa's hummingbird (*Calypte costae*), Crissal thrasher (*Toxostoma crissale*), Gila woodpecker (*Melanerpes uropygialis*), greater roadrunner (*Geococcyx californianus*), horned lark (*Eremophila alpestris*), ladder-backed woodpecker (*Picoides scalaris*), lesser nighthawk (*Chordeiles acutipennis*), loggerhead shrike (*Lanius ludovicianus*), Lucy's warbler (*Vermivora luciae*), phainopepla (*Phainopepla nitens*), sage sparrow (*Amphispiza belli*), Scott's oriole (*Icterus parisorum*), verdin (*Auriparus flaviceps*), and western meadowlark (*Sturnella neglecta*) (NMDGF 2010; USGS 2007).

Birds of Prey

Section 4.10.2.2.4 provided an overview of the birds of prey (raptors, owls, and vultures) within the six-state solar study area. Raptor species that could occur within the proposed Mason Draw SEZ include the American kestrel (*Falco sparverius*), golden eagle (*Aquila chrysaetos*), great horned owl (*Bubo virginianus*), long-eared owl (*Asio otus*), prairie falcon (*Falco mexicanus*), red-tailed hawk (*Buteo jamaicensis*), and turkey vulture (*Cathartes aura*) (NMDGF 2010; USGS 2007). Several other special status birds of prey are discussed in Section 12.2.12.2. These include the American peregrine falcon (*Falco peregrinus anatum*), bald eagle (*Haliaeetus leucocephalus*), ferruginous hawk (*Buteo regalis*), northern aplomado falcon (*Falco femoralis septentrionalis*), osprey (*Pandion haliaetus*), and western burrowing owl (*Athene cunicularia*).

Upland Game Birds

Section 4.10.2.2.5 provided an overview of the upland game birds (primarily pheasants, grouse, quail, and doves) that occur within the six-state solar study area. Upland game species that could occur within the proposed Mason Draw SEZ include the Gambel's quail (*Callipepla gambelii*), mourning dove (*Zenaida macroura*), scaled quail (*Callipepla squamata*), white-winged dove (*Zenaida asiatica*), and wild turkey (*Meleagris gallopavo*) (NMDGF 2010; USGS 2007).

Table 12.2.11.2-1 provides habitat information for representative bird species that could occur within the proposed Mason Draw SEZ. Special status bird species are discussed in Section 12.2.12.

12.2.11.2.2 Impacts

The types of impacts that birds could incur from construction, operation, and decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any such impacts would be minimized through the implementation of required programmatic design features described in Appendix A, Section A.2.2, and through the application of any additional mitigation measures. Section 12.2.11.2.3, below, identifies design features of particular relevance to the proposed Mason Draw SEZ.

TABLE 12.2.11.2-1 Habitats, Potential Impacts, and Potential Mitigation for Representative Bird Species That Could Occur on or in the Affected Area of the Proposed Mason Draw 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 272,100 acres[g] of potentially suitable habitat occurs within the SEZ region.	1 acre of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) during construction and operations	693 acres of potentially suitable habitat (0.3% of potentially suitable habitat)	Small overall impact. Avoidance of wash and riparian areas could reduce impacts. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Least sandpiper (*Calidris minutilla*)	Wet meadows, mudflats, flooded fields, lake shores, edges of salt marshes, and river sandbars. About 18,000 acres of potentially suitable habitat occurs within the SEZ region.	6 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) during construction and operations	3 acres of potentially suitable habitat (0.02% of available suitable habitat)	Small overall impact. Avoidance of wash and riparian areas could reduce impacts. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 12.2.11.2-1 (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				
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 4,146,000 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	111,060 acres of potentially suitable habitat (2.7% 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.
Black-tailed gnatcatcher (*Polioptila melanura*)	Nests in bushes mainly in wooded desert washes with dense mesquite, palo verde, ironwood, and acacia. Also occurs in desert scrub habitat. About 3,185,100 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	101,413 acres of potentially suitable habitat (3.2% of available 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 12.2.11.2-1 (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.)				
Black-throated sparrow (*Amphispiza bilineata*)	Chaparral and desert scrub habitats with sparse to open stands of shrubs. Often in areas with scattered Joshua trees. Nests in thorny shrubs or cactus. About 3,480,900 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	103,304 acres of potentially suitable habitat (3.0% of available 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.
Brewer's blackbird (*Euphagus cyanocephalus*)	Meadows, grasslands, riparian areas, agricultural and urban areas, and occasionally in sagebrush in association with prairie dog colonies and other shrublands. Requires dense shrubs for nesting. Roosts in marshes or dense vegetation. In winter, most often near open water and farmyards with livestock. About 1,648,700 acres of potentially suitable habitat occurs within the SEZ region.	4,007 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	42,443 acres of potentially suitable habitat (2.6% of available suitable habitat)	Small overall impact. Avoidance of riparian areas could reduce impacts. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Cactus wren (*Campylorhynchus brunneicapillus*)	Desert (especially areas with cholla cactus or yucca), mesquite, arid scrub, coastal sage scrub, and trees in towns in arid regions. Nests in *Opuntia* spp.; twiggy, thorny trees and shrubs; and sometimes in buildings. Nests may be used as winter roost. About 2,656,500 acres of potentially suitable habitat occurs within the SEZ region.	7,789 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	78,564 acres of potentially suitable habitat (3.0% of available suitable habitat)	Small overall impact. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 12.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Neotropical Migrants (Cont.)				
Common poorwill (*Phalaenoptilus nuttallii*)	Scrubby and brushy areas, prairie, desert, rocky canyons, open woodlands, and broken forests. Mostly in arid and semiarid habitats. Nests in open areas on a bare site. About 1,471,400 acres of potentially suitable habitat occurs within the SEZ region.	3,791 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	36,849 acres of potentially suitable habitat (2.5% of potentially suitable habitat)	Small overall impact. 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 4,495,700 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	111.969 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 12.2.11.2-1 (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.)				
Costa's hummingbird (*Calypte costae*)	Desert and semidesert areas, arid brushy foothills, and chaparral. Main habitats are desert washes, edges of desert riparian and valley foothill riparian areas, coastal shrub, desert scrub, desert succulent shrub, lower-elevation chaparral, and palm oasis. Also in mountains, meadows, and gardens during migration and winter. Most common in canyons and washes when nesting. Nests are located in trees, shrubs, vines, or cacti. About 3,383,800 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	103,001 acres of potentially suitable habitat (3.0% of available 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.
Crissal thrasher (*Toxostoma crissale*)	Desert scrub, mesquite, tall riparian brush and chaparral; usually beneath dense cover. Nests in low trees or shrubs. About 1,509,300 acres of potentially suitable habitat occurs within the SEZ region.	3,791 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	37,146 acres of potentially suitable habitat (2.5% of available suitable habitat)	Small overall impact. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Gila woodpecker (*Melanerpes uropygialis*)	Lower elevation woodlands, especially those dominated by cottonwoods, along stream courses. About 120,500 acres of potentially suitable habitat occurs within the SEZ region.	6 acres of potentially suitable habitat lost (0.005% of available potentially suitable habitat) during construction and operations	505 acres of potentially suitable habitat (0.4% of available suitable habitat)	Small overall impact. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 12.2.11.2-1 (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.)				
Greater roadrunner (*Geococcyx californianus*)	Desert scrub, chaparral, edges of cultivated lands, and arid open areas with scattered brush. Fairly common in many 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 4,409,900 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	111,291 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.
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 228,240 acres of potentially suitable habitat occurs in the SEZ region.	186 acres of potentially suitable habitat lost (0.08% of available potentially suitable habitat) during construction and operations	1,140 acres of potentially suitable habitat (0.5% of available potentially suitable habitat)	Small overall impact. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 12.2.11.2-1 (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*)	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 3,449,200 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	103,330 acres of potentially suitable habitat (3.0% of potentially suitable habitat)	Small overall impact. Avoid riparian habitats. No other 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.
Lesser nighthawk (*Chordeiles acutipennis*)	Open country, desert regions, scrub, savanna, and cultivated areas. Usually near water including open marshes, salt ponds, large rivers, rice paddies, and beaches. Roosts on low perches or the ground. Nests in the open on bare sites. About 4,047,300 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	112,346 acres of potentially suitable habitat (2.8% of potentially suitable habitat)	Moderate 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 12.2.11.2-1 (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.)				
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 4,441,800 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	117,707 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. Avoid riparian habitats, No other 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.
Lucy's warbler (*Vermivora luciae*)	Breeds most often in dense lowland riparian mesquite woodlands. Inhabits dry washes, riparian forests, and thorn forests during winter and migration. About 3,307,600 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	101,673 acres of potentially suitable habitat (3.1% of available suitable habitat)	Small overall impact. Avoid wash and riparian habitats. No other 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 12.2.11.2-1 (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.)				
Phainopepla (*Phainopepla nitens*)	Desert scrub, mesquite, juniper and oak woodlands, tall brush, washes, riparian woodlands, and orchards. Nests in dense foliage of large shrubs or trees, sometimes in a clump of mistletoe. About 4,313,700 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	110,273 acres of potentially suitable habitat (2.6% of available suitable habitat)	Small overall impact. Avoid wash and riparian habitats. No other 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.
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 2,219,800 acres of potentially suitable habitat occurs within the SEZ region.	7,904 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	61,289 acres of potentially suitable habitat (2.8% of available potentially suitable habitat)	Small overall impact. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Scott's oriole (*Icterus parisorum*)	Yucca, pinyon-juniper, arid oak scrub and palm oases. Foothills, desert slopes of mountains, and more elevated semiarid plains. Nests in trees or yuccas. About 2,842,500 acres of potentially suitable habitat occurs within the SEZ region.	8,808 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	71,378 acres of potentially suitable habitat (2.5% of available suitable habitat)	Small overall impact. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 12.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Neotropical Migrants (Cont.)				
Verdin (*Auriparus flaviceps*)	Desert riparian, desert wash, desert scrub, and alkali desert scrub areas with large shrubs and small trees. Nests in shrubs, small trees, or cactus. About 3,466,100 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	101,731 acres of potentially suitable habitat (2.9% of available suitable habitat)	Small overall impact. Avoid wash and riparian habitats. No other 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.
Western meadowlark (*Sturnella neglecta*)	Agricultural areas, especially in winter. Also inhabits native grasslands, croplands, weedy fields, and less commonly in semidesert and sagebrush shrublands. About 1,555,400 acres of potentially suitable habitat occurs within the SEZ region.	4,007 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	41,997 acres of potentially suitable habitat (2.7% of available suitable habitat)	Small overall impact. Avoidance of desert grassland habitats could reduce impacts. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 12.2.11.2-1 (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]	
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 3,717,100 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	103,689 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.
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 3,629,700 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	103,478 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. 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 4,641,800 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	114,107 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.

TABLE 12.2.11.2-1 (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]	
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 1,743,700 acres of potentially suitable habitat occurs within the SEZ region.	4,015 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	42,461 acres of potentially suitable habitat (2.4% of potentially suitable habitat)	Small overall impact. Avoidance of riparian woodlands could reduce impacts to roosting habitats.
Prairie falcon (*Falco mexicanus*)	Associated primarily with perennial grasslands, savannahs, rangeland, some agricultural fields, and desert scrub areas. Nests in pothole or well-sheltered ledge on rocky cliff or steep earth embankment. May also nest in man-made excavations on otherwise unsuitable cliffs and old nests of ravens, hawks, and eagles. Forages in large patch areas with low vegetation. May forage over irrigated croplands in winter. About 4,641,800 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	114,107 acres of potentially suitable habitat (2.5% of available 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 3,444,200 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost 0.3% of available potentially suitable habitat) during construction and operations	102,663acres 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.
Turkey vulture (*Cathartes aura*)	Occurs in open stages of most habitats that provide adequate cliffs or large trees for nesting, roosting, and resting. Migrates and forages over most open habitats. Will roost communally in trees, exposed boulders, and occasionally transmission line support towers. About 2,059,400 acres of potentially suitable habitat occurs in the SEZ region.	7,794 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	59,310 acres of potentially suitable habitat (2.9% of available potentially suitable habitat)	Small overall impact.

TABLE 12.2.11.2-1 (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				
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 3,520,800 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	103,752 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.
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 4,490,900 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	112,258 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.
Scaled quail (*Callipepla squamata*)	Desert scrub dominated by mesquite, yucca, and cactus and grasslands. Bare habitat is an important habitat component. About 3,383,900 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	102,748 acres of potentially suitable habitat (3.0% of available 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 12.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Upland Game Birds (Cont.)				
White-winged dove (*Zenaida asiatica*)	Desert riparian, wash, succulent shrub, scrub, and Joshua tree habitats, orchards and vineyards, croplands, and pastures. About 3,266,300 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	102,741 acres of potentially suitable habitat (3.1% of available suitable habitat)	Small overall impact. Avoid wash and riparian habitats. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Wild turkey (*Meleagris gallopavo*)	Lowland riparian forests, foothill shrubs, pinyon-juniper woodlands, foothill riparian forests, and agricultural areas. About 814,800 acres of potentially suitable habitat occurs within the SEZ region.	3,834 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat) during construction and operations	22,684 acres of potentially suitable habitat (2.8% of available potentially suitable habitat)	Small overall impact. Avoid riparian habitats.

[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 using SWReGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area. A maximum of 10,327 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 10,327 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.

Footnotes continued on next page.

TABLE 12.2.11.2-1 (Cont.)

[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); NMDGF (2010); USGS (2004, 2005a, 2007).

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 12.2.11.2.1 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 12.2.11.2.3).

In general, impacts on birds would result from habitat disturbance (i.e., habitat reduction, fragmentation, and alteration), and from disturbance, injury, or mortality to individual birds. Table 12.2.11.2-1 summarizes the magnitude of potential impacts on representative bird species resulting from solar energy development in the proposed Mason Draw SEZ. Direct impacts on representative bird species would be small for all species, as less than 0.001 to 0.5% of the potentially suitable habitats identified for the representative species in the SEZ would be lost. Larger areas of potentially suitable habitats for the bird species occur within the area of potential indirect effects (e.g., up to 3.2% of available habitat for the black-tailed gnatcatcher) (Table 12.2.11.2-1). Other impacts on birds could result from collision with vehicles and infrastructure (e.g., buildings and fences), surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, noise, lighting, spread of invasive species, accidental spills, and harassment. Indirect impacts on areas outside the SEZ (for example, impacts caused by dust generation, erosion, and sedimentation) are expected to be negligible with implementation of programmatic design features.

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

12.2.11.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

- For solar energy facilities within the SEZ, 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 NMDGF. A permit may be required under the Bald and Golden Eagle Protection Act.

- Wash and riparian areas, which could provide unique habitats for some bird species, should be avoided.

If these SEZ-specific design features are implemented in addition to 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.

12.2.11.3 Mammals

12.2.11.3.1 Affected Environment

This section addresses mammal species that are known to occur, or for which potentially suitable habitat occurs, on or within the potentially affected area of the proposed Mason Draw SEZ. The list of mammal species potentially present in the SEZ area was determined from species lists available from BISON-M (NMDGF 2010) 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) and the South Central GAP Analysis Program (USGS 2010d). See Appendix M for additional information on the approach used.

More than 75 species of mammals are reported from Dona Ana County (NMDGF 2010); however, suitable habitats for a number of these species are limited or nonexistent within the proposed Mason Draw SEZ (USGS 2007). Similar to the overview of mammals provided for the six-state solar energy study area (Section 4.10.2.3), the following discussion for the SEZ emphasizes big game and other mammal species that (1) have key habitats within or near the SEZ, (2) are important to humans (e.g., big game, small game, and furbearer species), and/or (3) are representative of other species that share important habitats.

Big Game

The big game species that could occur within the vicinity of the proposed Mason Draw SEZ include the cougar (*Puma concolor*), desert bighorn sheep (*Ovis canadensis mexicana*), mule deer (*Odocoileus hemionus*), and pronghorn (*Antilocapra americana*) (NMDGF 2010; USGS 2007). Due to its special species status, the desert bighorn sheep is addressed in Section 12.2.12. Potentially suitable habitat for the cougar occurs throughout the SEZ. Figure 12.2.11.3-1 shows the location of the SEZ relative to where mule deer are rare or absent and where they occur at a density of <10 deer/mi^2 (<4 deer/km^2). Figure 12.2.11.3-2 shows the location of the SEZ relative to the mapped range of pronghorn.

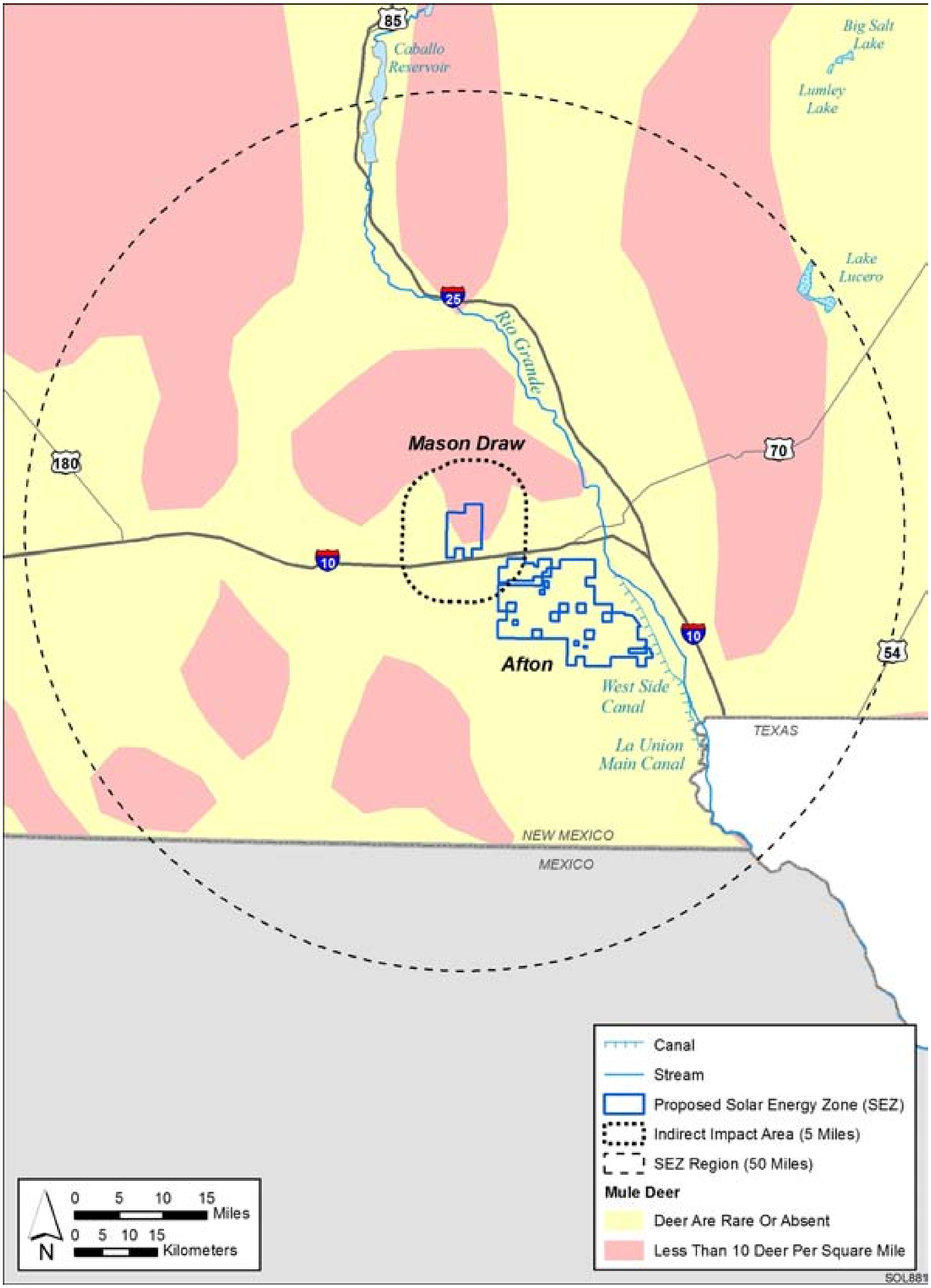

FIGURE 12.2.11.3-1 Density of Mule Deer within the Proposed Mason Draw SEZ Region (Source: BLM 2009a)

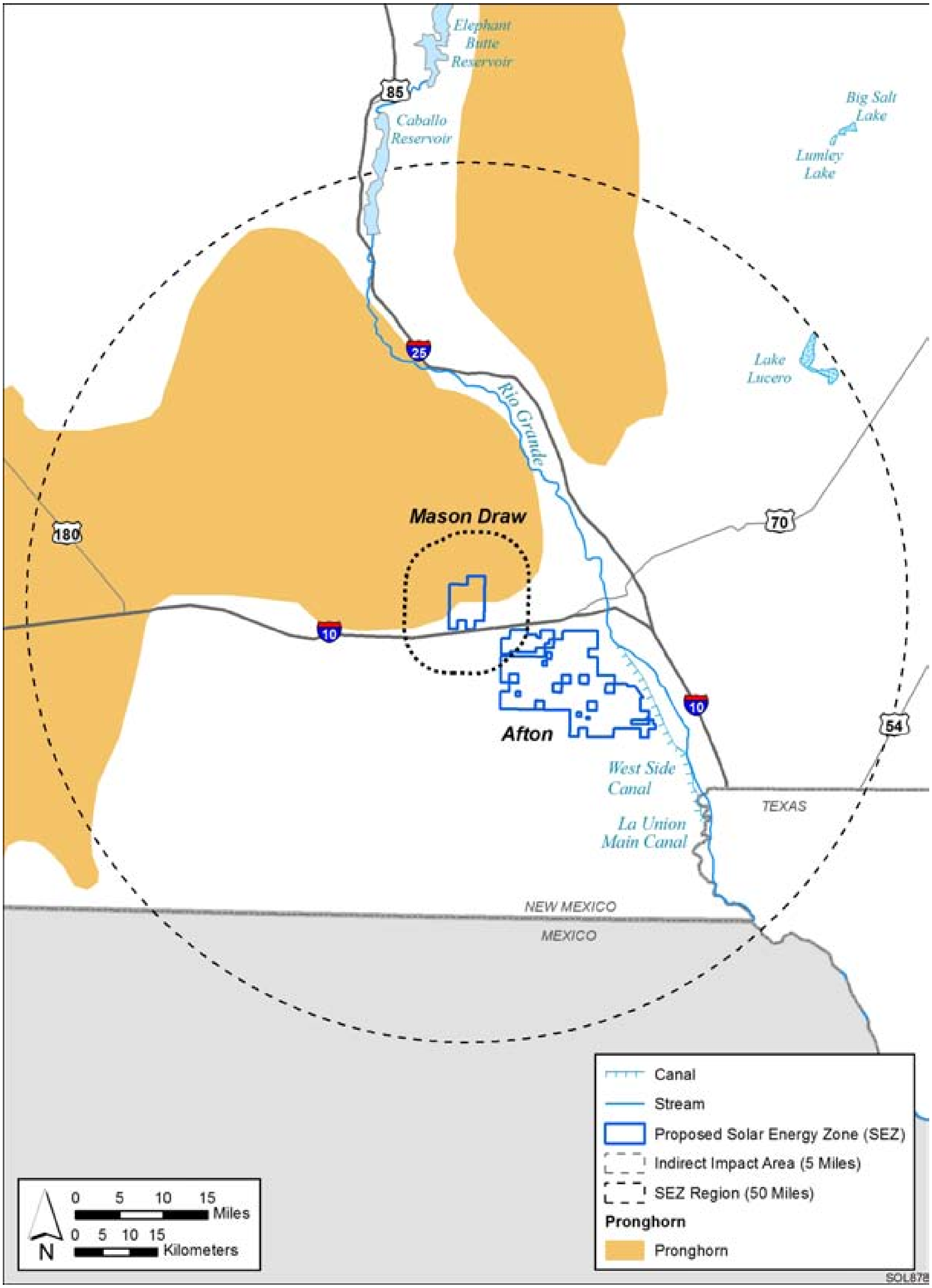

FIGURE 12.2.11.3-2 Location of the Proposed Mason Draw SEZ Relative to the Mapped Range of Pronghorn (Source: BLM 2009b)

Other Mammals

A number of small game and furbearer species occur within the area of the proposed Mason Draw 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*), desert cottontail (*Sylvilagus audubonii*), gray fox (*Urocyon cinereoargenteus*), javelina (*Pecari tajacu*), kit fox (*Vulpes macrotis*), ringtail (*Bassariscus astutus*), and striped skunk (*Mephitis mephitis*) (NMDGF 2010; USGS 2007).

The nongame (small) mammals include rodents, bats, and shrews. Representative species for which potentially suitable habitat occurs within the proposed Mason Draw SEZ include Botta's pocket gopher (*Thomomys bottae*), cactus mouse (*Peromyscus eremicus*), canyon mouse (*Peromyscus crinitus*), deer mouse (*P. maniculatus*), desert pocket mouse (Chaetodipus penicillatus), desert shrew (*Notiosorex crawfordi*), Merriam's kangaroo rat (*Dipodomys merriami*), northern grasshopper mouse (*Onychomys leucogaster*), Ord's kangaroo rat (*Dipodomys ordii*), round-tailed ground squirrel (*Spermophilus tereticaudus*), southern plains woodrat (*Neotoma micropus*), spotted ground squirrel (*Spermophilus spilosoma*), western harvest mouse (*Reithrodontomys megalotis*), and white-tailed antelope squirrel (*Ammospermophilus leucurus*) (NMDGF 2010; 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*), silver-haired bat (*Lasionycteris noctivagans*), spotted bat (*Euderma maculatum*), and western pipistrelle (*Parastrellus hesperus*) (NMDGF 2010; 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. Special status bat species that could occur within the SEZ area are addressed in Section 12.2.12.

Table 12.2.11.3-1 provides habitat information for representative mammal species that could occur within the proposed Mason Draw SEZ. Special status mammal species are discussed in Section 12.2.12.

12.2.11.3.2 Impacts

The types of impacts that mammals could incur from construction, operation, and decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any such impacts would be minimized through the implementation of required programmatic design features described in Appendix A, Section A.2.2, and through the application of any additional mitigation measures. Section 12.2.11.3.3, below, identifies design features of particular relevance to mammals for the proposed Mason Draw 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 12.2.11.3.1 following the analysis approach described in Appendix M. Additional NEPA assessments and coordination with state natural resource agencies may be needed to address project-specific impacts more thoroughly. These assessments and consultations could result in additional required actions to avoid or mitigate impacts on mammals (see Section 12.2.11.3.3).

TABLE 12.2.11.3-1 Habitats, Potential Impacts, and Potential Mitigation for Representative Mammal Species That Could Occur on or in the Affected Area of the Proposed Mason Draw SEZ

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]	
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 4,253,300 acres[g] of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	111,565 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.
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 4,544,800 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	111,918 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.
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 1,580,800 acres of potentially suitable habitat occurs in the SEZ region.	4,009 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	42,495 acres of potentially suitable habitat (2.7% of available potentially suitable habitat)	Small overall impact. Avoidance of desert grassland habitats could reduce impacts.

TABLE 12.2.11.3-1 (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				
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 3,449,900 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	103,142 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.
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 3,697,300 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	102,375 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.
Bobcat (*Lynx rufus*)	Most habitats except subalpine coniferous forest and montane meadow grasslands. Most common in rocky country from deserts through ponderosa forests. About 2,221,700 acres of potentially suitable habitat occurs in the SEZ region.	7,835 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	64,603 acres of potentially suitable habitat (2.9% 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, they are restricted to broken, rough country with abundant shrub cover and a good supply of rabbits or rodents. About 4,625,500 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	113,958 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 12.2.11.3-1 (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]	
Small Game and Furbearers (Cont.)				
Desert cottontail (*Sylvilagus audubonii*)	Abundant to common in grasslands, open forests, and desert shrub habitats. Can occur in areas with minimal vegetation as long as adequate cover (e.g., rock piles, fallen logs, fence rows) is present. Thickets and patches of shrubs, vines, and brush also used as cover. About 4,380,400 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	111,432 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.
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 4,482,400 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	112,007 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.
Javelina (spotted peccary) (*Pecari tajacu*)	Often in thickets along creeks and washes. Beds in caves, mines, boulder fields, and dense stands of brush. May visit a water hole on a daily basis. About 3,405,200 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	102,324 acres of potentially suitable habitat (3.0% of available suitable habitat)	Small overall impact. Avoid riparian and wash habitats. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 12.2.11.3-1 (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.)				
Kit fox (*Vulpes macrotis*)	Desert and semidesert areas with relatively open vegetative cover and soft soils. Seeks shelter in underground burrows. About 4,116,900 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	111,498 acres of potentially suitable habitat (2.7% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Ringtail (*Bassariscus astutus*)	Usually in rocky areas with cliffs or crevices for daytime shelter, desert scrub, chaparral, pine-oak and conifer woodlands. About 3,756,100 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	103,823 acres of potentially suitable habitat (2.8% of available 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.
Striped skunk (*Mephitis mephitis*)	Occurs in most habitats other than alpine tundra. Common at lower elevations, especially in and near cultivated fields and pastures. Generally inhabits open country in woodlands, brush areas, and grasslands, usually near water. Dens under rocks, logs, or buildings. About 4,501,900 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	112,016 acres of potentially suitable habitat (2.5% of available 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 12.2.11.3-1 (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				
Big brown bat (*Eptesicus fuscus*)	Most habitats from lowland deserts to timberline meadows. Roosts in hollow trees, rock crevices, mines, tunnels, and buildings. About 3,730,400 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	103,880 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.
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 3,463,900 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	103,379 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.
Brazilian free-tailed bat (*Tadarida brasiliensis*)	Cliffs, deserts, grasslands, old fields, savannas, shrublands, woodlands, and suburban/urban areas. Roosts in buildings, caves, and hollow trees. May roost in rock crevices, bridges, signs, or cliff swallow nests during migration. Large maternity colonies inhabit caves, buildings, culverts, and bridges. About 3,823,900 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	104,148 acres of potentially suitable habitat (2.7% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 12.2.11.3-1 (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.)				
Cactus mouse (*Peromyscus eremicus*)	Variety of areas including desert scrub, semidesert chaparral, desert wash, semidesert grassland, and cliff and canyon habitats. About 3,425,100 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	102,378 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small overall impact. Avoid wash habitats. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
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 3,488,900 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	103,486 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small overall impact. Avoid riparian habitats. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Canyon mouse (*Peromyscus crinitus*)	Associated with rocky substrates in a variety of habitats, including desert scrub, sagebrush shrublands, woodlands, cliffs and canyons, and volcanic rock and cinder lands. Source of free water not required. About 1,421,100 acres of potentially suitable habitat occurs within the SEZ region.	4,015 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	42,069 acres of potentially suitable habitat (3.0% of available suitable habitat)	Small overall impact. Avoidance of rocky cliffs and outcrops could reduce impacts.

TABLE 12.2.11.3-1 (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.)				
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 4,403,100 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	111,565 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. Avoid riparian habitats. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Desert pocket mouse (*Chaetodipus penicillatus*)	Sparsely vegetated sandy deserts. Prefers rock-free bottomland soils along rivers and streams. Sleeps and rears young in underground burrows. About 3,192,800 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	101,586 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Desert shrew (*Notiosorex crawfordi*)	Generally found in arid areas with adequate cover for nesting and resting. Deserts, semiarid grasslands with scattered cactus and yucca, chaparral slopes, alluvial fans, sagebrush, gullies, juniper woodlands, riparian areas, and dumps. About 3,684,200 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	103,512 acres of potentially suitable habitat (2.8% of available suitable habitat)	Small overall impact. Avoid riparian habitats. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 12.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat[a]	Maximum Area of Potential Habitat Affected[b]: Within SEZ (Direct Effects)[c]	Maximum Area of Potential Habitat Affected[b]: Outside SEZ (Indirect Effects)[d]	Overall Impact Magnitude[e] and Species-Specific Mitigation[f]
Nongame (small) Mammals (Cont.)				
Merriam's kangaroo rat (*Dipodomys merriami*)	Plains, grasslands, scrub-grasslands, desertscrub, shortgrass plains, oak and juniper savannahs, mesquite dunes, and creosote flats. About 4,161,300 acres of potentially suitable habitat occurs in the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	112,891 acres of potentially suitable habitat (2.7% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Northern grasshopper mouse (*Onychomys leucogaster*)	Occurs in grasslands, sagebrush deserts, overgrazed pastures, weedy roadside ditches, sand dunes, and other habitats with sandy soil and sparse vegetation. About 4,250,900 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	110,357 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.
Ord's kangaroo rat (*Dipodomys ordii*)	Various habitats ranging from semidesert shrublands and pinyon-juniper woodlands to shortgrass or mixed prairie and silvery wormwood. Also occurs in dry, grazed, riparian areas if vegetation is sparse. Most common on sandy soils that allow for easy digging and construction of burrow systems. About 4,287,100 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	111,858 acres of potentially suitable habitat (2.6% of available 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 12.2.11.3-1 (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.)				
Round-tailed ground squirrel (*Spermophilus tereticaudus*)	Optimum habitat includes desert succulent shrub, desert wash, desert scrub, alkali desert scrub, and levees in cropland habitat. Also occurs in urban habitats. Burrows usually at base of shrubs. About 1,802,000 acres of potentially suitable habitat occurs within the SEZ region.	7,608 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	58,070 acres of potentially suitable habitat (3.2% of available suitable habitat)	Small overall impact. Avoid wash habitats.
Silver-haired bat (*Lasionycteris noctivagans*)	Urban areas, chaparral, alpine and subalpine grasslands, forests, scrub-grassland, oak savannah and desertscrub habitats. Roosts under bark, and in hollow trees, caves, and mines. Forages over clearings and open water. About 3,069,200 acres of potentially suitable habitat occurs within the SEZ region.	7,986 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	80,830 acres of potentially suitable habitat (2.6% of available suitable habitat)	Small overall impact.
Southern plains woodrat (*Neotoma micropus*)	Semiarid and desert grassland environments. Burrows along the sides of arroyos and favors outwash plains and overgrazed lands. Occurs on rocky, gravelly, and sandy soils. About 4,251,900 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	111,150 acres of potentially suitable habitat (2.6% of available 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.
Spotted bat (*Euderma maculatum*)	Various habitats from desert to montane coniferous forests, mostly in open or scrub areas. Roosts in caves and cracks and crevices in cliffs and canyons. About 1,467,200 acres of potentially suitable habitat occurs within the SEZ region.	3,802 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	37,156 acres of potentially suitable habitat (2.5% of available suitable habitat)	Small overall impact. Avoidance of rocky cliffs and outcrops could reduce impacts to roosting habitats.

TABLE 12.2.11.3-1 (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.)				
Spotted ground squirrel (*Spermophilus spilosoma*)	Arid grasslands and deserts. About 4,152,300 acres of potentially suitable habitat occurs within the SEZ region.	10,327 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	109,948 acres of potentially suitable habitat (2.6% of available 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 3,201,100 acres of potentially suitable habitat occurs in the SEZ region.	7,980 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	80,590 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. Avoid riparian habitats.
Western pipistrelle (*Parastrellus hesperus*)	Deserts and lowlands, desert mountain ranges, desert scrub flats, and rocky canyons. Roosts mostly in rock crevices, sometimes mines and caves, and rarely in buildings. Suitable roosts occur in rocky canyons and cliffs. Most abundant bat in desert regions. About 3,059,600 acres of potentially suitable habitat occurs in the SEZ region.	7,980 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	80,688 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	Small overall impact.
White-tailed antelope squirrel (*Ammospermophilus leucurus*)	Low deserts, semidesert and montane shrublands, plateaus, and foothills in areas with sparse vegetation and hard gravelly surfaces. Spends its nights and other periods of inactivity in underground burrows. About 2,712,000 acres of potentially suitable habitat occurs within the SEZ region.	7,786 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	78,880 acres of potentially suitable habitat (2.9% of available potentially suitable habitat)	Small overall impact.

Footnotes on next page.

TABLE 12.2.11.3-1 (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 10,327 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 10,327 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*: $\leq$1% of the population or its habitat would be lost and the activity would not result in a measurable change in carrying capacity or population size in the affected area; (2) *moderate*: >1 but $\leq$10% of the population or its habitat would be lost and the activity would result in a measurable but moderate (not destabilizing) change in carrying capacity or population size in the affected area; (3) *large*: >10% of a population or its habitat would be lost and the activity would result in a large, measurable, and destabilizing change in carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.

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

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

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

Table 12.2.11.3-1 summarizes the magnitude of potential impacts on representative mammal species resulting from solar energy development (with the inclusion of programmatic design features) in the proposed Mason Draw SEZ.

Cougar

Up to 10,327 acres (41.8 km^2) of potentially suitable cougar habitat could be lost by SEZ development within the proposed Mason Draw SEZ. This represents about 0.2% of potentially suitable cougar habitat within the SEZ region. About 111,565 acres (451.5 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.

Mule deer

Based on land cover analyses, up to 10,327 acres (41.8 km^2) of potentially suitable mule deer habitat could be lost by SEZ development within the proposed Mason Draw SEZ. This represents about 0.2% of potentially suitable mule deer habitat within the SEZ region. More than 111,918 acres (452.9 km^2) of potentially suitable mule deer habitat occurs within the area of indirect effects. Based on mapped ranges, 4,604 acres (18.6 km^2) of mule deer range where deer are rare or absent and 8,305 acres (33.6 km^2) of higher density mule deer range (i.e., <10 deer/mi^2 [<4 deer/km^2]) occur within the SEZ. Some combination of these ranges up to 10,327 acres (41.8 km^2) could be directly affected by solar energy development in the SEZ. This is 0.2% of these ranges within the SEZ region. About 84,980 acres (344 km^2) of the low-density deer range and 39,675 acres (160.6 km^2) of the higher density mule deer range occur within the area of indirect effects (Figure 12.2.11.3-1). Overall, impacts on mule deer from solar energy development in the SEZ would be small.

Pronghorn

Based on land cover analyses, up to 4,009 acres (16.2 km^2) of potentially suitable pronghorn habitat could be lost by SEZ development within the proposed Mason Draw SEZ. This represents about 0.3% of potentially suitable pronghorn habitat within the SEZ region. About 42,495 acres (172.0 km^2) of potentially suitable pronghorn habitat occurs within the area of indirect effects. Based on mapped pronghorn range (Figure 12.2.11.3-2) and up to 4,604 acres (18.6 km^2) of pronghorn range within the SEZ could be directly affected, and about 67,740 acres (274 km^2) could be indirectly affected. Overall, impacts on pronghorn from solar energy development in the SEZ would be small.

Other Mammals

Direct impacts on other representative mammal species would be small for all species, as 0.2 to 0.4% of the potentially suitable habitats identified for these species in the proposed Mason

Draw SEZ would be lost. Larger areas of potentially suitable habitats for the representative mammal species occur within the area of potential indirect effects (e.g., up to 3.2% of available habitat for the desert pocket mouse and round-tailed ground squirrel) (Table 12.2.11.3-1).

Summary

Overall, direct impacts on mammal species from habitat loss would be small (Table 12.2.11.3-1). 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 (for example, impacts caused by dust generation, erosion, and sedimentation) would be negligible with implementation of programmatic design features.

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

12.2.11.3.3 SEZ-Specific Design Features and Design Feature Effectiveness

The implementation of required programmatic design features described in Appendix A, Section A.2.2, would reduce the potential for effects on mammals. Indirect impacts could be reduced to negligible levels by implementing design features, especially those engineering controls that would reduce runoff, sedimentation, spills, and fugitive dust. While SEZ-specific design features important for reducing impacts on mammals are best established when project details are being considered, 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 riparian habitats, which could provide more unique habitats for some mammal species, should be avoided.

If these SEZ-specific design features are implemented in addition to other 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.

12.2.11.4 Aquatic Biota

12.2.11.4.1 Affected Environment

This section addresses aquatic habitats and biota known to occur in the proposed Mason Draw SEZ itself or within an area that could be affected, either directly or indirectly, by activities associated with solar energy development within the proposed SEZ. There are no perennial or intermittent surface water bodies or streams within the proposed Mason Draw SEZ. There are ephemeral washes that drain into a single large ephemeral wash (Kimble Draw) located near the center of the proposed SEZ. The washes within the SEZ are typically dry and are not likely to support aquatic or riparian habitats. The washes on the SEZ drain into a dry plain and are not connected to any perennial surface waters. The National Wetlands Inventory mapping indicates wetlands are present within the proposed SEZ, primarily in the form of temporarily flooded depressional areas and riparian wetlands associated with Kimble Draw (USFWS undated). Further information on the wetlands near the proposed Mason Draw SEZ is given in Section 12.2.10.1. Such ephemeral or intermittent depressions are typically dry and not likely to contain aquatic habitat or biota. Although not considered aquatic habitat, such nonpermanent surface waters may contain invertebrates that are either aquatic opportunists (i.e., species that occupy both temporary and permanent waters) or specialists adapted to living in temporary aquatic environments (Graham 2001). On the basis of information from ephemeral pools in the American Southwest, ostracods (seed shrimp) and small planktonic crustaceans (e.g., copepods or cladocerans) may be present, and larger branchiopod crustaceans such as fairy shrimp could occur (Graham 2001). Various types of insects that have aquatic larval stages, such as dragonflies and a variety of midges and other fly larvae, may also occur depending on the duration of standing water, the distance to permanent water features, and the abundance of other invertebrates for prey (Graham 2001).

There are no perennial or intermittent surface water bodies or streams located within the area of indirect effects associated with the proposed Mason Draw SEZ. The ephemeral Mason Draw is located 2 mi (3 km) west of the proposed SEZ and is not likely to contain aquatic habitat or biota, but more detailed site survey data would be necessary to characterize the aquatic biota in Mason Draw, if present. The NWI mapping indicates wetlands are present within the area of indirect effects associated with the proposed SEZ (USFWS 2009). The wetlands are generally associated with Mason Draw to the west of the site. As discussed above, desert wetlands are typically dry but may contain aquatic biota adapted to desiccating conditions.

Outside of the area of indirect effects, but within 50 mi (80 km) of the proposed SEZ, there is 4,041 acres (16 km^2) of intermittent lake (Lake Lucero) and 8,201 acres (33 km^2) of reservoir habitat (Caballo Reservoir). There are 285 mi (459 km) of intermittent stream, 104 mi (167 km) of perennial stream (primarily the Rio Grande), and 24 mi (39 km) of canals located within 50 mi (80 km) of the proposed SEZ. In addition, there are wetlands associated with the Rio Grande.

12.2.11.4.2 Impacts

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. Effects that are particularly relevant to aquatic habitats and communities include water withdrawal and changes in water, sediment, and contaminant inputs associated with runoff.

No permanent or intermittent water bodies or streams are present within the area of direct or indirect effects associated with the proposed Mason Draw SEZ. Ephemeral streams and wetlands present within the area of direct and indirect effects associated with the SEZ could be affected by ground disturbance and airborne and waterborne soil deposition. While these features are typically dry and are not expected to support aquatic habitat or communities, more detailed site surveys of ephemeral and intermittent surface waters would be necessary to determine whether solar energy development activities would result in direct or indirect impacts on aquatic biota. The ephemeral streams within the proposed SEZ and the area of indirect effects do not drain into any permanent surface waters, and the nearest perennial surface water is the Rio Grande River, located more than 10 mi (16 km) from the SEZ. Therefore, no direct or indirect impacts on aquatic habitat or biota are expected to result from solar development activities.

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. Within the SEZ, there is the potential for contaminants to enter the ephemeral washes and intermittent wetlands, especially if heavy machinery is used in or near the channel. The potential for introducing contaminants into permanent surface waters would be small, given that the washes do not drain into any permanent surface water and given the relatively large distance from any features to solar development activities (minimum of approximately 10 mi [16 km]).

In arid environments, reductions in the quantity of water in aquatic habitats are of particular concern. Water quantity in aquatic habitats could be affected if significant amounts of surface water or groundwater were utilized for power plant cooling water, for washing mirrors, or for other needs. Of the technologies available, a PV system is the most practical given the amount of groundwater present and the existing water allotments (see Section 12.2.9.2). Additional details regarding the volume of water required and the types of organisms present in potentially affected water bodies would be required in order to further evaluate the potential for impacts from water withdrawals on intermittent wetlands inside the SEZ and surface water outside the SEZ and area of indirect effects.

12.2.11.4.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

- Appropriate engineering controls should be implemented to minimize the amount of ground disturbance, contaminants, runoff, and fugitive dust near wetlands located within the SEZ.

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

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

This section addresses special status species that are known to occur, or for which suitable habitat occurs, within the potentially affected area of the proposed Mason Draw 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 New Mexico[4]; and
- Species that have been ranked by the State of New Mexico as S1 or S2, or species of concern by the State of New Mexico or the USFWS; hereafter referred to as "rare" species.

Special status species known to occur within 50 mi (80 km) of the Mason Draw SEZ center (i.e., the SEZ region) were determined from natural heritage records available through NatureServe Explorer (NatureServe 2010), information provided by the BLM Las Cruces District Office (Hewitt 2009a), New Mexico Rare Plant Technical Council (1999), Biota Information System of New Mexico (BISON-M) (NMDGF 2010), Natural Heritage New Mexico (NHNM) (McCollough 2009), Southwest Regional Gap Analysis Project (SWReGAP) (USGS 2004, 2005a, 2007), South Central GAP Analysis Program (USGS 2010d), Texas GAP Analysis Program (USGS 2010b), and the USFWS Environmental Conservation Online System (ECOS) (USFWS 2010). The information reviewed consisted of county-level occurrences as determined from NatureServe and BISON-M, quad-level occurrences provided by the NHNM, 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 Dona Ana, Luna, Otero, and Sierra Counties in New Mexico, as well as El Paso County, Texas, and Chihuahua, Mexico. However, the SEZ and affected area occur only in Dona Ana County. Appendix M presents additional information on the approach used to identify species that could be affected by development within the SEZ.

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3 See Section 4.6.4 for definitions of these species categories. Note that some of the categories of species included here do not fit BLM's definition of special status species as defined in BLM Manual 6840 (BLM 2008). 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 New Mexico are those plants listed as endangered under the Endangered Plant Species Act (NMSA 1978 § 75-6-1) or wildlife listed as threatened or endangered by the Wildlife Conservation Act (NMSA 1978 § 17-2-37).

12.2.12.1 Affected Environment

The affected area considered in the assessment included the areas of direct and indirect effects. The area of direct effects was defined as the area that would be physically modified during project development (i.e., where ground-disturbing activities would occur). For the Mason Draw SEZ, the area of direct effects included only the SEZ itself. Because of the proximity of existing infrastructure, the impacts of construction and operation of transmission lines outside of the SEZ are not assessed, based on the assumptions 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 line construction or upgrades. Similarly, the impacts of construction of or upgrades to access roads were not assessed for this SEZ because of the proximity of Interstate 10 (see Section 12.2.1.2 for a discussion of development assumptions for this SEZ). The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ boundary. Indirect effects considered in the assessment included effects from groundwater withdrawals, surface runoff, dust, noise, lighting, and accidental spills from the SEZ, but did not include ground-disturbing activities. For the most part, the potential magnitude of indirect effects would decrease with increasing distance away from the SEZ. This area of indirect effects was identified on the basis of professional judgment and was considered sufficiently large to bound the area that would potentially be subject to indirect effects. The affected area includes the areas of both direct and indirect effects.

The primary land cover habitat types within the affected area are Chihuahuan piedmont semidesert grassland as well as Chihuahuan desert creosote-scrub (see Section 12.2.10). Potentially unique habitats in the affected area in which special status species may reside include grasslands, woodlands, cliff and rock outcrops, desert dunes, playas, washes, and riparian and aquatic habitats. No aquatic habitats are known to occur on the SEZ or within the area of indirect effects. The nearest surface water feature is the Rio Grande, about 12 mi (19 km) east of the SEZ (Figure 12.2.12.1-1).

All special status species that are known to occur within the Mason Draw SEZ region (i.e., within 50 mi [80 km] of the center of the SEZ) are listed, with their status, nearest recorded occurrence, and habitats in Appendix J. Twenty-nine of these species could be affected by solar energy development on the SEZ, based on recorded occurrences or the presence of potentially suitable habitat in the affected area. These species, their status, and their habitats are presented in Table 12.2.12.1-1. For many of the species listed in the table (especially plants), their predicted potential occurrence in the affected area is based only on a general correspondence between mapped land cover types and descriptions of species habitat preferences. This overall approach to identifying species in the affected area probably overestimates the number of species that actually occur there. For many of the species identified as having potentially suitable habitat in the affected area, the nearest known occurrence is more than 20 mi (32 m) away from the SEZ.

Based on NHNM records and information provided by the BLM Las Cruces District Office, occurrences for the following five special status species intersect the affected area of the Mason Draw SEZ: desert night-blooming cereus, Texas horned lizard, northern aplomado falcon, fringed myotis, and Townsend’s big-eared bat. These species are indicated in bold text in Table 12.2.12.1-1.

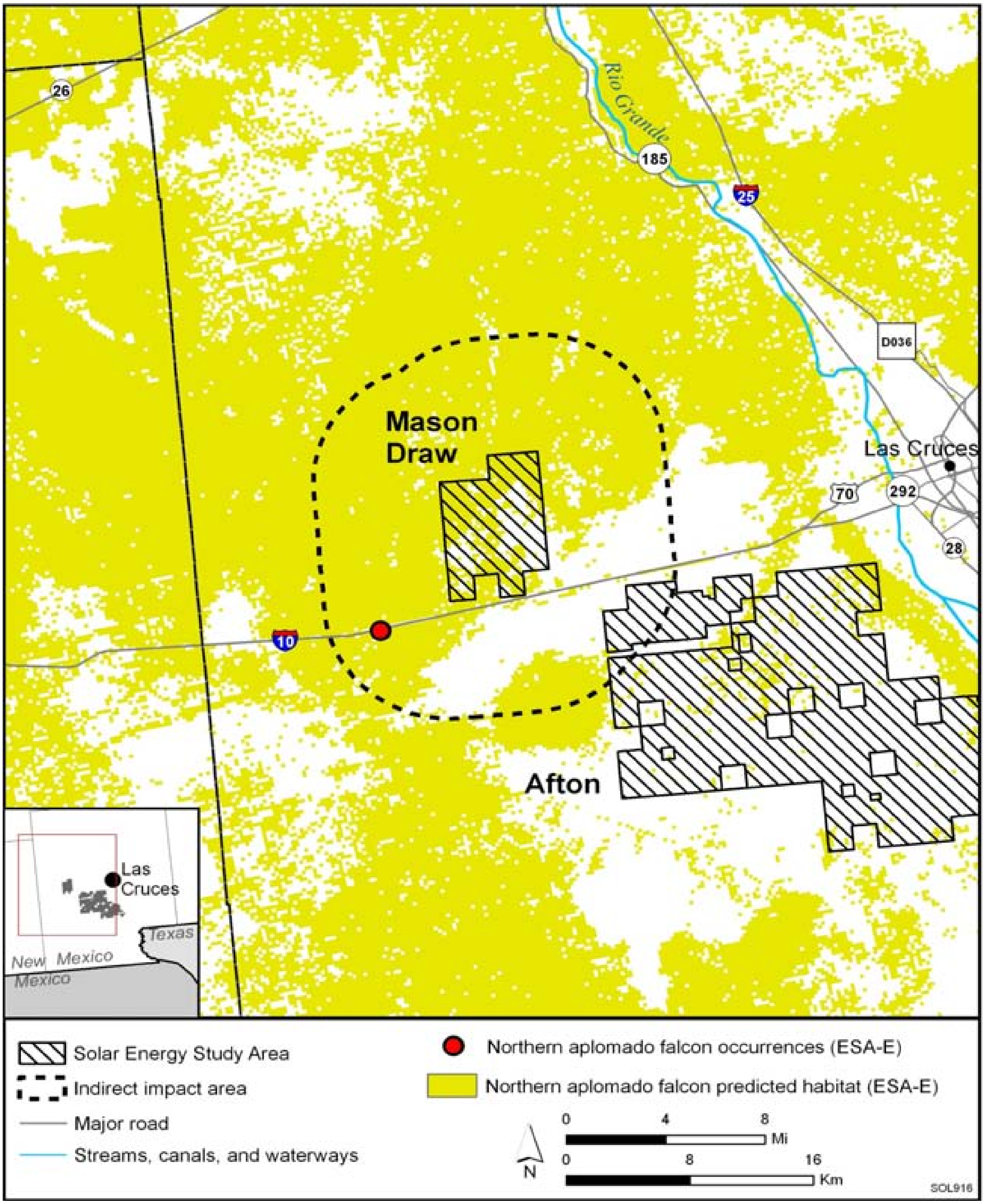

FIGURE 12.2.12.1-1 Known or Potential Occurrences of Species Listed as Endangered or Threatened under the ESA, Candidates for Listing under the ESA, or Species under Review for ESA Listing in the Affected Area of the Proposed Mason Draw SEZ (Sources: Hewitt 2009a; USGS 2007)

TABLE 12.2.12.1-1 Habitats, Potential Impacts, and Potential Mitigation for Special Status Species That Could Be Affected by Solar Energy Development on the Proposed Mason Draw 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						
Alamo beard-tongue	*Penstemon alamosensis*	FWS-SC; NM-SC	Sacramento and San Andres Mountains in Dona Ana and Otero Counties, New Mexico, as well as the Hueco Mountains in El Paso County, Texas, in sheltered rocky areas, canyon sides, and canyon bottoms on limestone substrate. Elevations range between 4,300 and 5,300 ft.[h] Nearest recorded occurrence is 30 mi[i] northeast of the SEZ. About 10,000 acres[j] of potentially suitable habitat occurs in the SEZ region.	0 acres	100 acres of potentially suitable habitat (1.0% of available potentially suitable habitat)	Small overall impact; no direct impact. No species-specific mitigation is warranted.
Arizona coralroot	*Hexalectris spicata*	BLM-S; NM-E; FWS-SC; NM-S2	Oak and pinyon-juniper woodland communities in areas of heavy leaf litter. Known to occur in Dona Ana County. About 141,500 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	17 acres of potentially suitable habitat (<0.1% of available potentially suitable habitat)	Small overall impact; no direct impact. No species-specific mitigation is warranted.

TABLE 12.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Desert night-blooming cereus[k]	***Peniocereus greggii* var. *greggii*[k]**	BLM-S; NM-E; FWS-SC; NM-S1	Sandy to silty gravelly soils in desert grassland **communities**, gravelly flats, and washes. Known to occur in the affected area approximately 3 mi northeast of the SEZ. About 1,400,000 acres of potentially suitable habitat occurs in the SEZ region.	4,100 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	43,500 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to desert grassland habitat on the SEZ could reduce impacts. In addition, , pre-disturbance surveys and avoidance or minimization of disturbance to occupied habitats in the area of direct effects; translocation of individuals from area of direct effects; or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Grama grass cactus	*Sclerocactus papyracanthus*	BLM-S	Pinyon-juniper woodlands and desert grasslands on sandy soils at elevations between 4,900 and 7,200 ft. Nearest recorded occurrence is 30 mi northeast of the SEZ. About 1,379,000 acres of potentially suitable habitat occurs in the SEZ region.	4,000 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	42,000 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to desert grassland habitat on the SEZ could reduce impacts. See desert night-blooming cereus for a list of other applicable mitigation.
Marble Canyon rockcress	*Sibara grisea*	BLM-S; FWS-SC; NM-SC	Rock crevices and the bases of limestone cliffs in chaparral and pinyon-juniper woodland communities at elevations between 4,500 and 6,000 ft. Known to occur in Dona Ana County. About 179,000 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	444 acres of potentially suitable habitat (0.2% of available potentially suitable habitat)	Small overall impact; no direct impact. No species-specific mitigation is warranted.

TABLE 12.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Mosquito plant	*Agastache cana*	FWS-SC; NM-SC	Rock crevices of granite cliffs or in canyon habitats at the lower edge of the pinyon-juniper zone. Elevations range between 4,600 and 5,900 ft. Known to occur in Dona Ana County. About 10,000 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	100 acres of potentially suitable habitat (1.0% of available potentially suitable habitat)	Small overall impact; no direct impact. No species-specific mitigation is warranted.
New Mexico rock daisy	*Perityle staurophylla* var. *staurophylla*	BLM-S; FWS-SC; NM-SC	Endemic to south-central New Mexico in crevices of limestone cliffs and boulders at elevations between 4,900 and 7,000 ft. Known to occur in Dona Ana County. About 10,000 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	100 acres of potentially suitable habitat (1.0% of available potentially suitable habitat)	Small overall impact; no direct impact. No species-specific mitigation is warranted.
Sand prickly-pear cactus	*Opuntia arenaria*	NM-E; FWS-SC; NM-S2	Sandy areas, particularly semi-stabilized sand dunes among open Chihuahuan desert scrub, often associated with sparse cover of grasses. Elevation ranges between 3,800 and 4,300 ft. Nearest occurrence is 18 mi southeast of the SEZ. About 762,500 acres of potentially suitable habitat occurs in the SEZ region.	1,000 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	7,300 acres of potentially suitable habitat (1.0% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to sand dunes and sand transport systems on the SEZ could reduce impacts. In addition, pre-disturbance surveys and avoidance or minimization of disturbance to occupied habitats in the area of direct effects; translocation of individuals from area of direct effects; or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 12.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Sandberg pincushion cactus	*Escobaria sandbergii*	FWS-SC; NM-SC; NM-S2	San Andres and Fra Cristobal Mountains in Dona Ana and Sierra Counties, New Mexico, on rocky limestone soils in Chihuahuan desert scrub and open oak and pinyon-juniper woodlands at elevations between 4,200 and 7,400 ft. Known to occur in Dona Ana County. About 2,732,000 acres of potentially suitable habitat occurs in the SEZ region.	8,800 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	66,600 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoidance or minimization of disturbance to occupied habitats in the area of direct effects; translocation of individuals from area of direct effects; or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Sandhill goosefoot	*Chenopodium cycloides*	BLM-S; NM-S2	Open sandy areas, frequently along the edges of sand dunes. Known to occur in Dona Ana County. About 801,000 acres of potentially suitable habitat occurs in the SEZ region.	1,000 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	7,200 acres of potentially suitable habitat (0.9% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to sand dunes and sand transport systems on the SEZ could reduce impacts. See sand prickly-pear cactus for a list of other applicable mitigations.
Sneed's pincushion cactus	*Escobaria sneedii* var. *sneedii*	ESA-E; NM-E; NM-S2	Limestone cracks of broken terrain on steep slopes and on limestone edges and rocky slopes in mountainous regions at elevations between 4,000 and 6,000 ft. Nearest recorded occurrences are approximately 32 mi southeast of the SEZ. About 10,000 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	100 acres of potentially suitable habitat (1.0% of available potentially suitable habitat)	Small overall impact; no direct impact. No species-specific mitigation is warranted.

TABLE 12.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Plants (Cont.)						
Villard pincushion cactus	*Escobaria villardii*	BLM-S; NM-E; FWS-SC; NM-S2	Franklin and Sacramento Mountains in Otero and Dona Ana Counties, New Mexico, on loamy soils of desert grassland on broad limestone benches at elevations between 4,500 and 6,500 ft. Known to occur in Dona Ana County. About 1,379,000 acres of potentially suitable habitat occurs in the SEZ region.	4,000 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	42,000 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to desert grassland habitats on the SEZ could reduce impacts. See desert night-blooming cereus for a list of applicable mitigations.
Invertebrates						
Samalayuca Dune grasshopper	*Cibolacris samalayucae*	NM-SC	Open sand dune habitats. Known to occur in Dona Ana County. About 801,000 acres of potentially suitable habitat occurs in the SEZ region.	1,000 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	7,200 acres of potentially suitable habitat (0.9% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance to sand dunes and sand transport systems on the SEZ could reduce impacts. In addition, pre-disturbance surveys and avoidance minimization of disturbance to occupied habitats in the area of direct effects or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Shotwell's range grasshopper	*Shotwellia isleta*	NM-SC	Non-saline playas that are composed of clay soils. Known to occur in Dona Ana County. About 10,300 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	50 acres of potentially suitable habitat (0.5% of available potentially suitable habitat)	Small overall impact; no direct impact. No species-specific mitigation is warranted.

TABLE 12.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Reptiles						
Texas horned lizard	***Phrynosoma cornutum***	BLM-S	Flat, open, generally dry habitats with little plant cover, except for bunchgrass, cactus, and desert scrub in areas of sandy or gravelly soil. Nearest quad-level occurrence intersects the affected area within 5 mi east of the SEZ. About 4,038,500 acres of potentially suitable habitat occurs in the SEZ region.	12,900 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	110,100 acres of potentially suitable habitat (2.7% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoidance or minimization of disturbance to occupied habitats in the area of direct effects; translocation of individuals from areas of direct effects; or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Birds						
American peregrine falcon	*Falco peregrinus anatum*	BLM-S; NM-T	Year-round resident in the SEZ region. Open habitats, including deserts, shrublands, and woodlands that are associated with high, near vertical cliffs and bluffs above 200 ft. When not breeding, activity is concentrated in areas with ample prey, such as farmlands, marshes, lakes, rivers, and urban areas. Known to occur in Dona Ana County. About 2,194,500 acres of potentially suitable habitat occurs in the SEZ region.	7,700 acres of potentially suitable foraging habitat lost (0.4% of available potentially suitable habitat)	59,000 acres of potentially suitable habitat (2.7% 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 effects.
Bald eagle	*Haliaeetus leucocephalus*	BLM-S; NM-T; FWS-SC	Winter resident in the SEZ region. Near large bodies of water or free-flowing rivers with abundant fish and waterfowl prey. Winters near open water. May occasionally forage in arid shrubland habitats. Known to occur in Dona Ana County. About 1,785,000 acres of potentially suitable habitat occurs in the SEZ region.	3,900 acres of potentially suitable foraging habitat lost (0.2% of available potentially suitable habitat)	42,200 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	Small overall impact on foraging habitat only. Avoidance of direct impacts on all foraging habitat is not feasible because suitable foraging habitat is widespread in the area of direct effects.

TABLE 12.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Birds (Cont.)						
Eastern bluebird	*Sialia sialis*	NM-S1	Year-round resident in the SEZ region. Forest edges, open woodlands, and partly open situations with scattered trees, from coniferous or deciduous forest to riparian woodland. Also occurs in pine woodlands or savannas. Nests are in natural cavities, old woodpecker holes, bird boxes, or similar sites. Nearest quad-level occurrence is approximately 13 mi southeast of the SEZ. About 1,006,000 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	26,600 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	Small overall impact; no direct impact. No species-specific mitigation is warranted.
Ferruginous hawk	*Buteo regalis*	BLM-S; NM-S2	Winter resident in SEZ region in grasslands, sagebrush and saltbrush habitats, as well as the periphery of pinyon-juniper woodlands throughout the project area. Known to occur in Dona Ana County. About 154,000 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	325 acres of potentially suitable habitat (0.2% of available potentially suitable habitat)	Small overall impact on foraging habitat only; no direct impact. No species-specific mitigation is warranted.

TABLE 12.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Birds (Cont.)						
Gray vireo	*Vireo vicinior*	NM-T; NM-S2	Summer breeding resident in the SEZ region. Semiarid, shrubby habitats, especially mesquite and brushy pinyon-juniper woodlands; also chaparral, desert scrub, thorn scrub, oak-juniper woodland, pinyon-juniper, mesquite, and dry chaparral. Nests in shrubs or trees. Known to occur in Dona Ana County. About 745,000 acres of potentially suitable habitat occurs in the SEZ region.	3,700 acres of potentially suitable foraging or nesting habitat lost (0.5% of available potentially suitable habitat)	22,600 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoidance or minimization of disturbance to occupied nests in the area of direct effects or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Northern aplomado falcon	***Falco femoralis septentrionalis***	ESA-E; NM-E; NM-S1	Year-round resident in the SEZ region. Open rangeland and savanna, semiarid grasslands with scattered trees, mesquite, and yucca. Nests in old stick nests of other raptors or ravens that are located in trees or shrubs in areas of desert grassland. Nearest occurrence is within the affected area approximately 3 mi southwest of the SEZ. About 2,686,500 acres of potentially suitable habitat occurs in the SEZ region.	8,000 acres of potentially suitable foraging or nesting habitat lost (0.3% of available potentially suitable habitat)	79,000 acres of potentially suitable habitat (2.9% of available potentially suitable habitat)	Small overall impact on foraging and nesting habitat. Avoiding or minimizing disturbance to desert grasslands on the SEZ could reduce impacts. Pre-disturbance surveys and avoidance or minimization of disturbance to occupied nests in the area of direct effects or compensatory mitigation of direct effects on occupied habitats could reduce impacts. The potential for impact and need for mitigation should be determined in consultation with the USFWS and NMDGF.

TABLE 12.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Birds (Cont.)						
Western burrowing owl	*Athene cunicularia*	BLM-S; FWS-SC; NM-SC	Year-round resident in the SEZ region. Open grasslands and prairies, as well as disturbed sites such as golf courses, cemeteries, and airports throughout the SEZ region. Nests in burrows constructed by mammals (prairie dog, badger, etc.). Known to occur in Dona Ana County. About 4,167,600 acres of potentially suitable habitat occurs in the SEZ region.	12,750 acres of potentially suitable foraging or nesting habitat lost (0.3% of available potentially suitable habitat)	108,000 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoidance or minimization of disturbance to occupied burrows in the area of direct effects or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Mammals						
Desert bighorn sheep	*Ovis canadensis mexicana*	NM-T; NM-SC; NM-S1	Open, steep rocky terrain in mountainous habitats in desert regions. Rarely uses desert lowlands, but may use them as corridors for travel between mountain ranges. Known to occur in Dona Ana County. About 316,000 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	3,000 acres of potentially suitable habitat (1.0% of available potentially suitable habitat)	Small overall impact; no direct impact. No species-specific mitigation is warranted.
Fringed myotis	***Myotis thysanodes***	BLM-S	Year-round resident in the SEZ region. Wide range of habitats, including lowland riparian, desert shrub, pinyon-juniper, and sagebrush. Roosts in buildings and caves. Nearest quad-level occurrence intersects the affected area about 5 mi east of the SEZ. About 3,676,500 acres of potentially suitable habitat occurs in the SEZ region.	12,750 acres of potentially suitable foraging habitat lost (0.3% of available potentially suitable habitat)	100,500 acres of potentially suitable foraging or roosting habitat (2.7% 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 effects.

TABLE 12.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Mammals (Cont.)						
Long-legged myotis	*Myotis volans*	BLM-S	Year-round resident in the SEZ region. Primarily montane coniferous forests; also riparian and desert habitats. Hibernates in caves and mines. Roosts in abandoned buildings, rock crevices, and under bark of trees. Known to occur in Dona Ana County. About 3,462,500 acres of potentially suitable habitat occurs in the SEZ region.	11,750 acres of potentially suitable foraging habitat lost (0.3% of available potentially suitable habitat)	101,500 acres of potentially suitable foraging or 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 effects.
Townsend's big-eared bat	***Corynorhinus townsendii***	BLM-S; FWS-SC; NM-SC	Year-round resident in the SEZ region. Near forests and shrubland habitats below 9,000 ft elevation throughout the SEZ region. Roosts and hibernates in caves, mines, and buildings. Nearest quad-level occurrence intersects the affected area about 5 mi east of the SEZ. About 3,221,100 acres of potentially suitable habitat occurs in the SEZ region.	8,100 acres of potentially suitable foraging habitat lost (0.3% of available potentially suitable habitat)	81,000 acres of potentially suitable foraging or 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 effects.
Western red bat	*Lasiurus blossevillii*	FWS-SC; NM-S2	Year-round resident in the SEZ region. Forages in riparian and other wooded areas. Roosts primarily in cottonwood trees along riparian areas, but also in fruit orchards. Known to occur in Dona Ana County. About 77,200 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	770 acres of potentially suitable habitat (1.0% of available potentially suitable habitat)	Small overall impact; no direct impact. No species-specific mitigation is warranted.

TABLE 12.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[a]	Habitat[b]	Maximum Area of Potential Habitat Affected[c]: Within SEZ (Direct Effects)[d]	Maximum Area of Potential Habitat Affected[c]: Outside SEZ (Indirect Effects)[e]	Overall Impact Magnitude[f] and Species-Specific Mitigation[g]
Mammals (Cont.)						
Western small-footed myotis	*Myotis ciliolabrum*	BLM-S	Year-round resident in the SEZ region. Variety of woodlands and riparian habitats at elevations below 9,000 ft. Roosts in caves, buildings, mines, and crevices of cliff faces. Known to occur in Dona Ana County. About 4,394,000 acres of potentially suitable habitat occurs in the SEZ region.	12,800 acres of potentially suitable foraging habitat lost (0.3% of available potentially suitable habitat)	109,700 acres of potentially suitable foraging or 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 effects.
Yellow-faced pocket gopher	*Cratogeomys castanops*	NM-S2	Deep sandy or silty soils that are relatively free of rocks. Prefers deep firm soils; rich soils of river valleys and streams, agricultural land (orchards, gardens, potato fields and other croplands), and meadows. Also in mesquite-creosote habitat. Constructs shallow foraging burrows and deeper ones between nest and food cache. Known to occur in Dona Ana County. About 1,608,700 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	35,000 acres of potentially suitable habitat (2.2% of available potentially suitable habitat)	Small overall impact; no direct impact. No species-specific mitigation is warranted.

[a] BLM-S = listed as a sensitive species by the BLM; ESA-C = candidate for listing under the ESA; ESA-E = listed as endangered under the ESA; FWS-SC = USFWS species of concern; NM-E = listed as endangered by the State of New Mexico; NM-T = listed as threatened by the State of New Mexico; NM-S1 = ranked as S1 in the State of New Mexico; NM-S2 = ranked as S2 in the State of New Mexico; NM-SC = species of concern in the State of New Mexico.

[b] For plant species, potentially suitable habitat was determined by using land cover types from SWReGAP and the Texas Gap Analysis Program. For terrestrial vertebrate species, potentially suitable habitat was determined by using habitat suitability and land cover models from SWReGAP and the Texas Gap Analysis Program. Area of potentially suitable habitat for each species is presented for the SEZ region, which is defined as the area within 50 mi (80 km) of the SEZ center.

Footnotes continued on next page.

TABLE 12.2.12.1-3 (Cont.)

[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 because of the proximity of existing infrastructure to the SEZ.

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

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

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

[g] Species-specific mitigation measures are suggested here, but final mitigation measures 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.

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

In their scoping comments on the proposed Mason Draw SEZ (Stout 2009), the USFWS expressed concern for impacts of project development within the SEZ on habitat for the northern aplomado falcon—a species listed as endangered under the ESA. In addition to this species, the Sneed's pincushion cactus, listed as endangered under the ESA, may also occur in the affected area of the Mason Draw SEZ. These two species are discussed below and information on their habitat is presented in Table 12.2.12.1-1; additional basic information on life history, habitat needs, and threats to populations of these species is provided in Appendix J.

Sneed's Pincushion Cactus

The Sneed's pincushion cactus is a perennial cactus listed as endangered under the ESA. This species is endemic to a range of less than 100 mi (160 km) between Las Cruces, New Mexico, and El Paso, Texas. This species is primarily known to occur in limestone cracks of broken terrain on steep slopes at elevations between 4,000 and 6,000 ft (1,220 and 1,800 m). Nearest recorded occurrences of this species are about 32 mi (51 km) southeast of the SEZ. The USFWS did not identify the Sneed's pincushion cactus in their scoping comments on the proposed Mason Draw SEZ (Stout 2009). According to the SWReGAP land cover model, rocky cliffs and outcrops that may be potentially suitable habitat for this species do not occur on the SEZ; however, approximately 100 acres (0.4 km^2) of potentially suitable rocky cliffs and outcrops may occur in the area of indirect effects (Table 12.2.12.1-1). Critical habitat for this species has not been designated.

Northern Aplomado Falcon

The northern aplomado falcon is a raptor that is listed as endangered under the ESA. This species is known to occur in Chihuahuan grassland habitats in southern New Mexico, western Texas, and northern Mexico. Suitable habitats include rangeland, savannas, and semiarid grasslands with scattered trees, mesquite (*Prosopis glandulosa*), and *Yucca* spp. Within these areas, the northern aplomado falcon feeds primarily on other small birds and infrequently on small mammals and reptiles. Nests are located in old nests of other bird species (usually raptors or ravens).

In their scoping comments on the Mason Draw SEZ, the USFWS discussed the potential for northern aplomado falcons to occur in the affected area. Natural and reintroduced populations may occur within the SEZ region (Stout 2009). Reintroductions of northern aplomado falcons in southern New Mexico under Section 10(j) of the ESA began in 2006. According to the USFWS, northern aplomado falcon populations may occur on the SEZ and throughout the affected area of the proposed Mason Draw SEZ in areas of Chihuahuan desert grassland, especially where scattered yucca, mesquite, and cactus are present. According to a field-validated habitat suitability model provided by the BLM Las Cruces District Office (Hewitt 2009a), suitable grassland habitat for this species occurs on the SEZ and in the area of indirect effects. The species is known to occur in the affected area about 3 mi (5 km) southwest of the SEZ (Figure 12.2.12.1-1; Table 12.2.12.1-1). According to the SWReGAP habitat suitability model, approximately 8,000 acres (32 km^2) and 79,000 acres (320 km^2) of potentially suitable habitat may occur on the SEZ and within the area of indirect effects, respectively. On the basis of SWReGAP land cover data, approximately 4,000 acres (16 km^2) of Chihuahuan grassland habitat occurs on the SEZ. This habitat could provide foraging and nesting habitat. Based upon this information, it is concluded that portions of the Mason Draw SEZ may provide suitable habitat for the northern aplomado falcon. Critical habitat for this species has not been designated.

12.2.12.1.2 Species That Are Candidates for Listing under the ESA

In their scoping comments on the proposed Mason Draw SEZ (Stout 2009), the USFWS did not mention any species that are candidates for listing under the ESA that may be impacted by solar energy development on the Mason Draw SEZ. On the basis of known occurrences and the presence of potentially suitable habitat, there are no species that are candidates for ESA listing that may occur in the affected area of the Mason Draw SEZ.

12.2.12.1.3 Species That Are under Review for Listing under the ESA

In their scoping comments on the proposed Mason Draw SEZ (Stout 2009), the USFWS did not mention any species that are under review for listing under the ESA that may be impacted by solar energy development on the Mason Draw SEZ. On the basis of known occurrences and the presence of potentially suitable habitat, there are no species under review for ESA listing that may occur in the affected area of the Mason Draw SEZ.

12.2.12.1.4 BLM-Designated Sensitive Species

There are 16 BLM-designated sensitive species may occur in the affected area of the Mason Draw SEZ (Table 12.2.12.1-1), including the following (1) plants: Arizona coralroot, desert night-blooming cereus, grama grass cactus, Marble Canyon rockcress, New Mexico rock daisy, sandhill goosefoot, and Villard pincushion cactus; (2) reptiles: Texas horned lizard; (3) birds: American peregrine falcon, bald eagle, ferruginous hawk, and western burrowing owl; and (4) mammals: fringed myotis, long-legged myotis, Townsend's big-eared bat, and western small-footed myotis. Occurrences of four of these species intersect the affected area of the Mason Draw SEZ: desert night-blooming cereus, Texas horned lizard, fringed myotis, and Townsend's big-eared bat. Habitats in which BLM-designated sensitive species are found, the amount of potentially suitable habitat in the affected area, and known locations of the species relative to the SEZ are presented in Table 12.2.12.1-1. These species as related to the SEZ are described in the remainder of this section. Additional life history information for these species is provided in Appendix J.

Arizona Coralroot

The Arizona coralroot is a perennial herb that is known from Arizona, New Mexico, and Texas. It occurs in oak and pinyon-juniper woodland communities in areas with heavy leaf litter. This species is known to occur in Dona Ana County. According to the SWReGAP land cover model, potentially suitable woodland habitat does not occur on the SEZ. However, potentially suitable woodland habitat may occur in the area of indirect effects within 5 mi (8 km) of the SEZ (Table 12.2.12.1-1).

Desert Night-Blooming Cereus

The desert night-blooming cereus is a perennial shrub-like cactus that is known from southern Arizona, New Mexico, and Texas. It occurs in sandy to silty soils in desert grassland communities, flats, and washes. The species is known to occur in the affected area, about 3 mi (5 km) northeast of the SEZ. Potentially suitable desert grassland habitat may occur on the SEZ and in other portions of the affected area (Table 12.2.12.1-1).

Grama Grass Cactus

The grama grass cactus is a perennial shrub-like cactus that is known from southern Arizona, New Mexico, and Texas. It occurs in pinyon-juniper woodlands and desert grasslands on sandy soils. The nearest recorded occurrence of this species is about 30 mi (48 km) northeast of the SEZ. Although it is not known to occur in the affected area, potentially suitable desert grassland habitat may occur on the SEZ and in other portions of the affected area (Table 12.2.12.1-1).

Marble Canyon Rockcress

The Marble Canyon rockcress is an annual herb that is known from southern New Mexico and Texas. It occurs in rock crevices and at the bases of limestone cliffs in chaparral and pinyon-juniper communities at elevations between 4,500 and 6,000 ft (1,350 and 1,800 m). This species is known to occur in Dona Ana County. According to the SWReGAP land cover model, potentially suitable rocky cliff and outcrop habitat does not occur on the SEZ. However, potentially suitable habitat may occur in portions of the area of indirect effects within 5 mi (8 km) from the SEZ (Table 12.2.12.1-1).

New Mexico Rock Daisy

The New Mexico rock daisy is a perennial herb that is endemic to south-central New Mexico. It occurs in crevices of limestone cliffs and boulders at elevations between 4,900 and 7,000 ft (1,500 and 2,100 m). This species is known to occur in Dona Ana County. According to the SWReGAP land cover model, potentially suitable rocky cliff and outcrop habitat does not occur on the SEZ. However, potentially suitable habitat may occur in portions of the area of indirect effects within 5 mi (8 km) from the SEZ (Table 12.2.12.1-1).

Sandhill Goosefoot

The sandhill goosefoot is an annual herb that ranges from Nebraska south to New Mexico and Texas. It occurs in open sandy habitats, frequently along desert sand dunes. This species is known to occur in Dona Ana County. According to the SWReGAP land cover model, potentially suitable sand dune habitat may occur on the SEZ and other portions of the affected area (Table 12.2.12.1-1).

Villard Pincushion Cactus

The Villard pincushion cactus is a perennial shrub-like cactus that is known from the Franklin and Sacramento Mountains in southern New Mexico. It occurs on loamy soils on limestone benches in desert grassland at elevations between 4,500 and 6,500 ft (1,370 and 2,000 m). This species is known to occur in Dona Ana County. According to the SWReGAP land cover model, potentially suitable desert grassland habitat may occur on the SEZ and other portions of the affected area (Table 12.2.12.1-1).

Texas Horned Lizard

The Texas horned lizard is widespread in the south-central United States and northern Mexico. This lizard inhabits open arid and semiarid regions on sandy substrates and sparse vegetation. Vegetation in suitable habitats includes grasses, cacti, or scattered brush or scrubby trees. Nearest quad-level occurrences of this species intersect the affected area about 5 mi (8 km) east of the SEZ. According to the SWReGAP habitat suitability model, potentially suitable habitat for this species occurs on the SEZ and throughout portions of the affected area (Table 12.2.12.1-1).

American Peregrine Falcon

The American peregrine falcon is known throughout the western United States from areas with high vertical cliffs and bluffs that overlook large open areas such as deserts, shrublands, and woodlands. Nests are usually constructed on rock outcrops and cliff faces. Foraging habitat varies from shrublands and wetlands to farmland and urban areas. This species is known to occur in Dona Ana County. According to the SWReGAP habitat suitability model, potentially suitable year-round foraging and nesting habitat for the American peregrine falcon may occur within the affected area of the Mason Draw SEZ. On the basis of an evaluation of SWReGAP land cover types, however, potentially suitable nesting habitat (cliffs or outcrops) does not occur on the SEZ.

Bald Eagle

The bald eagle is primarily known to occur in riparian habitats associated with larger permanent water bodies such as lakes, rivers, and reservoirs. However, it may occasionally forage in arid shrubland habitats. This species is a winter resident in Dona Ana County. According to the SWReGAP habitat suitability model, potentially suitable winter foraging habitat for this species may occur in the affected area of the Mason Draw SEZ (Table 12.2.12.1-1).

Ferruginous Hawk

The ferruginous hawk is known to occur throughout the western United States. According to the SWReGAP habitat suitability model, only potentially suitable winter foraging habitat for this species occurs within the affected area of the Mason Draw SEZ. This species inhabits open grasslands, sagebrush flats, desert scrub, and the edges of pinyon-juniper woodlands. This species is known to occur in Dona Ana County. According to the SWReGAP habitat suitability model, suitable habitat for this species does not occur on the SEZ; however, potentially suitable foraging habitat occurs in portions of the area of indirect effects outside of the SEZ (Table 12.2.12.1-1).

Western Burrowing Owl

The western burrowing owl forages in grasslands, shrublands, open disturbed areas, and nests in burrows usually constructed by mammals. According to the SWReGAP habitat suitability model for the western burrowing owl, potentially suitable year-round foraging and nesting habitat may occur in the affected area of the Mason Draw SEZ. This species is known to occur in Dona Ana County. Potentially suitable foraging and breeding habitat is expected to occur on the SEZ and in other portions of the affected area (Table 12.2.12.1-1). 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 Mason Draw SEZ region, where it occurs in a variety of habitats, including riparian, shrubland, sagebrush, and pinyon-juniper woodlands. The species roosts in buildings and caves. The nearest quad-level occurrence of this species intersects the affected area about 5 mi (8 km) east of the SEZ. 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 12.2.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is no potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ, but about 100 acres (0.4 km^2) of potentially suitable habitat occurs in the area of indirect effects.

Long-Legged Myotis

The long-legged myotis is a year-round resident in the Mason Draw SEZ region, where it is primarily known from montane coniferous forests. The species is also known to forage in desert shrublands. The species roosts in buildings, caves, mines, and rock crevices. This species is known to occur in Dona Ana County. 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 12.2.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is no suitable roosting habitat (rocky cliffs and outcrops) on the SEZ, but about 100 acres (0.4 km^2) of potentially suitable 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 Mason Draw 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 quad-level occurrence of this species intersects the affected area about 5 mi (8 km) east of the SEZ. According to the SWReGAP habitat suitability model, potentially suitable year-round foraging habitat for this species may occur on the SEZ and other portions of the affected area (Table 12.2.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is no suitable roosting habitat (rocky cliffs and outcrops) on the SEZ, but approximately 100 acres (0.4 km^2) of potentially suitable habitat occurs in the area of indirect effects.

Western Small-Footed Myotis

The western small-footed myotis is a year-round resident in the Mason Draw 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, beneath boulders or loose bark, buildings, and other man-made structures. This species is known to occur in Dona Ana County. According to the SWReGAP habitat suitability model, potentially suitable year-round foraging habitat for this species may occur on the SEZ and other portions of the affected area (Table 12.2.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is no suitable roosting habitat (rocky cliffs and outcrops) on the SEZ, but approximately 100 acres (0.4 km^2) of potentially suitable habitat occurs in the area of indirect effects.

12.2.12.1.5 State-Listed Species

There are 9 species listed by the State of New Mexico that may occur in the Mason Draw SEZ affected area (Table 12.2.12.1-1). These state-listed species include the following (1) plants: Arizona coralroot, desert night-blooming cereus, sand prickly-pear cactus, and Sneed's pincushion cactus; (2) birds: American peregrine falcon, bald eagle, gray vireo, and northern aplomado falcon; and (3) mammal: desert bighorn sheep. All of these species are protected in

New Mexico under the Endangered Plant Species Act (NMSA 1978 §75-6-1) or the Wildlife Conservation Act (NMSA 1978 §17-2-37). The following three of these species have not been previously described due to their status under the ESA or BLM (Sections 12.2.12.1.1 or 12.2.12.1.4): sand prickly-pear cactus, gray vireo, and desert bighorn sheep. These species as related to the SEZ are described in this section and Table 12.2.12.1-1. Additional life history information for these species is provided in Appendix J.

Sand Prickly-Pear Cactus

The sand prickly-pear cactus occurs from southern New Mexico and western Texas. This cactus species is listed as endangered in the State of New Mexico. It occurs in semi-stabilized sand dunes in the Chihuahua Desert region in areas of sparse grass cover. This species is known to occur as near as 18 mi (29 km) southeast of the SEZ. According to the SWReGAP land cover model, potentially suitable desert dune habitat occurs on the SEZ and other portions of the affected area (Table 12.2.12.1-1).

Gray Vireo

The gray vireo is a small neotropical migrant songbird that is known from the southwestern United States and northern Mexico. This species is listed as threatened in the State of New Mexico. According to the SWReGAP habitat suitability model, this species may occur throughout the SEZ region as a summer breeding resident. Breeding and foraging habitat for this species consists of semiarid shrublands, pinyon-juniper woodlands, oak-scrub woodlands, and chaparral habitats. This species is known to occur in Dona Ana County, and potentially suitable foraging or nesting habitat for this species may occur on the SEZ or in other portions of the affected area (Table 12.2.12.1-1).

Desert Bighorn Sheep

The desert bighorn sheep is currently listed as threatened in the State of New Mexico. It is one of several subspecies of bighorn sheep that is known to occur in the southwestern United States. This subspecies occurs in eastern Arizona, New Mexico, and Texas. Within New Mexico, desert bighorn sheep inhabit visually open, rocky, desert mountain ranges in the southern portion of the state. The species rarely uses desert lowlands and valleys, but these areas may be occasionally used as movement corridors between mountain ranges. This species is known to occur in Dona Ana County. According to the SWReGAP habitat suitability model, potentially suitable habitat for this species does not occur on the SEZ; however, potentially suitable habitat may occur in the area of indirect effects within 5 mi (8 km) of the SEZ (Table 12.2.12.1-1).

12.2.12.1.6 Rare Species

Twenty-three rare species (i.e., state rank of S1 or S2 in New Mexico or a species of concern by the USFWS or State of New Mexico) may be affected by solar energy development on the Mason Draw SEZ (Table 12.2.12.1-1). Eight of these species have not been discussed above: (1) plants: Alamo beardtongue, mosquito plant, and Sandberg pincushion cactus; (2) invertebrates: Samalayuca Dune grasshopper and Shotwell's range grasshopper; (3) birds: eastern bluebird; and (4) mammals: western red bat and yellow-faced pocket gopher. These species as related to the SEZ are described in Table 12.2.12.1-1.

12.2.12.2 Impacts

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

The assessment of impacts on special status species is based on available information on the presence of species in the affected area as presented in Section 12.2.12.1 and following the analysis approach described in Appendix M. It is assumed that prior to development, surveys would be conducted to determine the presence of special status species and their habitats in and near areas where ground-disturbing activities would occur. Additional NEPA assessments, ESA consultations, and coordination with state natural resource agencies may be needed to address project-specific impacts more thoroughly. These assessments and consultations could result in additional required actions to avoid, minimize, or mitigate impacts on special status species (see Section 12.2.12.3).

Solar energy development within the Mason Draw SEZ could affect a variety of habitats (see Sections 12.2.9 and 12.2.10). These impacts on habitats could in turn affect special status species that are dependent on those habitats. Based on NHNM records and information provided by the BLM Las Cruces District Office, occurrences for the following five special status species intersect the Mason Draw affected area: desert night-blooming cereus, Texas horned lizard, northern aplomado falcon, fringed myotis, and Townsend's big-eared bat. Suitable habitat for each of these species may occur in the affected area. 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 12.2.12.1, this approach probably overestimates the number of species that actually occur in the affected area, and may therefore overestimate impacts to some special status species.

Potential direct and indirect impacts on special status species within the SEZ and in the area of indirect effects outside the SEZ are presented in Table 12.2.12.1-1. In addition, the overall potential magnitude of impacts on each species (assuming programmatic design features are in place) is presented along with any potential species-specific mitigation measures that could further reduce impacts.

Impacts on special status species could occur during all phases of development (construction, operation, and decommissioning and reclamation) of a utility-scale solar energy project within the SEZ. Construction and operation activities could result in short- or long-term impacts on individuals and their habitats, especially if these activities are sited in areas where special status species are known to or could occur. As presented in Section 12.2.1.2, impacts of access road and transmission line construction, upgrade, or operation are not assessed in this evaluation because of the proximity of existing infrastructure to the SEZ.

Direct impacts would result from habitat destruction or modification. It is assumed that direct impacts would occur only within the SEZ where ground-disturbing activities are expected to occur. Indirect impacts could result from surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, accidental spills, harassment, and lighting. No ground-disturbing activities associated with project facilities 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., desert dunes, washes, and grasslands). 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.

12.2.12.2.1 Impacts on Species Listed under the ESA

In their scoping comments on the proposed Mason Draw SEZ (Stout 2009), the USFWS expressed concern for impacts of project development within the SEZ on the northern aplomado falcon—a bird species listed as endangered under the ESA. In addition to this species, the Sneed's pincushion cactus—also listed as endangered under the ESA—may be affected by project development on the SEZ. Impacts to these species are discussed below and summarized in Table 12.2.12.1-1.

Sneed's Pincushion Cactus

The Sneed's pincushion cactus is endemic to a small region between Las Cruces and El Paso. It inhabits limestone cracks of broken terrain on steep rocky slopes and is known to occur within 32 mi (51 km) southeast of the Mason Draw SEZ. According to the SWReGAP land cover model, potentially suitable rocky cliff and outcrop habitat for this species does not occur on the SEZ. However, about 100 acres (0.4 km^2) of suitable habitat occurs in the area of potential indirect effects; this area represents about 1.0% of the available suitable habitat in the region (Table 12.2.12.1-1).

The overall impact on the Sneed's pincushion cactus from construction, operation, and decommissioning of utility-scale solar energy facilities within the Mason Draw 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.

If deemed necessary, actions to reduce impacts (e.g., reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions of incidental take statements) on the Sneed's pincushion cactus, including development of a survey protocol, avoidance measures, minimization measures, and, potentially, compensatory mitigation, should be taken in consultation with the USFWS under Section 7 of the ESA. Consultation with the New Mexico Department of Game and Fish (NMDGF) should also occur to determine any state mitigation requirements.

Northern Aplomado Falcon

The northern aplomado falcon inhabits Chihuahuan grasslands in southern New Mexico, western Texas, and northern Mexico and is known to occur approximately 3 mi (5 km) southwest of the Mason Draw SEZ (Figure 12.2.12.1-1). According to the SWReGAP habitat suitability model, about 8,000 acres (32 km^2) of potentially suitable habitat within the SEZ could be directly affected by construction and operations of solar energy development on the Mason Draw SEZ. This direct effects area represents about 0.3% of available suitable habitat in the region. About 79,000 acres (320 km^2) of suitable habitat occurs in the area of potential indirect effects; this area represents about 2.9% of the available suitable habitat in the region (Table 12.2.12.1-1). On the basis of SWReGAP land cover data, about 4,000 acres (16 km^2) of Chihuahuan grassland habitat occurs on the SEZ. In addition, a field-verified habitat suitability model provided by the BLM Las Cruces District Office indicates that suitable grassland habitat for this species is known to occur on the SEZ. Based upon this information, it is concluded that portions of the Mason Draw SEZ may provide suitable habitat for the northern aplomado falcon.

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

Avoiding or minimizing disturbance to desert grassland habitat on the SEZ could reduce direct impacts on the northern aplomado falcon to negligible levels. Impacts could also be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to potential nesting habitat in the area of direct effects. If avoidance or minimization are not feasible options, a compensatory mitigation plan could be developed and implemented to mitigate direct effects on suitable nesting 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 in the area of direct effects.

Development of actions to reduce impacts (e.g., reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions of incidental take statements) on the northern aplomado falcon, including development of a survey protocol, avoidance measures, minimization measures, and, potentially, compensatory mitigation, would require consultation with the USFWS per Section 7 of the ESA. Consultation with NMDGF should also occur to determine any state mitigation requirements.

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

In their scoping comments on the proposed Mason Draw SEZ (Stout 2009), the USFWS did not mention any species that are candidates for listing under the ESA that may be impacted by solar energy development on the Mason Draw SEZ. On the basis of known occurrences and the presence of potentially suitable habitat, there are no species that are candidates for ESA listing that may occur in the affected area of the Mason Draw SEZ.

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

In their scoping comments on the proposed Mason Draw SEZ (Stout 2009), the USFWS did not mention any species that are under review for listing under the ESA that may be impacted by solar energy development on the Mason Draw SEZ. On the basis of known occurrences and the presence of potentially suitable habitat, there are no species under review for ESA listing that may occur in the affected area of the Mason Draw SEZ.

12.2.12.2.4 Impacts on BLM-Designated Sensitive Species

Impacts to 16 BLM-designated sensitive species that may be affected by solar energy development on the Mason Draw SEZ but that have not previously discussed as listed under the ESA, candidates, or under review for ESA listing are discussed below.

Arizona Coralroot

The Arizona coralroot is not known to occur in the affected area of the Mason Draw SEZ, and suitable habitat does not occur on the SEZ; however, about 17 acres (<0.1 km^2) of potentially suitable pinyon-juniper woodland habitat occurs in the area of indirect effects within 5 mi (8 km) of the SEZ. This area represents less than 0.1% of the available suitable habitat in the SEZ region (Table 12.2.12.1-1).

The overall impact on the Arizona coralroot from construction, operation, and decommissioning of utility-scale solar energy facilities within the Mason Draw 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.

Desert Night-Blooming Cereus

The desert night-blooming cereus is known to occur about 3 mi (5 km) northeast of the Mason Draw SEZ, and potentially suitable habitat occurs in the affected area. About 4,100 acres (17 km^2) of potentially suitable desert grassland habitat on the SEZ may be directly affected by solar energy construction and operations (Table 12.2.12.1-1). This direct effects area represents 0.3% of available suitable habitat in the region. About 43,500 acres (176 km^2) of potentially suitable grassland habitat occurs in the area of potential indirect effects; this area represents about 3.1% of the available suitable habitat in the SEZ region (Table 12.2.12.1-1).

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

Avoiding or minimizing disturbance to desert grasslands on the SEZ could reduce direct impacts on the desert night-blooming cereus. Alternatively, 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 uses one or more of these options could be designed to completely offset the impacts of development.

Grama Grass Cactus

The grama grass cactus is known to occur about 30 mi (48 km) northeast of the Mason Draw SEZ and potentially suitable habitat occurs in the affected area. About 4,000 acres (16 km^2) of potentially suitable desert grassland habitat on the SEZ may be directly affected by construction and operations of solar energy development (Table 12.2.12.1-1). This direct effects area represents 0.3% of available suitable habitat in the region. About 42,000 acres (170 km^2) of potentially suitable grassland habitat occurs in the area of potential indirect effects; this area represents about 3.0% of the available suitable habitat in the SEZ region (Table 12.2.12.1-1).

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

Avoidance or minimization of disturbance to desert grassland habitat in the area of direct effects and the implementation of mitigation measures described previously for the desert night-blooming cereus could reduce direct impacts on this species to negligible levels. The need for mitigation, other than programmatic design features, should be determined by conducting pre-disturbance surveys for the species and its habitat on the SEZ.

Marble Canyon Rockcress

The Marble Canyon rockcress is known to occur in Dona Ana County. According to the SWReGAP land cover model, potentially suitable rocky cliff and outcrop and pinyon-juniper habitats for this species do not occur on the SEZ. However, about 444 acres (2 km^2) of potentially suitable habitat occurs in the area of indirect effects within 5 mi (8 km) of the SEZ; this area represents 0.2% of the available suitable habitat in the SEZ region (Table 12.2.12.1-1).

The overall impact on the Marble Canyon rockcress from construction, operation, and decommissioning of utility-scale solar energy facilities within the Mason Draw 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.

New Mexico Rock Daisy

The New Mexico rock daisy is known to occur in Dona Ana County. According to the SWReGAP land cover model, potentially suitable rocky cliff and outcrop habitat for this species does not occur on the SEZ. However, about 100 acres (0.4 km^2) of potentially suitable habitat occurs in the area of indirect effects within 5 mi (8 km) of the SEZ; this area represents 1.0% of the available suitable habitat in the SEZ region (Table 12.2.12.1-1).

The overall impact on the New Mexico rock daisy from construction, operation, and decommissioning of utility-scale solar energy facilities within the Mason Draw 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.

Sandhill Goosefoot

The sandhill goosefoot is not known to occur in the affected area of the Mason Draw SEZ. However, the species is known to occur in Dona Ana County, and about 1,000 acres (4 km^2) of potentially suitable desert sand dune habitat on the SEZ may be directly affected by construction and operations of solar energy development. This direct effects area represents 0.1% of available suitable habitat in the region. About 7,200 acres (29 km^2) of potentially suitable habitat occurs in the area of indirect effects within 5 mi (8 km) of the SEZ; this area represents 0.9% of the available suitable habitat in the SEZ region (Table 12.2.12.1-1).

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

Avoiding or minimizing disturbance to dunes and other sandy areas on the SEZ could reduce direct impacts on this species. In addition, 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 plan could be developed and implemented to mitigate direct effects on occupied habitats. The protection and enhancement of existing occupied or suitable habitats could compensate for habitats lost to development. A comprehensive mitigation strategy that uses one or more of these options could be designed to completely offset the impacts of development.

Villard Pincushion Cactus

The Villard pincushion cactus is not known to occur in the affected area of the Mason Draw SEZ. However, the species is known to occur in Dona Ana County, and about 4,000 acres (16 km^2) of potentially suitable desert grassland habitat on the SEZ may be directly affected by construction and operations of solar energy development (Table 12.2.12.1-1). This direct effects area represents 0.3% of available suitable habitat in the region. About 42,000 acres (170 km^2) of potentially suitable grassland habitat occurs in the area of potential indirect effects; this area represents about 3.0% of the available suitable habitat in the SEZ region (Table 12.2.12.1-1).

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

Avoidance or minimization of disturbance to desert grassland in the area of direct effects and the implementation of mitigation measures described previously for the desert night-blooming cereus could reduce direct impacts on this species to negligible levels. The need for mitigation, other than programmatic design features, should be determined by conducting pre-disturbance surveys for the species and its habitat on the SEZ.

Texas Horned Lizard

The Texas horned lizard is known to occur in the affected area of the Mason Draw SEZ. About 12,900 acres (52 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 12.2.12.1-1). This direct impact area represents about 0.3% of potentially suitable habitat in the SEZ region. About 110,100 acres (446 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 2.7% of the potentially suitable habitat in the SEZ region (Table 12.2.12.1-1).

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

Avoidance of all potentially suitable habitats to mitigate impacts on the Texas horned lizard is not feasible because potentially suitable desert scrub habitat is widespread throughout the area of direct effects. However, direct impacts could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the area of direct effects. If avoidance or minimization is not feasible, individuals could be translocated from the area of direct effects to protected areas that would not be affected directly or indirectly by future development. Alternatively, or in combination with translocation, a compensatory mitigation plan could be developed and implemented to mitigate direct effects on occupied habitats. Compensation could involve the protection and enhancement of existing occupied or suitable habitats to compensate for habitats lost to development. A comprehensive mitigation strategy that used one or more of these options could be designed to completely offset the impacts of development.

American Peregrine Falcon

The American peregrine falcon is a year-round resident in the Mason Draw SEZ region, and potentially suitable habitat is expected to occur in the affected area. About 7,700 acres (31 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 12.2.12.1-1). This direct impact area represents 0.4% of potentially suitable habitat in the SEZ region. About 59,000 acres (239 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 2.7% of the potentially suitable habitat in the SEZ region (Table 12.2.12.1-1). Most of this area could serve as foraging habitat (open shrublands). On the basis of an evaluation of SWReGAP land cover data, potentially suitable nest sites for this species (rocky cliffs and outcrops) do not occur on the SEZ, but about 100 acres (0.4 km^2) of this habitat may occur in the area of indirect effects.

The overall impact on the American peregrine falcon from construction, operation, and decommissioning of utility-scale solar energy facilities within the Mason Draw SEZ is considered small because direct effects would only occur on potentially suitable foraging habitat, and the amount of this habitat in the area of direct effects represents less than 1% of potentially suitable foraging habitat in the SEZ region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts on this species to negligible levels. Avoidance of all potentially suitable foraging habitats is not feasible because potentially suitable habitat is widespread throughout the area of direct effects and readily available in other portions of the SEZ region.

Bald Eagle

The bald eagle is a winter resident in the Mason Draw SEZ region, and only potentially suitable foraging habitat is expected to occur in the affected area. About 3,900 acres (16 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 12.2.12.1-1). This direct impact area represents 0.2% of potentially suitable habitat in the SEZ region. About 42,200 acres (171 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 2.4% of the potentially suitable habitat in the SEZ region (Table 12.2.12.1-1). Most of the suitable foraging habitat on the SEZ and in the area of indirect effects is composed of desert shrubland and grassland.

The overall impact on the bald eagle from construction, operation, and decommissioning of utility-scale solar energy facilities within the Mason Draw SEZ is considered small because the amount of potentially suitable foraging habitat for this species in the area of direct effects represents less than 1% of potentially suitable foraging habitat in the SEZ region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts on this species to negligible levels. Avoidance of all potentially suitable foraging habitats is not feasible because potentially suitable habitat is widespread throughout the area of direct effects and readily available in other portions of the SEZ region.

Ferruginous Hawk

The ferruginous hawk is a winter resident in the Mason Draw SEZ region, and only potentially suitable foraging habitat is expected to occur in the affected area. According to the SWReGAP habitat suitability model, suitable habitat for this species does not occur within the area of direct effects. However, about 325 acres (1 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 0.2% of the potentially suitable habitat in the SEZ region (Table 12.2.12.1-1).

The overall impact on the ferruginous hawk from construction, operation, and decommissioning of utility-scale solar energy facilities within the Mason Draw 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.

Western Burrowing Owl

The western burrowing owl is a year-round resident in the Mason Draw SEZ region, and potentially suitable foraging and nesting habitat is expected to occur in the affected area. About 12,750 acres (52 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 12.2.12.1-1). This direct impact area represents 0.3% of potentially suitable habitat in the SEZ region. About 108,000 acres (437 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 12.2.12.1-1). Most of this area could serve as foraging and nesting habitat (shrublands). The abundance of burrows suitable for nesting in the affected area has not been determined.

The overall impact on the western burrowing owl from construction, operation, and decommissioning of utility-scale solar energy facilities within the Mason Draw SEZ is considered moderate 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.

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

Fringed Myotis

The fringed myotis is a year-round resident within the Mason Draw SEZ region, and quad-level occurrences of this species are known to intersect the affected area of the SEZ. According to the SWReGAP habitat suitability model, about 12,750 acres (52 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 12.2.12.1-1). This direct impact area represents 0.3% of potentially suitable habitat in the SEZ region. About 100,500 acres (407 km^2) of potentially suitable foraging habitat occurs in the area of indirect effect; this area represents about 2.7% of the available suitable habitat in the region (Table 12.2.12.1-1). Most of the potentially suitable habitat in the affected area is foraging habitat represented by desert shrubland. On the basis of an evaluation of SWReGAP land cover data, potentially suitable roost habitat (rocky cliffs and outcrops) does not occur on the SEZ, but about 100 acres (0.4 km^2) of potentially suitable roost habitat may occur 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 Mason Draw SEZ is considered small because the amount of potentially suitable foraging habitat for this species in the area of direct effects represents less than 1% of potentially suitable foraging habitat in the SEZ region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts on this species to negligible levels. Avoidance of all potentially suitable foraging habitats is not feasible because potentially suitable habitat is widespread throughout the area of direct effects and readily available in other portions of the SEZ region.

Long-Legged Myotis

The long-legged myotis is a year-round resident within the Mason Draw SEZ region. According to the SWReGAP habitat suitability model, about 11,750 acres (48 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 12.2.12.1-1). This direct impact area represents 0.3% of potentially suitable habitat in the SEZ region. About 101,500 acres (411 km^2) of potentially suitable foraging habitat occurs in the area of indirect effects; this area represents about 2.9% of the available suitable habitat in the region (Table 12.2.12.1-1). Most of the potentially suitable habitat in the affected area is foraging habitat represented by desert shrubland. On the basis of an evaluation of SWReGAP land cover data, potentially suitable roost habitat (rocky cliffs and outcrops) does not occur on the SEZ, but about 100 acres (0.4 km^2) of potentially suitable roost habitat may occur in the area of indirect effects.

The overall impact on the long-legged myotis from construction, operation, and decommissioning of utility-scale solar energy facilities within the Mason Draw SEZ is considered small because the amount of potentially suitable foraging habitat for this species in the area of direct effects represents less than 1% of potentially suitable foraging habitat in the SEZ region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts on this species to negligible levels. Avoidance of all potentially suitable foraging habitats is feasible because potentially suitable habitat is widespread throughout the area of direct effects and readily available in other portions of the SEZ region.

Townsend's Big-Eared Bat

The Townsend's big-eared bat is a year-round resident within the Mason Draw SEZ region, and quad-level occurrences of this species are known to intersect the affected area of the SEZ. According to the SWReGAP habitat suitability model, about 8,100 acres (33 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 12.2.12.1-1). This direct impact area represents 0.3% of potentially suitable habitat in the

SEZ region. About 81,000 acres (328 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 2.5% of the available suitable foraging habitat in the region (Table 12.2.12.1-1). Most of the potentially suitable habitat in the affected area is foraging habitat represented by desert shrubland. On the basis of an evaluation of SWReGAP land cover data, potentially suitable roost habitat (rocky cliffs and outcrops) does not occur on the SEZ, but about 100 acres (0.4 km^2) of potentially suitable roost habitat may occur in the area of indirect effects.

The overall impact on the Townsend's big-eared bat from construction, operation, and decommissioning of utility-scale solar energy facilities within the Mason Draw SEZ is considered small because the amount of potentially suitable foraging habitat for this species in the area of direct effects represents less than 1% of potentially suitable foraging habitat in the SEZ region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts on this species to negligible levels. Avoidance of all potentially suitable foraging habitats is not because potentially suitable habitat is widespread throughout the area of direct effects and readily available in other portions of the SEZ region.

Western Small-Footed Myotis

The western small-footed myotis is a year-round resident within the Mason Draw SEZ region. According to the SWReGAP habitat suitability model, about 12,800 acres (52 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 12.2.12.1-1). This direct impact area represents 0.3% of potentially suitable habitat in the SEZ region. About 109,700 acres (444 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 2.5% of the available suitable foraging habitat in the region (Table 12.2.12.1-1). Most of the potentially suitable habitat in the affected area is foraging habitat represented by desert shrubland. On the basis of an evaluation of SWReGAP land cover data, potentially suitable roost habitat (rocky cliffs and outcrops) does not occur on the SEZ, but about 100 acres (0.4 km^2) of such habitat may occur in the area of indirect effects.

The overall impact on the western small-footed myotis from construction, operation, and decommissioning of utility-scale solar energy facilities within the Mason Draw SEZ is considered small because the amount of potentially suitable foraging habitat for this species in the area of direct effects represents less than 1% of potentially suitable foraging habitat in the SEZ region. The implementation of programmatic design features is expected to be sufficient to reduce indirect impacts on this species to negligible levels. Avoidance of all potentially suitable foraging habitats is not feasible because potentially suitable habitat is widespread throughout the area of direct effects and readily available in other portions of the SEZ region.

12.2.12.2.5 Impacts on State-Listed Species

Nine species listed by the State of New Mexico may occur in the Mason Draw SEZ affected area (Table 12.2.12.1-1). Of these species, impacts to the following state-listed species have not been previously described: sand prickly-pear cactus, gray vireo, and desert bighorn sheep. Impacts on each of these three species are discussed below and summarized in Table 12.2.12.1-1.

Sand Prickly-Pear Cactus

The sand prickly-pear cactus is known to occur as near as 18 mi (29 km) southeast of the Mason Draw SEZ. According to the SWReGAP land cover model, about 1,000 acres (4 km^2) of potentially suitable sand dune habitat for this species on the SEZ could be directly affected by construction and operations (Table 12.2.12.1-1). This direct impact area represents 0.1% of potentially suitable habitat in the SEZ region. About 7,300 acres (30 km^2) of potentially suitable sand dune habitat occurs in the area of potential indirect effects; this area represents about 1.0% of the available suitable habitat in the SEZ region (Table 12.2.12.1-1).

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

Avoiding or minimizing disturbance to sand dunes and sand transport systems on the SEZ and implementing mitigation measures described previously for the sandhill goosefoot (Section 12.2.12.2.4) could reduce direct impacts on this species. The need for mitigation, other than programmatic design features, should be determined by conducting pre-disturbance surveys for the species and its habitat in the area of direct effects.

Gray Vireo

The gray vireo is known from the southwestern United States and occurs as a summer breeding resident in the Mason Draw SEZ region. According to the SWReGAP habitat suitability model, about 3,700 acres (15 km^2) of potentially suitable habitat on the SEZ could be directly affected by construction and operations (Table 12.2.12.1-1). This direct impact area represents 0.5% of potentially suitable habitat in the SEZ region. About 22,600 acres (91 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 3.0% of the potentially suitable habitat in the SEZ region (Table 12.2.12.1-1). Most of the potentially suitable habitat on the SEZ and throughout the area of indirect effects could serve as foraging or nesting habitat where suitable shrubs and trees occur.

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

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

Desert Bighorn Sheep

The desert bighorn sheep (*Ovis canadensis mexicana*), a subspecies of bighorn sheep, is known in southeastern Arizona, southern New Mexico, and western Texas. According to the SWReGAP habitat suitability model, suitable habitat for this species does not occur in the area of direct effects. However, approximately 3,000 acres (12 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 1.0 % of the potentially suitable habitat in the SEZ region (Table 12.2.12.1-1).

The overall impact on the desert bighorn sheep from construction, operation, and decommissioning of utility-scale solar energy facilities within the Mason Draw 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.

12.2.12.2.6 Impacts on Rare Species

Twenty-three rare species (i.e., state rank of S1 or S2 in New Mexico or a species of concern by the USFWS or State of New Mexico) may be affected by solar energy development on the Mason Draw SEZ (Table 12.2.12.1-1). Impacts to eight rare species have not been discussed previously. These include the following: (1) plants: Alamo beardtongue, mosquito plant, and Sandberg pincushion; (2) invertebrates: Samalayuca Dune grasshopper and Shotwell's range grasshopper; (3) bird: eastern bluebird; and (4) mammals: western red bat and yellow-faced pocket gopher. Impacts on these species are described in Table 12.2.12.1-1.

12.2.12.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

- Pre-disturbance surveys should be conducted within the SEZ to determine the presence and abundance of special status species, including those identified in Table 12.2.12.1-1; disturbance to occupied habitats for these species should be avoided or minimized to the extent practicable. If avoiding or minimizing impacts to 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 uses one or more of these options to offset the impacts of development should be prepared in coordination with the appropriate federal and state agencies.

- Consultations with the USFWS and NMDGF should be conducted to address the potential for impacts on the following species currently listed as threatened or endangered under the ESA: Sneed’s pincushion cactus and northern aplomado falcon. Consultation would identify an appropriate survey protocol, avoidance and minimization measures, and, if appropriate, reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions for incidental take statements (if necessary).

- Avoiding or minimizing disturbance to desert grassland habitat on the SEZ could reduce or eliminate impacts on the following four special status species: desert night-blooming cereus, grama grass cactus, Villard pincushion cactus, and northern aplomado falcon.

- Avoiding or minimizing disturbance to sand dune habitat and sand transport systems on the SEZ could reduce or eliminate impacts on the following three special status species: sand prickly-pear cactus, sandhill goosefoot, and Samalayuca Dune grasshopper.

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

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

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12.2.13 Air Quality and Climate

12.2.13.1 Affected Environment

12.2.13.1.1 Climate

The proposed Mason Draw SEZ is located in the west-central portion of Dona Ana County in south-central New Mexico. The SEZ with an average elevation of about 4,530 ft (1,380 m) is located about 12 mi (19 km) west of the Mesilla Valley, which is the floodplain of the Rio Grande River running north–south. The SEZ is located in the northern portion of the Chihuahuan Desert, the northern reaches of which protrude into New Mexico from north–central Mexico. The area experiences a high desert arid climate, characterized by warm summers, mild winters, light precipitation, a high evaporation rate, low relative humidity, abundant sunshine, and relatively large annual and diurnal temperature ranges (NCDC 2010a). Meteorological data collected at the Las Cruces International Airport, about 8 mi (13 km) east of the Mason Draw SEZ boundary, and at NMSU, about 18 mi (29 km) east, are summarized below.

A wind rose from the Las Cruces International Airport, based on data collected 33 ft (10 m) above the ground over the 5-year period 2005 to 2009, is presented in Figure 12.2.13.1-1 (NCDC 2010b). During this period, the annual average wind speed at the airport was about 7.1 mph (3.2 m/s); the prevailing wind direction was from the west (about 13.1% of the time) and secondarily from the west–southwest (about 9.3% of the time). Westerly winds occurred more frequently throughout the year, except from July through September when southeast winds prevailed. Wind speeds categorized as calm (less than 1.1 mph [0.5 m/s]) occurred frequently (about 16.6% of the time) because of the stable conditions caused by strong radiative cooling from late night to sunrise. Average wind speeds by season were the highest in spring at 9.1 mph (4.1 m/s); lower in winter and summer at 6.9 mph (3.1 m/s) and 6.8 mph (3.0 m/s), respectively; and lowest in fall at 5.8 mph (2.6 m/s).

Elevation plays a larger role than latitude in determining the temperature of any specific location in New Mexico (NCDC 2010a). For the period 1959 to 2010, the annual average temperature at NMSU was 61.8°F (16.6°C) (WRCC 2010a). January was the coldest month, with an average minimum of 28.1°F (−2.2°C), and July was the warmest, with an average maximum of 94.8°F (34.9°C). In summer, daytime maximum temperatures higher than 90°F (32.2°C) are common, and minimums are in the 60s. The minimum temperatures recorded were below freezing (≤32°F [0°C]) during the colder months (from October to April, with a peak of about 24 days in January and 23 days in December), but subzero temperatures were very rare. During the same period, the highest temperature, 110°F (43.3°C), was reached in June 1994, and the lowest, −10°F (−23.3°C), in January 1962. In a typical year, about 98 days had a maximum temperature of at least 90°F (32.2°C), while about 84 days had minimum temperatures at or below freezing.

In New Mexico, summer rains fall mostly during brief, but frequently intense thunderstorms associated with general southeasterly circulation from the Gulf of Mexico (NCDC 2010a). In contrast, winter precipitation is caused mainly by frontal activity associated

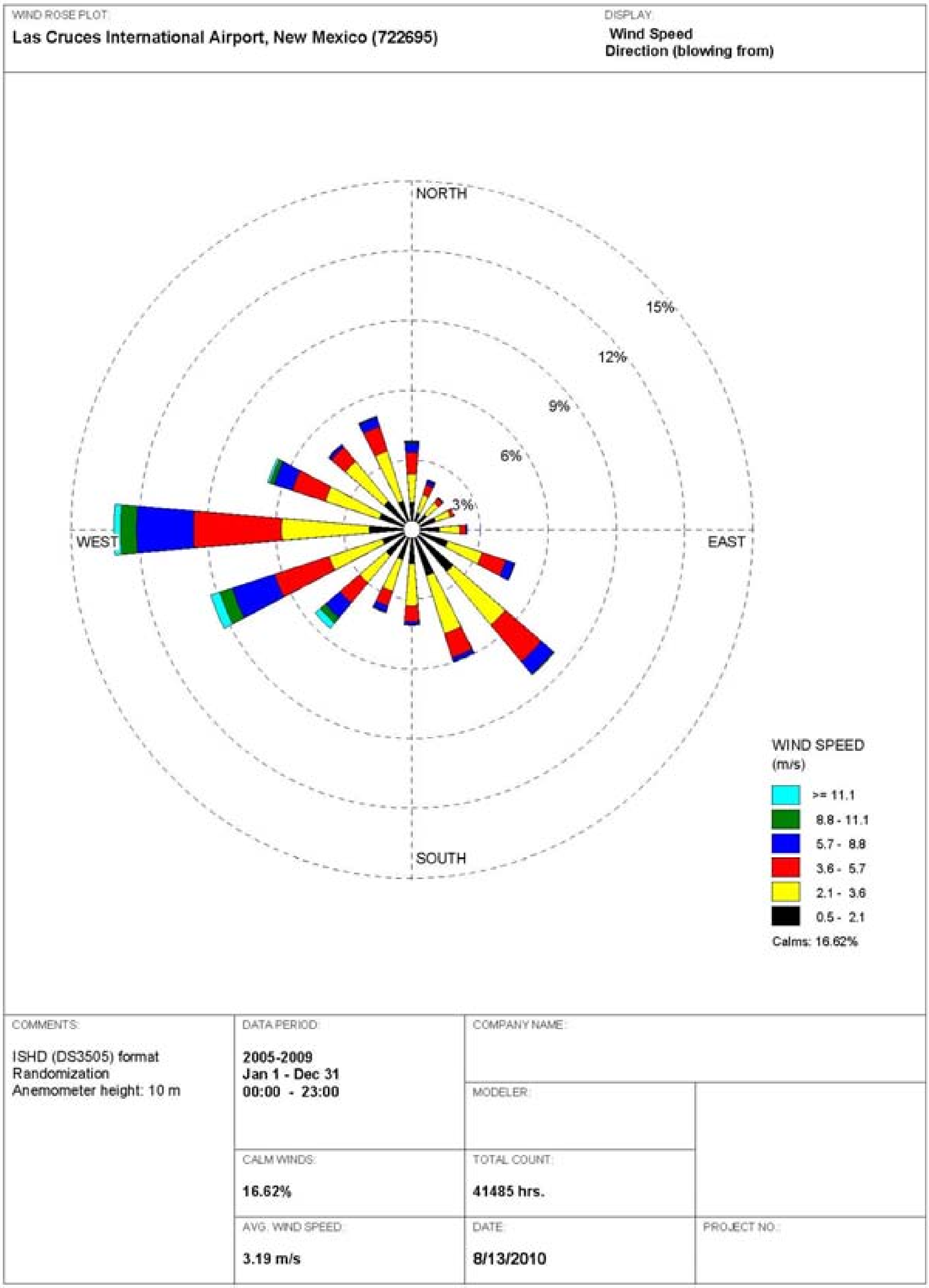

FIGURE 12.2.13.1-1 Wind Rose at 33 ft (10 m) at the Las Cruces International Airport, New Mexico, 2005 to 2009 (Source: NCDC 2010b)

with general movement of Pacific Ocean storms. For the 1959 to 2010 period, annual precipitation at NMSU averaged about 9.38 in. (23.8 cm) (WRCC 2010a). On average, 50 days a year have measurable precipitation (0.01 in. [0.025 cm] or higher). Seasonally, precipitation is the highest in summer (nearly half of the annual total), lower in fall and winter, and tapers off markedly in spring. Snow occurs mostly from November to February, and the annual average snowfall at NMSU was about 3.5 in. (8.9 cm), with the highest monthly snowfall of 12.7 in. (32.3 cm) in November 1976.

The proposed Mason Draw SEZ is far from major water bodies (more than 360 mi [579 km] to the Gulf of California and 670 mi [1,078 km] to the Gulf of Mexico). Severe weather events, with the exception of dust storms, are a rarity in Dona Ana County, which encompasses the Mason Draw SEZ (NCDC 2010c).

General floods are seldom widespread in New Mexico. Rather, floods associated with heavy thunderstorms may occur in small areas for a short time (NCDC 2010a). Since 1994, 44 floods (mostly flash floods) have been reported in Dona Ana County, most of which occurred during July through September (NCDC 2010c). These floods caused no deaths or injuries, though they did cause considerable property and minor crop damage.

In Dona Ana County, a total of 57 hailstorms have been reported since 1956, some of which caused considerable property damage. Hail measuring 2.5 in. (6.4 cm) in diameter was reported in 1991. In Dona Ana County, 46 thunderstorm wind events have been reported since 1959; those up to a maximum wind speed of 102 mph (46 m/s) occurred primarily during the summer months, causing some property damage (NCDC 2010c).

No dust storms were reported in Dona Ana County (NCDC 2010c). However, the ground surface of the SEZ is covered primarily with loamy fine sands and sandy loams, which have relatively high dust storm potential. High winds can trigger large amounts of dust from areas of dry and loose soils with sparse vegetation in Dona Ana County. Dust storms can deteriorate air quality and visibility and may have adverse effects on health, particularly for people with asthma or other respiratory problems. Dona Ana County experiences between 6 and 18 days per year when dust levels exceed federal health standards (NMED 2000a). In this area, high winds are common during the months of January through April, and most dust storms last about 4 hours.

Because of the considerable distances to major water bodies, hurricanes never hit New Mexico. On rare occasions, remnants of a tropical storm system originating from the Pacific Ocean or the Gulf of Mexico may dump rains in the area, but there is no record of serious wind damage from these storms (NCDC 2010a). Historically, four tropical depressions passed within 100 mi (160 km) of the proposed Mason Draw SEZ (CSC 2010). In the period from 1950 to April 2010, a total of 12 tornadoes (0.2 per year each) were reported in Dona Ana County (NCDC 2010c). Most tornadoes occurring in Dona Ana County were relatively weak (i.e., nine were F0 and three were F1 on the Fujita tornado scale), and these tornadoes caused no deaths or injuries, though they did cause some property damage. Most of these tornadoes occurred far from the SEZ; the nearest one hit about 5 mi (8 km) west of the SEZ.

12.2.13.1.2 Existing Air Emissions

Dona Ana County has a few industrial emission sources over the county, but their emissions are relatively small, except for two major NO_x emission sources: Rio Grande Generating Station in Sunland Park and Physical Plant Boilers at NMSU. Several emission sources are located around the proposed Mason Draw SEZ but their emissions are relatively small. Several major roads exist in Dona Ana County, such as I-10 and I-25, U.S. 70, and many state routes. Thus, onroad mobile source emissions are substantial compared to other sources in Dona Ana County. Data on annual emissions of criteria pollutants and VOCs in Dona Ana County are presented in Table 12.2.13.1-1 for 2002 (WRAP 2009). Emissions data are classified into six source categories: point, area, onroad mobile, nonroad mobile, biogenic, and fire (wildfires, prescribed fires, agricultural fires, structural fires). In 2002, area sources were major contributors to total emissions of SO_2 (about 41%), PM_{10} (about 91%), and $PM_{2.5}$ (about 79%). Onroad sources were major contributors to NO_x and CO emissions (about 48% and 65%, respectively). Biogenic sources (i.e., vegetation—including trees, plants, and crops—and soils) that release naturally occurring emissions contributed secondarily to CO emissions (about 16%), and accounted for most of VOC emissions (about 89%). Nonroad sources were secondary contributors to SO_2 and NO_x emissions. In Dona Ana County, point and fire emissions sources were minor contributors to criteria pollutants and VOCs.

TABLE 12.2.13.1-1 Annual Emissions of Criteria Pollutants and VOCs in Dona Ana County, New Mexico, Encompassing the Proposed Mason Draw SEZ, 2002[a]

Pollutant[b]	Emissions (tons/yr)[c]
SO_2	788
NO_x	12,263
CO	73,129
VOCs	81,171
PM_{10}	7,299
$PM_{2.5}$	2,316

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

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

c To convert tons to kilograms, multiply by 907.

Source: WRAP (2009).

In 2010, New Mexico is projected to produce about 89.4 MMt of *gross*[5] CO_2e[6] emissions, which is about 1.3% of total U.S. GHG emissions in 2008 (Bailie et al. 2006). Gross GHG emissions in New Mexico increased by about 31% from 1990 to 2010, compared to 14% growth in U.S. GHG emissions during the 1990 to 2008 period. In 2010, about 89.1% of GHG emissions in New Mexico are from energy sector: electric production (about 37.2%), transportation (about 19.7%), fossil fuel industry (about 22.7%), and fuel use in the residential, commercial, and industrial sectors combined (about 9.5%). New Mexico's *net* emissions in 2010 were about 68.5 MMt CO_2e, considering carbon sinks from forestry activities and agricultural soils throughout the state. The EPA (2009a) also estimated 2005 emissions in New Mexico. Its estimate of CO_2 emissions from

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

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

fossil fuel combustion was 59.0 MMt, which was a little lower than the state's estimate. Electric power generation and transportation accounted for about 53.8% and 26.0% of the CO_2 emissions total, respectively, while the residential, commercial, and industrial sectors accounted for the remainder (about 20.2%).

12.2.13.1.3 Air Quality

New Mexico has established more stringent standards than NAAQS for SO_2, NO_2, and CO, but no standards for O_3, PM (PM_{10} and $PM_{2.5}$), or Pb (EPA 2010a; Title 20, Chapter 2, Part 3 of the *New Mexico Administrative Code* [20.2.3 NMAC]). In addition, the state has adopted standards for hydrogen sulfide and total reduced sulfur, and still retains a standard for TSP, which was formerly a criteria pollutant but was replaced by PM_{10} in 1987.

Dona Ana County is located administratively within the El Paso-Las Cruces-Alamogordo Interstate Air Quality Control Region (AQCR 153) (Title 40, Part 81, Section 82 of the *Code of Federal Regulations* [40 CFR 81.82]), along with three other counties in New Mexico (Lincoln, Otero, and Sierra) and six counties in Texas. Southeastern Dona Ana County, which borders El Paso in Texas and Ciudad Juarez in Mexico, historically has experienced air quality problems, notably PM and O_3 pollution. Dona Ana County is designated as being in attainment for all criteria pollutants except PM_{10} (40 CFR 81.332).[7] The entire state is designated as an unclassifiable/attainment area, except for a small portion of southeastern Dona Ana County around Anthony, which is adjacent to El Paso, Texas, and has been designated nonattainment for PM_{10} since 1991. Accordingly, the area surrounding the proposed Mason Draw SEZ is in unclassifiable/attainment for all six criteria pollutants.

As briefly discussed in Section 12.2.13.1.1, Dona Ana County frequently experiences natural dust storm events, which cause PM_{10} exceedances of the NAAQS. Western states frequently plagued by natural dust storms requested that the EPA develop a commonsense policy, called a NEP, to address high PM_{10} pollution caused by natural events. Under the NEP, state and local governments are required to develop a NEAP, which provides alternatives for controlling significant sources of human-caused windblown dust, with the understanding that dust storms sometimes override the best dust control efforts (NMED 2000b). The New Mexico Air Quality Bureau submitted an original NEAP for Dona Ana County in December 2000 and reevaluated the NEAP in 2005. In accordance with the NEAP for Dona Ana County, the county and the City of Las Cruces maintain erosion control ordinances to protect and maintain the natural environment and to reduce the negative health effects caused by the creation of fugitive dust.

Ambient concentration data representative of the proposed Mason Draw SEZ for all criteria pollutants except Pb are available for Dona Ana County. For CO, O_3, PM_{10} and $PM_{2.5}$, concentration data from monitoring stations in and around Las Cruces are presented, located

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7 A small, "marginal" 1-hour O_3 nonattainment area, the Sunland Park area, has existed in the southeastern part of the county since 1995. The area is no longer subject to the 1-hour standard because the standard was revoked in 2004, at which time Sunland Park was redesignated as a maintenance area for the 8-hour O_3 standard.

ranging from 11 mi (18 km) to 17 mi (27 km) east of the SEZ. For SO_2 and NO_2, concentration data from Sunland Park, which is located about 43 mi (69 km) southeast of the SEZ, are presented. Concentration levels for O_3, PM_{10}, and $PM_{2.5}$ in southeastern Dona Ana County (e.g., Anthony and Sunland Park) have frequently exceeded these standards. Ambient air quality in Anthony and Sunland Park, which are small cities, is affected by the adjacent metropolitan areas of El Paso, Texas, and Ciudad Juarez, Mexico, and by the Chihuahuan Desert. In contrast, ambient air quality around the proposed Mason Draw SEZ represented by measurements in Las Cruces is fairly good. The background concentration levels for SO_2, NO_2, CO, 1-hour O_3, annual PM_{10}, and $PM_{2.5}$ around the Mason Draw SEZ from 2004 through 2008 were less than or equal to 68% of their respective standards, as shown in Table 12.2.13.1-2 (EPA 2010b). However, the monitored 8-hour O_3 concentrations were approaching the applicable standard (about 93%). Concentrations for 24-hour PM_{10} were below its standard (about 94%) during the 2004 through 2007 period. However, the 24-hour PM_{10} standard was exceeded in 2008 because of the higher number of dust storm episodes than usual. No measurement data for Pb are available for Dona Ana County, but Pb levels are expected to be low, considering that the most recent Pb concentration in Albuquerque in 2004[8] was only 2% of its standard.

The PSD regulations (see 40 CFR 52.21), which are designed to limit the growth of air pollution in clean areas, apply to a major new source or modification of an existing major source within an attainment or unclassified area (see Section 4.11.2.3). As a matter of policy, the EPA recommends that the permitting authority notify the Federal Land Managers when a proposed PSD source would locate within 62 mi (100 km) of a sensitive Class I area. Several Class I areas are located in Arizona, New Mexico, and Texas, but none is within 62 mi (100 km) of the proposed SEZ. The nearest is Gila WA (40 CFR 81.421), about 73 mi (117 km) northwest of the Mason Draw SEZ. This Class I area is not located downwind of prevailing winds at the Mason Draw SEZ (Figure 12.2.13.1-1). The next nearest Class I areas include Bosque del Apache WA and White Mountains WA, which are located about 93 mi (150 km) north and 99 mi (160 km) northeast of the SEZ, respectively.

12.2.13.2 Impacts

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

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[8] Pb measurements have been discontinued since 2004 in the state of New Mexico due to continuously low readings after the phaseout of leaded gasoline.

TABLE 12.2.13.1-2 NAAQS, SAAQS, and Background Concentration Levels Representative of the Proposed Mason Draw SEZ in Dona Ana County, New Mexico, 2004 to 2008

				Background Concentration Level	
Pollutant[a]	Averaging Time	NAAQS	SAAQS	Concentration[b,c]	Measurement Location, Year
SO_2	1-hour	75 ppb[d]	NA[e]	NA	NA
	3-hour	0.5 ppm	NA	0.006 ppm (1.2%; NA)	Sunland Park, 2005
	24-hour	0.14 ppm	0.10 ppm	0.004 ppm (2.9%; 4.0%)	Sunland Park, 2004
	Annual	0.030 ppm	0.02 ppm	0.001 ppm (3.3%; 5.0%)	Sunland Park, 2006
NO_2	1-hour	100 ppb[f]	NA	NA	NA
	24-hour	NA	0.10 ppm	NA	NA
	Annual	0.053 ppm	0.05 ppm	0.011 ppm (21%; 22%)	Sunland Park, 2004
CO	1-hour	35 ppm	13.1 ppm	3.8 ppm (11%; 29%)	Las Cruces, 2004
	8-hour	9 ppm	8.7 ppm	2.7 ppm (30%; 31%)	Las Cruces, 2006
O_3	1-hour	0.12 ppm[g]	NA	0.082 ppm (68%; NA)	Las Cruces, 2006
	8-hour	0.075 ppm	NA	0.070 ppm (93%; NA)	Las Cruces, 2006
PM_{10}	24-hour	150 $\mu g/m^3$	NA	175 $\mu g/m^3$ (117%; NA)	Las Cruces, 2008
	Annual	50 $\mu g/m^3$ [h]	NA	25 $\mu g/m^3$ (50%; NA)	Las Cruces, 2008
$PM_{2.5}$	24-hour	35 $\mu g/m^3$	NA	15.0 $\mu g/m^3$ (43%; NA)	Las Cruces, 2007
	Annual	15.0 $\mu g/m^3$	NA	6.6 $\mu g/m^3$ (44%; NA)	Las Cruces, 2006
Pb	Calendar quarter	1.5 $\mu g/m^3$	NA	0.03 $\mu g/m^3$ (2.0%; NA)	Albuquerque, Bernalillo Co., 2004[j]
	Rolling 3-month	0.15 $\mu g/m^3$ [i]	NA	NA	NA

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

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

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

[d] Effective August 23, 2010.

[e] NA = not applicable or not available.

[f] Effective April 12, 2010.

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

Footnotes continued on next page

TABLE 12.2.13.1-2 (Cont.)

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[h] Effective December 18, 2006, the EPA revoked the annual PM_{10} standard of 50 $\mu g/m^3$ but annual PM_{10} concentrations are presented for comparison purposes.

[i] Effective January 12, 2009.

[j] This location with the highest observed concentrations in the state of New Mexico is not representative of the Mason Draw SEZ; it is presented to show that Pb is not generally a concern in New Mexico.

Sources: EPA (2010a,b); 20.2.3 NMAC.

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 Mason Draw 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 12.2.13.3 below identifies SEZ-specific design features of particular relevance to the Mason Draw SEZ.

12.2.13.2.1 Construction

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

Methods and Assumptions

Air quality modeling for PM_{10} and $PM_{2.5}$ emissions associated with construction activities was performed by using the EPA-recommended AERMOD model (EPA 2009b). Details for emissions estimation, the description of AERMOD, input data processing procedures, and modeling assumption are described in Appendix M, Section M.13. Estimated air concentrations were compared with the applicable NAAQS levels at the site boundaries and nearby communities and with PSD increment levels at nearby Class I areas.[9] However, no receptors were modeled for PSD analysis at the nearest Class I area, Gila WA, because it is about

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[9] To provide a quantitative assessment, the modeled air impacts of construction were compared to the NAAQS 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.

73 mi (117 km) from the SEZ, which is more than the maximum modeling distance of 31 mi (50 km) for the AERMOD. Rather, several regularly spaced receptors in the direction of the Gila WA were selected as surrogates for the PSD analysis. For the Mason Draw 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 eastern half of the SEZ, close to the nearest residences and the towns of Mesilla and Las Cruces in the Mesilla Valley,

- Surface hourly meteorological data from the Las Cruces International Airport and upper air sounding data from Santa Teresa for the 2005 to 2009 period, and

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

Results

The modeling results for concentration increments and total concentrations (modeled plus background concentrations) for both PM_{10} and $PM_{2.5}$ that would result from construction-related fugitive emissions are summarized in Table 12.2.13.2-1. Maximum 24-hour PM_{10} concentration increments modeled to occur at the site boundaries would be an estimated 498 $\mu g/m^3$, which far exceeds the relevant standard level of 150 $\mu g/m^3$. Total 24-hour PM_{10} concentrations of 673 $\mu g/m^3$ 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 50 $\mu g/m^3$ at the nearest residences, located about 3.1 mi (5 km) east of the SEZ; about 20 $\mu g/m^3$ at Picacho (closest town to the SEZ); and about 10 to 20 $\mu g/m^3$ at all other cities in the Mesilla Valley, stretching from Anthony (to the south) to Salem (to the north). Annual average modeled concentration increments and total concentrations (increment plus background) for PM_{10} at the SEZ boundary would be about 88.9 $\mu g/m^3$ and 114 $\mu g/m^3$, respectively, which are higher than the NAAQS level of 50 $\mu g/m^3$, which was revoked by the EPA in December 2006. Annual PM_{10} increments would be much lower, about 4 $\mu g/m^3$ at the nearest residences, about 1 $\mu g/m^3$ at Picacho, and about 0.6 $\mu g/m^3$ or lower at all other cities in the Mesilla Valley. Total 24-hour $PM_{2.5}$ concentrations would be 47.6 $\mu g/m^3$ at the SEZ boundary, which is higher than the NAAQS level of 35 $\mu g/m^3$; modeled increments contribute about twice the amount of background concentration to this total. The total annual average $PM_{2.5}$ concentration would be 15.5 $\mu g/m^3$, which is somewhat higher than the NAAQS level of 15.0 $\mu g/m^3$. At the nearest residences, predicted maximum 24-hour and annual $PM_{2.5}$ concentration increments would be about 3.5 and 0.4 $\mu g/m^3$, respectively.

TABLE 12.2.13.2-1 Maximum Air Quality Impacts from Emissions Associated with Construction Activities for the Proposed Mason Draw SEZ

			Concentration (μg/m^3)				Percentage of NAAQS	
Pollutant[a]	Averaging Time	Rank[b]	Maximum Increment[b]	Background[c]	Total	NAAQS	Increment	Total
PM_{10}	24 hours	H6H	498	175	673	150	332	449
	Annual	–[d]	88.9	25.0	114	50	178	228
$PM_{2.5}$	24 hours	H8H	32.6	15.0	47.6	35	93	136
	Annual	–	8.9	6.6	15.5	15.0	59	103

[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 12.2.13.1-2.

[d] A dash indicates not applicable.

Predicted 24-hour and annual PM_{10} concentration increments at the surrogate receptors for the nearest Class I Area—Gila WA—would be about 11.8 and 0.34 μg/m^3, or 147% and 8% of the PSD increments for the Class I area, respectively. These surrogate receptors are more than 40 mi (64 km) from the Gila WA, and thus, predicted concentrations in Gila WA would be much lower than the above values (about 70% 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 $PM_{2.5}$ concentration levels could exceed the standard levels at the SEZ boundaries and in the immediate surrounding areas during the construction of solar facilities. To reduce potential impacts on ambient air quality and in compliance with programmatic design features, aggressive dust control measures would be used. Potential air quality impacts on nearby communities would be much lower. 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 (Gila WA). Construction activities are not subject to the PSD program, and the comparison provides only a screen for gauging the magnitude of the impact. Accordingly, it is anticipated that impacts of construction activities on ambient air quality would be moderate and temporary.

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

15 ppm. NO_X emissions from engine exhaust would be primary contributors to potential impacts on AQRVs. If requested by a federal land manager n response to a permit application, site-specific analyses for AQRVs would need to be done. 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, based on the assumptions that the existing regional 115-kV transmission line might be used to connect some new solar facilities to load centers and that additional project-specific analysis would be performed for new transmission construction or line upgrades. However, some construction of transmission lines could occur within the SEZ. Potential impacts on ambient air quality would be a minor component of construction impacts in comparison to solar facility construction, and would be temporary in nature.

12.2.13.2.2 Operations

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

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

Estimates of potential air emissions displaced by solar project development at the Mason Draw SEZ are presented in Table 12.2.13.2-2. Total power generation capacity ranging from 1,147 to 2,065 MW is estimated for the Mason Draw SEZ for various solar technologies (see Section 12.2.2). The estimated amount of emissions avoided for the solar technologies evaluated depends only on the megawatts of conventional fossil fuel–generated power displaced, because a composite emission factor per megawatt-hour of power by conventional technologies is assumed (EPA 2009c). It is estimated that if the Mason Draw SEZ was fully developed, emissions avoided would range from 5.9 to 11% of total emissions of SO_2, NO_X, Hg, and CO_2 from electric power systems in the state of New Mexico (EPA 2009c). Avoided emissions would be up to 4.1% of total emissions from electric power systems in the six-state study area. When compared to all source categories, power production from the same solar facilities would displace up to 6.4% of SO_2, 2.4% of NO_X, and 5.5% of CO_2 emissions in the state of New Mexico (EPA 2009a; WRAP 2009). These emissions would be up to 0.69% of total emissions from all source categories in the six-state study area. Power generation from fossil fuel–fired power plants accounts for more than 97% of the total electric power generated in New Mexico. The contribution of coal combustion is about 85%, followed by natural gas combustion of about 12%. Thus, solar facilities built in the Mason Draw SEZ could displace relatively more fossil fuel emissions than those built in other states that rely less on fossil fuel–generated power.

TABLE 12.2.13.2-2 Annual Emissions from Combustion-Related Power Generation Avoided by Full Solar Development of the Proposed Mason Draw 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
12,909	1,147–2,065	2,010–3,619	1,804–3,247	4,489–8,080	0.066–0.12	2,001–3,601
Percentage of total emissions from electric power systems in New Mexico[d]			5.9–11%	5.9–11%	5.9–11%	5.9–11%
Percentage of total emissions from all source categories in New Mexico[e]			3.5–6.4%	1.3–2.4%	–[f]	3.1–5.5%
Percentage of total emissions from electric power systems in the six-state study area[d]			0.72–1.3%	1.2–2.2%	2.3–4.1%	0.76–1.4%
Percentage of total emissions from all source categories in the six-state study area[e]			0.38–0.69%	0.17–0.30%	–	0.24–0.43%

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

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

[c] Composite combustion-related emission factors for SO_2, NO_x, Hg, and CO_2 of 1.79, 4.47, 6.6×10^{-5}, and 1,990 lb/MWh, respectively, were used for the state of New Mexico.

[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).

As discussed in Section 5.11.1.5, the operation of associated transmission lines would generate some air pollutants from activities such as periodic site inspections and maintenance. However, these activities would occur infrequently, and the amount of emissions would be small. In addition, transmission lines could produce minute amounts of O_3 and its precursor NO_x associated with corona discharge (i.e., the breakdown of air near high-voltage conductors), which is most noticeable for high-voltage lines during rain or very humid conditions. Since the proposed Mason Draw 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.

12.2.13.2.3 Decommissioning/Reclamation

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

12.2.13.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features are required. Limiting dust generation during construction and operations at the proposed Mason Draw 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.

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12.2.14 Visual Resources

12.2.14.1 Affected Environment

The proposed Mason Draw SEZ is located in Dona Ana County in southern New Mexico. The southern border of the SEZ is 33 mi (53 km) north of the Mexican border. The SEZ occupies 12,909 acres (52.241 km^2) and extends about 3.9 mi (6.3 km) east to west and nearly 6.1 mi (9.8 km) north to south. The SEZ is within the Chihuahuan Desert physiographic province, typified by alternating mountains and valleys. Flat valley basins form broad expanses of desert, generally with grassland and shrubland vegetative cover (EPA 2010a). The proposed Mason Draw SEZ is located within the Chihuahuan Basins and Playas Level IV ecoregion. The SEZ ranges in elevation from 4,770 ft (1,454 m) in the northeastern portion to 4,370 ft (1,332 m) in the southwestern portion.

The SEZ is located on West Mesa, west of Las Cruces, the Mesilla Valley, and the Rio Grande. About 10 mi (16 km) northwest of the SEZ, the mountains of the Sierra de Las Uvas begin to rise, with peaks more than 6,000 ft (1,800 m). The Sleeping Lady Hills rise 0.5 mi (0.8 km) east of the SEZ and partially screen the SEZ from view from many areas to the east. To the northeast are some limited views of the Robledo Mountains, about 8 mi (13 km) from the SEZ. The Robledo Mountains include peaks more than 5,500 ft (1,676 m) in elevation. The 7,000-ft+ (2,100-m+) Florida Mountains, at about 25 mi (40 km) from the SEZ, are a prominent feature on the western horizon. The West Potrillo Mountains are visible to the south of the SEZ. I-10 runs east–west immediately south of the SEZ. It is the only major road in the immediate vicinity of the SEZ. Portions of the proposed Afton SEZ are visible across I-10, 2.8 mi (4.5 km) to the southeast of the proposed Mason Draw SEZ. The SEZ and surrounding lands are shown in Figure 12.2.14.1-1.

The SEZ is located on a flat, treeless mesa, with a strong horizon line and surrounded by mountain ranges, especially the Sleeping Lady Hills, being the dominant visual feature. Some mountain ranges are too distant to add significantly to the scenic quality. The surrounding mountains are generally tan in color, but distant mountains appear bluish-gray. Tan-colored soil dominates the desert floor, which is covered with the olive-green of creosotebush in many parts of the SEZ. Sand dunes in the south portion of the SEZ add some topographic relief.

Vegetation is generally sparse in much of the SEZ and is predominantly scrubland, with creosotebush and other low shrubs dominating the desert floor within most of the SEZ. During a July 2009 site visit, the vegetation presented a limited range of greens (mostly olive green creosotebushes) with some browns and grays (from lower shrubs), with medium to coarse textures, and generally low visual interest.

No permanent surface water is present within the SEZ.

Cultural disturbances visible within the SEZ include dirt and gravel roads, transmission towers and conductors, a pipeline ROW, and telephone poles and lines. Traffic on I-10 is visible from some locations in the southern portion of the SEZ. These cultural modifications generally

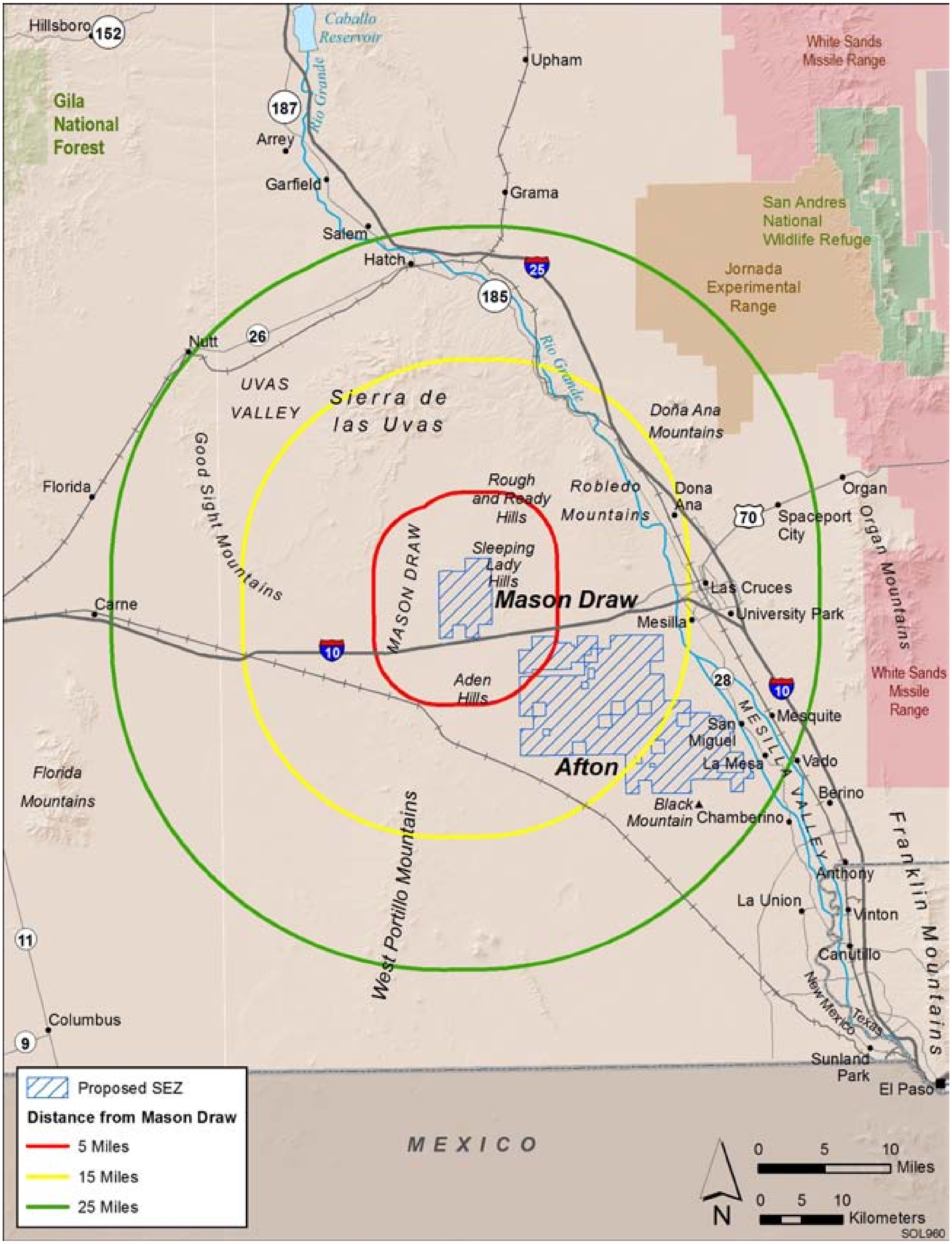

FIGURE 12.2.14.1-1 Proposed Mason Draw SEZ and Surrounding Lands

detract from the scenic quality of the SEZ; however, the SEZ is large enough that from some locations within the SEZ, these features are distant and have a relatively small effect on views.

The general lack of topographic relief, water, and physical variety results in low scenic value within the SEZ itself; however, because of the flatness of the landscape, the lack of trees, and the breadth of the desert floor, the SEZ presents a panoramic landscape with sweeping views of the surrounding lands that add somewhat to the scenic values within the SEZ viewshed. In general, the varied and irregular forms and tan colors of the mountains provide visual contrasts to the strong horizontal line and green vegetation of the mesa. A panoramic view of the SEZ and other photographs of the SEZ are shown in Figures 12.2.14.1-2, 12.2.14.1-3, and 12.2.14.1-4.

The BLM conducted a VRI for the SEZ and surrounding lands in 2010 (BLM 2010b). 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. Classes I and II are the most valued; Class III represents a moderate value; and Class IV represents the least value. Class I is reserved for specially designated areas, such as national wildernesses and other congressionally and administratively designated areas where decisions have been made to preserve a natural landscape. Class II is the highest rating for lands without special designation. More information about VRI methodology is available in Section 5.12 and in *Visual Resource Inventory*, BLM Manual Handbook 8410-1 (BLM 1986a).

The VRI map for the SEZ and surrounding lands is shown in Figure 12.2.14.1-5. The VRI values for the SEZ and immediate surroundings are VRI Classes III, indicating moderate visual values, except for the far northern portion of the SEZ, beyond 5 mi (8 km) from I-10, which has a VRI value of Class IV, indicating low relative visual values. The inventory indicates low scenic quality for the SEZ and its immediate surroundings. Positive scenic quality attributes included adjacent scenery. The inventory indicates high sensitivity for most of the SEZ and its immediate surroundings, because it is along a major travel corridor (I-10) with high levels of use, noted in the inventory as providing “views of classic New Mexico landscapes.” Public interest, however, is low.

Lands within the 25-mi (40-km), 650-ft (198-m) viewshed of the SEZ contain 114,304 acres (462.572 km$^{2)}$) of VRI Class II areas, primarily in the Sierra de las Uvas and Robledo Mountains north of the SEZ and in the West Portillo Mountains south of the SEZ; 337,657 acres (1,366.45 km^2) of Class III areas, primarily east and west of the SEZ in the I-10 corridor; and 358,420 acres (1,450.47 km^2) of VRI Class IV areas, concentrated primarily immediately north of the SEZ, northwest of the SEZ in the Uvas Valley, and on the West Mesa south of the SEZ.

The Mimbres Resource Management Plan and Final EIS (BLM 1993) indicates that the SEZ is managed as VRM Class III. VRM Class III objectives include partial retention of landscape character and permit moderate modification of the existing character of the

FIGURE 12.2.14.1-2 Approximately 120° Panoramic View of the Proposed Mason Draw SEZ from the Northwestern Portion of the SEZ, Facing Southeast, Including Sleeping Lady Hills at Far Left and West Potrillo Mountains at Right

FIGURE 12.2.14.1-3 Approximately 180° Panoramic View of the Proposed Mason Draw SEZ from the Western Portion of the SEZ, Facing Southeast, Including Sleeping Lady Hills at Far Left and West Potrillo Mountains at Right

FIGURE 12.2.14.1-4 Photograph of the Proposed Mason Draw SEZ from the Northwest Portion of the SEZ Facing Northwest toward Sierra de Las Uvas and Butterfield Trail

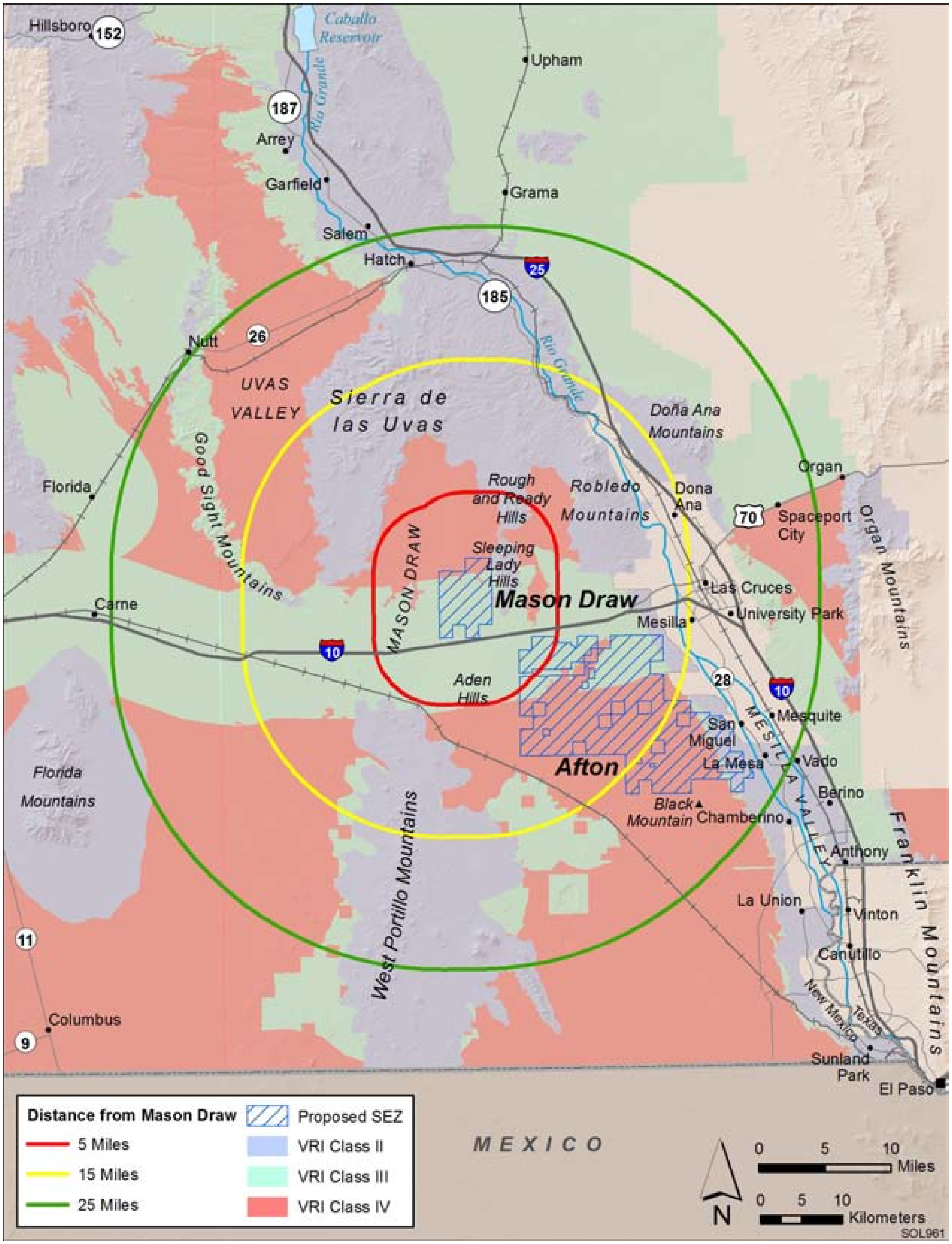

FIGURE 12.2.14.1-5 Visual Resource Inventory Values for the Proposed Mason Draw SEZ and Surrounding Lands

landscape. The VRM map for the SEZ and surrounding lands is shown in Figure 12.2.14.1.2-6. More information about the BLM VRM program is available in Section 5.12 and in *Visual Resource Management,* BLM Manual Handbook 8400 (BLM 1984).

12.2.14.2 Impacts

The potential for impacts from utility-scale solar energy facilities on visual resources within the proposed Mason Draw 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 such 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 are 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 requires precise knowledge of these variables and is not possible given the scope of this PEIS. Therefore, the following analysis does not describe or suggest potential contrast levels arising from glint and glare for facilities that might be developed within the SEZ. However, it should be assumed that glint and glare are possible visual impacts from *any* utility-scale solar facility, regardless of size, landscape setting, or technology type. The occurrence of glint and glare at solar facilities could potentially cause large though temporary increases in brightness and visibility of the facilities. The visual contrast levels projected for sensitive visual resource areas discussed in the following analysis do not account for potential glint and glare effects; however, these effects would be incorporated into a future site-and project-specific assessment that would be conducted for specific proposed utility-scale solar energy projects. For more information about potential glint and glare impacts associated with utility-scale solar energy facilities, see Section 5.12 of this PEIS.

12.2.14.2.1 Impacts on the Proposed Mason Draw 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.

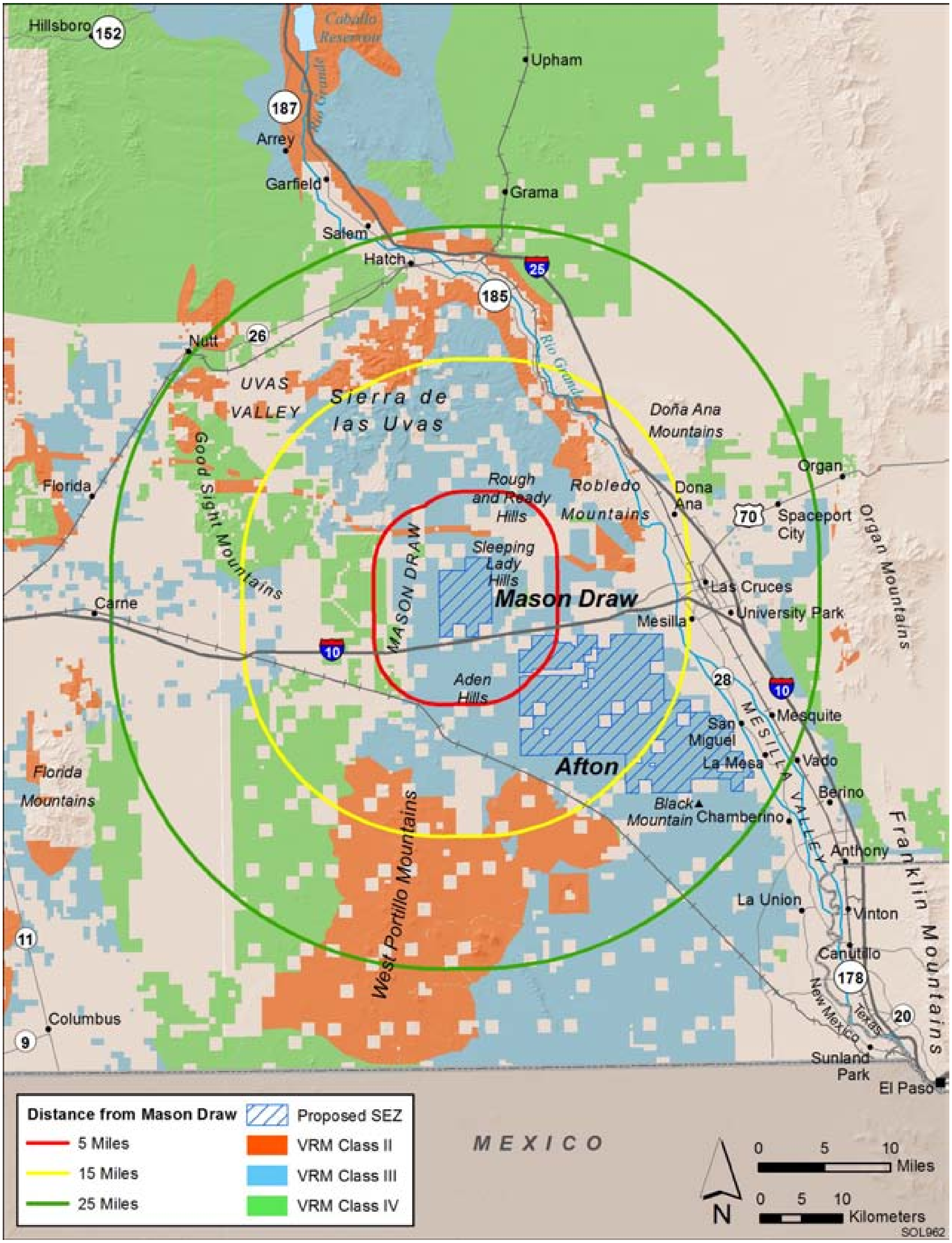

FIGURE 12.2.14.1-6 Visual Resource Management Classes for the Proposed Mason Draw SEZ and Surrounding Lands

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

Common and technology-specific visual impacts from utility-scale solar energy development, as well as impacts associated with electric transmission lines, are discussed in Section 5.12 of this PEIS. Impacts would last throughout construction, operation, and decommissioning, and some impacts could continue after project decommissioning. Visual impacts resulting from solar energy development in the SEZ would be in addition to impacts from solar energy and other projects that may occur on other public or private lands within the SEZ viewshed. For discussion of cumulative impacts, see Section 12.2.22.4.13 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. As noted above, and shown in Figure 12.2.14.1-6, the SEZ is currently managed as VRM Class III. More information about impact determination using the BLM VRM program is available in Section 5.12 and in *Visual Resource Contrast Rating*, BLM Manual Handbook 8431-1 (BLM 1986b).

Implementation of programmatic design features (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.

12.2.14.2.2 Impacts on Lands Surrounding the Proposed Mason Draw SEZ

Because of the large size of utility-scale solar energy facilities and the generally flat, open nature of the proposed SEZ, lands outside the SEZ would be subjected to visual impacts related to construction, operation, and decommissioning of utility-scale solar energy facilities. The affected areas and extent of impacts would depend on a number of visibility factors and viewer distance (for a detailed discussion of visibility and related factors, see Section 5.12). A key component in determining impact levels is the intervisibility between the project and potentially affected lands; if topography, vegetation, or structures screen the project from viewer locations, there is no impact.

Preliminary viewshed analyses were conducted to identify which lands surrounding the proposed SEZ would have views of solar facilities in at least some portion of the SEZ (see Appendix M for information on the assumptions and limitations of the methods used). Four viewshed analyses were conducted, assuming four different heights representative of project 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 12.2.14.2-1 shows the combined results of the viewshed analyses for all four solar technologies. The colored segments indicate areas with clear lines of sight to one or more areas within the SEZ and from which solar facilities within these areas of the SEZ would be expected to be visible, assuming the absence of screening vegetation or structures and adequate lighting and other atmospheric conditions. The light brown areas are locations from which PV and parabolic trough arrays located in the SEZ could be visible. Solar dishes and power blocks for CSP technologies would be visible from the areas shaded in light brown and the additional areas shaded in light purple. Transmission towers and short solar power towers would be visible from the areas shaded light brown, 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 available in Appendix N. The visibility of these facilities would fall between that for tall power towers and PV and parabolic trough arrays.

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

Figure 12.2.14.2-2 shows the results of a GIS analysis that overlays selected federal, state, and BLM-designated sensitive visual resource areas onto the combined tall solar power tower (650 ft [198.1 m]) and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds in order to illustrate which of these sensitive visual resource areas would have views of solar facilities within the SEZ and therefore potentially would be subject to visual impacts from those facilities. Distance zones that correspond with BLM's VRM system-specified foreground–middleground distance (5 mi [8 km]), background distance (15 mi [24 km]), and a 25-mi (40-km) distance zone are shown as well, in order to indicate the effect of distance from the SEZ on impact levels, which are highly dependent on distance.

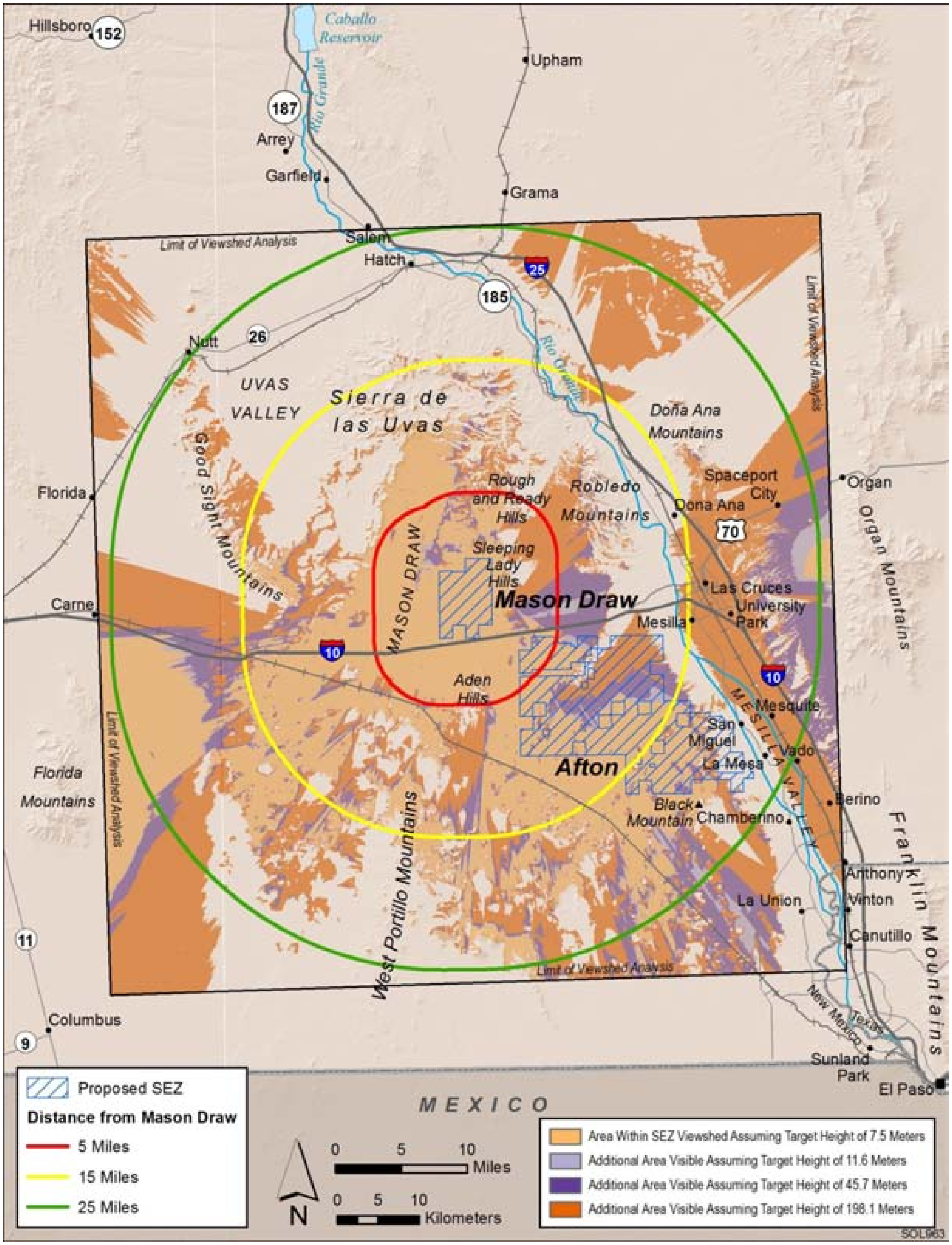

FIGURE 12.2.14.2-1 Viewshed Analyses for the Proposed Mason Draw SEZ and Surrounding Lands, Assuming Solar Technology Heights of 24.6 ft (7.5 m), 38 ft (11.6 m), 150 ft (45.7 m), and 650 ft (198.1 m) (shaded areas indicate lands from which solar development within the SEZ could be visible)

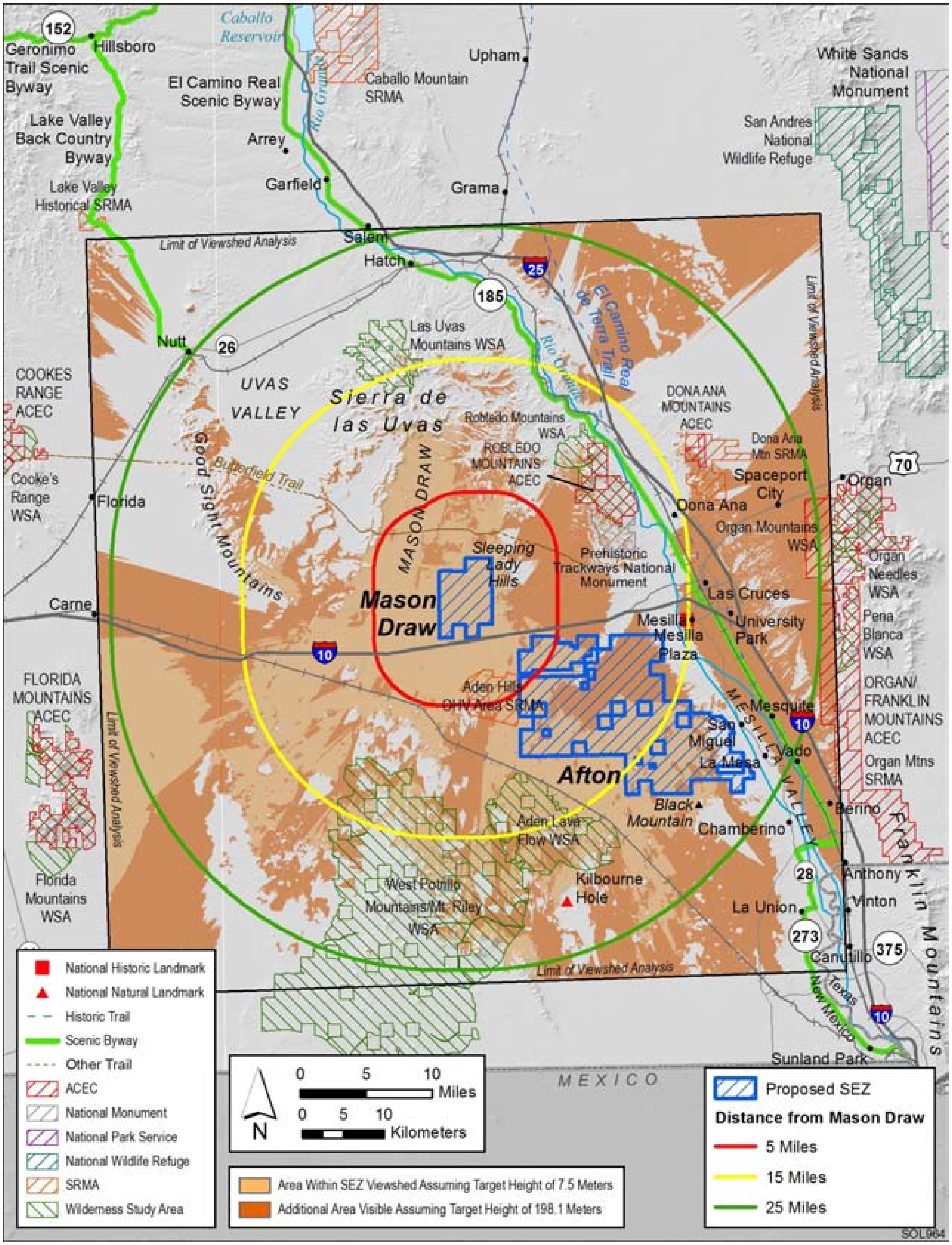

FIGURE 12.2.14.2-2 Overlay of Selected Sensitive Visual Resource Areas onto Combined 650-ft (198.1-m) and 24.6-ft (7.5-m) Viewsheds for the Proposed Mason Draw SEZ

The scenic resources included in the analyses were as follows:

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

Potential impacts on specific sensitive resource areas visible from and within 25 mi (40 km) of the proposed Mason Draw SEZ are discussed below. The results of this analysis are also summarized in Table 12.2.14.2-1. Further discussion of impacts on these areas is available in Sections 12.2.3 (Specially Designated Areas and Lands with Wilderness Characteristics) and 12.2.17 (Cultural Resources) of the PEIS.

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

TABLE 12.2.14.2-1 Selected Potentially Affected Sensitive Visual Resources within a 25-mi (40-km) Viewshed of the Proposed Mason Draw SEZ, Assuming a Target Height of 650 ft (198.1 m)

		Feature Area or Linear Distance		
	Feature Name		Visible between	
Feature Type	(Total Acreage/ Linear Distance)	Visible within 5 mi	5 and 15 mi	15 and 25 mi
National Monument	Prehistoric Trackways (5,255 acres)[a]	0 acres	1,226 acres (23%)[b]	0 acres
WSAs	Aden Lava Flow (25,978 acres)	0 acres	8,962 acres (35%)	12,920 acres (50%)
	Las Uvas Mountains (11,084 acres)	0 acres	135 acres (1%)	356 acres (3%)
	Robledo Mountains (13,049 acres)	0 acres	2,534 acres (19%)	7 acres (0.05%)
	West Potrillo Mountains/Mt. Riley (159,323 acres)	0 acres	13,544 acres (9%)	29,773 acres (19%)
SRMAs	Aden Hills OHV Area (8,054 acres)	4,605 acres (57%)	2,518 acres (31%)	2 acres (0.03%)
	Dona Ana Mountain (8,345 acres)	0 acres	0 acres	3,117 acres (37%)
	Organ/Franklin Mountains (60,793 acres)	0 acres	0 acres	3,453 acres (6%)
ACECs designated for outstanding scenic values	Dona Ana Mountains (1,427 acres)	0 acres	0 acres	524 acres (37%)
	Organ/Franklin Mountains (58,512 acres)	0 acres	0 acres	3,504 acres (6%)
	Robledo Mountains (8,659 acres)	0 acres	1,227 acres (14%)	5 acres (0.06%)
National Historic Landmark	Mesilla Plaza	0 acres	Yes	

TABLE 12.2.14.2-1 (Cont.)

Feature Type	Feature Name (Total Acreage/ Highway Length)	Feature Area or Linear Distance: Visible within 5 mi	Visible between 5 and 15 mi	Visible between 15 and 25 mi
National Historic Trail	El Camino Real de Tierra Adentro	0 mi	0.7 mi	25.6 mi
National Natural Landmark	Kilbourne Hole			Yes
Scenic Byway	El Camino Real (299 mi)	0 mi	2.2 mi	16.7 mi

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

[b] Values in parentheses are percentages of feature acreage or length viewable.

GOOGLE EARTH™ VISUALIZATIONS

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

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

National Monument

- Prehistoric Trackways National Monument. The Prehistoric Trackways National Monument occupies about 5,255 acres (21.27 km^2) and is 8.3 mi (13.4 km) northeast of the SEZ, at the point of closest approach. The monument was established in 2009 to conserve, protect, and enhance the unique and nationally important paleontological, scientific, educational, scenic, and recreational resources and values of the Robledo Mountains. It is at an elevation of about 4,500 ft (1,372 m) and includes the southern portion of the Robledo Mountains ACEC/WSA and the northern portion of the Picacho SRMA.

Within 25 mi (40 km), solar energy facilities within the SEZ could be visible from portions of the southeastern slopes of the mountains within the national monument. Visible areas of the national monument within the 25-mi (40-km) radius of analysis total about 1,226 acres (5.0 km^2) in the 650-ft (198.1-m) viewshed, or 23% of the total national monument acreage. None of the monument is within the 24.6-ft (7.5-m) viewshed. As shown in Figure 12.2.14.2-2, the visible area of the national monument extends to about 10.8 mi (17.4 km) from the point of the closest approach at the northeastern boundary of the SEZ.

Views of the SEZ from the national monument are almost completely screened by the Sleeping Lady Hills directly west of the SEZ; however, taller solar facility components at some locations within the SEZ could be visible above the hills or in gaps between the hills from scattered viewpoints on peaks and high southwest-facing ridges in the national monument. From some of these viewpoints, the upper portions of transmission towers and lower-height power towers might just be visible, but they might not be noticed by casual viewers. At about 8 mi (13 km), the receivers of operating power towers would likely be visible as bright points of light atop visible tower structures, against a backdrop of the distant Florida Mountains. At night, if more than 200 ft (61 m) tall, power towers would have navigation warning lights that could potentially be visible from the national monument.

Because of the near-complete screening of the SEZ from the national monument, under the 80% development scenario analyzed in the PEIS, weak levels of visual contrasts would be expected for viewpoints in the national monument.

Wilderness Study Areas

- *Aden Lava Flow*. Aden Lava Flow is a 25,978-acre (105-km^2) WSA 11 mi (18 km) south of the SEZ. According to the Mimbres RMP, the area has significant scenic and geologic values as well as interesting wildlife and wildlife features (BLM 1993).

  As shown in Figure 12.2.14.2-2, within 25 mi (40 km) of the SEZ, solar energy facilities within the SEZ could be visible from significant portions of the WSA (about 21,882 acres [88.553 km^2] in the 650-ft [198.1-m] viewshed, or 84% of the total WSA acreage, and 14,365 acres [58.133 km^2] in the 25-ft [7.5-m] viewshed, or 55% of the total WSA acreage). The visible area of the WSA extends from the point of closest approach to the SEZ to 19 mi (31 km) from the southern boundary of the SEZ.

Solar facilities within the SEZ could be visible from most of the Aden Lava Flow WSA, although from some portions of the WSA, facility visibility would be limited to taller solar facilities because of screening by intervening topography. Both the WSA and the SEZ are very flat and are at similar elevations, so there are open, but low-angle views, from the WSA to the SEZ.

Figure 12.2.14.2-3 is a Google Earth visualization of the SEZ as seen from an unpaved road on the north rim of a volcanic cone in the northwestern portion of the WSA, about 13 mi (21 km) south of the SEZ. The viewpoint, although elevated with respect to the surrounding mesa, is about 120 ft (37 m) lower in elevation than the SEZ. The visualization includes simplified wireframe models of a hypothetical solar power tower facility. The models were placed within the SEZ as a visual aid for assessing the approximate size and viewing angle of utility-scale solar facilities. The receiver towers depicted in the visualization are properly scaled models of a 459-ft (140-m) high power tower with an 867-acre (3.5-km^2) field of 12-ft (3.7-m) heliostats, each representing about 100 MW of electric generating capacity. Five models were placed in the SEZ for this and other visualizations shown in this section of this PEIS. In the visualization, the SEZ area is depicted in orange; the heliostat fields in blue.

As shown in the visualization, because the viewpoint is lower in elevation than the SEZ, the vertical angle of view is extremely low. Although collector/reflector arrays for solar facilities within the SEZ would be visible, they would be seen as very thin lines on the horizon, which would greatly reduce their apparent size, conceal the strong regular geometry of the array, and cause the arrays to appear to repeat the strong horizon line, thereby reducing visual contrast. Taller solar facility components, such as transmission towers, could be visible, depending on lighting, but might not be noticed by casual observers.

Operating power towers within the SEZ would be visible, although the heliostat arrays at their bases might be difficult to see. At almost 13 mi (21 km), the receivers would likely appear as points of light atop discernable tower structures against a sky backdrop just above the northern horizon. At night, if sufficiently tall, the towers would have red flashing lights, or white or red flashing strobe lights that would likely be visible, although other lights also would likely be visible in this direction, including light from I-10 and the Las Cruces Municipal Airport east of the SEZ.

Under the 80% development scenario analyzed in the PEIS, solar facilities within the SEZ would be expected to cause weak visual contrast levels as

FIGURE 12.2.14.2-3 Google Earth Visualization of the Proposed Mason Draw SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Volcanic Cone in the Northwest Portion of the Aden Lava Flow WSA

seen from this viewpoint. Because most other viewpoints within the WSA have similar views, contrast levels in general would not be expected to rise above weak levels.

The proposed Afton SEZ is partially in the line of sight to the proposed Mason Draw SEZ from much of the Aden Lava Flow WSA east of the viewpoint described above. If there were solar facilities within the western portions of the Afton SEZ, they could add to the contrasts from solar facilities seen from the Aden Lava Flow WSA, and because the Afton SEZ is much closer to the WSA, impacts on the WSA from solar facilities in the Afton SEZ could greatly exceed impacts arising from solar facilities within the much smaller and more distant proposed Mason Draw SEZ.

- *Las Uvas Mountains.* Las Uvas Mountains is an 11,084-acre (44.855-km^2) WSA 13 mi (21 km) northwest of the SEZ.

  As shown in Figure 12.2.14.2-2, within 25 mi (40 km) of the SEZ, solar energy facilities within the SEZ could be visible from the southeastern portions of the WSA (about 491 acres [1.99 km^2] in the 650-ft [198.1-m] viewshed, or 4% of the total WA acreage, and 137 acres [0.554 km^2] in the 25-ft [7.5-m] viewshed, or 1% of the total WSA acreage). The visible area of the WSA extends to 17 mi (27 km) from the northern boundary of the SEZ.

  Views of the SEZ from most of the WSA are screened by mountains within the Sierra de Las Uvas relatively near to the WSA; however, just under 500 acres (2.02 km^2) of the WSA are within the SEZ viewshed, and of this acreage, just 137 acres (0.554 km^2) of land on scattered high ridges and peaks within the WSA would have views of lower height solar facilities in portions of the SEZ.

  Figure 12.2.14.2-4 is a Google Earth visualization of the SEZ as seen from a high ridge immediately east of Chivatos Canyon in the southeastern portion of the WSA. The viewpoint is 15 mi (24 km) from the northwest corner of the SEZ and is elevated about 1,400 ft (430 m) above the SEZ.

  The view direction is south, through Valles Canyon toward the northwestern portion of the SEZ. Mesa Azul screens the view of the western portion of the SEZ, while unnamed ridges south of Tailholt Mountain screen the northeast portion of the SEZ from view. The visualization suggests that from this viewpoint, the SEZ would occupy a very small portion of the horizontal field of view, because of the long distance to the SEZ, but also in part because much of the SEZ is partially screened from view. However, visual attention from this viewpoint could be focused on solar facilities within the visible portion of the SEZ because of the “framing” effect of the view down the length of the valley.

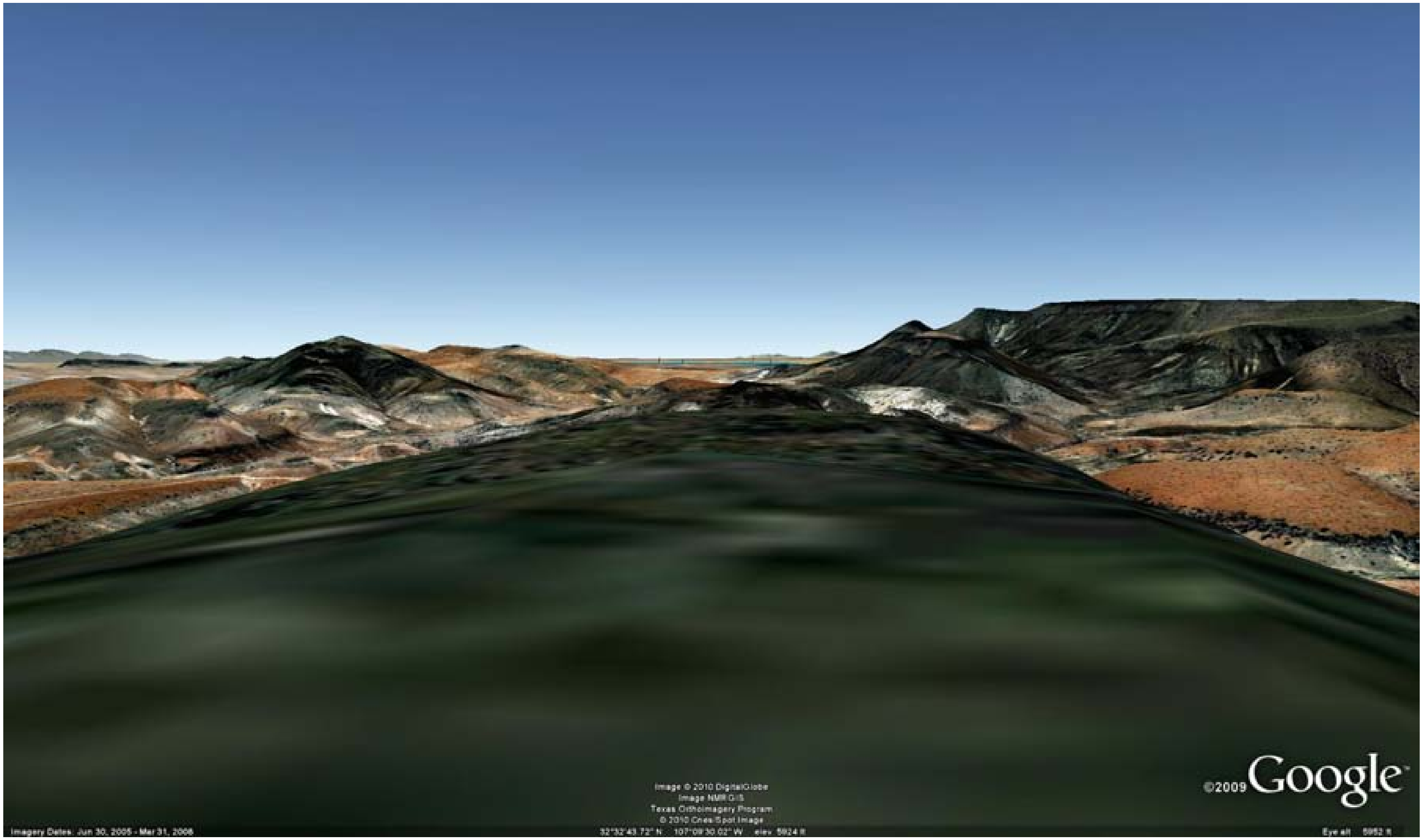

FIGURE 12.2.14.2-4 Google Earth Visualization of the Proposed Mason Draw SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a High Ridge in the Southeastern Portion of the Las Uvas Mountains WSA

Because of the long distance to the SEZ, the angle of view would be very low. Collector/reflector arrays for solar facilities within the SEZ would be seen nearly edge-on, which would reduce their apparent size, conceal their strong regular geometry, and make them appear to repeat the strong horizon line, thus reducing apparent visual contrast.

Operating power towers within the SEZ would likely be visible, although the heliostat arrays at their bases might be screened from view if they were located in the southern portion of the SEZ. At almost 15 mi (24 km), the receivers would likely appear as points of light against a sky backdrop or the mesa floor just above the southeastern horizon. The tower structures might be visible, but might not be noticed by casual viewers. At night, if sufficiently tall, the towers would have red flashing lights or white or red flashing strobe lights that would likely be visible.

Under the 80% development scenario analyzed in the PEIS, solar facilities within the SEZ would be expected to cause weak visual contrast levels as seen from this viewpoint. Because most other viewpoints within the WSA have similar or more obstructed views, contrast levels in general would not be expected to rise above weak levels.

- *Robledo Mountains.* Robledo Mountains WSA is a 13,049-acre (52.807-km^2) WSA 7.8 mi (12.6 km) away at the point of closest approach northeast of the SEZ.

  As shown in Figure 12.2.14.2-2, within 25 mi (40 km), solar energy facilities within the SEZ could be visible from high peaks and some southwest-facing slopes of the WSA, primarily in the west-central portion. Visible areas of the WSA within the 25-mi (40-km) radius of analysis total about 2,541 acres (10.28 km^2) in the 650-ft (198.1-m) viewshed, or 20% of the total WSA acreage, and 336 acres (1.36 km^2) in the 24.6-ft (7.5-m) viewshed, or 3% of the total WSA acreage. The visible area of the WSA extends about 11.0 mi (18 km) from the northeastern boundary of the SEZ.

  Solar facilities within the SEZ could be visible from the highest peaks and some southwest-facing slopes in the WSA, but only about 336 acres (1.36 km^2) at the highest elevations would have views of low-height solar facilities within the SEZ. The Sleeping Lady Hills west of the SEZ would partially screen views of the SEZ from many locations within the WSA, especially lower-elevation viewpoints.

  Figure 12.2.14.2-5 is a Google Earth visualization of the SEZ as seen from a communications site at the end of an unpaved road atop Lookout Peak in the northern portion of the WSA. The viewpoint is 11 mi (18 km) from the northeast corner of the SEZ and is elevated about 1,100 ft (340 m) above the

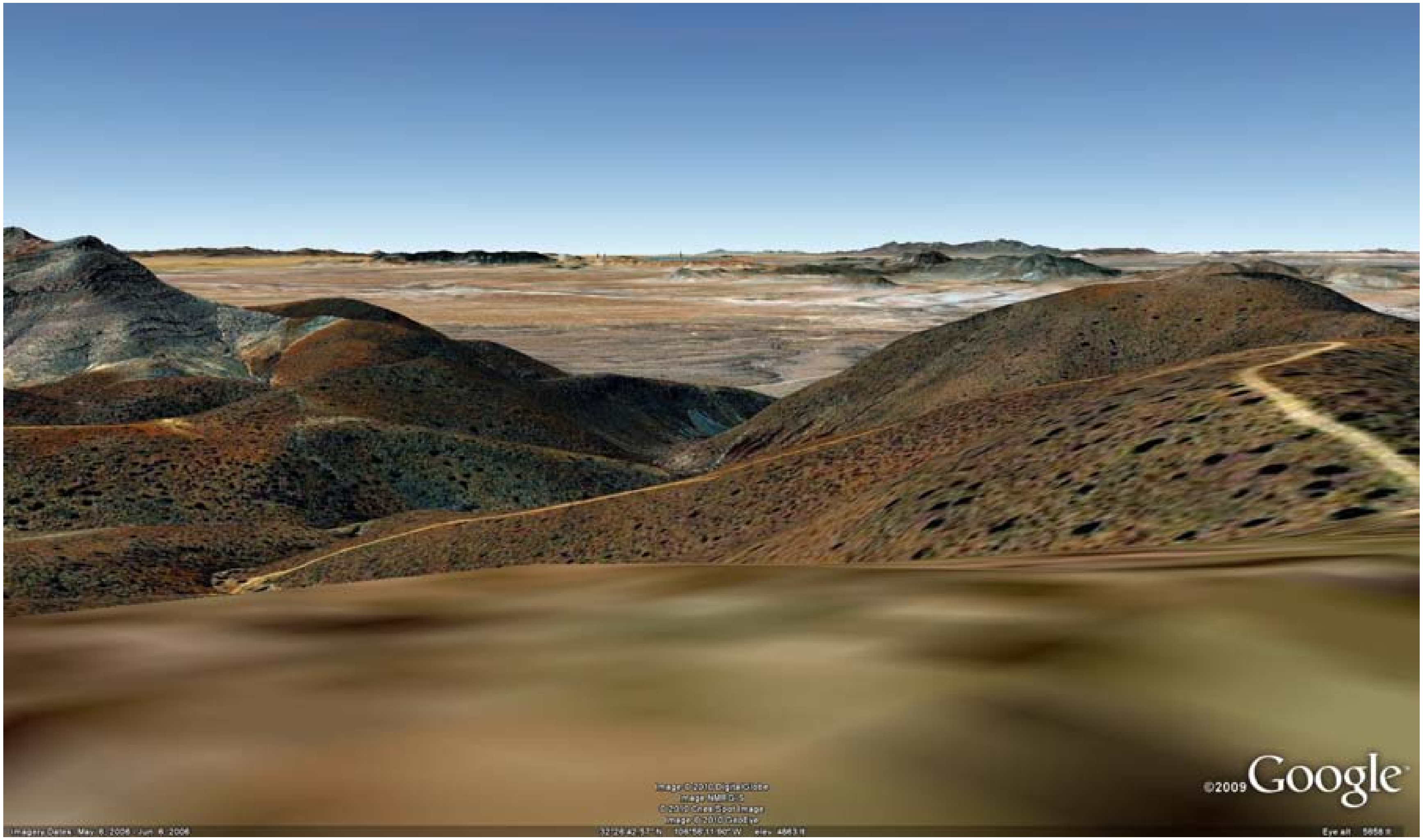

FIGURE 12.2.14.2-5 Google Earth Visualization of the Proposed Mason Draw SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Communication Site on Lookout Peak in the Northern Portion of Robledo Mountains WSA

SEZ. Because of its elevation and orientation with respect to the Sleeping Lady Hills, Lookout Peak has a relatively unobstructed view of the SEZ.

The visualization suggests that from this viewpoint, the SEZ would occupy a very small portion of the horizontal field of view, in part because more than half (the southern portion) of the SEZ is partially screened from view by the Sleeping Lady Hills. Collector/reflector arrays for solar facilities located in the northern portion of the SEZ would likely be visible, although the angle of view would be low. Collector/reflector arrays would be seen nearly edge-on, which would reduce their apparent size, conceal their strong regular geometry, and make them appear to repeat the strong horizon line, thus reducing apparent visual contrast. Taller solar facility components, such as transmission towers, could be visible, depending on lighting, but might not be noticed by casual observers.

Operating power towers within the SEZ would likely be visible, although the heliostat arrays at their bases might be screened from view if they were located in the southern portion of the SEZ. At 11 mi (18 km), the receivers would likely appear as points of light atop visible tower structures against a sky backdrop just above the southwestern horizon. At night, if sufficiently tall, the towers would have red flashing lights, or white or red flashing strobe lights that would likely be visible. Other lighting associated with solar facilities could be visible as well.

Under the 80% development scenario analyzed in the PEIS, solar facilities within the SEZ would be expected to cause weak visual contrast levels as seen from this viewpoint. Because most other viewpoints within the WSA have similar or more obstructed views, even if closer to the SEZ, contrast levels would not be expected to rise above weak levels.

- *West Potrillo Mountains/Mt. Riley.* West Potrillo Mountains/Mt. Riley WSA is a 159,323-acre (644.76-km^2) WSA located 10 mi (16 km) away at the point of closest approach south of the SEZ.

  As shown in Figure 12.2.14.2-2, within 25 mi (40 km), solar energy facilities within the SEZ could be visible from the northern portion of the WSA. Visible areas of the WSA within the 25-mi (40-km) radius of analysis total about 43,317 acres (175.30 km^2) in the 650-ft (198.1-m) viewshed, or 27% of the total WSA acreage, and 20,358 acres (82.386 km^2) in the 24.6-ft (7.5-m) viewshed, or 13% of the total WSA acreage. The visible area of the WSA extends to about 24 mi (39 km) from the southern boundary of the SEZ.

  Figure 12.2.14.2-6 is a Google Earth visualization of the SEZ as seen from the summit of a volcanic cone in the far northern portion of the WSA. The viewpoint is about 13 mi (21 km) west-southwest of the far southwestern

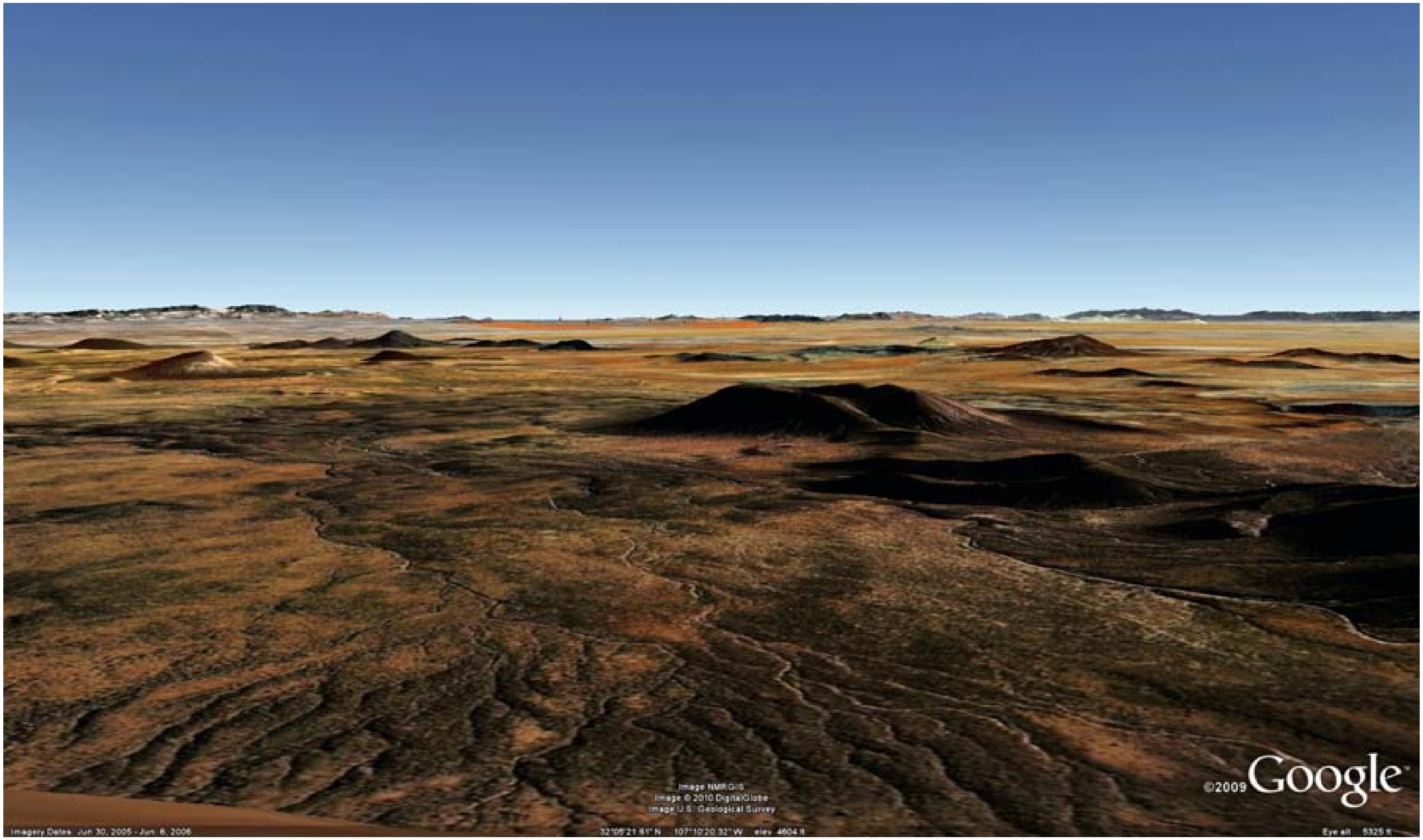

FIGURE 12.2.14.2-6 Google Earth Visualization of the Proposed Mason Draw SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from an Unnamed Summit in the Northern Portion of West Potrillo Mountains WSA

corner of the SEZ. The viewpoint is elevated about 750 ft (230 m) above the SEZ.

The visualization suggests that from this viewpoint, the SEZ would occupy a small to moderate amount of the horizontal field of view. The viewpoint is sufficiently elevated that the SEZ would be visible as a narrow band below the horizon. Collector/reflector arrays for solar facilities within the SEZ would be seen nearly edge on, which would reduce their apparent size, conceal their strong regular geometry, and make them appear to repeat the line of the horizon, thus tending to reduce visual contrast. Taller solar facility components, such as transmission towers, could be visible, depending on lighting, but might not be noticed by casual observers.

Operating power towers within the SEZ would likely be visible. At more than 13 mi (21 km), the receivers would likely appear as points of light atop visible tower structures against a sky backdrop just above the northeastern horizon. At night, if sufficiently tall, the towers would have red flashing lights, or white or red flashing strobe lights that would likely be visible.

Under the 80% development scenario analyzed in the PEIS, solar facilities within the SEZ would be expected to cause weak to moderate visual contrast levels as seen from this viewpoint. Most, but not all, other viewpoints within the WSA have lower elevation and therefore more obstructed views, even if closer to the SEZ. From these viewpoints, contrast levels would not be expected to rise above weak levels.

Special Recreation Management Areas

- *Aden Hills*. The 8,054-acre (32.59-km^2) Aden Hills SRMA is a BLM-designated SRMA 2.4 mi (3.9 km) from the SEZ's southern boundary. The SRMA is designated for OHV use. Annual usage is estimated at 10,000 visitors. About 7,125 acres (28.83 km^2), or 89% of the SRMA, are within the 650-ft (198.1-m) viewshed of the SEZ, and 6,059 acres (24.52 km^2), or 75% of the SRMA, are within the 24.6-ft (7.5-m) viewshed. As shown in Figure 12.2.14.2-2, the portion of the SRMA within the viewshed extends from the point of closest approach to 7.2 mi (11.6 km) from the SEZ.

  Most of the SRMA has unobstructed views of the SEZ, although at least partial screening of the SEZ might occur in some depressions, and some of the western portion of the SRMA is screened by the Aden Hills. In general, however, visitors to the SRMA would have solar facilities within the SEZ in plain view to the north, and much of the SRMA would be within the BLM VRM Program's foreground–middleground distance of 3-5 mi (5-8 km). Furthermore, the Afton SEZ is adjacent to the SRMA's eastern boundary and is visible from nearly the entire SRMA, so that if solar facilities were built within the Afton SEZ, they could potentially add substantially to the visual impacts associated with development in the proposed Mason Draw SEZ, and could, for some locations, be much greater.

Figure 12.2.14.2-7 is a Google Earth visualization of the SEZ as seen from a low hill in the far northern portion of the SRMA. The viewpoint is about 3.4 mi (5.5 km) south of the southern boundary of the SEZ. The viewpoint is elevated about 225 ft (69 m) above the SEZ.

The visualization suggests that from this viewpoint, the SEZ would stretch across most of the horizontal field of view. The vertical angle of view would be very low, reducing visual contrast substantially. Solar facilities in the SEZ would be seen in a band under the Sierra de Las Uvas, and west of the Sleeping Lady Hills. The collector/reflector arrays of solar facilities in the SEZ would be seen edge on or nearly so, which would reduce their apparent size, conceal their strong regular geometry, and repeat the line of the horizon, thus reducing visual contrasts with the surrounding strongly horizontal landscape. Ancillary facilities, such as buildings, transmission towers, cooling towers; and plumes, if present, would likely be visible projecting above the collector/reflector arrays, and their forms, lines, and colors, as well as reflective properties, could add to visual contrasts with the generally natural-appearing and strongly horizontal surrounding landscape.

Operating power towers in the farther portions of the SEZ would likely be visible as bright points of light atop discernable tower structures, but operating power towers in the closest portions of the SEZ could be substantially brighter, with the tower’s structural details apparent. Receiver lights in the closest portions of the SEZ could be bright enough to strongly attract visual attention. At night, if sufficiently tall, the towers would have red flashing lights, or white or red flashing strobe lights that would likely be conspicuous, but would be viewed across the lights associated with I-10. Other lighting associated with solar facilities in the SEZ could be visible as well.

Because of the short distance to, and generally unobstructed views of, the SEZ, under the 80% development scenario analyzed in the PEIS, solar facilities within the proposed Mason Draw SEZ would be expected to cause strong visual contrast from this viewpoint in the Aden Hills SRMA.

Figure 12.2.14.2-8 is a Google Earth visualization of the SEZ as seen from a point in the far northeastern portion of the SRMA. The viewpoint is about 4.1 mi (6.5 km) southeast of the southeast corner of the SEZ and about 50 ft (15 m) lower in elevation than the southeast corner of the SEZ.

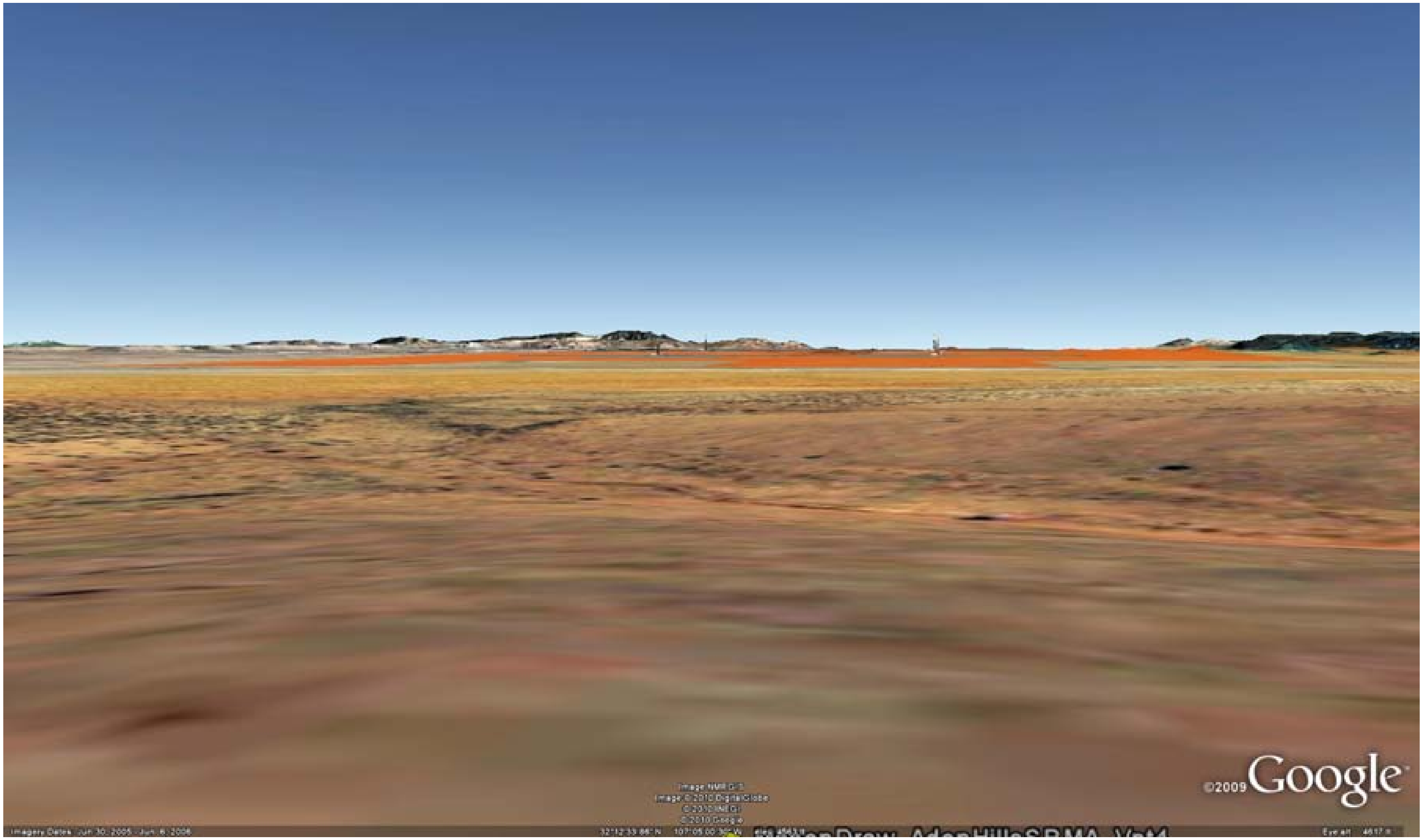

FIGURE 12.2.14.2-7 Google Earth Visualization of the Proposed Mason Draw SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Hill in the Northern Portion of Aden Hills SRMA

FIGURE 12.2.14.2-8 Google Earth Visualization of the Proposed Mason Draw SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Point in the Far Northeastern Portion of Aden Hills SRMA

The visualization suggests that from this viewpoint, the angle of view would be extremely low, almost eliminating visibility of low-height collector/reflector arrays in the middle of the SEZ and reducing visual contrasts from collector/reflector arrays substantially, regardless of their locations within the SEZ. Solar facilities in the SEZ would be seen in a band under the Sierra de Las Uvas and the Sleeping Lady Hills. Where visible, collector/reflector arrays of solar facilities in the SEZ would be seen edge-on, greatly reducing their apparent size, concealing their strong regular geometry, and repeating the line of the horizon, thus reducing visual contrasts with the surrounding strongly horizontal landscape. Ancillary facilities, such as buildings, transmission towers, cooling towers, and plumes, if present, would likely be visible, projecting above the collector/reflector arrays. Their forms, lines, and colors, as well as reflective properties, could add to visual contrasts with the generally natural-appearing and strongly horizontal surrounding landscape.

Operating power towers in the farther portions of the SEZ would likely be visible as bright points of light atop discernable tower structures, but if located in the closest portions of the SEZ could be substantially brighter and could strongly attract visual attention. At night, if sufficiently tall, the towers would have red flashing lights, or white or red flashing strobe lights that would likely be conspicuous, but other lights also would likely be visible in the area. Other lighting associated with solar facilities in the SEZ could be visible as well, but direct visibility of the lighting could be partially restricted by the very low angle of view.

Under the 80% development scenario analyzed in the PEIS, the very low angle of view would reduce visibility of collector/reflector arrays in the SEZ, and although contrast levels would depend on project location within the SEZ, the types of solar facilities and their designs, and other visibility factors, moderate visual contrasts from solar energy development within the SEZ would be expected from this viewpoint in the Aden Hills SRMA.

It should be noted that this viewpoint and many others within the SRMA could also have views of solar facilities within the Afton SEZ, which borders the SRMA on its eastern side. Because of the very large relative size of the Afton SEZ and its close proximity to the SRMA, if solar facilities were present in the Afton SEZ, they could greatly increase the perceived visual impacts associated with solar energy development in this landscape setting.

In summary, the SRMA is very close to the proposed SEZ. Because the SRMA and the SEZ are very flat, and in most of the SRMA there is generally little screening by topography of views to the SEZ, most locations within the SRMA would have open views of the SEZ. Although the vertical angle of view is generally very low, as viewed from the SRMA the SEZ appears large enough that it would stretch across much of the horizon, resulting in moderate to strong visual contrast for many locations within the northern portion of the

SRMA. Lower contrast levels would be expected in the more distant southern portions of the SRMA and at viewpoints in the western portion of the SRMA, subject to partial screening by the Aden Hills.

- *Dona Ana Mountains.* Dona Ana Mountains SRMA is an 8,345-acre (33.77-km^2) BLM-designated SRMA 16 mi (26 km) northeast of the SEZ, at the point of closest approach. The mountains offer a number of hiking trails, 15 mi (24 km) of mountain biking trails, and 7 mi (11 km) of horseback trails.

  The area of the SRMA within the 650-ft (198.1-m) viewshed of the SEZ includes 3,117 acres (12.61 km^2), or 37% of the total SRMA acreage. The area of the SRMA within the 24.6-ft (7.5-m) viewshed of the SEZ includes 16 acres (0.06 km^2), or 0.2% of the total SRMA acreage. As shown in Figure 12.2.14.2-2, the visible area extends from the point of closest approach to 18 mi (29 km) into the SRMA.

  Visibility of solar facilities within the proposed Mason Draw SEZ would be from the south- and southwest-facing slopes of the Dona Ana Mountains, portions of the plain south and east of the mountains, and the south slope of a lone hill northeast of the community of Dona Ana. Outside of the Dona Ana Mountains, the Sleeping Lady Hills and the eastern rim of West Mesa would provide nearly complete screening of the entire SEZ as seen from the SRMA.

  From high-elevation viewpoints within the Dona Ana Mountains in the SRMA, if sufficiently tall power towers were located in certain portions of the SEZ, the receivers could be visible just over the Sleeping Lady Hills, beyond the eastern rim of West Mesa. However, at a minimum of 16 mi (26 km) from the SEZ, if visible, the receivers could appear as points of light immediately above a notch in the Sleeping Lady Hills, or just north of the northernmost major summit in the Sleeping Lady Hills. Given the nearly complete screening of the SEZ from the ACEC, there would be a small likelihood of seeing a power tower in the SEZ; however, even if operating power towers were visible, minimal visual contrast levels would be expected. If power towers were visible, at night, if more than 200 ft (61 m) tall, power towers would have navigation warning lights that could potentially be visible from the SRMA.

- *Organ/Franklin Mountains.* Organ/Franklin Mountains SRMA is a BLM-designated SRMA 24 mi (39 km) east of the SEZ at the point of closest approach.

  As shown in Figure 12.2.14.2-2, a portion of the 60,793-acre (246.02-km^2) Organ/Franklin Mountains SRMA is within the viewshed of the SEZ. The area of the SRMA within the 650-ft (198.1-m) viewshed of the SEZ includes 3,453 acres (13.97 km^2), or 6% of the total SRMA acreage. The area of the SRMA within the 24.6-ft (7.5-m) viewshed of the SEZ includes 1,397 acres

(5.653 km^2), or 2% of the total SRMA acreage. The visible area extends from the point of closest approach to beyond 25 mi (40 km) from the eastern boundary of the SEZ.

The Organ/Franklin Mountains SRMA is almost entirely contained within the Organ/Franklin Mountains ACEC, and impacts to the SRMA are the same as those described below for the Organ/Franklin Mountains ACEC.

ACECs Designated for Outstandingly Remarkable Scenic Values

- *Dona Ana Mountains*. The 1,427-acre (5.775-km^2) Dona Ana Mountains ACEC is 17 mi (27 km) northeast of the SEZ at the closest point of approach. The ACEC's scenic value is noted in the Mimbres RMP (BLM 1993). The jagged peaks of the Dona Ana Mountains are highly scenic and are within view of most of the northern Mesilla Valley and the northeast portion of Las Cruces. Scenic quality is of more than local significance and is enjoyed by hundreds of thousands of motorists on I-25 annually (BLM 1993). About 3,117 acres (12.61 km^2), or 37% of the ACEC, is within the 650-ft (198.1-m) viewshed of the SEZ, and 16 acres (0.066 km^2), or 1% of the total ACEC acreage, is in the 24.6-ft (7.5-m) viewshed. The visible area of the ACEC extends to about 18 mi (29 km) from the northeastern boundary of the SEZ.

  The Dona Ana Mountains ACEC is wholly contained within the northern portion of the Dona Ana Mountains SRMA, and impacts to the ACEC are the same as those described above for the Dona Ana Mountains SRMA.

- *Organ Mountains/Franklin Mountains*. The 58,512-acre (236.79-km^2) Organ/Franklin Mountains ACEC is 24 mi (39 km) east of the SEZ at the closest point of approach. The ACEC's scenic value is noted in the Mimbres RMP (BLM 1993). The two mountain ranges comprise some of the most spectacular scenery in southern New Mexico, with extensive viewsheds containing both interstate highways and large metropolitan populations (BLM 1993). About 3,504 acres (14.18 km^2), or 6% of the ACEC, is within the 650-ft (198.1-m) viewshed of the SEZ, and 1,398 acres (5.658 km^2), or 2% of the total ACEC acreage, is in the 24.6-ft (7.5-m) viewshed. The visible area extends from the point of closest approach to beyond 25 mi (40 km) from the eastern boundary of the SEZ.

  As shown in Figure 12.2.14.2-2, only the far western portions of the ACEC on the lower slopes of the Organ Mountains are within the 25-mi (40-km) SEZ viewshed, and in most of the area within the viewshed, visibility of solar facilities within the SEZ would be limited to taller components. Views would be across the urbanized and visual cluttered Mesilla Valley. Views of much of the northern portions of the SEZ from the ACEC would be screened by the Sleeping Lady Hills east of the SEZ. Within the ACEC, viewpoints in the SEZ

25-mi (40-km) viewshed are only a few hundred feet higher in elevation than the SEZ, so at a distance of 24 to 25 mi (38 to 40 km), the vertical angle of view is very low. Where visible, collector/reflector arrays for solar facilities within the SEZ would be seen edge-on and would not likely be noticed unless reflecting early morning sunlight. If visible, they would be seen as very short horizontal lines on the distant horizon, just south of the Sierra de Las Uvas. They would repeat the line of the horizon, tending to reduce visual contrast. Because the SEZ would occupy a very small portion of the horizontal field of view, the arrays would appear to be very small in any event.

If power towers were visible in the SEZ, when operating, they would likely appear as distant light on the western horizon against a sky backdrop. At night, if sufficiently tall, power towers in the SEZ would have red flashing lights, or white or red flashing strobe lights that could be visible, but there could be other lights visible in the SEZ area, including lights associated with I-10 and the Las Cruces Municipal Airport. The highway and the airport both are close to the line of sight from the ACEC to the SEZ. Other lighting associated with solar facilities could be visible as well, but would not likely be conspicuous at the long distance from the ACEC to the SEZ.

Because of the very long distance to the SEZ, the very low angle of view, and partial screening of the SEZ, under the 80% development scenario analyzed in the PEIS, solar facilities within the proposed Mason Draw SEZ would be expected to cause minimal visual contrast for viewpoints in the Organ/Franklin Mountains ACEC.

- *Robledo Mountains.* The 8,659-acre (35.04-km^2) Robledo Mountains ACEC is located 7.7 mi (12.4 km) northeast of the SEZ at the closest point of approach. The ACEC's scenic value is noted in the Mimbres RMP (BLM 1993). The Robledos also provide a spectacular scenic quality to the inhabitants of the northern Mesilla Valley. The scenery is enjoyed by hundreds of thousands of travelers on I-25 annually. About 1,232 acres (4.986 km^2), or 14% of the ACEC, is within the 650-ft (198.1-m) viewshed of the SEZ, and 223 acres (0.902 km^2), or 3% of the total ACEC acreage, is in the 24.6-ft (7.5-m) viewshed. The visible area of the ACEC extends to about 11 mi (18 km) from the northeastern boundary of the SEZ.

  The Robledo Mountains ACEC is wholly contained within the Robledo Mountains WSA, and impacts to the ACEC are the same as those described above for the Robledo Mountains WSA.

National Historic Landmark

- *Mesilla Plaza.* Mesilla Plaza has been on the National Register of Historic Places since 1982, and it also is a National Historic Landmark. Mesilla, with

2,200 residents, is the best-known and most visited historical community in Southern New Mexico. The plaza is about 15 mi (24 km) east of the SEZ. It is within the 650-ft (198.1-m) viewshed of the SEZ; however, it is not within the 24.6-ft (7.5-m) viewshed.

The Sleeping Lady Hills and the rim of West Mesa provide nearly complete screening of the SEZ from Mesilla Plaza. If sufficiently tall power towers were located in the far southeastern portion of the SEZ, the receivers could potentially be visible just over the eastern rim of West Mesa. At almost 15 mi (24 km), if visible, an operating receiver could appear as a point of light immediately above West Mesa. At night, if more than 200 ft (61 m) tall, power towers would have navigation warning lights that could potentially be visible from the plaza. The line of sight from the Plaza to the SEZ passes directly over I-10 and the Las Cruces Municipal Airport; both locations of visible, frequent activity, and not natural settings. Given the nearly complete screening of the SEZ from the Plaza, there would be very little chance of seeing a power tower in the SEZ; however, even if power towers were visible, minimal visual contrast levels would be expected.

National Natural Landmark

- *Kilbourne Hole.* A remnant of an ancient volcanic explosion, Kilbourne Hole was designated a National Natural Landmark in 1975. This crater is in a desert basin between the Potrillo Mountains and the Rio Grande, 9.3 mi (15.0 km) south to southwest of the SEZ. The crater measures 1.7 mi (2.7 km) long by well over a mile across, and is several hundred feet deep.

  Views of the SEZ from inside the Kilbourne Hole crater would be completely screened by the crater walls; however, there is a ridge around almost the entire crater, and the SEZ would be visible from the ridgeline and north-facing slopes of most of the ridge. The northernmost portion of the rim of Kilbourne Hole is about 20 mi (32 km) from the SEZ. A trail runs along the top of much of the ridge.

  The rim of Kilbourne Hole varies in elevation, but its highest elevation is slightly lower than the lowest elevation within the SEZ. Hence, at a minimum of 20 mi (32 km) from the SEZ, the angle of view from Kilbourne Hole to the SEZ is quite low. Furthermore, the SEZ would occupy a very small portion of the horizontal field of view as seen from Kilbourne Hole. Low-height solar facilities within the SEZ, if visible, would be seen edge-on, greatly reducing their apparent size and concealing the strong regular geometry of the arrays. Their line-like appearance would repeat the strong line of the horizon, tending to reduce visual contrast, and at 20 mi (32 km), they might be difficult to notice.

If power towers were located within the SEZ, when operating, the receivers might be visible as distant points of light against the backdrop of the Sierra de Las Uvas. At night, if sufficiently tall, the towers would have red flashing lights, or white or red flashing strobe lights that could be visible, but there would be other lights visible in the SEZ area, as the SEZ would be viewed across I-10. Under the 80% development scenario analyzed in this PEIS, solar facilities within the SEZ would be expected to create weak levels of visual contrast as seen from viewpoints on the rim of Kilbourne Hole.

The proposed Afton SEZ is partially in the line of sight from Kilbourne Hole to the Mason Draw SEZ. If there were solar facilities within the far western portions of the Afton SEZ, they could add to the contrasts from solar facilities seen from Kilbourne Hole, and because the Afton SEZ is much closer to Kilbourne Hole, impacts from solar facilities in the Afton SEZ could greatly exceed impacts arising from solar facilities within the much smaller and more distant Mason Draw SEZ.

National Historic Trail

- *El Camino Real de Tierra Adentro.* El Camino Real de Tierra Adentro is a congressionally designated historic trail that extends 404 mi (650 km) from El Paso, Texas, to Ohkay Owingeh Pueblo, New Mexico. Historically, the trail began in Mexico City, Mexico. The historic trail passes within 16 mi (26 km) of the SEZ at the point of closest approach east of the SEZ. About 26 mi (42 km) of the trail are within the 650-ft (198.1-m) viewshed of the SEZ, and the distance to the SEZ ranges from the point of closest approach to beyond 25 mi (40 km) southeast of the southeastern boundary of the SEZ. None of the byway is within any of the lower-height viewsheds of the SEZ.

  In the vicinity of the SEZ, the El Camino Real de Tierra Adentro runs north from Anthony, New Mexico, through the Mesilla Valley. The trail shares the same route as the El Camino Real National Scenic Byway for a number of miles and then roughly parallels I-10 and I-25 before leaving the valley north of Radium Springs. The trail leaves the SEZ viewshed just south of Dona Ana, but it reenters and leaves it again in three different locations north of Radium Springs.

  Much of the trail route through the Mesilla Valley is in rural or urbanized landscapes, with substantial levels of cultural disturbance visible. Views from the trail are sometimes screened briefly by orchards of tall trees that line the roads in the valley, particularly away from Las Cruces.

  For those portions of the historic trail within the 650-ft (198.1-m) viewshed of the SEZ, the Sleeping Lady Hills and the eastern rim of West Mesa would provide nearly complete screening of the entire SEZ as seen from the trail. If sufficiently tall power towers were located in certain portions of the SEZ, when operating, the receivers could potentially be visible just over the eastern rim of West Mesa from those portions of the trail south of Radium Springs, or through gaps in the Robledos Mountains for those portions of the trail within the viewshed north of Radium Springs. However, at 16 mi (26 km) or more from the SEZ, and considerably farther for most of the trail, if visible, a receiver could appear as a distant star-like point of light immediately above West Mesa. Given the nearly complete screening of the SEZ from the trail, there would be a small likelihood of seeing a power tower in the SEZ; however, even if power towers were visible, minimal visual contrast levels would be expected.

Scenic Byway

- *El Camino Real.* El Camino Real is a congressionally designated scenic byway that extends 299 mi (481 km) from the U.S.–Mexico border to Santa Fe. The scenic byway passes within about 12 mi (19 km) of the SEZ at the point of closest approach east of the SEZ. About 19 mi (31 km) of the byway are within the 650-ft (198.1-m) viewshed of the SEZ, and the distance within the viewshed to the SEZ ranges from 14 mi (23 km) northeast of the SEZ to more than 31 mi (50 km) southeast of the southeastern boundary of the SEZ. None of the byway is within any of the lower-height viewsheds of the SEZ.

  In the vicinity of the SEZ, the El Camino Real National Scenic Byway extends north from El Paso through the Mesilla Valley. The byway shares the same route as the El Camino Real de Tierra Adentro National Historic Trail, for a number of miles, and then roughly parallels I-10 and I-25. Much of the byway route through the Mesilla Valley is in rural or urbanized landscapes, with substantial levels of cultural disturbance visible. Views from the byway are sometimes screened briefly by orchards of tall trees that line the roads in the valley, particularly away from Las Cruces.

  The southern portion of the byway follows State Route 273, turns east briefly at La Union for about 1 mi (1.6 km), then follows State Route 28 north for about 5 mi (8 km) before turning east again at State Route 168. At this point, the byway enters the 650-ft (198.1-m) viewshed of the SEZ; however, northbound travelers would be facing east, away from the SEZ at this point. The byway follows State Route 168 east for about 3 mi (5 km), then turns north at State Route 478 and follows State Route 478 past the SEZ. Shortly after crossing U.S. 70, the byway passes out of the SEZ viewshed, then follows State Route 188 and then State Route 185 north and slightly west, until it leaves the valley north of Radium Springs.

> For those portions of the scenic byway within the 650-ft (198.1-m) viewshed of the SEZ, the Sleeping Lady Hills and the eastern rim of West Mesa would provide nearly complete screening of the entire SEZ as seen from the byway. If sufficiently tall power towers were located in the far southeastern portion of the SEZ, when operating, the receivers could potentially be visible just over the eastern rim of the West Mesa. At night, if more than 200 ft (61 m) tall, power towers would have navigation warning lights that could potentially be visible from the byway. At 12 mi (19 km) or more from the SEZ, and considerably farther for most of the byway, if visible, a receiver could appear as a point of light immediately above West Mesa. Given the nearly complete screening of the SEZ from the byway, there would be a small likelihood of seeing a power tower in the SEZ; however, even if power towers were visible, minimal visual contrast levels would be expected.

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.

In addition to impacts associated with the solar energy facilities themselves, sensitive visual resources could be affected by other facilities that would be built and operated in conjunction with the solar facilities. With respect to visual impacts, the most important associated facilities would be access roads and transmission lines, the precise location of which cannot be determined until a specific solar energy project is proposed. Currently a 115-kV transmission line is within the proposed SEZ, so construction and operation of a transmission line outside the proposed SEZ would not be required. However, construction of transmission lines within the SEZ 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, based on the assumptions that the existing 115-kV transmission line might be used to connect some new solar facilities to load centers and that additional project-specific analysis would be performed for new transmission construction or line upgrades. Depending on project- and site-specific conditions, visual impacts associated with access roads, and particularly transmission lines, could be large. Detailed information about visual impacts associated with transmission lines is presented in Section 5.7.1. A detailed site-specific NEPA analysis would be required to determine visibility and associated impacts precisely for any future solar projects, based on more precise knowledge of the facility location and characteristics.

Impacts on Selected Other Lands and Resources

Butterfield Trail. The Butterfield Trail is an historic mail and passenger stagecoach trail that ran between Memphis, Tennessee; St Louis, Missouri; and San Francisco, California. The trail was an important route that connected the eastern United States to the western frontier. The trail's trace passes just north of both the proposed Afton and Mason Draw SEZs, and solar facilities in both SEZs could be visible to trail users. About 17 mi (27 km) of the trail passes through the proposed Mason Draw SEZ 25-mi (40-km) 650-ft (198.1 m) viewshed, with about 8.7 mi (14.0 km) in the 24.6-ft (7.5-m) viewshed. Much of the trail within the viewshed of the proposed Mason Draw SEZ is also in the viewshed of the proposed Afton SEZ and could potentially be subject to visual impacts from solar development in both SEZs. The proposed Mason Draw SEZ is closer to the Butterfield Trail than the Afton SEZ.

The trail enters the 25-mi (40 km) viewshed about 5.8 trail mi (9.3 km) west of the Mesilla Valley near Picacho Peak, and about 7.0 mi (11.3 km) west of the SEZ. The trail ascends from a shallow canyon onto the West Mesa, where only the upper parts of tall solar power towers within the SEZ could be in view, depending on their locations within the SEZ. For westbound trail users, barring screening by the scrub vegetation common to the area or screening by small undulations in local topography, the upper portions of sufficiently tall power towers in the far southern portion of the SEZ could come into view above the western horizon just west of the ruins of a Butterfield Trail stagecoach stop about 6.6 mi (10.7 km) east of the SEZ. If visible, at distances of about 8 to 9 mi (13 to 14 km), operating power tower receivers would likely appear as bright points of light, just above the Sleeping Lady Hills, against a sky backdrop. At this point and at many points along the trail, visual contrasts from solar facilities in the proposed Mason Draw SEZ would be minimal to weak. If sufficiently tall, at night, visible power towers in the SEZ would have red flashing lights, or white or red flashing strobe lights that could be noticeable.

For about 5.5 mi (8.9 km), views of the SEZ would be largely obscured by the Sleeping Lady Hills just west of the SEZ. The trail eventually passes around the northern end of the Sleeping Lady Hills, and the SEZ would be in view between the Sleeping Lady Hills and the Rough and Ready Hills. At a point almost 2 mi (3 km) nearly straight north of the northeast corner of the SEZ, low-height solar facilities within the SEZ would come into view briefly, then be partially screened by a low rise between the trail and the SEZ. Although this trail segment includes the point of closest approach of the trail to the SEZ, much of the SEZ would be screened from view. Where operating power towers were visible, if located in the closest portions of the SEZ, they would likely appear as brilliant white non-point light sources atop towers with clearly discernable structural features and would strongly attract visual attention. If sufficiently tall, at night, visible power towers in the SEZ would have red flashing lights or white or red flashing strobe lights that could be very conspicuous from the trail at this location.

Figure 12.2.14.2-9 is a Google Earth visualization of the SEZ as seen from the Butterfield Trail near the point of maximum potential visibility of solar facilities within the proposed Mason Draw SEZ. The viewpoint is about 2.1 mi (3.4 km) north of the center of the northern boundary of the SEZ and about 2.5 mi (4.0 km) west of the gap between the Rough and Ready Hills and the Sleeping Lady Hills. The viewpoint is about 100 ft (30 m) higher in elevation than the nearest point in the SEZ.

The visualization shows that at this viewpoint, barring screening by the scrub vegetation common to the area or by small undulations in local topography, tall power towers throughout

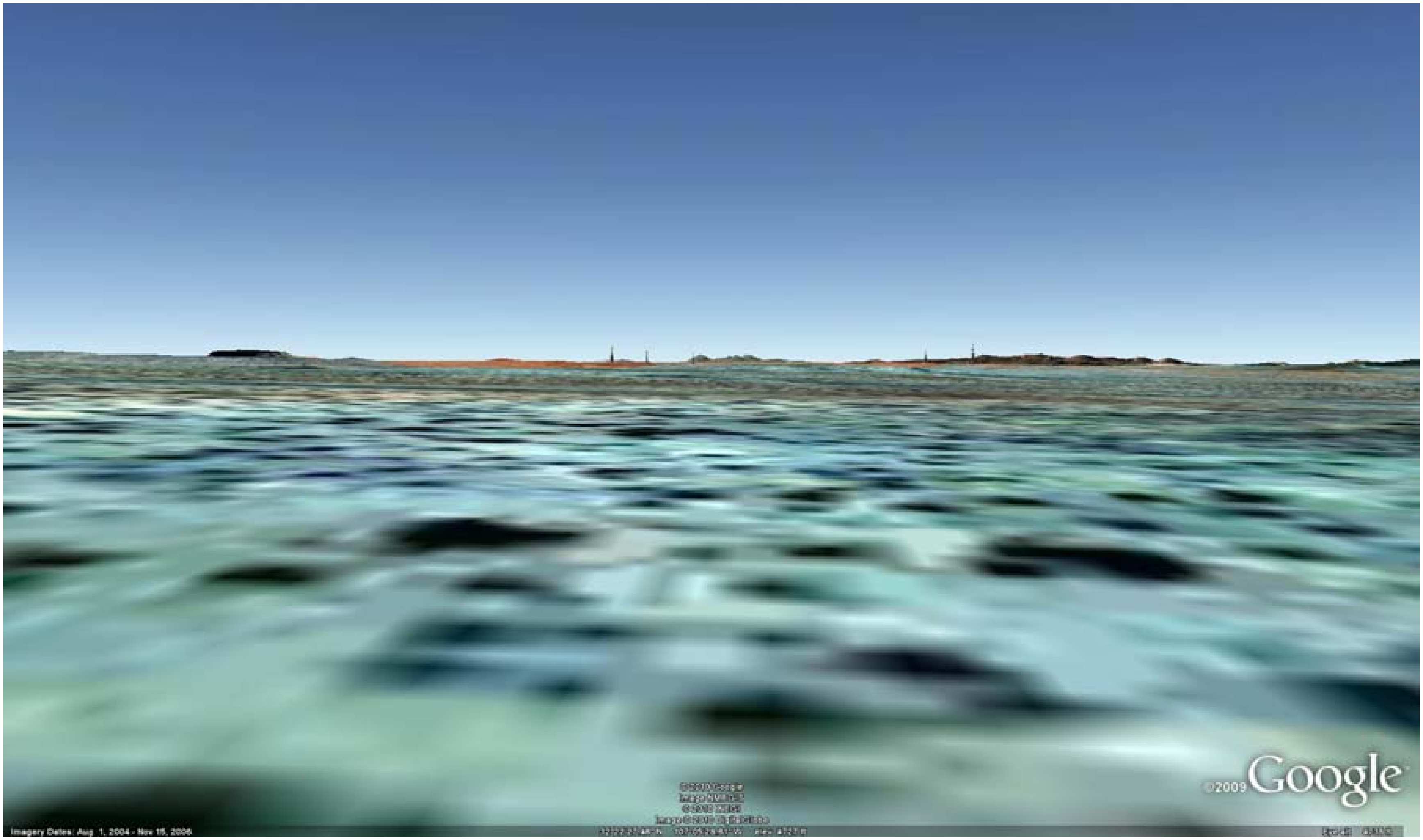

FIGURE 12.2.14.2-9 Google Earth Visualization of the Proposed Mason Draw SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from the Butterfield Trail North of the SEZ

much of the SEZ would likely be in view above the southern horizon, although low-height facilities in much of the SEZ would be obscured by low rises between the trail and the SEZ. The visualization shows four power tower models near the center of the SEZ, but if tall power towers were located across the east-west width of the SEZ, they would stretch across the southern horizon, nearly filling the horizontal field of view to the south. If operating power towers in the far northern portion of the SEZ were in view, they would likely appear as brilliant white nonpoint (i.e., having rectangular or cylindrical lit surfaces visible) light sources atop towers with clearly discernable structural features. They would strongly attract visual attention, potentially dominating views to the south, especially if multiple towers were visible. Power towers in the far southern portion of the SEZ could still be visible, but would be less bright and very low to the horizon; thus, more likely to be screened by vegetation and small undulations in local topography.

Lower height facilities in some portions of the SEZ could be visible, but the vertical angle of view would be very low. Collector/reflector arrays would be seen edge-on, if at all, and would appear as very thin lines on the southern horizon, repeating the strong horizon line, which would reduce contrasts. Ancillary facilities, such as buildings, STGs, and other power block components, cooling towers, and transmission facilities, as well as plumes (if present), could be visible above the collector/reflector arrays and could add form, color, and line contrast, especially for facilities in the far northern portion of the SEZ.

The potential visual contrast expected for this viewpoint would vary greatly depending on project locations within the SEZ, technologies, and site designs, but under the PEIS 80% development scenario, solar facilities within the SEZ would be expected to create moderate to strong visual contrasts as seen from this viewpoint, with stronger contrast levels expected if there were multiple power towers visible in the northern portion of the SEZ, and much lower contrast levels if only low-height solar facilities were located in the northern portion of the SEZ.

Farther west of the viewpoint just described, the trail runs more or less west, and although the SEZ boundary turns southward, adding more distance between the trail and the SEZ, the distance to the northern boundary of the SEZ is still within 3 mi (5 km). Contrast levels would be generally similar to those just described, but decreasing slightly as trail users moved west, because the elevation of the trail slowly drops, while the distance to the SEZ increases. This causes the already low vertical angle of view to drop further, and thus more of the SEZ is screened by intervening topography.

Figure 12.2.14.2-10 is a Google Earth visualization of the SEZ as seen from the Butterfield Trail north of the western boundary of the SEZ. The viewpoint is about 3.1 mi (5.0 km) north of the western boundary of the SEZ, and about 4.5 mi (7.3 km) west of the gap between the Rough and Ready Hills and the Sleeping Lady Hills. The viewpoint is about 2.9 mi (4.7 km) from the nearest point in the SEZ and about 55 ft (17 m) lower in elevation than the nearest point in the SEZ.

The visualization shows that at this viewpoint, barring screening by the scrub vegetation common to the area or by small undulations in local topography, tall power towers throughout much of the SEZ would likely be in view above the southeastern horizon. However, low-height

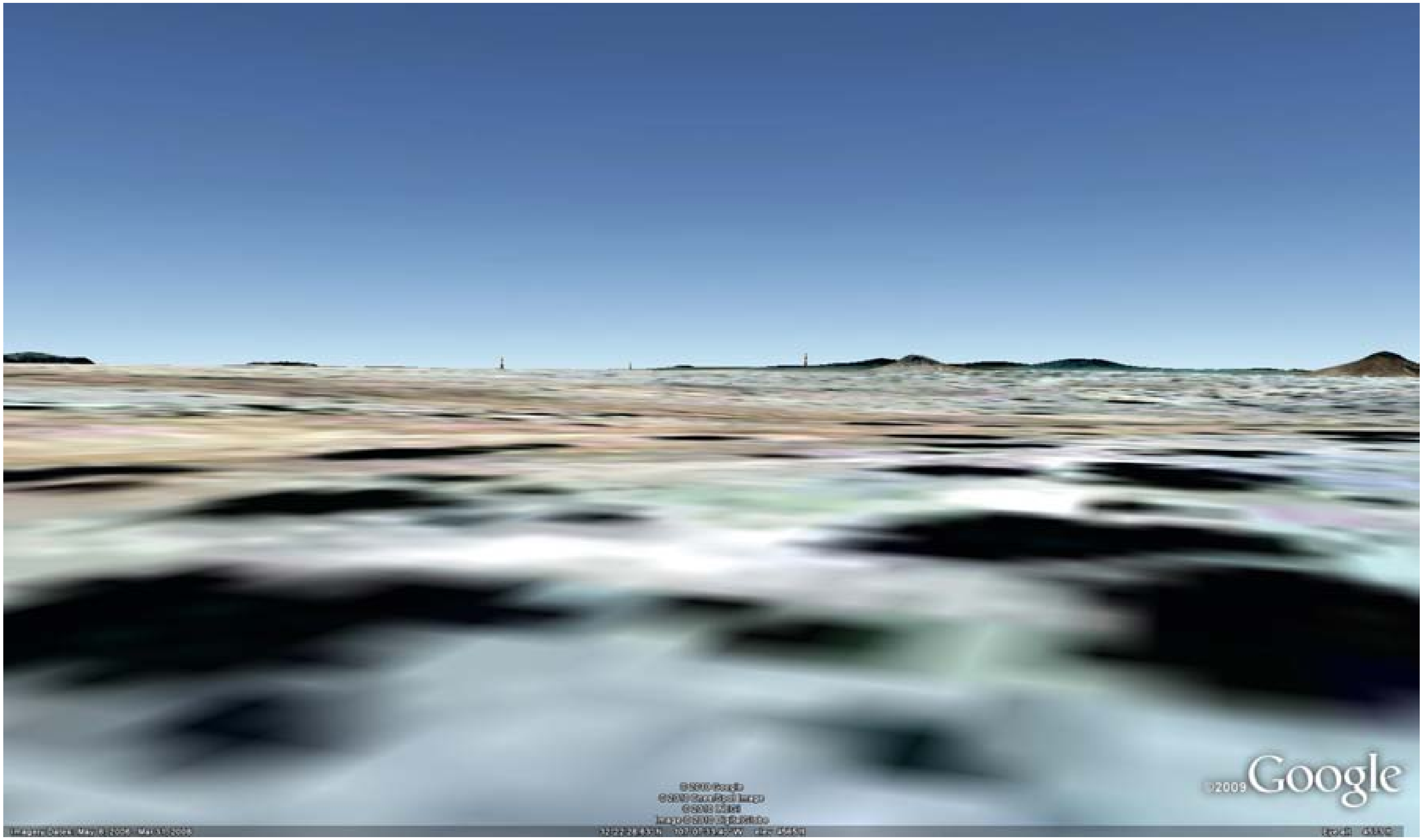

FIGURE 12.2.14.2-10 Google Earth Visualization of the Proposed Mason Draw SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from the Butterfield Trail North of the SEZ's Western Boundary

facilities in the SEZ would be obscured by low rises between the trail and the SEZ and some low hills northwest of the SEZ. The visualization shows four power tower models near the center of the SEZ, but similarly to the viewpoint just discussed, if tall power towers were located across the east-west width of the SEZ, they would stretch across the southeastern horizon, nearly filling the horizontal field of view to the southeast. If operating power towers in the far northwestern portion of the SEZ were in view, they would likely appear as very bright white non-point light sources atop towers with clearly discernable structural features. They would strongly attract visual attention, especially if multiple towers were visible. If sufficiently tall, at night, visible power towers in the SEZ would have red flashing lights or white or red flashing strobe lights that could be conspicuous from the trail at this location. Power towers in the far southern portion of the SEZ could still be visible, but they would be less bright and very low to the horizon; thus, more likely to be screened by vegetation and small undulations in local topography.

Low-height facilities at the SEZ would not be visible, but taller components, such as the tops of solar dishes, buildings, STG facilities, transmission towers, and plumes (if present), could be visible just above the horizon. If enough of their surface was visible, they could add form, line, and color contrasts, especially for facilities in the northwestern portion of the SEZ.

The potential visual contrast expected for this viewpoint would vary greatly depending on project locations within the SEZ, technologies, and site designs, but under the PEIS 80% development scenario, solar facilities within the SEZ would be expected to create weak to moderate visual contrasts as seen from this viewpoint. Stronger contrast levels would be expected if there were multiple power towers visible in the northwestern portion of the SEZ, and much lower contrast levels would be expected if only low-height solar facilities were located in the northwestern portion of the SEZ.

Farther west of the viewpoint just described, the trail continues more or less westward. Contrast levels continue to decrease slowly as trail users move west. The elevation of the trail slowly drops, while the distance to the SEZ increases, so the already low, vertical angle of view would drop further, and more of the SEZ would be screened by intervening topography. Eventually, after crossing a large wash about 3.2 mi (5.1 km) north-northwest of the SEZ's northwest corner, the trail's elevation begins to rise as the trail approaches the Sierra de Las Uvas. About 1.4 mi (2.3 km) west of the wash, westbound travelers could once again be able to see lower-height facilities in some portions of the SEZ.

Figure 12.2.14.2-11 is a Google Earth visualization of the SEZ as seen from the Butterfield Trail near the westernmost extent of the SEZ's viewshed. The viewpoint is about 5.0 mi (8.0 km) northwest of the northwest corner of the SEZ and about 8.6 mi (13.8 km) west of the gap between the Rough and Ready Hills and the Sleeping Lady Hills. The viewpoint is about 45 ft (14 m) higher in elevation than the nearest point in the SEZ.

The visualization suggests that from this viewpoint, the angle of view would be very low. Hills and low rises between the viewpoint and the SEZ would screen much of the SEZ from view, but similarly to the viewpoint just discussed, if tall power towers were located across the east-west width of the SEZ, they would fill much of the horizontal field of view to the southeast.

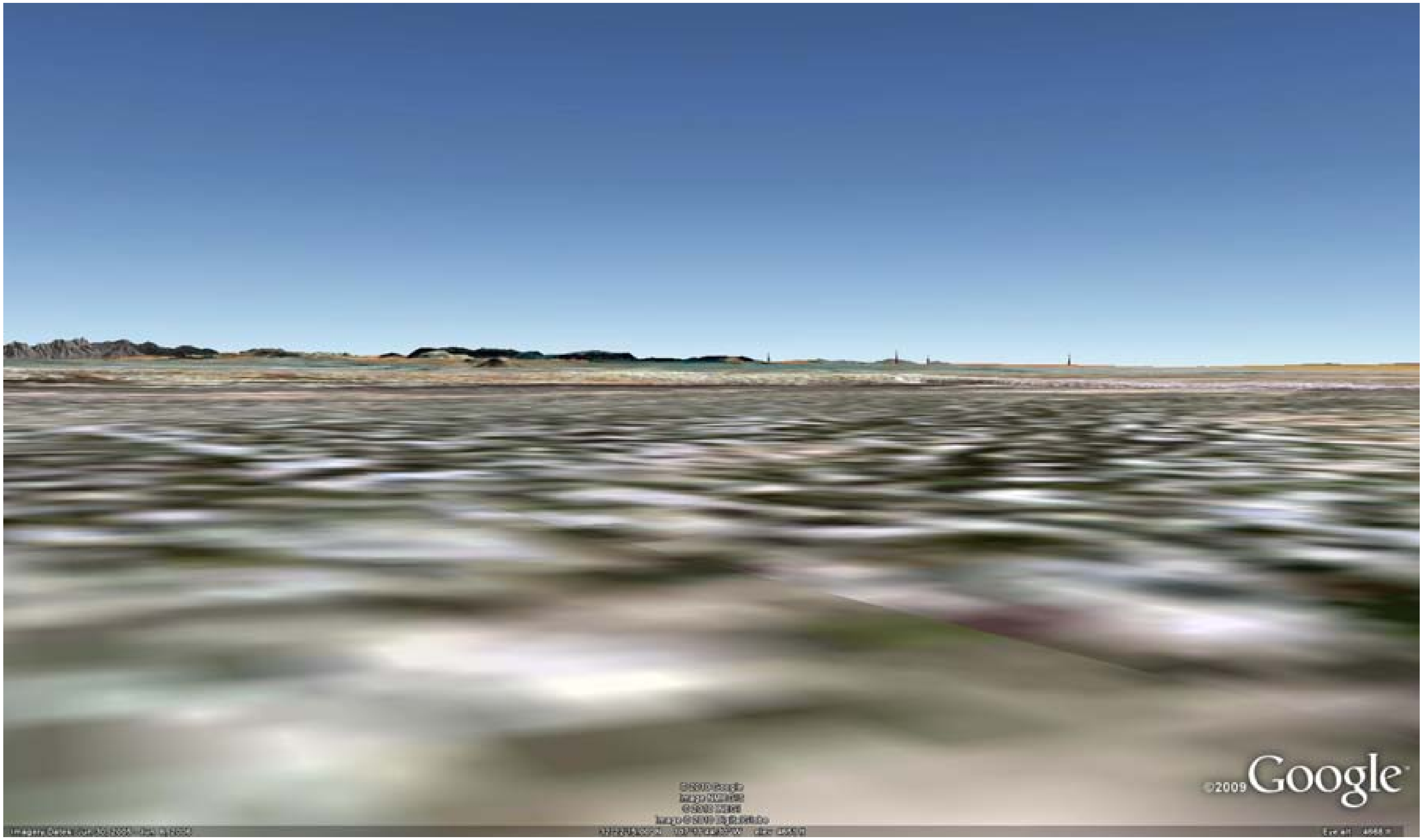

FIGURE 12.2.14.2-11 Google Earth Visualization of the Proposed Mason Draw SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from the Butterfield Trail near the Westernmost Extent of the Proposed Mason Draw SEZ Viewshed

Where visible, collector/reflector arrays of solar facilities in the SEZ would be seen edge-on, greatly reducing their apparent size, concealing their strong regular geometry, and repeating the line of the horizon, thus reducing visual contrasts with the surrounding, strongly-horizontal landscape. Ancillary facilities, such as buildings, transmission towers, cooling towers, and plumes, if present, could be visible, projecting above the collector/reflector arrays. Their forms, lines, and colors, as well as their reflective properties, could add to visual contrasts with the generally natural-appearing and strongly-horizontal surrounding landscape.

Operating power towers in the closer portions of the SEZ would likely be visible as bright, non-point light sources atop discernable tower structures, but if located in the closest portions of the SEZ could be substantially brighter, and could strongly attract visual attention. At night, if sufficiently tall, the towers would have red flashing lights, or white or red flashing strobe lights that would likely be conspicuous, but other lights also would likely be visible in the area. Other lighting associated with solar facilities in the SEZ could be visible as well.

The potential visual contrast expected for this viewpoint would vary greatly depending on project locations within the SEZ, technologies, and site designs, but under the PEIS 80% development scenario, solar facilities within the SEZ would be expected to create moderate visual contrasts as seen from this viewpoint, with stronger contrast levels expected if there were multiple power towers visible in the northwestern portion of the SEZ, and lower contrast levels if only low-height solar facilities were located in the northwestern portion of the SEZ.

Eastbound travelers on the Butterfield Trail would have similar views of solar facilities within the SEZ, but the order would be reversed, with one important potential distinction—if solar facilities also were present in the proposed Afton SEZ, eastbound travelers would see the visual contrasts associated with facilities in that SEZ after seeing any substantial visual contrasts from solar facilities within the proposed Mason Draw SEZ, rather than seeing contrasts from solar facilities in the proposed Afton SEZ before seeing facilities in the proposed Mason Draw SEZ. The viewer would see the contrasts from solar facilities in the proposed Afton SEZ shortly after seeing large contrasts from facilities within the proposed Mason Draw SEZ, which could affect the perception of relative impact from the solar facilities in the two SEZs.

In summary, the Butterfield Trail roughly parallels the northern boundary of the proposed Mason Draw SEZ throughout much of the SEZ viewshed, although in many places topographic screening and the very low angle of view would limit visual contrasts from solar facilities within the SEZ. Visual contrast levels seen from the trail would be highly dependent on the number, location, and height of power towers and other tall solar facility components in the northern portion of the SEZ. Under the 80% development scenario analyzed in the PEIS, potentially, up to strong levels of visual contrasts could be seen from points on the trail if multiple power towers or other tall solar facility components were located in the northern portions of the SEZ, with lower contrasts expected if taller facilities were not located in the northern portions of the SEZ. Regardless, in many portions of the trail within the SEZ viewshed, expected visual contrast levels from solar development in the proposed Mason Draw SEZ would be minimal to weak, due primarily to topographic screening and the very low angle of view between the trail and the SEZ. Finally, from some locations on the Butterfield Trail, solar facilities in the proposed Afton and Mason Draw SEZs could be visible simultaneously, potentially resulting in larger visual impacts.

U.S. 70. U.S. 70, a four-lane highway, enters Las Cruces from the northeast. West of Las Cruces, it shares the same route as I-10, where it travels in a west-southwest to east-northeast direction, near the southern boundary of the proposed Mason Draw SEZ. The AADT value for the shared U.S. 70 and I-10 route in the vicinity of the SEZ is about 16,000 vehicles (NM DOT 2009). About 52 mi (84 km) of U.S. 70 are within the SEZ 25-mi (40-km) viewshed, with 22 mi (35 km) in the 24.6-ft (7.5-m) viewshed.

Solar facilities in the SEZ could be in view for westbound U.S. 70 travelers beyond 25 mi (40 km) east of the SEZ, where they would enter the SEZ viewshed 1.1 mi (1.8 km) southwest of Organ, New Mexico, while descending the lower slopes and bajadas of the Organ Mountains. Visibility of solar facilities within the SEZ would be limited to taller solar facility components, including transmission towers and power towers, which could be visible just over the tops of the Sleeping Lady Hills above the rim of West Mesa. However, at the long distance to the SEZ, the tops of transmission towers would likely be difficult to notice, and operating power tower receivers would appear as distant, star-like points of light just over the Sleeping Lady Hills. At night, if more than 200 ft (61 m) tall, power towers would have navigation warning lights that could potentially be visible from this portion of U.S. 70. Expected contrast levels would be minimal.

As westbound vehicles on U.S. 70 continued down the slope, the already low angle of view would decrease further, and the Sleeping Lady Hills would screen even the tallest solar facility components, so that just west of Las Cruces, U.S. 70 would pass out of the proposed Mason Draw SEZ viewshed altogether until after joining I-10 and ascending to the top of West Mesa. (U.S. 70 would also be subject to potential visual impacts from solar facilities that might be built in the proposed Afton SEZ.)

After joining with I-10 east of West Mesa and subsequently ascending to the top of the mesa, the route would be subject to strong contrast levels from solar development within the proposed Mason Draw SEZ, as well as impacts from solar facilities built within the proposed Afton SEZ. For a detailed description of potential impacts to those portions of U.S. 70 that share the route with I-10 west of Las Cruces, see the Interstate 10 discussion below.

Eastbound U.S. 70 travelers would be subject to similar visual contrast levels as described below for I-10 for the shared portion of the route; however, east of West Mesa, U.S. 70 heads almost directly away from the SEZ, so the SEZ would be almost directly behind eastbound vehicles on U.S. 70. This would substantially decrease both the frequency and duration of views of the SEZ. While taller solar facilities within the SEZ could be visible, given that they would be at a long distance and directly behind eastbound vehicles, both visual contrast levels and associated impacts would likely be minimal.

Interstate 10. I-10, a four-lane interstate highway, extends in a north–south direction through the Mesilla Valley, from El Paso to Las Cruces, then turns east-west in Las Cruces to pass between the proposed Afton and Mason Draw SEZs, then heads more or less straight west across southern New Mexico. The AADT value for I-10 in the vicinity of the SEZ is about

16,000 vehicles at the Las Cruces Airport just north of the SEZ, but as high as 42,700 vehicles at the I-10 – I-25 interchange in Las Cruces, east of the SEZ (NM DOT 2009).

About 53 mi (85 km) of I-10 is within the SEZ viewshed, and solar facilities in the SEZ could be in full view from some portions of I-10 as travelers approached from both directions. This distance would equate to about 45 minutes of total viewing time at highway speeds. I-10 is within the SEZ 24.6-ft (7.5-m) viewshed for about 24 mi (39 km). This distance would equate to about 20 minutes total viewing time at highway speeds.

Within the 25-mi (40-km) SEZ viewshed, northbound travelers on I-10 could first see solar facilities within the SEZ as far south as the vicinity of Vado. However, because of topographic screening by the Sleeping Lady Hills and the rim of West Mesa, views would be sporadic, distant, and almost entirely screened for those portions of I-10. East of the Rio Grande on I-10, solar development in the SEZ would be screened from view with the exception of the upper portions of power towers in the far eastern portion of the SEZ that might be visible above the rim of West Mesa. Where visible, the receiver lights would likely appear as distant star-like points of light just above the rim of West Mesa. At night, if sufficiently tall, the towers would have red flashing lights, or white or red flashing strobe lights that could attract attention, but would be seen above the numerous lights of Las Cruces and the surrounding communities. Expected visual contrast levels associated with solar development in the SEZ as seen from this segment of I-10 would be minimal to weak.

At the I-10–I-25 interchange in Las Cruces, I-10 turns west to ascend the slope to West Mesa and passes out of the viewshed briefly (for about 5.5 mi [8.9 km], or about 5 minutes of travel time). After ascending the slope up to the top of West Mesa, I-10 re-enters the SEZ viewshed, but for about the first 4.7 mi (7.6 km) only taller solar facility components, such as transmission towers and power towers, would be visible in the SEZ, because the Sleeping Lady Hills would still screen most of the SEZ from view. Operating power tower receivers would appear much brighter than they would have from the Mesilla Alley floor, and could appear as very bright point- or non-point light sources immediately above the Sleeping Lady Hills, or in low areas between individual hills. Note that if there was solar development in the proposed Afton SEZ, depending on project locations, types, sizes, and other visibility factors, those facilities could be visible from I-10 in this area and could potentially create strong visual contrasts.

As westbound vehicles approached the southern end of the Sleeping Lady Hills just west of the SEZ, views of the SEZ from I-10 would open up, and expected visual contrast levels would rise rapidly. Figure 12.2.14.2-12 is a Google Earth visualization of the SEZ as seen from I-10, directly south of the Sleeping Lady Hills and about 1.75 mi (2.8 km) southeast of the southeast corner of the SEZ. The view faces northwest toward a cluster of four power tower models in the approximate center of the SEZ. The center of the cluster is about 4.5 mi (7.2 km) from the viewpoint, with the closest tower at about 3.6 mi (5.8 km) from the viewpoint. These distances are all within the BLM VRM program’s foreground–middleground distance of 5 mi (8 km), where visual impacts would typically be greatest. The visualization suggests that from this location, solar facilities in the southern portion of the SEZ would be in full view, but

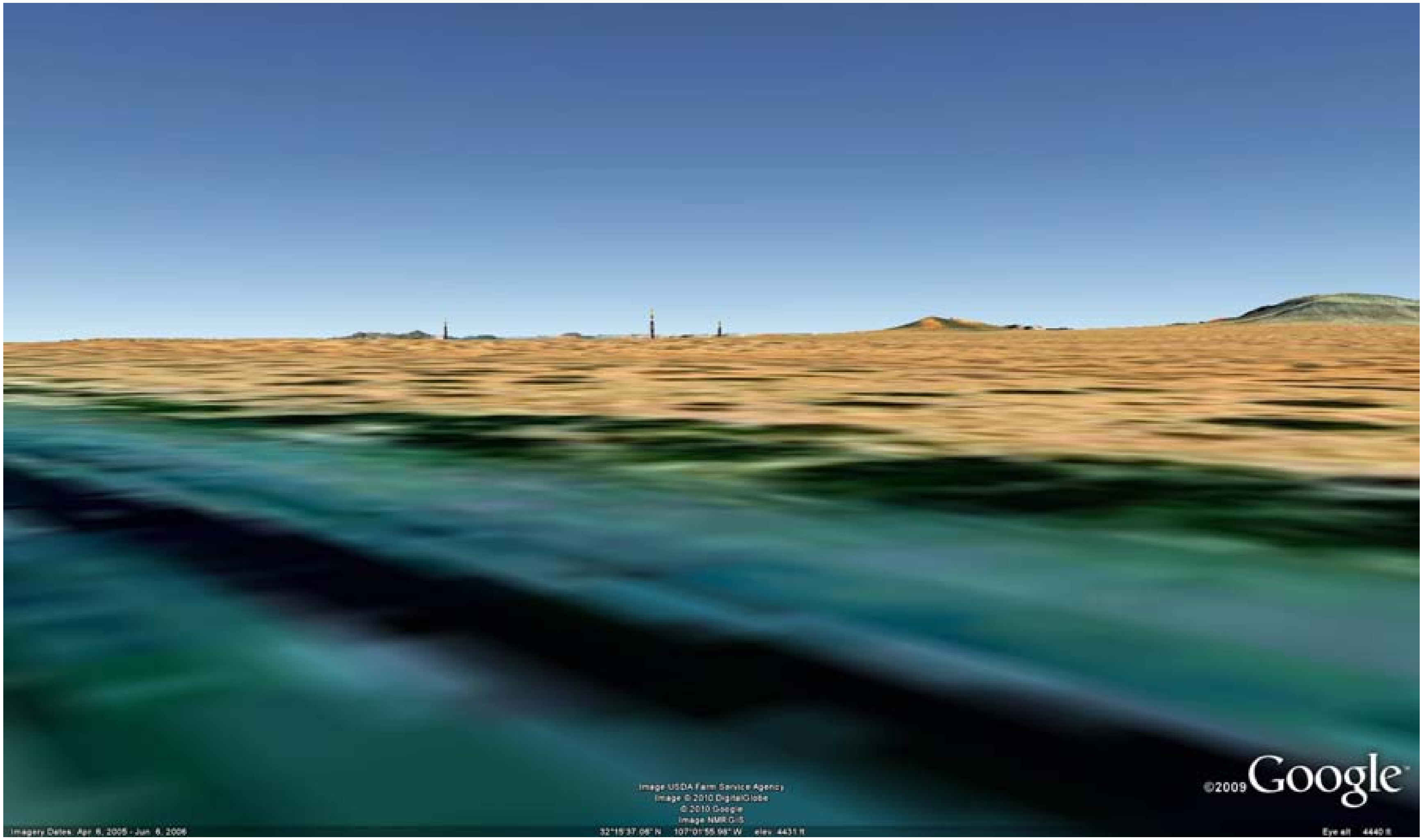

FIGURE 12.2.14.2-12 Google Earth Visualization of the Proposed Mason Draw SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from I-10 South of the Sleeping Lady Hills

facilities in the northern portion of the SEZ could still be screened by the Sleeping Lady Hills. The SEZ would occupy a substantial portion of the horizontal field of view.

Facilities located within the southern portion of the SEZ would strongly attract the eye and likely dominate views from I-10. Structural details of some facility components for nearby facilities would likely be visible. Steam plumes, transmission towers, and other tall facility components would be seen against a sky backdrop, projecting above the Sierra de Las Uvas northwest of the SEZ. From this viewpoint, solar collector arrays would be seen nearly edge on and would repeat the horizontal line of the plain in which the SEZ is situated, which would tend to reduce visual line contrast. However, as the viewer approached the SEZ, the collector arrays could increase in apparent size until their form was visible, and they no longer appeared as horizontal lines.

If power towers were located within the SEZ, close to this viewpoint, the receivers would likely appear as brilliant white nonpoint light sources atop towers with structural details clearly visible. The towers and receivers would strongly attract visual attention.

At night, if sufficiently tall, visible power towers in the SEZ would have red flashing lights, or white or red flashing strobe lights that could be very conspicuous from this viewpoint.

Because of the close proximity of this viewpoint to the SEZ, under the 80% development scenario analyzed in the PEIS, strong visual contrasts from solar energy development within the SEZ would be expected at this viewpoint. Note that at this viewpoint, vehicles would just be passing the western boundary of the proposed Afton SEZ, and solar energy facilities within the Afton SEZ would be falling behind the car, but could still be very conspicuous and likely would dominate views to the south and southeast from this location on I-10.

Under the 80% development scenario analyzed in the PEIS, visual contrast levels would be expected to peak for westbound I-10 travelers directly south of the SEZ, at the point of closest approach of I-10 to the SEZ, about 9.5 mi (15.3 km) west of the Las Cruces Municipal Airport. Figure 12.2.14.2-13 is a Google Earth visualization of the SEZ as seen from the point of closest approach of I-10 to the SEZ, about 0.1 mi (0.2 km) directly south of the SEZ.

The closest tower is approximately 2.4 mi (3.9 km) from the viewpoint. The visualization suggests that from this location, solar facilities within the SEZ would be in full view. The SEZ would occupy more than the entire field of view north of I-10, so travelers would have to turn their heads to scan across the full SEZ. Facilities located within the SEZ would strongly attract the eye and likely would dominate views from I-10. Structural details of facility components for nearby facilities would likely be visible. Steam plumes, transmission towers, and other tall facility components would be seen projecting above collector/reflector arrays against a sky backdrop. From this viewpoint, solar collector arrays would be seen nearly edge on, but they could be large enough in apparent size/height that their forms would be visible, and they would no longer appear as horizontal lines.

If power towers were located within the SEZ close to this viewpoint, the receivers would likely appear as brilliant white non-point light sources atop towers with structural details that are

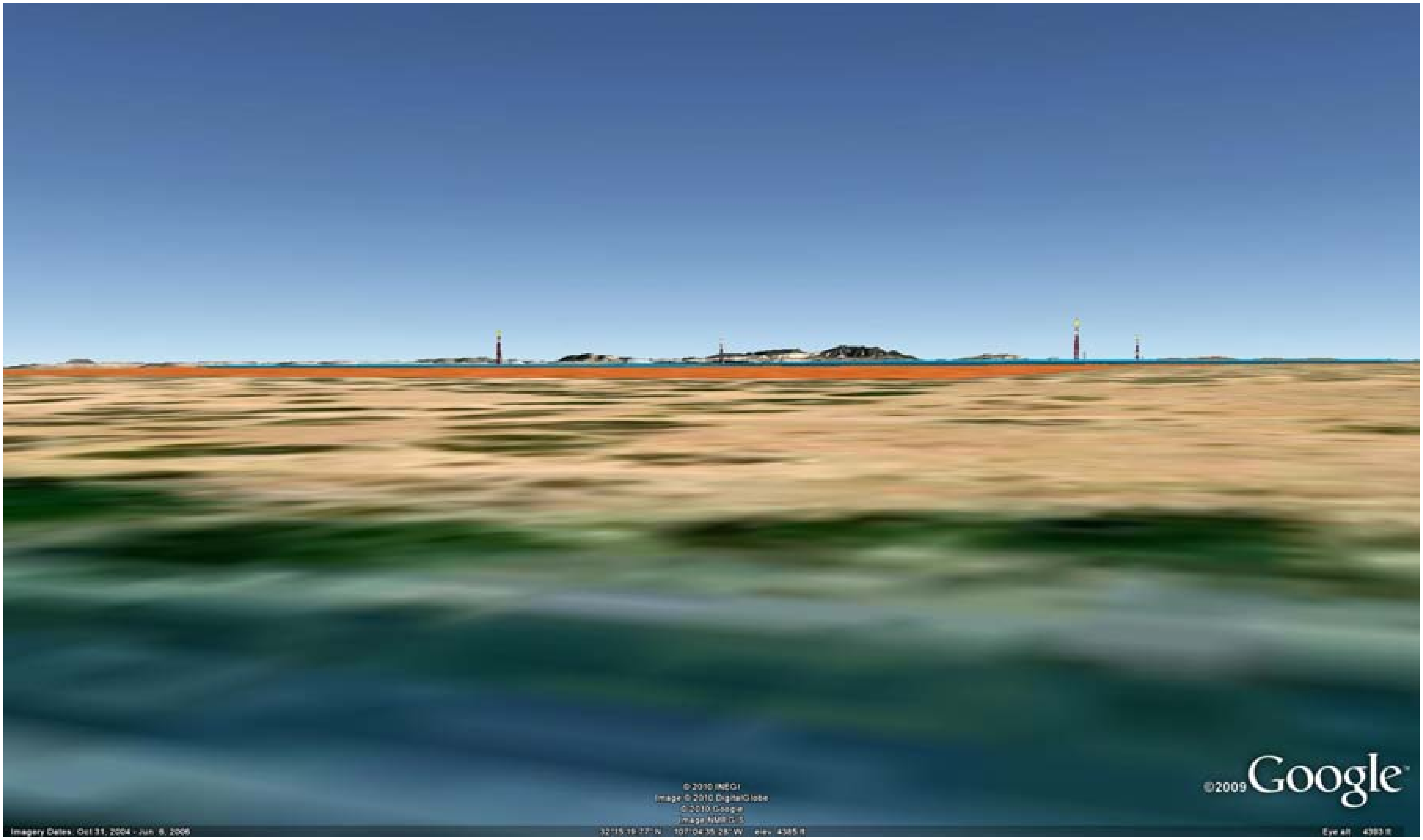

FIGURE 12.2.14.2-13 Google Earth Visualization of the Proposed Mason Draw SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from I-10 South of the SEZ

clearly discernable. The towers and receivers would strongly attract visual attention. At night, if sufficiently tall, visible power towers in the SEZ would have red flashing lights, or white or red flashing strobe lights that could be very conspicuous from this viewpoint. Other lighting associated with solar facilities in the SEZ could be visible as well.

Under the 80% development scenario analyzed in the PEIS, the SEZ could contain numerous solar facilities utilizing differing solar technologies as well as a variety of roads and ancillary facilities. The array of facilities could create a visually complex landscape that would exceed the visual absorption capability of the flat mesa in which the SEZ is located, leading to a perception of visual clutter that would likely be perceived negatively by many viewers. Because the SEZ would occupy so much of the horizontal field of view, although contrast levels would depend on the project's location within the SEZ, the types of solar facilities and their designs, and other visibility factors, strong visual contrasts from solar energy facilities within the SEZ would be expected at this viewpoint, with the strongest contrast levels occurring if large solar facilities, particularly power towers, were located in the far southern portions of the SEZ.

Shortly after vehicles pass the point of maximum visual contrast levels, westbound vehicles would pass the western end of the SEZ, and impacts from solar development would decrease rapidly, as the SEZ would be behind the vehicles.

Eastbound travelers on I-10 would see the same sorts and levels of visual contrasts from solar development within the proposed Mason Draw SEZ; however, lower height solar facilities within the SEZ would be in view for a relatively longer distance (and therefore longer driving time) compared to the approach from the east over the rim of West Mesa. Solar facilities within the SEZ would likely be in view longer, with much more gradual buildup in apparent size and visual contrast, which could affect perceptions of visual impacts from the facilities. While taller solar facilities within certain parts of the SEZ could come into view beyond 25 mi (40 km) west of the SEZ, lower-height facilities could come into view briefly (less than a 1-minute duration at highway speeds) about 22 mi (35 km) from the SEZ. I-10 would then be out of the SEZ's 7.5-m (24.6-ft) viewshed because of screening by intervening topography until about 14 mi (23 km) from the SEZ. After re-entering the 7.5-m (24.6-ft) viewshed, over the next 12 minutes or so, visual contrast levels would very quickly reach strong to very strong levels.

Past the Sleeping Lady Hills, visual contrasts would diminish substantially, but for a vehicle that descended from West Mesa into Mesilla Valley and turned south, solar facilities within the SEZ could be in view on the right side as the vehicle traveled down the Mesilla Valley, with expected contrast levels as described above (minimal to weak). Perceived impact levels would drop off further as the vehicle headed south down the valley, as the distance from the SEZ increased, and the viewing direction would be behind the vehicle.

In summary, solar facilities within the SEZ could be in view from I-10 for about 45 minutes of driving time at highway speeds, but most travelers' views would be much briefer. Facilities within the SEZ could be in view for about 63 mi (85 km) of the roadway, from more than 25 mi (40 km) west of the SEZ to beyond Vado. Northbound travelers could first see the upper portions of tall power towers within the SEZ near Vado, with a slight increase in contrast levels as I-10 passed north up the Mesilla Valley. The SEZ would pass out of view briefly after

I-10 turns west at Las Cruces, but solar facilities would be visible again (with partial screening) after vehicles ascended to the West Mesa. Solar facilities within the SEZ would come into full view as vehicles passed the Sleeping Lady Hills. Contrast levels would peak shortly thereafter, straight south of the SEZ. Depending on the location, type, and height of solar facility components in the SEZ, visual contrast levels could be strong. Eastbound travelers on I-10 would experience a more gradual build-up of visual contrast as they approached the SEZ across West Mesa.

Interstate 25. I-25, a four-lane interstate highway, extends north-south through the Mesilla Valley in the SEZ viewshed, from Las Cruces to just north of the community of Radium Springs. The AADT value for I-25 in the vicinity of the SEZ ranges from about 10,000 vehicles at the I-25–I-10 interchange in Las Cruces to 39,200 vehicles at the East Lohman Avenue interchange, and 16,300 vehicles north of the U.S. 70 interchange (NM DOT 2009). About 12 mi (19 km) of I-25 passes through the 650-ft (198.1-m) viewshed of the SEZ about 15 mi (24 km) east of the SEZ, extending northwest to southeast. The largest section of I-25 within the SEZ viewshed extends from the southern terminus of I-25 (at its junction with I-10) north to the vicinity of Dona Ana, a distance of about 10 mi (16 km). I-25 then passes out of the SEZ viewshed and then re-enters it for about 1.6 mi (2.6 km) north of Radium Springs, after leaving the Mesilla Valley.

For those portions of I-25 within the 650-ft (198.1-m) viewshed of the SEZ, the Sleeping Lady Hills and the eastern rim of West Mesa would provide nearly complete screening of the entire SEZ from the roadway. If sufficiently tall power towers were located in certain portions of the SEZ, when operating, the receivers could potentially be visible just over the eastern rim of West Mesa from those portions of I-25 within the viewshed south of Radium Springs, or through gaps in the Robledos Mountains for those portions of the route within the viewshed north of Radium Springs. However, at a minimum of 15 mi (24 km) from the SEZ (and considerably farther for some of the roadway), if visible, a receiver could appear as a point of light immediately above West Mesa. At night, if more than 200 ft (61 m) tall, power towers would have navigation warning lights that could potentially be visible from this portion of I-25. Given the nearly complete screening of the SEZ from I-25, there would be a small likelihood of seeing a power tower in the SEZ; however, even if power towers were visible, minimal visual contrast levels would be expected.

Communities of Las Cruces, University Park, Mesilla, Spaceport City, San Miguel, Mesquite, and Vado. The viewshed analyses indicate potential visibility of solar facilities within the SEZ from the communities of Las Cruces, University Park, Mesilla, and other communities surrounding Las Cruces; Spaceport City; Mesquite; and Vado. These communities are located from 15 to 25 mi (24 to 40 km) from the SEZ.

Visibility of solar facilities within these communities would be limited to the upper portions of taller power towers located in the SEZ at points where they would be visible over the Sleeping Bear Hills west of the SEZ. The Sleeping Bear Hills screen nearly the entire SEZ from view from the Mesilla Valley. Screening by small undulations in topography, vegetation, buildings, or other structures would likely further restrict or eliminate visibility of the SEZ and associated solar facilities from many locations within these communities, but a detailed future site-specific NEPA analysis is required to precisely determine visibility. Expected contrast levels in these communities would be minimal in any event, because of the long distance to the SEZ, but could be nonexistent in some cases.

Other Impacts. In addition to the impacts described for the resource areas above, nearby residents and visitors to the area might 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 traveled area roads, including but not limited to I 10, I 25, and U.S. 70, as noted above. 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 this PEIS, from some locations, strong visual contrasts from solar development within the SEZ could potentially be observed.

12.2.14.2.3 Summary of Visual Resource Impacts for the Proposed Mason Draw SEZ

Because under the 80% development scenario analyzed in this PEIS there could be numerous solar facilities within the SEZ, a variety of technologies employed, and a range of supporting facilities that would contribute to visual impacts, a visually complex, man-made appearing industrial landscape could result. This essentially industrial-appearing landscape would contrast greatly with the surrounding generally natural-appearing lands. Therefore, large visual impacts on the SEZ and surrounding lands within the SEZ viewshed would be associated with solar energy development within the proposed Mason Draw SEZ because of major modification of the character of the existing landscape. The potential exists for additional impacts from construction and operation of transmission lines and access roads.

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

Utility-scale solar energy development within the proposed Mason Draw SEZ is likely to result in moderate to strong visual contrasts at some viewpoints within the Aden Hills SRMA, which is within 2.4 mi (3.9 km) of the SEZ, at the point of closest approach. Seventeen miles (27 km) of the Butterfield Trail are within the SEZ's 25-mi (40-km) viewshed. Strong visual contrasts associated with solar facilities in the SEZ could be observed from some points on the Trail.

I-10 (and U.S. 70, which shares a route with I-10 in the vicinity of the SEZ) passes very close to the SEZ, and travelers on the highway could be subjected to strong visual contrasts from solar development within the SEZ, but typically their exposure would be brief.

12.2.14.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features have been identified to protect visual resources for the proposed Mason Draw 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 the programmatic design features presented in Appendix A, Section A.2.2, would be expected to reduce the magnitude of visual impacts experienced; 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 typical lack of screening vegetation and landforms within the SEZ viewshed, locating 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 be generally limited.

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12.2.15 Acoustic Environment

12.2.15.1 Affected Environment

The proposed Mason Draw SEZ is located in the west-central portion of Dona Ana County in south–central New Mexico. Neither the State of New Mexico nor Dona Ana County has established quantitative noise-limit regulations applicable to solar energy development.

I-10 runs east–west as close as about 500 ft (150 m) to the south. There is a good access road from the interchange off I-10, and several roads run through the SEZ. The nearest railroad runs as close as about 5 mi (8 km) to the southwest of the SEZ. Nearby airports include Las Cruces International Airport and Stahmann Farms Airfield (listed as an abandoned field but used by cropdusters on occasion), about 8 mi (13 km) east and 18 mi (29 km) east–southeast of the SEZ, respectively. Privately owned Burris E Station Airport is located about 3 mi (5 km) west–southwest of the SEZ, but it is permanently closed. No industrial activities occur around the SEZ, but a transmission line, water pipeline, telephone cable, and facilities for livestock grazing exist within the SEZ. Small-scale agricultural activities occur about 3 mi (5 mi) east of the SEZ. Large-scale irrigated agricultural lands exist about 12 mi (19 km) to the east in the fertile Mesilla Valley. No recreational land use except quail hunting occurs within the SEZ. No sensitive receptors (e.g., residences, hospitals, schools, or nursing homes) exist close to the proposed Mason Draw SEZ. The nearest residences lie about 3.1 mi (5.0 km) east of the SEZ, around the small-scale agricultural lands. Many large and small population centers are developed in the Mesilla Valley, including Dona Ana, Las Cruces, Mesilla, Picacho, and University Park to the east, but they are more than 12 mi (19 km) from the SEZ. Accordingly, noise sources around the SEZ include road traffic, railroad traffic, aircraft flyover, agricultural activities, livestock grazing, and quail hunting. The proposed Mason Draw SEZ is mostly undeveloped, and its overall character is considered to be rural. Background noise levels in the most areas of the SEZ would be lower, except areas to the south of the SEZ along I-10. To date, no environmental noise survey has been conducted around the proposed Mason Draw SEZ. On the basis of the population density, the day–night average noise level (L_{dn} or DNL) is estimated to be 39 dBA for Dona Ana County, typical of a rural area (33 to 47 dBA L_{dn}) (Eldred 1982; Miller 2002).[10]

12.2.15.2 Impacts

Potential noise impacts associated with solar projects in the Mason Draw SEZ would occur during all phases of the projects. During the construction phase, potential noise impacts on the nearest residences (about 3.1 mi [5.0 km] to the east of the SEZ boundary) associated with operation of heavy equipment and vehicular traffic would be anticipated, albeit of short duration. During the operations phase, potential impacts on nearby residences would be anticipated, depending on the solar technologies employed. Noise impacts shared by all solar technologies

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

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 Mason Draw 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 (see Section 12.2.15.3 below). This section primarily addresses potential noise impacts on humans, although potential impacts on wildlife at nearby sensitive areas are discussed, Additional discussion on potential noise impacts on wildlife is presented in Section 5.10.2.

12.2.15.2.1 Construction

The proposed Mason Draw SEZ has a relatively flat terrain; thus, minimal site preparation activities would be required, and associated noise levels would be lower than those during general construction (e.g., erecting building structures and installing equipment, piping, and electrical).

For the parabolic trough and power tower technologies, the highest construction noise levels would occur at the power block area, where key components (e.g., steam turbine/ generator) needed to generate electricity are located; a maximum of 95 dBA at a distance of 50 ft (15 m) is assumed, if impact equipment such as pile drivers or rock drills is not being used. Typically, the power block area is located in the center of the solar facility, at a distance of more than 0.5 mi (0.8 km) from the facility boundary. Noise levels from construction of the solar array would be lower than 95 dBA. When geometric spreading and ground effects are considered, as explained in Section 4.13.1, noise levels would attenuate to about 40 dBA at a distance of 1.2 mi (1.9 km) from the power block area. This noise level is typical of daytime mean rural background levels. In addition, mid- and high-frequency noise from construction activities is significantly attenuated by atmospheric absorption under the low-humidity conditions typical of an arid desert environment, and by temperature lapse conditions typical of daytime hours; thus, noise attenuation to a 40-dBA level would occur at distances somewhat shorter than 1.2 mi (1.9 km). If a 10-hour daytime work schedule is considered, the EPA guideline level of 55 dBA L_{dn} for residential areas (EPA 1974) would occur about 1,200 ft (370 m) from the power block area, which would be well within the facility boundary. For construction activities occurring near the residences closest to the eastern SEZ boundary, estimated noise levels at the nearest residences would be about 29 dBA, which is well below the typical daytime mean rural background level of 40 dBA. In addition, an estimated 40-dBA L_{dn}[11] at these residences (i.e., no contribution from construction activities) is well below the EPA guidance of 55 dBA L_{dn} for residential areas.

It is assumed that a maximum of two projects at any one time would be developed for SEZs greater than 10,000 acres (40.5 km^2) but less than 30,000 acres (121.4 km^2), such as the Mason Draw SEZ. If two projects were to be built in the eastern portion of the SEZ near the closest residences, noise levels would be about 3 dBA higher than the above-mentioned value

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

(29 dBA), equivalent to a just-noticeable increase of about 3 dBA over a single project, but increase only 0.2 dBA in L_{dn}.

There are no specially designated areas within 5 mi (8 km) of the Mason Draw SEZ, which is the farthest distance that noise, except extremely loud noise, would be discernable. Thus, noise impacts for nearby specially designated areas were not modeled.

Depending on soil conditions, pile driving might be required for installation of solar dish engines. However, the pile drivers used, such as vibratory or sonic drivers, would be relatively small and quiet, in contrast to the impulsive impact pile drivers frequently used at large-scale construction sites. Potential impacts on the nearest residences would be anticipated to be negligible, considering the distance to the nearest residences (about 3.1 mi [5.0 km] from the eastern 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 Mason Draw SEZ would cause some unavoidable, but localized, minimal, short-term noise impacts on neighboring communities, even when construction activities would occur near the eastern SEZ boundary, close to the nearest residences.

Construction activities could result in various degrees of ground vibration, depending on the equipment used and construction methods employed. All construction equipment causes ground vibration to some degree, but activities that typically generate the most severe vibrations are high-explosive detonations and impact pile driving. As is the case for noise, vibration would diminish in strength with distance. For example, vibration levels at receptors beyond 140 ft (43 m) from a large bulldozer (87 VdB at 25 ft [7.6 m]) would diminish below the threshold of perception for humans, which is about 65 VdB (Hanson et al. 2006). During the construction phase, no major construction equipment that can cause ground vibration would be used, and no residences or sensitive structures are 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, based on the assumptions that the existing regional 115-kV transmission line might be used to connect some new solar facilities to load centers and that additional project-specific analysis would be performed for new transmission construction or line upgrades. However, some construction of transmission lines could occur within the SEZ. Potential noise impacts on nearby residences would be a minor component of construction impacts in comparison to solar facility construction, and would be temporary in nature.

12.2.15.2.2 Operations

Noise sources common to all or most types of solar technologies include equipment motion from solar tracking; maintenance and repair activities (e.g., washing mirrors or replacing broken mirrors) at the solar array area; commuter/visitor/support/delivery traffic within and around the solar facility; and control/administrative buildings, warehouses, and other auxiliary buildings/structures. Diesel-fired emergency power generators and 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 eastern SEZ boundary, the predicted noise level would be about 32 dBA at the nearest residences, located about 3.1 mi (5.0 km) from the SEZ boundary, which is lower than the typical daytime mean rural background level of 40 dBA. If TES were not used (i.e., if the operation were limited to daytime, 12 hours only[12]), 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 would be operating close to the nearest residences, combined noise levels would be about 3 dBA higher than the above-mentioned value (32 dBA), equivalent to a just-noticeable increase of about 3 dBA over a single facility, but increase only 0.4 dBA in L_{dn}. However, day–night average noise levels higher than those estimated above by using simple noise modeling would be anticipated if TES were used during nighttime hours, as explained below and in Section 4.13.1.

On a calm, clear night typical of the proposed Mason Draw SEZ setting, the air temperature would likely increase with height (temperature inversion), because of strong radiative cooling. Such a temperature profile tends to focus noise downward toward the ground. There would be little, if any, shadow zone[13] within 1 or 2 mi (2 or 3 km) of the noise source in the presence of a strong temperature inversion (Beranek 1988). In particular, such conditions add to the effect of noise being more discernable during nighttime hours, when the background 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

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

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

(see Section 4.13.1). On the basis of these assumptions, the estimated nighttime noise level at the nearest residences (about 3.1 mi [5.0 km] from the eastern SEZ boundary) would be 42 dBA, which is higher than the typical nighttime mean rural background level of 30 dBA. The day–night average noise level is estimated to be about 45 dBA L_{dn}, which is still well below the EPA guideline of 55 dBA L_{dn} for residential areas. The assumptions are conservative in terms of operating hours, and no credit was given to other attenuation mechanisms, so it is likely that noise levels would be lower than 45 dBA L_{dn} at the nearest residences, even if TES were used at a solar facility. As for construction, if two projects were to be built within the SEZ near the closest residences, noise levels would be about 3 dBA higher than the above-mentioned value (42 dBA), equivalent to a just-noticeable increase of about 3 dBA over a single project, but increase about 2 dBA in L_{dn}. Consequently, operating parabolic trough or power tower facilities using TES and located near the eastern SEZ boundary could result in minor adverse noise impacts on the nearest residences, depending on background noise levels and meteorological conditions. In the permitting process, refined noise propagation modeling would be warranted, along with measurement of background noise levels.

The solar dish engine is unique among CSP technologies, because it generates electricity directly and does not require a power block. A single, large solar dish engine has relatively low noise levels, but a solar facility might employ tens of thousands of dish engines, which would cause high noise levels around such a facility. For example, the proposed 750-MW SES Solar Two dish engine facility in California would employ as many as 30,000 dish engines (SES Solar Two, LLC 2008). At the proposed Mason Draw SEZ, on the basis of the assumption of dish engine facilities of up to 1,147-MW total capacity (covering 80% of the total area, or 10,327 acres [41.8 km^2]), up to 45,900 25-kW dish engines could be employed. For a large dish engine facility, several hundred 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 46 dBA at 2 mi (3.2 km) from the boundary of the square-shaped dish engine solar field; both values are higher than the typical daytime mean rural background level of 40 dBA. However, these levels would occur at somewhat shorter distances than the aforementioned distances, considering noise attenuation by atmospheric absorption and temperature lapse during daytime hours. To estimate noise levels at the nearest residences, it was assumed dish engines were placed all over the Mason Draw SEZ at intervals of 98 ft (30 m). Under these assumptions, the estimated noise level at the nearest residences, about 3.1 mi (5.0 km) east of the SEZ boundary, would be about 43 dBA, which is a little higher than above the typical daytime mean rural background level of 40 dBA. On the basis of 12-hr daytime operation, the estimated 43 dBA L_{dn} at these residences is well below the EPA guideline of 55 dBA L_{dn} for residential areas. On the basis of other noise attenuation mechanisms, noise levels at the nearest residences would be lower than the values estimated above. Noise from dish engines could cause adverse impacts on the nearest residences, depending on background noise levels and meteorological conditions. Thus, consideration of minimizing noise impacts is very important during the siting of dish engine facilities. Direct mitigation of dish engine noise through noise control engineering could also limit noise impacts.

During operations, no major ground-vibrating equipment would be used. In addition, no sensitive structures are located close enough to the proposed Mason Draw SEZ to experience physical damage. Therefore, during operation of any solar facility, potential vibration impacts on surrounding communities and vibration-sensitive structures would be negligible.

Transformer-generated humming noise and switchyard impulsive noises would be generated during the operation of solar facilities. These noise sources would be located near the power block area, typically near the center of a solar facility. Noise from these sources would generally be limited within the facility boundary and not be heard at the nearest residences, assuming a 3.6-mi (5.8-km) distance (at least 0.5 mi [0.8 km] to the facility boundary and 3.1 mi [5.0 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, respectively (Lee et al. 1996), 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 to it (e.g., within 500 ft [152 m] of a 230-kV transmission line). The proposed Mason Draw 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.

12.2.15.2.3 Decommissioning/Reclamation

Decommissioning/reclamation requires many of the same procedures and equipment used in traditional construction. Decommissioning/reclamation would include dismantling of solar facilities and support facilities such as buildings/structures and mechanical/electrical installations, disposal of debris, grading, and revegetation as needed. Activities for decommissioning would be similar to those 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.

12.2.15.3 SEZ-Specific Design Features and Design Feature Effectiveness

The implementation of required programmatic design features described in 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 Mason Draw SEZ during construction and operation would be anticipated to cause only minor increases in noise levels at the nearest residences and specially designated areas. Accordingly, SEZ-specific design features are not required.

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12.2.16 Paleontological Resources

12.2.16.1 Affected Environment

The proposed Mason Draw SEZ is composed primarily (7,462 acres [30.2 km^2], or 58% of the SEZ) of unclassified Quaternary surface deposits (classified as QTs on geologic maps) of the Upper Santa Fe Group. The PFYC (as discussed in Section 4.14) for QTs is Class 4/5 (on the basis of the PFYC GIS data from the New Mexico State BLM Office [Hester 2009]). Portions of the SEZ contain young alluvial sediments that are less than 10,000 years old with little or no paleontological potential. These areas, comprising 2,781 acres (11.3 km^2), or 21.5% of the SEZ, are PFYC Class 1. Other portions, totaling 2,391 acres (9.7 km^2), or 18.5% of the SEZ, contain andesitic intermediate volcanic units. While these volcanic units are unlikely to contain preserved organic material themselves, interbedded sediments dating to the Oligocene and Eocene have some potential to contain preserved materials, and, therefore, the PFYC for these areas is Class 2. Additional diffuse portions of the Mason Draw SEZ are composed of igneous rocks unlikely to contain paleontological resources; 59 acres (0.2 km^2) of igneous rocks are classified as PFYC Class 1 (0.4%). However, ash flow tuffs may preserve fossil material, and these areas (215 acres [0.9 km^2], 1.6% of SEZ) have a PFYC of Class 2.

A review of known localities of paleontological resources within New Mexico from the New Mexico State BLM Office indicated no known localities within the proposed Mason Draw SEZ and one locality within 5 mi (8 km) of the SEZ to the west. The one locality contains two mammoth tusks found in an ash flow. Additional localities in the vicinity to the east in the Robledos Mountains (Prehistoric Trackways National Monument) and southeast of the SEZ in the Camp Rice Formation of the Upper Santa Fe Group are discussed in Section 12.1.16.1 for the Afton SEZ.

12.2.16.2 Impacts

On the basis of the PFYC classification for this area, there could be impacts on significant paleontological resources in the proposed Mason Draw SEZ, although the presence of such resources is currently unknown. A more detailed look at the geological deposits of the SEZ and their depth is needed, as well as a paleontological survey prior to development in PFYC Class 4/5 areas, in accordance with BLM IM2008-009 and IM2009-011 (BLM 2007, 2008b). For PFYC Class 1 and PFYC Class 2 areas, further assessment of paleontological resources is not likely to be necessary; however, important resources could exist; if any are identified, they would need to be managed on a case-by-case basis. Section 5.14 discusses the types of impacts that could occur if significant paleontological resources are found to be present within the Mason Draw SEZ during a paleontological survey. 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 would be conducted.

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 accessible. However, such impacts are possible given the paleontological potential of the surrounding area, especially if surface outcrops are present. If resources are discovered in the area during a paleontological survey for a particular project, a management plan should address a potential training program and a periodic monitoring schedule for the project boundaries. Programmatic design features for controlling water runoff and sedimentation would prevent erosion-related impacts on buried deposits outside of the SEZ.

No new access roads or transmission line ROWs are anticipated for the proposed Mason Draw SEZ, based on the assumption that existing corridors would be used; thus no impacts on paleontological resources are anticipated related to the creation of new access pathways. However, 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.

The programmatic design feature requiring a stop work order in the event of an inadvertent discovery of paleontological resources would reduce impacts by preserving some information and allowing possible excavation of the resource, if warranted. Depending on the significance of the find, it could also result in some modifications to the project footprint. Since the SEZ is located in an area classified as PFYC 4/5, a stipulation would be included in the permitting document to alert the solar energy developer that there is the possibility of a delay if paleontological resources are uncovered during surface-disturbing activities.

12.2.16.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

The need for and the nature of any SEZ-specific design features would depend on the results of future paleontological investigations.

12.2.17 Cultural Resources

12.2.17.1 Affected Environment

12.2.17.1.1 Prehistory

The proposed Mason Draw SEZ is located near the proposed Afton SEZ, and the Mason Draw site follows the same prehistoric sequence as presented for the Afton site in Section 12.1.17.1.[14]

12.2.17.1.2 Ethnohistory

The proposed Mason Draw SEZ is located on an upland plateau west of the Mesilla Valley of the Rio Grande. When Spanish explorers first entered the general area in the sixteenth century, they considered the area between El Paso and Socorro unoccupied, most likely because they were unaware of Apache in the overlooking mountains (Kirkpatrick et al. 2001). However, this territory was traditionally used by the Chiricahua Apache (Opler 1941, 1983b) and historically was within the range of the Manso, who appear to have been allied with the Apache (Griffen 1983). Given its location, the site of the proposed SEZ is likely to have been used primarily for hunting and gathering and is also likely to have been known to the Tigua and Piros Pueblos located near modern El Paso, as well as the Chiricahua and Manso (Schroeder 1979; Houser 1979).

Chiricahua Apache

Traditionally, the Chiricahua Apache were hunters and gatherers based in the mountains of southern New Mexico and northern Mexico west of the Rio Grande, and in southeastern Arizona (Opler 1941, 1983b). A brief ethnohistory of the Chiricahua is presented in Section 12.1.17.1.2

Manso

The proposed SEZ also lies in the traditional range associated with the Manso. The Spanish first encountered the Manso, sometimes called Manso Apache, near present-day El Paso. They called them *manso*, tame or peaceful, because of their initial peaceful encounter. Little is known of their affiliation, but they may have been Apache allies (Griffen 1983; Opler 1983a).

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[14] Distances presented in the prehistoric context from the proposed Afton SEZ to various known sites and areas would be roughly similar for the Mason Draw SEZ, which is 3 mi (5 km) northwest of Afton SEZ. Distances to the north would be roughly 6 mi (10 km) shorter, to the east 20 mi (32 km) longer, to the south 12 mi (20 km) longer, and to the west 6 mi (10 km) shorter.

The Manso form one element of the Tigua community of Tortugas in Las Cruces, associated with the Pueblo of Ysleta del Sur in El Paso (Houser 1979).

Piro

The Piros are possible descendants of the Jornada Mogollon. When first encountered by Coronado in 1540, Piro pueblos stretched along the banks of the Rio Grande from Mogollon Gulch to the Rio Solado. They were farmers, employing both irrigation and rainfall agriculture. They grew the traditional maize, beans, and squash along with cotton. Bison and turkey meat supplied protein. Their numbers appear to have declined in the ensuing century, and by 1670 they were reduced to four pueblos. Left out of the conspiracy, they retreated south with the Spanish during the Pueblo Revolt of 1680. Many Piros remained in the south and have joined with Ysleta del Sur or the Tortugas community in Las Cruces (Schroeder 1979).

12.2.17.1.3 History

The historic framework for the area of the proposed Mason Draw SEZ also follows closely with that of the Afton SEZ area and is summarized in Section 12.1.17.1.3. Historic properties of most relevance are discussed below in Section 12.2.17.1.5, and distances to those properties from the SEZ are provided in that section.

12.2.17.1.4 Traditional Cultural Properties—Landscape

While thus far no specific features within the proposed Mason Draw SEZ have been identified as culturally important by Native Americans, the Potrillo and Florida Mountains southwest of the proposed SEZ are known to have been exploited by the Chiricahua Apache and may retain cultural importance. In general, the mountains surrounding Chiricahua territory were traditionally seen as the homes of the Mountain People, beneficent supernatural beings who shielded the Chiricahua from disease and invasion. From the Chiricahuan perspective, the universe is pervaded by supernatural power that individuals may acquire for healing, success in hunting, or other purposes. The power is made available through personified natural features and phenomena such as plants, animals, wind, lightning, or celestial bodies. This power is often acquired at its sacred home, usually in or near a well-known landmark (Opler 1941, 1947). Natural features may thus be of importance in the quest for this power (Opler 1983a,b; Cole 1988). Salinas Peak located 73 mi (188 km) to the northeast in the San Andres Mountains has been identified such a location for the Eastern Chiricahua (WSMR 1998). Ancient artifacts may also be important. Stone projectile points found in the landscape were traditionally seen as the result of arrows sent by the Lightning People during thunderstorms (Opler 1941).

12.2.17.1.5 Cultural Surveys and Known Archaeological and Historical Resources

The proposed Mason Draw SEZ encompasses 12,909 acres (52 km^2), of which 187 acres (0.75 km^2), covering about 2% of the SEZ, have been surveyed. These surveys have resulted in the recording of three cultural resources within the boundaries of the SEZ (Hewitt 2009b; Fallis 2010). Within 5 mi (8 km) of the proposed Mason Draw SEZ, 5,563 acres (23 km^2), about 5% of the 5-mi (8-km), buffer area have been surveyed. As a result of these surveys, 108 sites have been recorded, 12 of which are considered eligible for inclusion in the NRHP. Two sites have not been evaluated, and no information on eligibility status of the remaining 94 sites was available in the GIS data (Fallis 2010). One eligible site is Fort Mason, also known as Slocum's Ranch, Mason's Ranch Site, and Mason Stage Stop Station. The site is approximately 3 mi (5 km) from the northwest corner of the proposed SEZ. It is along the Butterfield Trail, or Butterfield Overland Mail Trail, and served as a stage stop from 1877 to 1883. Use of the wagon trail decreased rapidly with the completion of the railroad in 1881. Remnants of the adobe structure remain.

The BLM has designated several ACECs and SMAs in the vicinity of the proposed Mason Draw SEZ, as these areas have been determined to be rich in cultural resources and worthy of having the resources managed and protected by the BLM. The Los Tules ACEC is 14 mi (23 km) east of the proposed Mason Draw SEZ. The ACEC was designated to protect a large pithouse village site that is the type site for the Jornada variant of the Mogollon culture. Twenty-four miles (39 km) east of the SEZ is the Organ/Franklin Mountain ACEC, a 56,480-acre (229-km^2) area that contains the NRHP eligible sites of La Cueva and Dripping Springs. The Robledo Mountain ACEC is 8 mi (13 km) northeast of the SEZ and includes some of the earliest known habitation sites in New Mexico. The cultural resources in the Dona Ana Mountains ACEC are located 17 mi (27 km) northeast of the SEZ. On the north side of San Diego Mountain are several hundred of the most undisturbed petroglyphs in the Mimbres Resource Area, representing the Jornada culture. They are located within the San Diego Mountain ACEC, 19 mi (31 km) north of the SEZ. The Rincon ACEC is also a petroglyph site representative of the Jornada culture, 24 mi (39 km) north of the SEZ. About 31 mi (50 km) west of the proposed Mason Draw SEZ is the Cooke's Range ACEC. Resources protected by this ACEC include Fort Cummings, a fort established in 1863 to protect travelers on the emigrant trail to California, and the Massacre Peak and Pony Hill petroglyph sites, which are representative of the Mimbres culture. An additional ACEC established in the region, but outside of the 25-mi (40-km) distance for the viewshed analysis, is the Old Town ACEC, 47 mi (76 km) west of the SEZ. This ACEC contains the remains of a Mimbres village site that has been heavily looted. An estimated 1,000 whole pots have been removed illegally from the site, and consequently, the ACEC designation is one attempt to curb the looting practices.

The cultural SMA in the vicinity of the proposed Mason Draw SEZ is the Butterfield Trail, 2 mi (3 km) north of the SEZ. The trail is currently being considered for designation as a National Historic Trail. The congressionally designated El Camino Real de Tierra Adentro National Historic Trail, one of the oldest and longest continually used roads in the United States, is 14 mi (23 km) east of the proposed SEZ. These trails would need to be evaluated for high potential segments within the viewshed of the SEZ. Also in the vicinity of the proposed Mason Draw SEZ is the Mesilla Plaza, a National Historic Landmark that protects the historic features of the plaza that was built in 1848. It is about 15 mi (24 km) from the proposed SEZ. Of additional regional interest, the White Sands National Monument, 42 mi (68 km) northeast of the SEZ, was designated as a national monument for its cultural resources, in addition to its unique geologic and environmental resources (BLM 1993).

National Register of Historic Places

No properties listed in the NRHP are within the boundaries of the proposed Mason Draw SEZ, nor are any located within 5 mi (8 km) of the SEZ. However, 12 of the sites that have been recorded within 5 mi (8 km) of the SEZ have been determined to be eligible for inclusion in the NRHP.

Twenty-six properties in Dona Ana County are listed in the NRHP, 14 of which are located in the vicinity of Las Cruces, about 15 mi (24 km) east of the SEZ. Table 12.2.17.1-1 lists these properties. The Rio Grande Bridge at Radium Springs and Fort Selden are the two closest properties to the proposed Mason Draw SEZ—12 mi (19 km) northeast. Mesilla, 16 mi (26 km) east of the SEZ, maintains three properties—the Mesilla Plaza (also a National Historic Landmark), Barela-Reynolds House, and the La Mesilla Historic District. The town of Dona Ana, 14 mi (23 km) east of the SEZ, has two properties. Three additional NRHP properties are in Dona Ana County, but they are beyond the 25-mi (40-km) distance used for the viewshed analysis. Those properties are L.B. Bentley General Merchandise (27 mi [43 km] east of the SEZ), the International Boundary Marker No. 1, U.S. and Mexico (near El Paso, 43 mi [69 km] southeast of the SEZ), and Launch Complex 33 (a National Historic Landmark on the White Sands Missile Range, 40 mi [64 km] east of the SEZ). One property in Luna County is within 25 mi (40 km) of the SEZ—the Mahoney Building in Florida, New Mexico.

12.2.17.2 Impacts

Direct impacts on significant cultural resources could occur in the proposed Mason Draw SEZ; however, further investigation is needed. A cultural resources survey of the entire area of potential effect of a proposed project, 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. An evaluation would need to follow to determine whether any are eligible for listing in the NRHP as historic properties. The proposed Mason Draw SEZ has potential for containing significant cultural resources, especially in the dune areas. Section 5.15 discusses the types of effects that could occur on any significant cultural resources found to be present within the proposed Mason Draw SEZ. Impacts would be minimized through the implementation of required programmatic design features as described in Appendix A, Section A.2.2. Programmatic design features assume that the necessary surveys, evaluations, and consultations will occur.

Visual impacts on several property types are possible in the area this SEZ. Two important trail systems are within 15 mi (24 km) of the SEZ, as well as several properties listed in the NRHP and a National Historic Landmark. Additional analysis of the visual effects of solar

TABLE 12.2.17.1-1 National Register Properties within 25 mi (40 km) of the Proposed Mason Draw SEZ in Dona Ana County

NRHP Site	Distance from SEZ
Rio Grande Bridge at Radium Springs	12 mi (19 km)
Fort Selden	12 mi (19 km)
Our Lady of Purification Church	14 mi (23 km)
Dona Ana Village Historic District	14 mi (23 km)
Mesilla Plaza	15 mi (24 km)
Elephant Butte Irrigation District	Variable; Mesilla Diversion Dam 15 mi (24 km) (including split of West and East Side Canals)
Barela-Reynolds House	15 mi (24 km)
La Mesilla Historic District	15 mi (24 km)
Fort Fillmore	Address restricted
Alameda-Depot Historic District	16 mi (26 km)
Nestor Armijo House	16 mi (26 km)
Mesquite Street Original Townsite Historic District	16 mi (26 km)
Rio Grande Theatre	16 mi (26 km)
Thomas Branigan Memorial Library	16 mi (26 km)
Phillips Chapel CME Church	17 mi (27 km)
Hadley-Ludwick House	17 mi (27 km)
Goddard Hall	18 mi (29 km)
Foster Hall	18 mi (29 km)
Air Science	18 mi (29 km)
University President's House	18 mi (29 km)
Summerford Mountain Archaeological District	18 mi (29 km)
Green Bridge	19 mi (31 km)
San Jose Church	23 mi (37 km)
Mahoney Building[a]	24 mi (39 km)

[a] The Mahoney Building is in Luna County, not in Dona Ana County, but it is within the 25-mi (40-km) viewshed distance of the SEZ.

development on these properties would be needed prior to any development. (See Section 12.2.14 for an initial evaluation of visual effects.)

Programmatic design features to reduce water runoff and sedimentation would reduce the likelihood of indirect impacts on cultural resources resulting from erosion outside the SEZ boundary (including ROWs).

No requirements for new transmission lines or access corridors have currently been identified, assuming existing corridors would be used; therefore, no new areas of cultural concern would be made accessible as a result of development within the proposed Mason Draw 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 are to occur.

12.2.17.3 SEZ-Specific Design Features and Design Feature Effectiveness

Programmatic design features to mitigate adverse effects on significant cultural resources, such as avoidance of significant sites and features and cultural awareness training for the workforce on the sensitivity of certain types of cultural resources, including resources of concern to Native Americans (see also Section 12.2.18), but also possible properties of significance to the Hispanic population in this area, are provided in Appendix A, Section A.2.2.

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

- Coordination with trails associations and historical societies regarding impacts on El Camino Real de Tierra Adentro, the Butterfield Trail, and Mesilla Plaza, as well as other NRHP-listed properties, is also recommended.

Section 12.2.14.3 presents recommended design features for reducing visual impacts on the El Camino Real de Tierra Adentro National Historic Trail, the Butterfield Trail, and Mesilla Plaza National Historic Landmark. Similar measures can be used if other NRHP properties and their visual settings are determined to be potentially adversely affected by solar development on the mesa. Consultation with the New Mexico SHPO is required, but coordination with trails associations and local historical societies is also encouraged.

12.2.18 Native American Concerns

Many Native Americans tend to view their environment holistically and share many environmental and socioeconomic concerns with other ethnic groups. Issues of possible Native American concern shared with the population as a whole are addressed in several sections of this PEIS. General topics of concern are addressed in Section 4.16. Specifically for the proposed Mason Draw SEZ, Section 12.2.17 discusses archaeological sites, structures, landscapes, and traditional cultural properties; Section 12.2.8 discusses mineral resources; Section 12.2.9.1.3 discusses water rights and water use; Section 12.2.10 discusses plant species; Section 12.2.11 discusses wildlife species, including wildlife migration patterns; Section 12.2.13 discusses air quality; Section 12.2.14 discusses visual resources; Sections 12.2.19 and 12.2.20 discuss socioeconomics and environmental justice, respectively; and issues of human health and safety are discussed in Section 5.21. This section focuses on concerns that are specific to Native Americans and to which Native Americans bring a distinct perspective.

All federally recognized Tribes with traditional ties to the area of the proposed Mason Draw SEZ have been contacted so they could identify their concerns regarding solar energy development. The Tribes with traditional ties to the proposed SEZ, who were contacted, are listed in Table 12.2.18-1. Appendix K lists all federally recognized Tribes contacted for this PEIS.

12.2.18.1 Affected Environment

The traditional use areas of Native American Tribes have varied over time, and sometimes overlap. The proposed Mason Draw SEZ is within the traditional range of the Eastern Band of the Chiricahua Apache. The Indian Claims Commission included the area in the judicially established Chiricahua Apache traditional territory (Royster 2008). While the bands of the Chiricahua Apache had a strong sense of place, the plateau above the west bank of the Rio Grande was very likely shared with the neighboring Manso (Opler 1941, 1983b; Griffen 1983).

TABLE 12.2.18-1 Federally Recognized Tribes with Traditional Ties to the Proposed Mason Draw SEZ

Tribe	Location	State
Fort Sill Apache Tribe of Oklahoma	Apache	Oklahoma
Jicarilla Apache Nation	Dulce	New Mexico
Mescalero Apache Tribe	Mescalero	New Mexico
San Carlos Apache Tribe	San Carlos	Arizona
White Mountain Apache Tribe	Whiteriver	Arizona
Ysleta del Sur Pueblo	El Paso	Texas

12.2.18.1.1 Territorial Boundaries

The territorial boundaries of the Chiricahua Apache, Manso, and Piro are described in Section 12.1.18.1.1 for the proposed Afton SEZ and are not repeated here.

12.2.18.1.2 Plant Resources

This section focuses on those Native American concerns that have an ecological as well as cultural component. For many Native Americans, the taking of game or the gathering of plants or other natural resources may have been seen as both a sacred and secular act (Stoffle et al. 1990).

Currently, much of the proposed Mason Draw SEZ is flat, open terrain supporting widely spaced desert scrub, with drainages providing some relief. The drainages and scattered depressions support denser vegetation likely to include higher concentrations of plant resources traditionally important to Tribes. The proposed SEZ is located on relatively dry, level upland west of the Mesilla Valley of the Rio Grande. It was not well suited for indigenous agriculture and was likely used as an area for hunting and gathering. The Chiricahua Apache were primarily hunters and gatherers. They had access to a variety of ecosystems, and much of what they gathered is found in the mountains. Important plants found at lower elevations include agave, mesquite, yucca, cactus fruit, and seed-bearing plants, such as dropseed. Agave was a principal source of wild plant food for the Chiricahua. Gathered in the spring, its crowns were roasted to make mescal, which when sun-dried was storable for long periods. During a site visit, some agave was observed in the proposed Mason Draw SEZ; however, the dominant land cover is more likely to include mesquite, yucca, and wild grasses, also important to the Chiricahua (Opler 1941, 1983b; Cole 1988). Little is known of the Manso before they joined the Ysleta. Certainly thereafter they would have engaged in irrigation agriculture supplemented by hunting and gathering, as was the case with the Piro (Houser 1979; Schroeder 1979). The proposed Mason Draw SEZ supports plants that would have been attractive to the Apache groups in the nearby mountains and the Puebloan groups along the Rio Grande.

The plant communities observed or likely to be present at the proposed Mason Draw SEZ are discussed in Section 12.2.10. As shown in the USGS's Southwest Regional Gap Analysis, the land cover at the proposed SEZ is a mixture of Apacherian-Chihuahuan Mesquite Upland Scrub, Apacherian-Chihuahuan Desert Grassland and Steppe, and Chihuahuan Creosotebush Mixed Desert and Thorn Scrub, with patches of Chihuahuan Mixed Salt Desert Scrub and North American Warm Desert Pavement (USGS 2005a). While vegetation is sparse most of the year, seasonal rains often produce a florescence of ephemeral herbaceous species.

Native American populations have traditionally made use of hundreds of native plants. Table 12.2.18.1-1 lists plants traditionally used by the Chiricahua Apache that were either observed at the proposed Mason Draw SEZ or are probable members of the cover type plant communities identified for the SEZ. These plants are the dominant species; however, other plants important to Native Americans also could occur in the SEZ, depending on local conditions and the season. Over much of the proposed SEZ, creosotebush is dominant, but mesquite is also

TABLE 12.2.18.1-1 Plant Species Observed or Likely To Be Present in the Proposed Mason Draw SEZ That Were Important to Native Americans

Common Name	Scientific Name	Status
Agave	*Agave* spp.	Observed
Buckwheat	*Eriogonum* spp.	Possible
Creosotebush	*Larrea tridentata*	Observed
Honey Mesquite	*Prosopis Glandolosa*	Observed
Juniper	*Juniperus* spp.	Possible
Prickly Pear Cactus	*Opuntia* spp.	Possible
Screwbean Mesquite	*Prosopis pubescens*	Possible
Wild grasses	Various species	Observed
Yucca	*Yucca* spp.	Observed

Sources: Field visit; Opler (1941, 1983b); Cole (1988); USGS (2005a).

common. Creosotebush is important in traditional Native American medicine. Mesquite was among the most important traditional Tribal food plants. Its long bean-like pods were harvested in the summer, could be processed and stored, and were widely traded.

12.2.18.1.3 Other Resources

Water is an essential prerequisite for life in the arid Southwest. As long-time desert dwellers, Native Americans have a great appreciation for the importance of water in a desert environment. They have expressed concern over the use and availability of water for solar energy installations (Jackson 2009). 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).

Between the mountainous terrain favored by the Apache and the river bottomland farmed by the Piro, it is likely that the uplands where the proposed Mason Draw SEZ is situated were seasonal hunting grounds. Deer was the principal Chiricahua game animal. Deer have been an important source of food and of bone, sinew, and hide used to make a variety of implements. They were especially hunted in the fall, when meat and hides were thought to be best. The proposed SEZ is within mule deer range. Pronghorn were also important, but the SEZ does not appear to be within pronghorn range. Other prized game animals included elk (wapiti) and bighorn sheep. The proposed SEZ does not provide suitable habitat for either (USGS 2005b). While big game was highly prized, smaller animals, such as desert cottontail, woodrats, and squirrels (all potentially present in the proposed SEZ), traditionally also added protein to the diet, as did some birds. The Chiricahua would not eat snakes, lizards, or animals, such as peccaries, thought to feed on unclean species. Animals hunted for their skins or feathers include bobcat, mountain lion, badger, beaver, otter, and eagle (Opler 1941, 1983a). Wildlife likely to be found in the proposed Mason Draw SEZ is described in Section 12.2.11. Native American game species whose range includes the SEZ are listed in Table 12.2.18.1-2.

In other areas, Native Americans have expressed concern over ecological segmentation, that is, development that fragments animal habitat and does not provide corridors for movement. They would prefer solar energy development take place on land that has already been disturbed, such as abandoned farmland, rather than on undisturbed ground (Jackson 2009).

12.2.18.2 Impacts

To date, no comments have been received from the Tribes specifically referencing the proposed Mason Draw SEZ. However, the Tribal Historic Preservation Officer (THPO) for the Ysleta del Sur Pueblo in response to the 2008 notification of the impending PEIS, stated that the Ysleta did not believe that the actions addressed in the solar energy PEIS would adversely affect traditional, religious, or cultural sites important to Ysleta del Sur Pueblo. However, the THPO did request that Ysleta del Sur Pueblo be consulted if any burials or NAGPRA artifacts were encountered during development (Loera 2010).

The impacts that would be expected from solar energy development within the proposed Mason Draw SEZ on resources important to Native Americans fall into two major categories: impacts on the landscape and impacts on discrete localized resources.

TABLE 12.2.18.1-2 Animal Species Used by Native Americans Whose Range Includes the Proposed Mason Draw SEZ

Common Name	Scientific Name	Status
Badger	*Taxidea taxus*	Possible
Bald eagle	*Haliaeetus leucocephalus*	Winter
Bobcat	*Lynx rufus*	Possible
Desert cottontail	*Silvilagus audubonii*	All year
Gambel's quail	*Callipepla gambelii*	All year
Golden eagle	*Aquila chrysaetos*	Possible
Mountain lion	*Puma concolor*	Possible
Mourning dove	*Zenaida macroura*	All year
Mule deer	*Odocoileus hemionus*	All year
Rock squirrel	*Spermophilus variegates*	All year
Woodrats	*Neotoma* spp.	All year

Sources: Opler (1983b); USGS (2005b).

Potential landscape-scale impacts are those caused by the presence of an industrial facility within a culturally important landscape that includes sacred mountains and other geophysical features often tied together by a network of trails. Impacts may be visual—the intrusion of an industrial feature in sacred space; audible—noise from the construction, operation or decommissioning of a facility detracting from the traditional cultural values of the site; or demographic—the presence of a larger number of outsiders in the area that would increase the chance that the cultural importance of the area would be degraded by more foot and motorized traffic. As consultation with the Tribes continues and project-specific analyses are undertaken, it is possible that Native Americans will express concerns over potential visual effects of solar energy development within the proposed SEZ on the landscape. In addition, many traditional Chiricahua ritual specialists feel they derive their power from the sun (Opler 1947). They may be sensitive to deriving electric energy from the sun.

Localized effects could occur both within the proposed SEZ and in adjacent areas. Within the SEZ, these effects would include destroying or degrading important plant resources, destroying the habitat of and impeding the movement of culturally important animal species, destroying archaeological sites and burials, and the degrading or destroying trails. Plant resources are known to exist in the SEZ. Any ground-disturbing activity associated with the development of solar facilities within the SEZ has the potential for destruction of localized resources. However, significant areas of mesquite and associated plants important to Native Americans would remain outside the SEZ, and anticipated overall effects on these plant populations would be small. Animal species important to Native Americans are listed in Table 12.2.18.1-2. While the construction of utility-scale solar energy facilities would reduce the amount of habitat available to many of these species, similar habitat is abundant, and the effect on animal populations is likewise likely to be small.

Since solar energy facilities cover large tracts of ground, even taking into account the implementation of design features, it is unlikely that avoidance of all resources would be possible. The development of programmatic design features (see Appendix A, Section A.2.2) was based on the assumption that the necessary cultural surveys, site evaluations, and tribal consultations will occur. Implementation of programmatic design features should eliminate impacts on Tribes' reserved water rights and the potential for groundwater contamination issues.

12.2.18.3 SEZ-Specific Design Features and Design Feature Effectiveness

Programmatic design features to address impacts of potential concern to Native Americans, such as avoidance of sacred sites, water sources, 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 regarding potential issues of concern would be determined during government-to-government consultation with affected Tribes listed in Table 12.2.18-1.

Mitigation of impacts on archaeological sites and traditional cultural properties is discussed in Section 12.2.17.3, in addition to the design features for historic properties discussed in Section A.2.2, Appendix A.

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12.2.19 Socioeconomics

12.2.19.1 Affected Environment

This section describes current socioeconomic conditions and local community services within the ROI surrounding the proposed Mason Draw SEZ. The ROI is a three-county area consisting of Dona Ana County and Luna County in New Mexico and El Paso County in Texas. 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.

12.2.19.1.1 ROI Employment

In 2008, employment in the ROI stood at 377,094 (Table 12.2.19.1-1). Over the period 1999 to 2008, annual average employment growth rates were higher in Luna County (2.8%) and Dona Ana County (2.7%) than in El Paso County (0.7%). At 1.2%, the growth rate in the ROI as a whole was somewhat less than the average state rates for New Mexico (1.5%) and Texas (1.3%).

In 2006, the service sector provided the highest percentage of employment in the ROI at 53.0%, followed by wholesale and retail trade with 20.4% (Table 12.2.19.1-2). Smaller employment shares were held by manufacturing (8.0%), transportation and public utilities (5.2%), and finance, insurance and real estate (5.1%). Within the ROI, the distribution of

TABLE 12.2.19.1-1 ROI Employment in the Proposed Mason Draw SEZ

Location	1999	2008	Average Annual Growth Rate, 1999 to 2008 (%)
Dona Ana County, New Mexico	65,546	85,934	2.7
Luna County, New Mexico	8,687	11,436	2.8
El Paso County, Texas	261,213	279,724	0.7
ROI	335,446	377,094	1.2
New Mexico	793,052	919,466	1.5
Texas	9,766,299	11,126,436	1.3

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

TABLE 12.2.19.1-2 ROI Employment in the Proposed Mason Draw SEZ by Sector, 2006

	Dona Ana County, New Mexico		Luna County, New Mexico		El Paso County, Texas		ROI	
Industry	Employment	% of Total	Employment	% of Total	Employment	% of Total	Employment	% of Total
Agriculture[a]	5,042	9.8	668	11.8	1,038	0.5	6,748	2.6
Mining	175	0.3	–	0.0	375	0.2	550	0.2
Construction	4,798	9.3	205	3.6	8,856	4.4	13,859	5.3
Manufacturing	2,586	5.0	901	16.0	17,401	8.6	20,888	8.0
Transportation and public utilities	1,240	2.4	211	3.7	12,159	2.0	13,610	5.2
Wholesale and retail trade	8,957	17.3	1,339	23.7	42,676	21.1	52,972	20.4
Finance, insurance, and real estate	2,430	4.7	239	4.2	10,574	5.2	13,243	5.1
Services	26,497	51.3	2,138	37.9	108,952	53.8	137,587	53.0
Other	14	0.0	10	0.2	75	0.0	99	0.0
Total	51,658		5,641		202,368		259,667	

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

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

employment across sectors is similar to that of the ROI as a whole, with a slightly higher percentage of employment in agriculture (9.8%) and construction (9.3%), and slightly lower percentages in manufacturing (5.0%) and wholesale and retail trade (17.3%) in Dona Ana County compared to the ROI as a whole. Employment shares in Luna County in manufacturing (16.0%) and agriculture (11.8%) are larger than in the ROI as a whole, while employment in services (37.9%) is less important than in the ROI as a whole.

12.2.19.1.2 ROI Unemployment

Unemployment rates have varied across the three counties in the ROI. Over the period 1999 to 2008, the average rate in Luna County was 14.6%, with lower rates of 7.0%, in El Paso County, and 5.8%, in Dona Ana County (Table 12.2.19.1-3). The average rate in the ROI over this period was 7.0%; higher than the average rate for New Mexico (5.0%) and Texas (5.3%). Unemployment has been a significant problem in Luna County over the last 10 years; the rate reached 23.5% in 1999 and has often been higher than 12% in recent years. Unemployment rates for the first five months of 2009 contrast somewhat with rates for 2008 as a whole; in Luna County the unemployment rate increased to 16.6%, while rates reached 8.2% and 5.8% in El Paso County and Dona Ana County, respectively. The average rates for the ROI (7.9%), for New Mexico (5.6%), and for Texas (6.6%) were also higher during this period than the corresponding average rates for 2008.

TABLE 12.2.19.1-3 ROI Unemployment Rates (%) for the Proposed Mason Draw SEZ

Location	1999–2008	2008	2009[a]
Dona Ana County, New Mexico	5.8	4.4	5.8
Luna County, New Mexico	14.6	11.3	16.6
El Paso County, Texas	7.0	6.3	8.2
ROI	7.0	6.0	7.9
New Mexico	5.0	4.2	5.6
Texas	5.3	4.9	6.6

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

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

12.2.19.1.3 ROI Urban Population

The population of the ROI in 2006 to 2008 was 81% urban; the largest city, El Paso, Texas, had an estimated 2006 to 2008 population of 609,248; other cities in the ROI include Las Cruces, New Mexico (90,908) and Socorro, Texas (32,056) (Table 12.2.19.1-4). In addition, there are eight smaller cities in the ROI with a 2006 to 2008 population of less than 20,000.

Population growth rates in the ROI have varied over the period 2000 and 2006 to 2008 (Table 12.2.19.1-4). Horizon City, Texas, grew at an annual rate of 12.1% during this period, with higher-than-average growth also experienced in Las Cruces, New Mexico (2.6%) and Socorro, Texas (2.1%). The city of El Paso, Texas (1.0%) experienced a lower growth rate between 2000 and 2008, while Hatch, New Mexico (−0.2%) and Clint, Texas (−0.1%), experienced negative growth rates during this period.

12.2.19.1.4 ROI Urban Income

Median household incomes vary across cities in the ROI. Two cities for which data are available for 2006 to 2008—Las Cruces, New Mexico ($37,402) and El Paso, Texas ($36,649)—had median incomes lower than the average for New Mexico ($43,202), and Texas ($49,078) (Table 12.2.19.1-4).

TABLE 12.2.19.1-4 ROI Urban Population and Income for the Proposed Mason Draw SEZ

	Population			Median Household Income ($ 2008)		
City	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	1999	2006–2008	Average Annual Growth Rate, 1999 and 2006–2008 (%)[a]
Anthony, New Mexico	3,850	4,330	1.5	33,855	NA[b]	NA
Clint, Texas	980	970	–0.1	43,776	NA	NA
Columbus, New Mexico	1,765	1,832	0.5	17,733	NA	NA
Deming, New Mexico	14,116	15,414	1.1	25,855	NA	NA
El Paso, Texas	563,662	609,248	1.0	41,360	36,649	–1.3
Hatch, New Mexico	1,673	1,641	–0.2	27,360	NA	NA
Horizon City, Texas	5,233	13,019	12.1	62,559	NA	NA
Las Cruces, New Mexico	74,267	90,908	2.6	39,108	37,402	–0.5
Mesilla, New Mexico	2,180	2,196	0.1	54,430	NA	NA
Socorro, Texas	27,152	32,056	2.1	31,012	NA	NA
Sunland Park, New Mexico	13,309	14,436	1.0	25,961	NA	NA

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

[b] NA = not available.

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

Growth rates between 1999 and 2006 to 2008 were negative in Las Cruces, New Mexico (−1.3%) and El Paso, Texas (−0.5%). The average median household income growth rate for New Mexico as a whole over this period was −0.2%; in Texas the growth rate was −0.5%.

12.2.19.1.5 ROI Population

Table 12.2.19.1-5 presents recent and projected populations in the ROI and states as a whole. Population in the ROI stood at 1,009,542 in 2008, having grown at an average annual rate of 1.7% since 2000. Growth rates for the ROI have been similar to the rates for New Mexico (1.7%) and Texas (1.6%) over the same period.

Each county in the ROI has experienced growth in population since 2000. Dona Ana County recorded a population growth rate of 2.1% between 2000 and 2008; El Paso County, 1.7%; and Luna County, 1.1%. The ROI population is expected to increase to 1,202,799 by 2021 and to 1,227,080 by 2023.

12.2.19.1.6 ROI Income

Personal income in the ROI stood at $25.8 billion in 2007 and has grown at an annual average rate of 3.0% over the period 1998 to 2007 (Table 12.2.19.1-6). ROI personal income per capita also rose over the same period at a rate of 1.6%, increasing from $22,208 to $25,957. Per-capita incomes were higher in El Paso County ($26,237) in 2007 than in Dona Ana County ($25,493) and Luna County ($21,480). Although personal income and per-capita income growth rates in the ROI have been higher than for the states as a whole, personal income per capita was

TABLE 12.2.19.1-5 ROI Population for the Proposed Mason Draw SEZ

Location	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	2021	2023
Dona Ana County, New Mexico	174,682	206,486	2.1	260,227	267,444
Luna County, New Mexico	25,016	27,349	1.1	31,767	32,343
El Paso County, Texas	679,622	775,707	1.7	910,804	927,293
ROI	879,320	1,009,542	1.7	1,202,799	1,227,080
New Mexico	1,819,046	2,085,115	1.7	2,573,667	2,640,712
Texas	20,851,820	23,711,019	1.6	28,255,284	28,925,856

Sources: U.S. Bureau of the Census (2009e,f); Texas Comptroller's Office (2009); University of New Mexico (2009).

TABLE 12.2.19.1-6 ROI Personal Income for the Proposed Mason Draw SEZ

Location	1998	2007	Average Annual Growth Rate, 1998–2007 (%)
Dona Ana County, New Mexico			
Total income[a]	3.8	5.1	3.0
Per-capita income	22,254	25,493	1.4
Luna County, New Mexico			
Total income[a]	0.4	0.6	2.7
Per-capita income	18,034	21,480	1.8
El Paso County, Texas			
Total income[a]	15.0	20.1	3.0
Per-capita income	22,349	26,237	1.6
ROI			
Total income[a]	19.3	25.8	3.0
Per-capita income	22,208	25,957	1.6
New Mexico			
Total income[a]	48.8	62.4	2.5
Per-capita income	27,182	30,497	1.2
Texas			
Total income[a]	668.1	914.9	3.2
Per-capita income	25,186	37,808	1.7

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

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

slightly higher in New Mexico ($30,497) in 2007 than in the two counties. In El Paso County, per-capita income growth rates and per-capita incomes were slightly lower than for Texas as a whole ($37,808).

Median household income in 2006 to 2008 varied from $26,457 in Luna County, New Mexico, to $35,637 in El Paso County, Texas, and to $35,867 in Dona Ana County, New Mexico (U.S. Bureau of the Census 2009d).

12.2.19.1.7 ROI Housing

In 2007, nearly 341,800 housing units were located in the three counties, with more than 74% of those in El Paso County (Table 12.2.19.1-7). Owner-occupied units account for 65% of the occupied units in the three counties, with rental housing making up 35% of the total. At 17.7%, vacancy rates in 2007 were higher in Luna County than in Dona Ana County (11.3%) and El Paso County (9.2%). With an overall vacancy rate of 10.0% in the ROI, there were 34,139 vacant housing units in the ROI in 2007, of which 10,570 (7,422 in El Paso County, 2,690 in Dona Ana County, and 458 in Luna County) are estimated to be rental units that would be available to construction workers. There were 1,806 seasonal, recreational, or occasional-use units vacant at the time of the 2000 Census.

TABLE 12.2.19.1-7 ROI Housing Characteristics for the Proposed Mason Draw SEZ

Parameter	2000	2007
Dona Ana County, New Mexico		
Owner-occupied	40,248	44,251
Rental	19,348	23,913
Vacant units	5,654	8,641
Seasonal and recreational use	551	NA[a]
Total units	65,210	76,805
Luna County, New Mexico		
Owner-Occupied	7,043	7,253
Rental	2,354	2,589
Vacant units	1,894	2,113
Seasonal and recreational use	370	NA
Total units	9,397	9,842
El Paso County, Texas		
Owner Occupied	133,624	149,345
Rental	76,398	80,310
Vacant units	14,425	23,385
Seasonal and recreational use	885	NA
Total units	224,447	253,040
ROI		
Owner Occupied	180,875	200,849
Rental	98,100	106,812
Vacant units	21,973	34,139
Seasonal and recreational use	1,806	NA
Total units	300,948	341,800

[a] NA = data not available.

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

Housing stock in the ROI as a whole grew at an annual rate of 1.8% over the period 2000 to 2007, with 40,852 new units added to the existing housing stock in the ROI (Table 12.2.19.1-7).

The median value of owner-occupied housing in 2008 varied from $87,000 in Luna County, to $97,800 in El Paso County, to $133,300 in Dona Ana County (U.S. Bureau of the Census 2009g).

12.2.19.1.8 ROI Local Government Organizations

The various local and county government organizations in the ROI are listed in Table 12.2.19.1-8. There are no Tribal governments located in the ROI, although there are members of other Tribal groups located in the ROI whose Tribal governments are located in adjacent counties or states.

12.2.19.1.9 ROI Community and Social Services

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

Schools

In 2007, there were a total of 334 public and private elementary, middle, and high schools in the three-county ROI (NCES 2009). Table 12.2.19.1-9 provides summary statistics for

TABLE 12.2.19.1-8 ROI Local Government Organizations and Social Institutions in the Proposed Mason Draw SEZ

Governments	
City	
Anthony, New Mexico	Horizon City, Texas
Clint, Texas	Las Cruces, New Mexico
Columbus, New Mexico	Mesilla, New Mexico
Deming, New Mexico	Socorro, Texas
El Paso, Texas	Sunland Park, New Mexico
Hatch, New Mexico	
County	
Dona Ana County, New Mexico	El Paso County, Texas
Otero County, New Mexico	
Tribal	
None	

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

TABLE 12.2.19.1-9 ROI School District Data for the Proposed Mason Draw SEZ, 2007

Location	Number of Students	Number of Teachers	Student-Teacher Ratio	Level of Service[a]
Dona Ana County, New Mexico	39,320	2,578	15.3	12.8
Luna County, New Mexico	5,511	345	16.0	12.8
El Paso County, Texas	170,382	11,443	14.9	15.0
ROI	215,213	14,366	15.0	14.4

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

Source: NCES (2009).

enrollment, 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 Luna County schools (16.0) is slightly higher than in Dona Ana County schools (15.3) and El Paso County schools (14.9), while the level of service is slightly higher in El Paso County schools (15.0).

Health Care

While El Paso County has a much larger number of physicians (1,557), the number of doctors per 1,000 population is only slightly higher than in Dona Ana County, but significantly higher than in Luna County (1.1) (Table 12.2.19.1-10). The smaller number of health care professionals in Luna County and Dona Ana County may mean that residents of these counties have less access to specialized health care; a substantial number of county residents might also travel to El Paso County for their medical care.

Public Safety

Several state, county, and local police departments provide law enforcement in the ROI. Luna County has 30 officers and would provide law enforcement services to the SEZ, while Dona Ana County and El Paso County have 131 and 251 officers, respectively (Table 12.2.19.1-11). There are currently 695 professional firefighters in El Paso County, 195 in Dona Ana County, and 20 in Luna County. Levels of service in police protection in El Paso County (0.3) are significantly lower than for the other two counties, while fire protection in each county is similar to that for the ROI as a whole (Table 12.2.19.1-11).

TABLE 12.2.19.1-10 Physicians in the Proposed Mason Draw SEZ ROI, 2007

Location	Number of Primary Care Physicians	Level of Service[a]
Dona Ana County, New Mexico	369	1.8
Luna County, New Mexico	30	1.1
El Paso County, Texas	1,557	2.0
ROI	1,956	2.0

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

Source: AMA (2009).

TABLE 12.2.19.1-11 Public Safety Employment in the Proposed Mason Draw SEZ ROI

Location	Number of Police Officers[a]	Level of Service[b]	Number of Firefighters[c]	Level of Service
Dona Ana County, New Mexico	131	0.6	195	0.9
Luna County, New Mexico	30	1.1	20	0.7
El Paso County, Texas	251	0.3	695	0.9
ROI	412	0.4	910	0.9

[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).

12.2.19.1.10 ROI Social Structure and Social Change

Community social structures and other forms of social organization within the ROI are related to various factors, including historical development, major economic activities and sources of employment, income levels, race and ethnicity, and forms of local political organization. Although an analysis of the character of community social structures is beyond the scope of the current programmatic analysis, project-level NEPA analyses would include a description of ROI social structures, contributing factors, their uniqueness, and consequently, the susceptibility of local communities to various forms of social disruption and social change.

Various energy development studies have suggested that once the annual growth in population is between 5 and 15% in smaller rural communities, alcoholism, depression, suicide, social conflict, divorce, and delinquency would increase, and levels of community satisfaction would deteriorate (BLM 1980, 1983, 1996). Tables 12.2.19.1-12 and 12.2.19.1-13 present data for a number of indicators of social change, including violent crime and property crime rates, alcoholism and illicit drug use, and mental health and divorce, that might be used to indicate social change.

There is some variation in the level of crime across the ROI, with slightly higher rates of property-related crime rates in Dona Ana County (29.9) than in El Paso County (28.6) and Luna County (27.6). Violent crime rates were the same in Dona Ana County and El Paso County (4.2 per 1,000 population) and slightly lower in Luna County (3.8), meaning that overall crime rates in Dona Ana County (34.1) were slightly higher than for El Paso County (32.8) and Luna County (31.4).

Other measures of social change—alcoholism, illicit drug use, and mental health—are not available at the county level and thus are presented for the SAMHSA region in which the ROI is located. There is some variation across the two regions in which the three counties are located, with slightly higher rates for alcoholism and mental illness in the region in which Dona Ana County and Luna County are located and the same rates of illicit drug use in both regions (Table 12.2.19.1-13).

TABLE 12.2.19.1-12 County and ROI Crime Rates for the Proposed Mason Draw SEZ ROI[a]

	Violent Crime[b]		Property Crime[c]		All Crime	
Location	Offenses	Rate	Offenses	Rate	Offenses	Rate
Don Ana County, New Mexico	842	4.2	6,028	29.9	6,870	34.1
Luna County, New Mexico	103	3.8	747	27.6	850	31.4
El Paso County, Texas	3,068	4.2	21,147	28.6	24,215	32.8
ROI	4,013	4.2	27,922	28.9	31,935	33.0

[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 12.2.19.1-13 Alcoholism, Drug Use, Mental Health, and Divorce in the Proposed Mason Draw SEZ ROI[a]

Geographic Area	Alcoholism	Illicit Drug Use	Mental Health[b]	Divorce[c]
New Mexico Region 5 (includes Dona Ana County and Luna County)	8.3	3.0	9.9	–[d]
Texas Region 10 (includes El Paso County)	7.0	3.0	8.3	–
New Mexico				4.3
Texas				3.3

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

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

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

[d] A dash indicates data not available.

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

12.2.19.1.11 ROI Recreation

Various areas in the vicinity of the proposed SEZ are used for recreational purposes, with natural, ecological, and cultural resources in the ROI attracting visitors for a range of activities, including hunting, fishing, boating, canoeing, wildlife watching, camping, hiking, horseback riding, mountain climbing, and sightseeing. These activities are discussed in Section 12.2.5.

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 facilities, by identifying sectors in the economy in which expenditures on recreational activities occur. Not all activities in these sectors are directly related to recreation on state and federal lands; some activity occurs on private land (e.g., dude ranches, golf courses, bowling alleys, and movie theaters). Expenditures associated with recreational activities form an important part of the economy of the ROI. In 2007, 40,797 people were employed in the ROI in the various sectors identified as recreation, constituting 11.0% of total ROI employment (Table 12.2.19.1-14).

TABLE 12.2.19.1-14 Recreation Sector Activity in the Proposed Mason Draw SEZ ROI, 2007

ROI	Employment	Income ($ million)
Amusement and recreation services	747	15.0
Automotive rental	2,427	190.8
Eating and drinking places	31,602	447.4
Hotels and lodging places	2,099	41.6
Museums and historic sites	40	3.7
Recreational vehicle parks and campsites	109	2.3
Scenic tours	2,077	104.6
Sporting goods retailers	1,696	28.0
Total ROI	40,797	833.3

Source: MIG, Inc. (2010).

Recreation spending also produced almost $833.3 million in income in the ROI in 2007. The primary sources of recreation-related employment were eating and drinking places.

12.2.19.2 Impacts

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

12.2.19.2.1 Common Impacts

Construction and operation of a solar energy facility at the proposed SEZ would produce direct and indirect economic impacts. Direct impacts would occur as a result of expenditures on wages and salaries, procurement of goods and services required for project construction and operation, and the collection of state sales and income taxes. Indirect impacts would occur as project wages and salaries, procurement expenditures, and tax revenues subsequently circulate through the economy of each state, thereby creating additional employment, income, and tax revenues. Facility construction and operation would also require in-migration of workers and their families into the ROI surrounding the site, which would affect population, rental housing, health service employment, and public safety employment. Socioeconomic impacts common to all utility-scale solar energy 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 Appendix M). While it is clear that some land in the ROI would no longer be accessible for recreation, the majority of popular recreational locations would be precluded from solar development. It is also possible that solar development in the ROI would be visible from popular recreation locations and that construction workers residing temporarily in the ROI would occupy accommodation otherwise used for recreational visits, thus reducing visitation and consequently affecting the economy of the ROI.

Social Change

Although an extensive literature in sociology documents the most significant components of social change in energy boomtowns, the nature and magnitude of the social impact of energy development in small rural communities are still unclear (see Section 5.17.1.1.4). While some degree of social disruption is likely to accompany large-scale in-migration during the boom phase, there is insufficient evidence to predict the extent to which specific communities are likely to be affected, which population groups within each community are likely to be most affected, and the extent to which social disruption is likely to persist beyond the end of the boom period (Smith et al. 2001). Accordingly, because of the lack of adequate social baseline data, it has been suggested that social disruption is likely to occur once an arbitrary population growth rate associated with solar energy development projects has been reached, with an annual rate of between 5 and 10% growth in population assumed to result in a breakdown in social structures, with a consequent increase in alcoholism, depression, suicide, social conflict, divorce, delinquency, and deterioration in levels of community satisfaction (BLM 1980, 1983, 1996).

In overall terms, the in-migration of workers and their families into the ROI would represent an increase of 0.1 % in ROI 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 the insufficient range of housing choices to suit all solar occupations, many workers are likely to commute to the SEZ from larger communities elsewhere in the ROI, 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, closely 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

Cattle ranching and farming supported 565 jobs and $6.0 million in income in the ROI in 2007 (MIG, Inc. 2010). The construction and operation of solar facilities in the proposed SEZ could result in a decline in the amount of land available for livestock grazing, resulting in total (direct plus indirect) impacts of the loss of less than 1 job and less than $0.1 million in income in the ROI. There would also be a decline in grazing fees payable to the BLM and to the USFS by individual permittees based on the number of AUMs required to support livestock on public land. Assuming the 2008 fee of $1.35 per AUM, grazing fee losses would amount to $1,310 annually on land dedicated to solar development in the SEZ.

12.2.19.2.2 Technology-Specific Impacts

The socioeconomic impacts of solar energy development in the proposed SEZ were measured in terms of employment, income, state tax revenues (sales and income), BLM acreage rental and capacity fees, population in-migration, housing, and community service employment (education, health, and public safety). More information on the data and methods used in the analysis can be found 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 each technology. 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 technology would be up to 10,676 jobs (Table 12.2.19.2-1). Construction activities would constitute 2.3% of total ROI employment. A

TABLE 12.2.19.2-1 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Mason Draw SEZ with Trough Facilities[a]

Parameter	Maximum Annual Construction Impacts	Annual Operations Impacts
Employment (no.)		
Direct	3,488	450
Total	10,676	754
Income[b]		
Total	588.2	25.9
Direct state taxes[b]		
Sales	27.5	0.4
Income	12.6	0.7
BLM payments[b]		
Rental	NA[d]	1.2
Capacity[c]	NA	13.6
In-migrants (no.)	1,486	57
Vacant housing[e] (no.)	743	52
Local community service employment		
Teachers (no.)	22	1
Physicians (no.)	3	0
Public safety (no.)	2	0

[a] Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 1200 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 2,065 MW.

[b] Unless indicated otherwise, values are reported in $ million 2008.

[c] The BLM annual capacity payment was based on a fee of $6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), assuming a solar facility with no storage capability, and full build-out of the site. Projects with 3 or more hours of storage would generate higher payments, based on a fee of $7,884 per MW.

[d] NA = data not available.

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

solar development would also produce $588.2 million in income. Direct sales taxes would be $27.5 million; direct income taxes, $12.6 million.

Given the scale of construction activities and the likelihood of local worker availability in the required occupational categories, construction of a solar facility would mean that some in migration of workers and their families from outside the ROI would be required, with 1,486 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility construction on the number of vacant rental housing units would not be expected to be large, with 743 rental units expected to be occupied in the ROI. This occupancy rate would represent 5.0% of the vacant rental units expected to be available in the ROI.

In addition to the potential impact on housing markets, in-migration also 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, 22 new teachers, 3 physicians, and 2 public safety employees (career firefighters and uniformed police officers) would be required in the ROI. These increases would represent 0.1% of total ROI employment expected in these occupations.

Operations. Total operations employment impacts in the ROI (including direct and indirect impacts) from a build-out using solar trough technologies would be 754 jobs (Table 12.2.19.2-1). Such a solar development would also produce $25.9 million in income. Direct sales taxes would be $0.4 million; direct income taxes, $0.7 million. Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), acreage rental payments would be $1.2 million and solar generating capacity payments, at least $13.6 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 57 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 52 owner-occupied units expected to be occupied in the ROI.

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

Power Tower

Construction. Total construction employment impacts in the ROI (including direct and indirect impacts) from the use of power tower technology would be up to 4,252 jobs (Table 12.2.19.2-2). Construction activities would constitute 0.9% of total ROI employment. Such a solar development would also produce $234.3 million in income. Direct sales taxes would be $10.9 million; direct income taxes, $5.0 million.

Given the scale of construction activities and the likelihood of local worker availability in the required occupational categories, construction of a solar facility would mean that some in-migration of workers and their families from outside the ROI would be required, with 592 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility construction on the number of vacant rental housing units would not be expected to be large, with 296 rental units expected to be occupied in the ROI. This occupancy rate would represent 2.0% 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, 9 new teachers, 1 physician, and 1 public safety employee would be required in the ROI. These increases would represent less than 0.1% of total ROI employment expected in these occupations.

Operations. Total operations employment impacts in the ROI (including direct and indirect impacts) from a build-out using power tower technologies would be 330 jobs (Table 12.2.19.2-2). Such a solar development would also produce $10.6 million in income. Direct sales taxes would be less than $0.1 million; direct income taxes, $0.4 million. Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), acreage rental payments would be $1.2 million and solar generating capacity payments, at least $7.5 million.

Given the likelihood of local worker availability in the required occupational categories, operation of a power tower facility would mean that some in-migration of workers and their families from outside the ROI would be required, with 30 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 27 owner-occupied units expected to be required in the ROI.

TABLE 12.2.19.2-2 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Mason Draw SEZ with Power Tower Facilities[a]

Parameter	Maximum Annual Construction Impacts	Annual Operations Impacts
Employment (no.)		
Direct	1,389	232
Total	4,252	330
Income[b]		
Total	234.3	10.6
Direct state taxes[b]		
Sales	10.9	<0.1
Income	5.0	0.4
BLM payments[b]		
Rental	NA[c]	1.2
Capacity[d]	NA	7.5
In-migrants (no.)	592	30
Vacant housing[e] (no.)	296	27
Local community service employment		
Teachers (no.)	9	0
Physicians (no.)	1	0
Public safety (no.)	1	0

[a] Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 667 MW (corresponding to 6,000 acres [24 km^2] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 1,147 MW.

[b] Unless indicated otherwise, values are reported in $ million 2008.

[c] NA = data not available.

[d] The BLM annual capacity payment was based on a fee of $6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), assuming a solar facility with no storage capability, and full build-out of the site. Projects with 3 or more hours of storage would generate higher payments, based on a fee of $7,884 per MW.

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

No new community service employment would be required to meet existing levels of service in the ROI.

Dish Engine

Construction. Total construction employment impacts in the ROI (including direct and indirect impacts) from the use of dish engine technology would be up to 1,729 jobs (Table 12.2.19.2-3). Construction activities would constitute 0.4 % of total ROI employment. Such a solar development would also produce $95.2 million in income. Direct sales taxes would be $4.5 million; direct income taxes, $2.0 million.

Given the scale of construction activities and the likelihood of local worker availability in the required occupational categories, construction of a dish engine facility would mean that some in-migration of workers and their families from outside the ROI would be required, with 241 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility construction on the number of vacant rental housing units would not be expected to be large, with 120 rental units expected to be occupied in the ROI. This occupancy rate would represent 0.8% of the vacant rental units expected to be available in the ROI.

In addition to the potential impact on housing markets, in-migration would affect community service (education, health, and public safety) employment. An increase in such employment would be required to meet existing levels of service in the ROI. Accordingly, four new teachers would be required in the ROI. This increase would represent less than 0.1% of total ROI employment expected in this occupation.

Operations. Total operations employment impacts in the ROI (including direct and indirect impacts) from a build-out using dish engine technology would be 321 jobs (Table 12.2.19.2-3). Such a solar development would also produce $10.3 million in income. Direct sales taxes would be less than $0.1 million; direct income taxes, $0.4 million. Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), acreage rental payments would be $1.2 million, and solar generating capacity payments would total at least $7.5 million.

Given the likelihood of local worker availability in the required occupational categories, operation of a dish engine solar facility would mean that some in-migration of workers and their families from outside the ROI would be required, with 29 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 26 owner-occupied units expected to be required in the ROI.

TABLE 12.2.19.2-3 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Mason Draw SEZ with Dish Engine Facilities[a]

Parameter	Maximum Annual Construction Impacts	Annual Operations Impacts
Employment (no.)		
Direct	565	226
Total	1,729	321
Income[b]		
Total	95.2	10.3
Direct state taxes[b]		
Sales	4.5	<0.1
Income	2.0	0.4
BLM payments[b]		
Rental	NA[c]	1.2
Capacity[d]	NA	7.5
In-migrants (no.)	241	29
Vacant housing[e] (no.)	120	26
Local community service employment		
Teachers (no.)	4	0
Physicians (no.)	0	0
Public safety (no.)	0	0

[a] Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 667 MW (corresponding to 6,000 acres [24 km^2] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 1,147 MW.

[b] Unless indicated otherwise, values are reported in $ million 2008.

[c] NA = data not available.

[d] The BLM annual capacity payment was based on a fee of $6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), assuming a solar facility with no storage capability, and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of $7,884 per MW.

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

No new community service employment would be required to meet existing levels of service in the ROI.

Photovoltaic

Construction. Total construction employment impacts in the ROI (including direct and indirect impacts) from the use of PV technology would be up to 806 jobs (Table 12.2.19.2-4). Construction activities would constitute 0.2% of total ROI employment. Such a solar development would also produce $44.4 million in income. Direct sales taxes would be $2.1 million; direct income taxes, $1.0 million.

Given the scale of construction activities and the likelihood of local worker availability in the required occupational categories, construction of a solar facility would mean that some in-migration of workers and their families from outside the ROI would be required, with 112 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility construction on the number of vacant rental housing units would not be expected to be large, with 56 rental units expected to be occupied in the ROI. This occupancy rate would represent 0.4% of the vacant rental units expected to be available in the ROI.

In addition to the potential impact on housing markets, in-migration would affect community service (education, health, and public safety) employment. An increase in such employment would be required to meet existing levels of service in the ROI. Accordingly, two new teachers would be required in the ROI. This increase would represent less than 0.1% of total ROI employment expected in this occupation.

Operations. Total operations employment impacts in the ROI (including direct and indirect impacts) from a build-out using PV technologies would be 32 jobs (Table 12.2.19.2-4). Such a solar development would also produce $1.0 million in income. Direct sales taxes would be less than $0.1 million; direct income taxes, less than $0.1 million. Based on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), acreage rental payments would be $1.2 million, and solar generating capacity payments, at least $6.0 million.

Given the likelihood of local worker availability in the required occupational categories, operation of a PV solar facility would mean that some in-migration of workers and their families from outside the ROI would be required, with three persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility operation on the number of vacant owner-occupied housing units would not be expected to be large, with three owner-occupied units expected to be required in the ROI.

TABLE 12.2.19.2-4 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Mason Draw SEZ with PV Facilities[a]

Parameter	Maximum Annual Construction Impacts	Annual Operations Impacts
Employment (no.)		
Direct	263	23
Total	806	32
Income[b]		
Total	44.4	1.0
Direct state taxes[b]		
Sales	2.1	<0.1
Income	1.0	<0.1
BLM payments[b]		
Rental	NA[c]	1.2
Capacity[d]	NA	6.0
In-migrants (no.)	112	3
Vacant housing[e] (no.)	56	3
Local community service employment		
Teachers (no.)	2	0
Physicians (no.)	0	0
Public safety (no.)	0	0

[a] Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 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 1,147 MW.

[b] Unless indicated otherwise, values are reported in $ million 2008.

[c] NA = data not available.

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

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

No new community service employment would be required to meet existing levels of service in the ROI.

12.2.19.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features addressing socioeconomic impacts have been identified for the proposed Mason Draw 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.

12.2.20 Environmental Justice

12.2.20.1 Affected Environment

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

The analysis of the impacts of solar energy projects on environmental justice issues follows guidelines described in the CEQ's *Environmental Justice Guidance under the National Environmental Policy Act* (CEQ 1997). The analysis method has three parts: (1) a description of the geographic distribution of low-income and minority populations in the affected area is undertaken; (2) an assessment is conducted to determine whether construction and operation would produce impacts that are high and adverse; and (3) if impacts are high and adverse, a determination is made as to whether these impacts disproportionately affect minority and low-income populations.

Construction and operation of solar energy projects in the proposed 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 in an associated 50-mi (80-km) radius around the boundary of the SEZ. A description of the geographic distribution of minority and low-income groups in the affected area was based on demographic data from the 2000 Census (U.S. Bureau of the Census 2009k,l). The following definitions were used to define minority and low-income population groups:

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

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

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

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

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

The data in Table 12.2.20.1-1 show the minority and low-income composition of the total population located in the proposed SEZ based on 2000 Census data and CEQ guidelines. Individuals identifying themselves as Hispanic or Latino are included in the table as a separate entry. However, because Hispanics can be of any race, this number also includes individuals identifying themselves as being part of one or more of the population groups listed in the table.

A large number of minority and low-income individuals are located in the 50-mi (80-km) area around the boundary of the SEZ. Within the 50-mi (80-km) radius in New Mexico, 65.9% of the population is classified as minority, while 25.9% is classified as low-income. The number of minority individuals exceeds 50% of the total population in the area, and the number of minority individuals exceeds the state average by 20 percentage points or more; thus, there is a 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, there are no low-income populations in the 50-mi (80-km) area around the boundary of the SEZ.

Within the 50-mi (80-km) radius in Texas, 72.8% of the population is classified as minority, while 21.4% is classified as low income. The number of minority individuals exceeds 50% of the total population in the area, and the number of minority individuals exceeds the state average by 20 percentage points or more; thus, there is a minority population in the SEZ area based on 2000 Census data and CEQ guidelines. The number of low-income individuals does not exceed the state average by 20 percentage points or more and does not exceed 50% of the total

TABLE 12.2.20.1-1 Minority and Low-Income Populations within the 50-mi (80-km) Radius Surrounding the Proposed Mason Draw SEZ

Parameter	New Mexico	Texas
Total population	211,236	272,931
White, non-Hispanic	72,142	74,101
Hispanic or Latino	130,937	177,550
Non-Hispanic or Latino minorities	8,247	21,280
One race	6,066	18,312
Black or African American	2,481	12,558
American Indian or Alaskan Native	1,523	767
Asian	1,336	4,386
Native Hawaiian or Other Pacific Islander	77	293
Some other race	649	308
Two or more races	2,181	2,968
Total minority	139,184	198,830
Low income	54,687	58,508
Percentage minority	65.9	72.8
State percentage minority	33.2	29.0
Percentage low-income	25.9	21.4
State percentage low-income	18.4	15.4

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

population in the area; thus, there are no low-income populations in the 50-mi (80-km) area around the boundary of the SEZ.

Figures 12.2.20.1-1 and 12.2.20.1-2 show the locations of the minority and low-income population groups within the 50-mi (80-km) area around the boundary of the SEZ.

12.2.20.2 Impacts

Environmental justice concerns common to all utility-scale solar energy facilities are described in detail in Section 5.18. These impacts will be minimized through the implementation

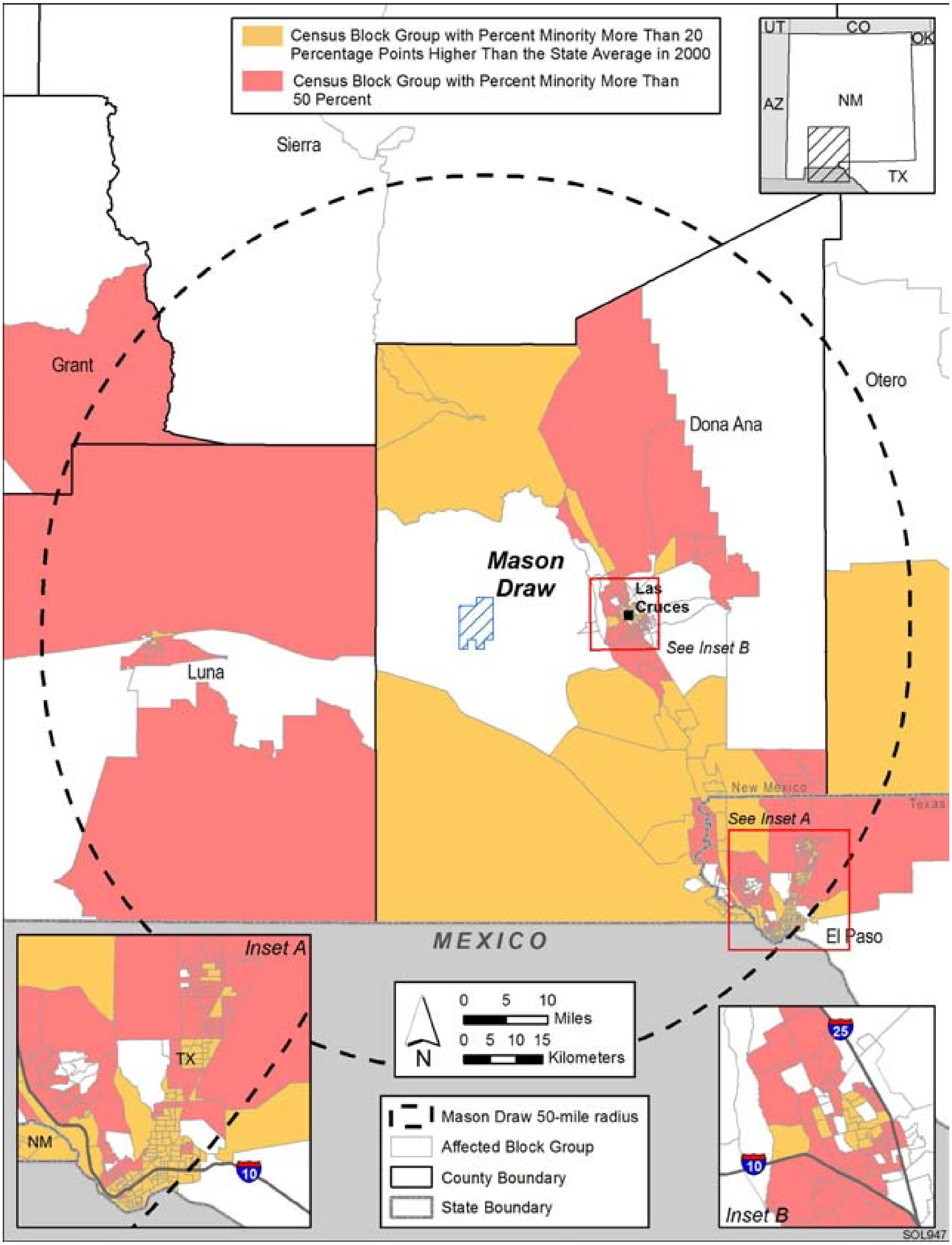

FIGURE 12.2.20.1-1 Minority Population Groups within the 50-mi (80-km) Area Surrounding the Proposed Mason Draw SEZ

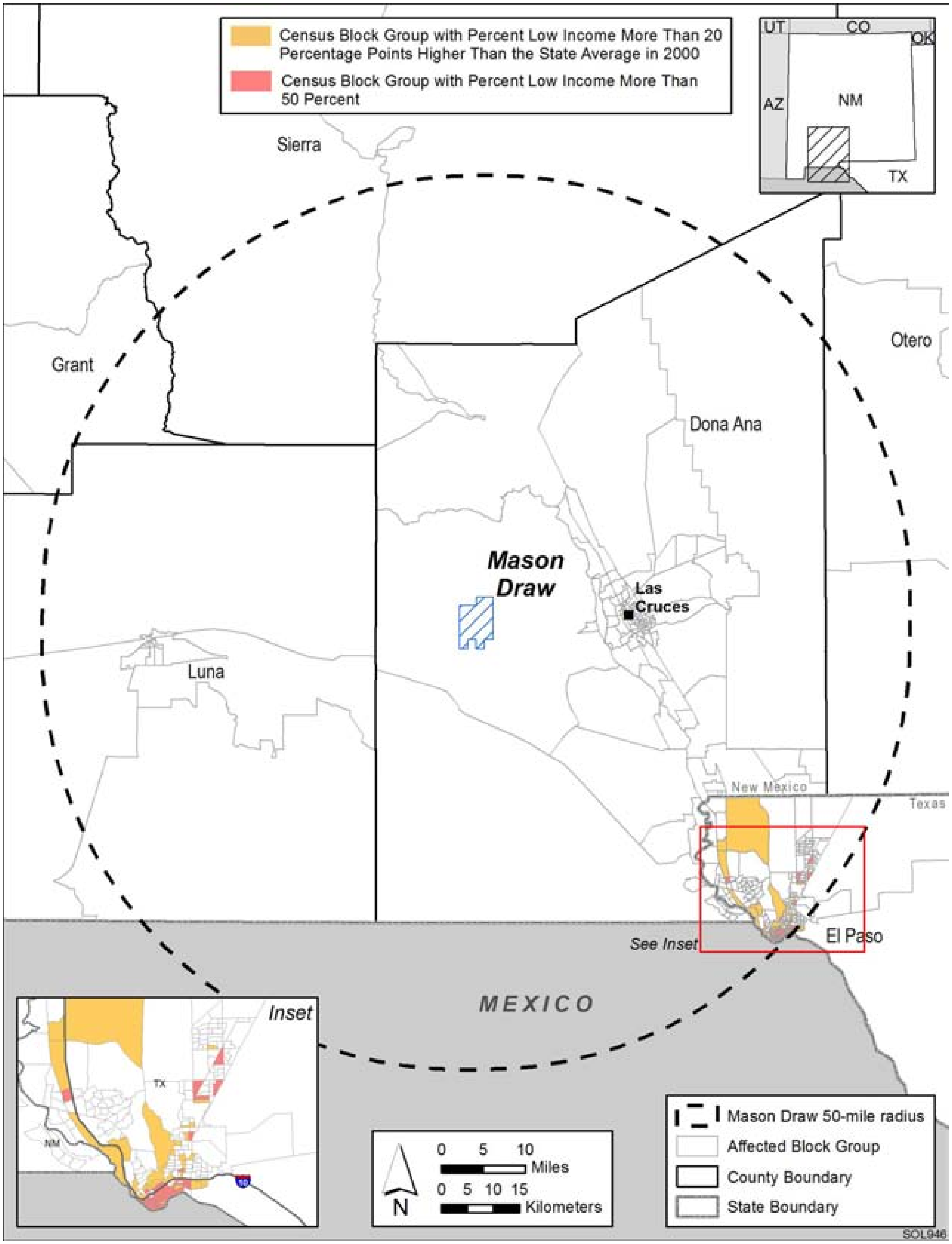

FIGURE 12.2.20.1-2 Low-Income Population Groups within the 50-mi (80-km) Radius Surrounding the Proposed Mason Draw SEZ

of 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 energy facilities within the proposed SEZ include noise and dust during the construction of solar facilities; noise and EMF effects associated with solar project operations; the 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. These are 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 development involving each of the four technologies. Although impacts are likely to be small, there are minority populations, as defined by CEQ guidelines (Section 12.2.20.1), within the 50-mi (80-km) radius around the boundary of the SEZ; thus any adverse impacts of solar projects could disproportionately affect minority populations. Because there are low-income populations within the 50-mi (80-km) radius, according to CEQ guidelines, there could also be impacts on low-income populations.

12.2.20.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features addressing environmental justice impacts have been identified for the proposed Mason Draw 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.

12.2.21 Transportation

The proposed Mason Draw SEZ is accessible by road, rail, and air networks. Two interstate highways, two major railroads, and a small regional airport serve the area. General transportation considerations and impacts are discussed in Sections 3.4 and 5.19.

12.2.21.1 Affected Environment

The proposed Mason Draw SEZ is near the I-10 corridor, about 18 mi (29 km) west of Las Cruces, New Mexico (Figure 12.2.21.1-1). A portion of the southern border of the SEZ is adjacent to the north side of I-10. Dona Ana County dirt roads C003, C004, C005, and C006 cross the SEZ, with C003 and C005 terminating to the south at Gecko Road, which parallels the northern boundary of I-10 and connects to Exit 116 on I-10. In the Mimbres RMP (BLM 1993), the SEZ area is included in the group of lands designated as "Limited, existing roads and trails," indicating that existing roads and trails are available for vehicle and OHV use. Deming, New Mexico, is about 35 mi (56 km) west on I-10. East of the SEZ, I-10 joins I-25 in Las Cruces and then travels south about 40 mi (64 km) to El Paso, Texas. Annual average traffic volumes for the major roads in the area are provided in Table 12.2.21.1-1.

The BNSF and UP railroads serve the area. The BNSF Railroad extends from the north-northwest to the south-southeast through Las Cruces east of the SEZ, with stops in Las Cruces, Mesilla Park, Mesquite, Vado, and Berino (BNSF 2010). The closest BNSF Railroad stop to the SEZ is in Las Cruces, about 20 mi (32 km) away. The UP Railroad comes within about 5.3 mi (8.5 km) of the southwest portion of the SEZ at its closest approach as it goes to El Paso to the southeast and Tucson to the west. The nearest UP Railroad stops to the SEZ are in Deming, about 32 mi (51 km) west, and in El Paso, 62 mi (100 km) southeast (UP Railroad 2009).

Five airports (four small and one larger) open to the public are within a driving distance of about 70 mi (113 km) from the proposed Mason Draw SEZ, as listed in Table 12.2.21.1-2. The small airports do not have regularly scheduled passenger service. The nearest public airport is Las Cruces International Airport, about 9 mi (14 km) east of the SEZ along I-10. The nearest larger airport is in El Paso, about a 70-mi (113-km) southeast of the SEZ. The El Paso International Airport is served by several major U.S. airlines, with 1.90 million passengers having departed from and 1.88 million passengers having arrived at the airport in 2008 (BTS 2009). For the same year, a total of 60.8 million lb (27.6 million kg) of freight was shipped from El Paso International Airport and 80.7 million lb (36.6 million kg) was received.

12.2.21.2 Impacts

As discussed in Section 5.19, the primary transportation impacts are anticipated to be from commuting worker traffic. I-10 provides a regional traffic corridor that would experience small impacts for single solar development projects that may have up to 1,000 daily workers, with an additional 2,000 vehicle trips per day (maximum). Such an increase is less than 15% of the current traffic on I-10 as it passes the southern section of the SEZ (as summarized in

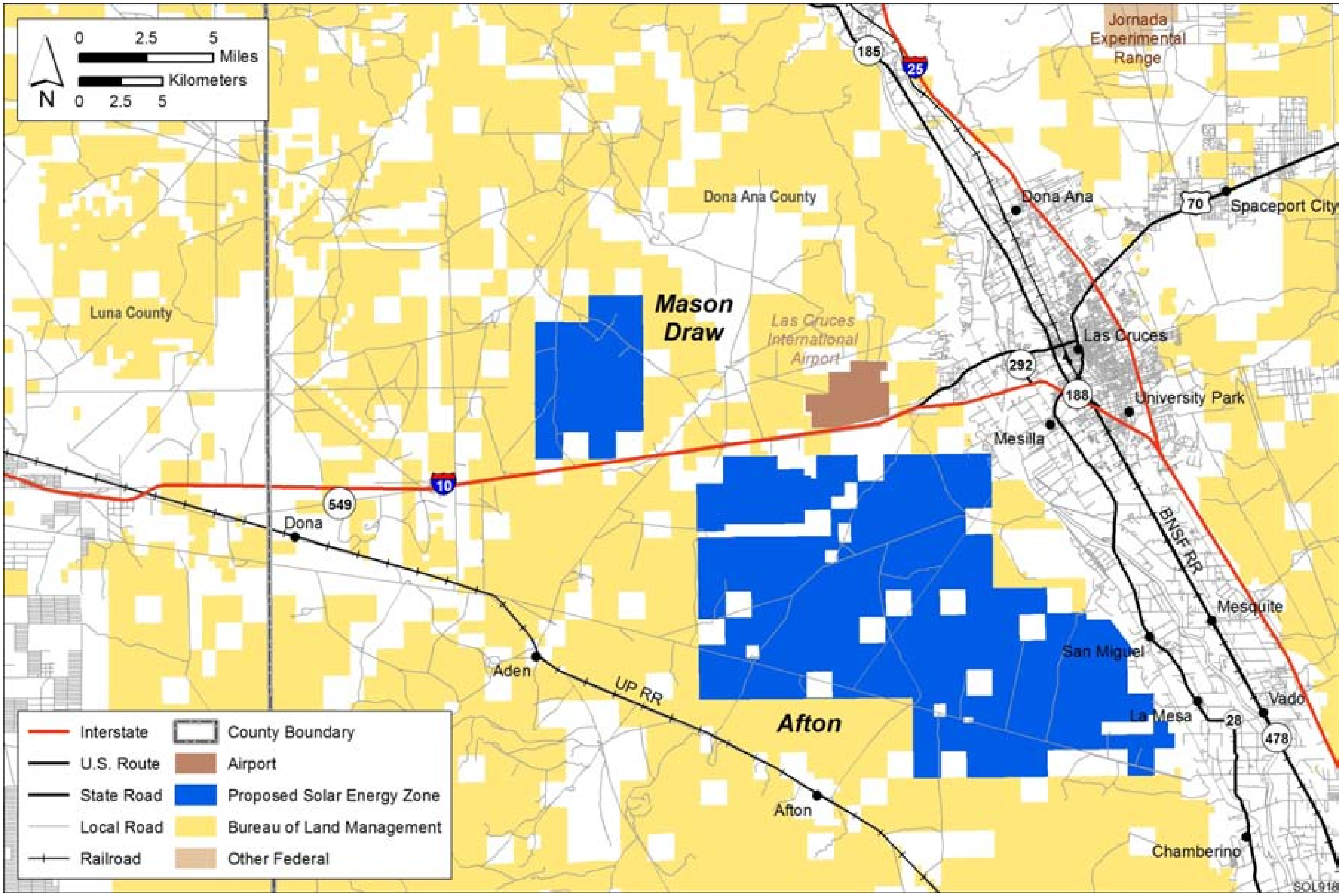

FIGURE 12.2.21.1-1 Local Transportation Network Serving the Proposed Mason Draw SEZ

TABLE 12.2.21.1-1 AADT for 2008 on Major Roads near the Proposed Mason Draw SEZ

Road	General Direction	Location	AADT (Vehicles)
I-10	East–west	West of Exit 102 in Akela	19,500
		East of Exit 102/West of State Route 549 (Exit 116)	16,800
		East of State Route 549	15,800
		West of Exit 132 (Las Cruces Airport)	16,000
		East of Exit 132	16,700
		East of junction U.S. 70	20,100
	North–south	South of I-25 interchange	42,700
		South of Mesquite (Exit 151)	30,800
I-25	North–south	North of University Park (Exit 1)	36,800
		North of East Lohman Ave. (Exit 3)	39,200
		North of junction U.S. 70	16,300
U.S. 70		Junction I-10	10,200
		West of Las Cruces	12,600
State Route 549	East–west	Southwest of junction with I-10 (Exit 116)	800

Source: NM DOT (2010).

Table 12.2.21.1-1). However, the exits on I-10 might experience moderate impacts with some congestion. Local road improvements would be necessary in any portion of the SEZ near I-10 that might be developed so as not to overwhelm the local roads near any site access points.

Should up to two large projects with approximately 1,000 daily workers each be under development simultaneously, an additional 4,000 vehicle trips per day could be added to I-10 in the vicinity of the SEZ, assuming ride-sharing programs were not implemented. This change would be about a 25% increase in the current average daily traffic level on segments of I-10 near the southern portion of the SEZ and could have moderate impacts on traffic flow during peak commuter times. The extent of the problem would depend on the relative locations of the projects within the SEZ, where the worker populations originate, and the work schedules. The affected exits on I-10 would experience moderate impacts, with some congestion. As mentioned above, local road improvements would be necessary in any portion of the SEZ near I-10 that might be developed so as not to overwhelm the local roads near any site access points.

Solar development within the SEZ would affect public access along OHV routes designated open and available for public use. If there are any routes designated as open within the proposed SEZ, these routes crossing areas granted ROWs for solar facilities would be

TABLE 12.2.21.1-2 Airports Open to the Public in the Vicinity of the Proposed Mason Draw SEZ

			Runway 1[a,b]			Runway 2[b]		
Airport	Location	Owner/Operator	Length (ft [m])	Type	Condition	Length (ft [m])	Type	Condition
Las Cruces International	About 9 mi (14 km) east of the SEZ on I-10.	City of Las Cruces	6,069 (1,850)	Asphalt	Good	7,499 (2,286)	Concrete/ Grooved	Excellent
			7,499 (2,286)	Asphalt	Fair	NA[c]	NA	NA
Dona Ana County Airport at Santa Teresa	About 59 mi (95 km) southeast of the SEZ near I-10 in Santa Teresa.	Dona Ana County	8,500 (2,591)	Asphalt	Good	NA	NA	NA
Deming Municipal	About 32 mi (51 km) west of the SEZ along I-10 in Deming.	City of Deming	5,675 (1,730)	Asphalt	Fair	6,627 (2,020)	Asphalt	Good
El Paso International	About a 70-mi (113-km) drive southeast of the SEZ near I-10 in El Paso.	City of El Paso	5,499 (1,676)	Asphalt	Fair	9,025 (2,751)	Asphalt/ Grooved	Excellent
			12,020 (3,664)	Asphalt/ Grooved	Good	NA	NA	NA
Hatch Municipal	About 68 mi (109 km) north of the SEZ near I-25 in Hatch.	Village of Hatch	4,110 (1,253)	Asphalt	Good	NA	NA	NA

[a] Las Cruces International and El Paso International each have three runways. In each case, information on two of the runways is presented in the "Runway 1" column, and information on the third is in the "Runway 2" column.

[b] Source: FAA (2010).

[c] NA = not applicable.

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

12.2.21.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features have been identified related to impacts on transportation systems around the proposed Mason Draw 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.

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12.2.22 Cumulative Impacts

The analysis presented in this section addresses the potential cumulative impacts in the vicinity of the proposed Mason Draw SEZ in Dona Ana County, New Mexico. The CEQ guidelines for implementing NEPA define cumulative impacts as environment 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 Mason Draw SEZ is located just west of the populated city of Las Cruces, New Mexico. The nearest towns are Aden, about 7 mi (11 km) to the south, and Dona, about 10 mi (16 km) to the southwest. The border with Mexico is approximately 33 mi (53 km) south of the proposed SEZ. Within 50 mi (80 km) of the SEZ, there are about nine WSAs. The ARS Jornada Experimental Range is 23 mi (37 km) northeast of the SEZ, the San Andres National Wildlife Refuge is about 34 mi (54 km) northeast of the SEZ, the White Sands National Monument is about 43 mi (69 km) northeast of the SEZ, and the Gila National Forest is about 44 mi (70 km) northwest of the SEZ. The White Sands Missile Range is 28 mi (45 km) east of the SEZ, and the Fort Bliss McGregor Range is 50 mi (80 km) east of the SEZ. In addition, the Mason Draw SEZ is close to the Afton SEZ, and in some areas, impacts from the two SEZs overlap.

The geographic extent of the cumulative impacts analysis for potentially affected resources near the proposed Mason Draw SEZ is identified in Section 12.2.22.1. An overview of ongoing and reasonably foreseeable future actions is presented in Section 12.2.22.2. General trends in population growth, energy demand, water availability, and climate change are discussed in Section 12.2.22.3. Cumulative impacts for each resource area are discussed in Section 12.2.22.4.

12.2.22.1 Geographic Extent of the Cumulative Impacts Analysis

The geographic extent of the cumulative impacts analysis for potentially affected resources evaluated near the proposed Mason Draw SEZ is provided in Table 12.2.22.1-1. 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. The evaluation of air quality may have a greater regional extent of impact than visual resources. The BLM, the DoD, and the USDA administer most of the lands around the SEZ. The BLM administers approximately 32% of the lands within a 50-mi (80-km) radius of the SEZ.

TABLE 12.2.22.1-1 Geographic Extent of the Cumulative Impacts Analysis by Resource Area: Proposed Mason Draw SEZ

Resource Area	Geographic Extent
Land Use	Dona Ana, Luna, Grant, Sierra, Otero Counties in New Mexico, and El Paso County in Texas
Specially Designated Areas and Lands with Wilderness Characteristics	Within a 25-mi (40-km) radius of the Mason Draw SEZ
Rangeland Resources	
Grazing	Grazing allotments within 5 mi (8 km) of the Mason Draw SEZ
Wild Horses and Burros	A 50-mi (80-km) radius from the center of the Mason Draw SEZ
Recreation	Dona Ana, Luna, Grant, Sierra, Otero Counties in New Mexico, and El Paso County in Texas
Military and Civilian Aviation	Dona Ana, Luna, Grant, Sierra, Otero Counties in New Mexico, and El Paso County in Texas
Soil Resources	Areas within and adjacent to the Mason Draw SEZ
Minerals	Dona Ana, Luna, Grant, Sierra, Otero Counties in New Mexico, and El Paso County in Texas
Water Resources	
Surface Water	Rio Grande River, West Side Canal, Mimbres River, Mason Draw, Kimble Draw
Groundwater	Mimbres and/or Mesilla groundwater basins
Air Quality and Climate	A 31-mi (50-km) radius from the center of the Mason Draw SEZ
Vegetation, Wildlife and Aquatic Biota, Special Status Species	A 50-mi (80-km) radius from the center of the Mason Draw SEZ, including portions of Dona Ana, Luna, Grant, Sierra, Otero Counties in New Mexico, and El Paso County in Texas
Visual Resources	Viewshed within a 25-mi (40-km) radius of the Mason Draw SEZ
Acoustic Environment (noise)	Areas adjacent to the Mason Draw SEZ
Paleontological Resources	Areas within and adjacent to the Mason Draw SEZ
Cultural Resources	Areas within and adjacent to the Mason Draw SEZ for archaeological sites; viewshed within a 25-mi (40-km) radius of the Mason Draw SEZ for other properties, such as traditional cultural properties
Native American Concerns	Areas within and adjacent to the Mason Draw SEZ; viewshed within a 25-mi (40-km) radius of the Mason Draw SEZ
Socioeconomics	A 50-mi (80-km) radius from the center of the Mason Draw SEZ
Environmental Justice	A 50-mi (80-km) radius from the center of the Mason Draw SEZ
Transportation	I-10 and 25; U.S. 54 and 70; several state highways including these nearby: 28, 185, 292, and 478.

12.2.22.2 Overview of Ongoing and Reasonably Foreseeable Future Actions

The future actions described below are those that are "reasonably foreseeable"; that is, they have already occurred, are ongoing, are funded for future implementation, or are included in firm near-term plans. Types of proposals with firm near-term plans are as follows:

- Proposals for which NEPA documents are in preparation or finalized;
- Proposals in a detailed design phase;
- Proposals listed in formal NOIs published in the Federal Register or state publications;
- Proposals for which enabling legislations have 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 12.2.22.2.1), and (2) other ongoing and reasonably foreseeable actions, including those related to mining and mineral processing, grazing management, transportation, recreation, water management, and conservation (Section 12.2.22.2.2). Together, these actions and trends have the potential to affect human and environmental receptors within the geographic range of potential impacts over the next 20 years.

12.2.22.2.1 Energy Production and Distribution

In March 2007, New Mexico passed Senate Bill 418, which expands the State's Renewable Energy Standard to 20% by 2020, with interim standards of 10% by 2011 and 15% by 2015. The bill also establishes a standard for rural electric cooperatives of 10% by 2020. Furthermore, utilities are to set a goal of at least a 5% reduction in total retail sales to New Mexico customers, adjusted for load growth, by January 1, 2020 (DSIRE 2010).

Reasonably foreseeable future actions related to renewable energy production and energy distribution within 50 mi (80 km) of the proposed Mason Draw SEZ are identified in Table 12.2.22.2-1 and are described in the following paragraphs. However, no projects for fast-track solar energy, wind, or geothermal have been identified within this distance.

TABLE 12.2.22.2-1 Reasonably Foreseeable Future Actions Related to Energy Development and Distribution near the Proposed Mason Draw SEZ[a]

Description	Status	Resources Affected	Primary Impact Location
Fast-Track Solar Energy Projects on BLM-Administered Land			
None			
Transmission and Distribution Systems			
SunZia Southwest Transmission Project (two 500-kV lines)	NOI May 29, 2009; Draft EIS is expected to be available for review and comment by late 2010	Land use, terrestrial habitats, visual	Project Study Area includes the proposed Mason Draw SEZ, most of central New Mexico, and a corridor through southwest New Mexico that connects to Arizona
High Plains Express Transmission Project (two 500-kV lines)	Feasibility Study Report June 2008	Land use, terrestrial habitats, visual	Conceptual route from northeast to southwest New Mexico via Luna, New Mexico, to Arizona

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

Renewable Energy Development

Renewable energy ROW applications are considered in two categories: fast-track and regular-track applications. Fast-track applications, which apply principally to solar energy facilities, are those applications on public lands for which the environmental review and public participation process is under way and the applications could be approved by December 2010. A fast-track project would be considered foreseeable, because the permitting and environmental review processes would be under way. There are no solar fast-track project applications within the ROI of the proposed Mason Draw SEZ. Regular-track proposals are considered potential future projects but not necessarily foreseeable projects, because not all applications would be expected to be carried to completion. These proposals are considered together as a general level of interest in development of renewable energy in the region and are discussed in the following section. The locations of these projects are shown on Figure 12.2.22-1.

Pending Renewable Energy ROW Applications on BLM-Administered Lands

One regular-track solar project ROW application has been submitted to the BLM that would be located within 50 mi (80 km) of the SEZ. Table 12.2.22.2-2 provides information on

TABLE 12.2.22.2-2 Pending Renewable Energy Project ROW Applications on BLM-Administered Land within 50-mi of the Mason Draw SEZ

Serial No.	Project Name	Application Received	Size (acres[a])	MW	Technology	Status	Field Office
Solar Applications							
NMNM 119969	EnXco Development Corp.	Feb. 6, 2008	3,000	600	CSP/Trough	Pending	Las Cruces
Wind Applications							
NMNM 122188	Uriel Wind, Inc.	Oct.16, 2008	3,200	–[b]	Wind	Authorized for Wind Site Testing	Las Cruces

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

[b] A dash indicates data not available.

the solar project that had a pending application submitted to BLM as of March 2010 (BLM and USFS 2010b). Figure 12.2.22.2-1 shows the locations of this application. In addition, there is one pending wind site testing ROW application within 50 mi (80 km) of the SEZ. The likelihood of any of the regular-track application projects actually being developed is uncertain but is generally assumed to be less than that for fast-track applications.

Transmission and Distribution

SunZia Southwest Transmission Project. This proposed project would be for two 500-kV transmission lines with an estimated total capacity of 3,000 MW. The proposed transmission line would originate at a new substation in either Socorro County or Lincoln County in the vicinity of Bingham or Ancho, New Mexico, and terminate at the Pinal Central Substation in Pinal County near Coolidge, Arizona. A new substation is also proposed east of Deming, New Mexico, about 25 mi (40 km) west of the proposed Mason Draw SEZ. The transmission line route would be approximately 460 mi (736 km) long. The route and alternatives would cross BLM lands on approximately 170 mi (272 km) in New Mexico and 45 mi (72 km) in Arizona, along with state and private lands (BLM 2010d). The project's Study Area includes the proposed Mason Draw SEZ, most of central New Mexico, and a corridor through southwest New Mexico that connects to Arizona. The project would transport electricity generated by power generation resources, including primarily renewable resources, to western power markets and load centers (BLM 2010d). A draft EIS is expected to be available for public review and comment by late 2010. Other federal, state, and county permitting efforts are also under way. SunZia is anticipated to be in service and delivering renewable energy by early 2014 (SunZia 2010).

High Plains Express Transmission Project. Two 500-kV transmission lines carrying up to 4,000 MW of bulk power are proposed, which would traverse 1,300 mi (2,092 km) from east-central Wyoming, through eastern Colorado, across New Mexico, to Arizona. The conceptual route for one 500-kV line would connect to a substation located about 30 mi (48 km) west of the proposed Mason Draw SEZ or interconnect with the proposed SunZia project for a portion of the route near the SEZ. The project would strengthen the eastern portion of the western grid, increase markets for renewable energy, increase system reliability, and allow economic transfers of energy. The project is projected to cost more than $5 billion (HPX 2008). Construction would begin in 2015 and operation in 2018. A project feasibility study was completed in 2008, while more detailed project studies are under way.

12.2.22.2.2 Other Actions

Other major ongoing and foreseeable actions identified within 50 mi (80 km) of the proposed Mason Draw SEZ are listed in Table 12.2.22.2-3 and are described in the following subsections.

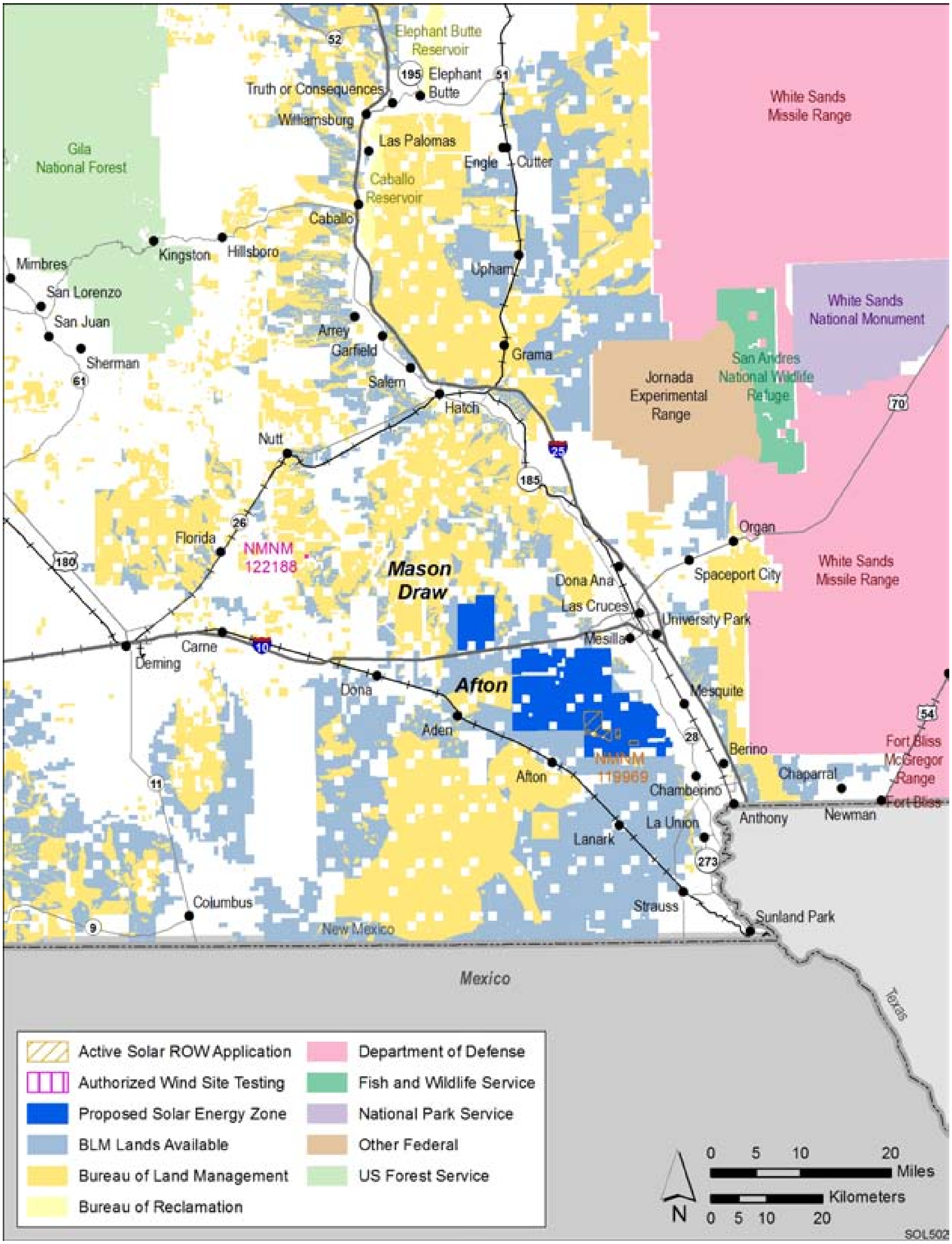

FIGURE 12.2.22.2-1 Locations of Renewable Energy Project ROW Applications within a 50-mi (80-km) Radius of the Proposed Mason Draw SEZ

TABLE 12.2.22.2-3 Other Major Actions near the Proposed Mason Draw SEZ[a]

Description	Status	Resources Affected	Primary Impact Location
Afton Generating Station	Operating since 2002	Land use, terrestrial habitats, air quality, visual	13 mi (21 km) southeast of the SEZ
Rio Grande Power Station	Operating since 1929	Land use, terrestrial habitats, water, air quality, visual	42 mi (68 km) southeast of the SEZ
Newman Power Station	Last unit began operating in 2009	Land use, terrestrial habitats, water, air quality, visual	38 mi (60 km) southeast of the SEZ
Fort Bliss	Established in 1854	Land use, terrestrial habitats, air quality, visual	42 mi (67 km) southeast of the SEZ
Fort Bliss McGregor Range	Operating since the 1940s	Land use, terrestrial habitats, air quality, visual	Nearest boundary 46 mi (75 km) east of the SEZ
Fort Bliss Dona Ana Range		Land use, terrestrial habitats, air quality, visual	23 mi (37 km) east of the SEZ
White Sands Missile Range	Operating since 1945	Land use, terrestrial habitats, air quality, visual	Nearest boundary about 25 mi (40 km) east of the SEZ
Jornada Experimental Range	Operating since 1912	Land use	Nearest boundary 17 mi (27 km) northeast of the SEZ
Opening of Hunting on the San Andres National Wildlife Refuge (NWR)	EA issued February 2007	Terrestrial habitat, wildlife	Boundary 27 mi (43 km) northeast of the SEZ
Mountain Lion Management on the San Andres NWR	EA issued September 2002	Terrestrial habitat, wildlife	Boundary 27 mi (43 km) northeast of the SEZ

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

Other Ongoing Actions

Afton Generating Station. PNM operates the Afton Generating Station, 12.5 mi (20 km) southwest of Las Cruces, New Mexico and 13 mi (21 km) southwest of the SEZ. The 135-MW plant consists of a simple-cycle, natural gas–fired facility (PNM 2002).

Rio Grande Power Station. El Paso Electric operates the Rio Grande Power Station, located on the banks of the Rio Grande River, about 42 mi (68 km) southeast of the SEZ. The plant consists of three steam-electric generating units with a total capacity of 246 MW. The units operate primarily on natural gas but can also operate on fuel oil (El Paso Electric 2010).

Newman Power Station. El Paso Electric operates the Newman Power Station, in El Paso, Texas, about 38 mi (60 km) southeast of the SEZ. The plant consists of three steam-electric and two combined cycle generating units with a total capacity of 614 MW. The units operate primarily on natural gas but can also operate on fuel oil (Reuters 2010).

Fort Bliss. The main cantonment area of Fort Bliss is adjacent to El Paso, Texas, approximately 42 mi (67 km) southeast of the SEZ. The installation, which also includes the McGregor Range, the Dona Ana Range, the North Training Area in New Mexico, and the South Training Area in Texas, occupies a total of 1.12 million acres (4530 km^2). Fort Bliss comprises a complex of facilities, training, and test activities. The original Army Post was established in 1854 (GlobalSecurity.org 2006).

Fort Bliss McGregor Range. Fort Bliss McGregor Range, 46 mi (75 km) east of the SEZ, encompasses 608,335 acres (2,461 km^2) of withdrawn public land, 71,083 acres (288 km^2) of Army fee-owned land, and 18,004 acres (73 km^2) of U.S. Forest Service land. Mission activities include training to maintain the operational readiness of active duty, reserve, and National Guard units through training, operations, and field exercises. Field exercises include field operations, communications, command and control, simulated enemy contact, smoke generation, and missile and weapons firing. Participation in joint training involves 10,000 to 20,000 personnel per year (GlobalSecurity.org 2005a).

Fort Bliss Dona Ana Range. Fort Bliss Dona Ana Range is 23 mi (37 km) east of the SEZ. The Multi-Purpose Range Complex consists of target lanes with armor stationary pits, moving and stationary targets, small arms ranges for mechanized infantry and aerial gunnery, and smoke generators for training to screen friendly actions against aggressor positions. Participation in joint training has involved more than 20,000 personnel per year (GlobalSecurity.org 2005b).

White Sands Missile Range (WSMR). The White Sands Missile Range, the Department of the Army's largest installation, covers approximately 2.2 million acres (8,900 km^2). The closest boundary is 25 mi (40 km) northeast of the SEZ. The facility began operating in 1945 and employs approximately 2,700 military personnel and contractors. The primary mission is to support missile development and test programs for the U.S. Army, Navy, Air Force, and The National Aeronautics and Space Administration (NASA). WSMR supports approximately 3,200 to 4,300 test events annually (GlobalSecurity.org 2005c; WSMR 2009).

Jornada Experimental Range. The Department of Agriculture's Jornada Experimental Range encompasses 193,000 acres (780 km^2). The closest boundary is 17 mi (27 km) north–northeast of the SEZ. The mission of the facility, which began operation in 1912, is to develop new knowledge of ecosystem processes as a basis for management and remediation of desert rangelands (USDA 2008).

Other Foreseeable Actions

Opening of Hunting on the San Andres NWR. The USFWS intends to remove exotic antelope oryx on the San Andres NWR through a limited hunting program. The closest boundary of the NWR is 27 mi (43 km) northeast of the SEZ. The NWR encompasses 57,215 acres (232 km^2). Oryx, a large African antelope introduced in the early 1970s, has caused habitat damage and presents potential disease for desert mule deer and desert bighorn sheep (USFWS 2007).

Mountain Lion Management on the San Andres NWR. The USFWS intends to protect desert bighorn sheep from predation by mountain lions during restoration efforts of desert bighorn sheep in the San Andres Mountains. The closest boundary of the NWR is 27 mi (43 km) northeast of the SEZ. The NWR encompasses 57,215 acres (232 km^2). Control of mountain lions would be concentrated in a limited area around the desert bighorn sheep release sites. Any mature mountain lion perceived to be a threat would be killed (USFWS 2002).

Grazing Allotments

One grazing allotment covers the entire Mason Draw SEZ. Within 50 mi (80 km) of the SEZ, most of the land is covered with grazing allotments with the exception of the land to the east.

Mining

Within 50 mi (80 km) of the proposed Mason Draw SEZ, the BLM *GeoCommunicator* database (BLM and USFS 2010a) shows several active mining claims on file with BLM. The highest density of claims is located 47 mi (75 km) northwest of the SEZ (101 to 200 claims per township).

12.2.22.3 General Trends

12.2.22.3.1 Population Growth

Over the period 2000 to 2008, the counties in the ROI experienced growth in population. The population in Dona Ana County in New Mexico grew at an annual rate of 2.1%, Luna County in New Mexico by 1.1%, and El Paso County in Texas by 1.7 %. The population of the ROI in 2008 was 1,009,542, having grown at an average annual rate of 1.7% since 2000. The growth rate for the state of New Mexico, as a whole, was 1.7% (Section 12.2.10.1).

12.2.22.3.2 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 Dona Ana, Luna, and El Paso Counties between 2006 and 2016, an increase in energy demand also is expected. However, the EIA projects a decline in per-capita energy use through 2030, mainly because of the high cost of oil and improvements in energy efficiency throughout the projection period. Primary energy consumption in the United States between 2007 and 2030 is expected to grow by about 0.5% each year; the fastest growth is projected for the commercial sector (at 1.1% each year). Transportation, residential, and industrial energy consumption are expected to grow each year by about 0.5, 0.4, and 0.1%, respectively (EIA 2009).

12.2.22.3.3 Water Availability

As described in Section 12.2.9.1, the Mason Draw SEZ is located on the eastern edge of the Mimbres Groundwater Basin, which is adjacent to the West Mesa portion of the Mesilla Groundwater Basin to the east. The two basins are hydraulically connected. Groundwater depth in the vicinity of the proposed Mason Draw SEZ is not known. Wells in the Mesilla Basin that are located over 3 mi (5 km) to the east have depth to groundwater values ranging between 185 and 320 ft (56 and 98 m). Groundwater extractions in the Mimbres Basin are greater towards the town of Deming, which is located 25 mi (40 km) west of the proposed SEZ near the center of the basin. Groundwater levels in this area have been decreasing at an average rate of 0.8 ft/yr (0.2 m/yr) since the 1940s.

Estimates for the total groundwater recharge in the Mimbres Basin range from 39,940 to 55,300 ac-ft/yr (49.3 million and 68.2 million m^3/yr). However, for the region around the proposed SEZ, the estimated recharge is only 1,740 ac-ft/yr (2.1 million m^3/yr). Total groundwater recharge for the Mesilla Basin was estimated to be less than 10,000 ac-ft/yr (12.3 million m^3/yr) (Section 12.1.9.1.2).

In 2005, water withdrawals from surface waters and groundwater in Dona Ana County were 521,000 ac-ft/yr (642 million m^3/yr), of which 61% came from surface waters and 39% came from groundwater. Agricultural was the largest use, at 470,000 ac-ft/yr (580 million m^3/yr), while public supply water use was 42,000 ac-ft/yr (52 million m^3/yr). The City of Las Cruces has obtained rights to 13,000 ac-ft/yr (16 million m^3/yr) from a planned well field in the West Mesa (Section 12.1.9.2.4).

12.2.22.3.4 Climate Change

A report on global climate change in the United States prepared by the U.S. Global Research Program (GCRP 2009) documents current temperature and precipitation conditions and historic trends. Excerpts of the conclusions from this report indicate the following for the southwest region of the United States, which includes western and central New Mexico:

- 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.

- Increased frequency and altered timing of flooding will increase risks to people, ecosystems, and infrastructure.

- The average temperature in the Southwest has already increased by about 1.5ºF (0.8ºC) compared to a 1960 to 1979 baseline, and by the end of the century, the average annual temperature is projected to rise 4ºF to 10ºF (2ºC to 6ºC).

- A 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, the 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 El Paso, present significant stress to health as well as electricity and water supplies.

- 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.

12.2.22.4 Cumulative Impacts on Resources

This section addresses potential cumulative impacts in the proposed Mason Draw SEZ on the basis of the following assumptions: (1) because of the moderate size of the proposed SEZ (>10,000 and <30,000 acres [>40.5 and <121 km^2]), up to two projects could be constructed at a time, and (2) maximum total disturbance over 20 years would be about 10,327 acres (41.8 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 up to 250 acres (1.01 km^2) monthly on the basis of construction schedules planned in current applications. Since a 115-kV 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 12.2.1.2). Regarding site access, the nearest major road is I-10, which runs adjacent to the southern boundary of the SEZ. It is assumed that no new access roads would need to be constructed to reach this road and to support solar development in the SEZ.

Cumulative impacts that would result from the construction, operation, and decommissioning of solar energy development projects within the proposed SEZ when added to other past, present, and reasonably foreseeable future actions described in the previous section in each resource area are discussed below. At this stage of development, because of the uncertain nature of future projects in terms of size, number, and location within the proposed SEZ and the types of technology that would be employed, the impacts are discussed qualitatively or semiquantitatively, 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 area.

12.2.22.4.1 Lands and Realty

The area covered by the proposed Mason Draw SEZ is largely rural and undeveloped. The areas surrounding the SEZ are both rural and industrial, with several large electric power plants nearby. I-10, which runs just south of the SEZ, would provide access to the SEZ, while the interior of the SEZ is accessible via two county roads (Section 12.2.2.1).

Development of the SEZ for utility-scale solar energy production would establish a new industrial area that would exclude many existing and potential uses of the land, perhaps in perpetuity. There is little development within the SEZ, while several industrial facilities and a municipal airport lie along the I-10 corridor to the south. Thus, utility-scale solar energy development within the SEZ would not be a new land use in the area, but would convert additional rural land to such use. Access to portions of the SEZ holding solar facilities by both the general public and much wildlife, for current uses, would be eliminated.

As shown in Table 12.2.22.2-2 and Figure 12.2.22.2-1, there are currently no solar applications on the SEZ, and one solar, one wind, and no geothermal applications on public land within a 50-mi (80-km) radius of the proposed SEZ. Other currently foreseeable projects identified in Section 12.2.22.2.2 are mainly transmission projects located more than 20 mi (32 km) from the SEZ (Section 12.2.22.2.2) and would have minimal impacts on land use near the SEZ. The proposed Afton SEZ is located 3 mi (5 km) to the southeast.

The development of utility-scale solar projects in the proposed Mason Draw SEZ in combination with other ongoing and foreseeable actions within the 50-mi (80-km) geographic extent of effects could have small cumulative effects on land use through impacts on land access and use for other purposes, and through impacts on groundwater availability and on visual resources, especially if the proposed Mason Draw and Afton SEZs are fully developed with solar facilities. It is not anticipated that approval of solar energy development within the SEZ would have a significant impact on the amount of public lands available for future ROWs outside the SEZ (Section 12.2.2.2.1), except lands developed with solar facilities in the nearby Afton SEZ.

12.2.22.4.2 Specially Designated Areas and Lands with Wilderness Characteristics

There are 16 specially designated areas within 25 mi (40 km) of the proposed Mason Draw SEZ in New Mexico that potentially could be affected by solar energy development within the SEZ from impacts on scenic and wilderness characteristics (Section 12.2.3.1). Potential exists for cumulative visual impacts on these areas from the construction of utility-scale solar energy facilities within the SEZ and other development outside the SEZ within the geographic extent of effects, including solar facilities in the proposed Afton SEZ. The magnitude of cumulative effects from currently foreseeable development, however, would be low due to the small number of projects identified. Existing urban, agricultural, and commercial development along I-10 and in the Mesilla Valley along the Rio Grande would contribute to cumulative visual impacts on sensitive areas.

12.2.22.4.3 Rangeland Resources

The proposed Mason Draw SEZ covers about 7% of one grazing allotment (Section 12.2.4.1.1). If utility-scale solar facilities were constructed on the SEZ, those areas occupied by the solar projects would be excluded from grazing. In addition, the nearby Afton SEZ includes significant portions of six allotments, including the allotment affected by the proposed Mason Draw SEZ, which could be affected by solar facilities built there. Other foreseeable projects within 50 mi (80 km) of the SEZ, mainly transmission projects, are not expected to significantly affect grazing because of the nature and small number of the proposed projects.

The proposed Mason Draw SEZ is about 120 mi (193 km) from the nearest wild horse and burro HMA managed by the BLM and about 235 mi (378 km) from any wild horse and burro territories administered by the USFS; thus solar energy development within the SEZ would not directly or indirectly affect wild horses and burros (Section 12.2.4.2.2). The SEZ would not, therefore, contribute to cumulative effects on wild horses and burros.

12.2.22.4.4 Recreation

The easy access of the proposed SEZ to nearby population centers invites some types of outdoor recreation, including hiking, biking, backcountry driving, and small game hunting (Section 12.2.5.1). Construction of utility-scale solar projects on the SEZ would preclude recreational use of the affected lands for the duration of the projects, while access restrictions within the SEZ could affect access to recreational areas within and outside the SEZ. The nearby proposed Afton SEZ would have similar effects from solar facilities built there. Such effects within either SEZ are expected to be small due to low current use and alternate recreational areas, while the cumulative effects of two SEZs would be small as well. Effects on wilderness characteristics in surrounding specially designated areas from visual impacts of solar facilities are more difficult to assess, but small cumulative impacts on these areas from solar development in both SEZs could accrue. Other foreseeable actions within the geographic extent of effects, mainly transmission projects located more than 20 mi (32 km) from the SEZ, would not contribute significantly to cumulative impacts on recreation.

12.2.22.4.5 Military and Civilian Aviation

One military training route overlaps the proposed Mason Draw SEZ. This route has a minimum altitude level of 100 ft (30 m) above ground level, which could be affected by solar facilities or transmission lines greater than this height. The Las Cruces International Airport lies 8 mi (13 km) to the east of the SEZ (Section 12.2.6.1). FAA regulations, including height restrictions on solar facilities and transmission lines, would prevent conflicts with civilian airport operations there. Foreseeable development within 50 mi (80 km) of the SEZ, including potential solar facilities within the nearby proposed Afton SEZ, would not affect military or civilian aviation; thus, there would be no cumulative impacts.

12.2.22.4.6 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 ongoing activities outside of the proposed SEZ, including military training operations and agriculture. Cumulative impacts on soil resources from other ongoing and foreseeable projects within the region are unlikely, because these projects are few in number, are mostly more than 20 mi (32 km) from SEZ, and generally do not produce significant soil disturbance (Section 12.2.22.2). Cumulative impacts from solar facilities in both the proposed Mason Draw SEZ and the nearby Afton SEZ would depend on the number and size of facilities ultimately built, but are expected to remain small with mitigations in place.

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 activities outside the SEZ. However, with the required design features in place, cumulative impacts would likewise be small.

12.2.22.4.7 Minerals (Fluids, Solids, and Geothermal Resources)

As discussed in Section 12.2.8, there are currently no active oil and gas leases or mining claims within the proposed Mason Draw SEZ, and there are no pending proposals for geothermal energy development. Because of the generally low level of mineral production in the proposed SEZ and surrounding area, and the expected low impact on mineral accessibility of other foreseeable actions within the geographic extent of effects, including potential solar facilities within the nearby proposed Afton SEZ, no cumulative impacts on mineral resources are expected.

12.2.22.4.8 Water Resources

Section 12.2.9.2 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 evaluated solar technologies would be up to about 3,500 ac-ft/yr (4.3 million m^3/yr). During operations, with full development of the SEZ on more than 80% of its available land area, the amount of water needed for evaluated solar technologies would range from 58 to 31,011 ac-ft/yr (71,000 to 38 million m^3/yr). The amount of water needed during decommissioning would be similar to or less than the amount used during construction. In 2005, water withdrawals from surface waters and groundwater in Dona Ana County were 521,000 ac-ft/yr (642 million m^3/yr), of which 61% came from surface waters and 39% came from groundwater. The largest water use was for agricultural irrigation, at 470,000 ac-ft/yr (580 million m^3/yr) (Section 12.2.9.1.3). Therefore, cumulatively the additional water resources needed for solar facilities in the SEZ during operations would constitute from a very small (0.01%) to a moderate (6.0%) increment (the ratio of the annual water requirement for operations to the annual amount withdrawn in Dona Ana County), depending on the solar technology used (PV technology at the low end and the wet-cooled parabolic trough technology at the high end).

Water use estimates for solar technologies at the proposed Mason Draw SEZ are small compared to the water use in Dona Ana County; however, the physical location of the proposed SEZ has limited water availability in the underlying groundwater aquifers. As discussed in Section 12.2.9.1.2, the proposed Mason Draw SEZ is located on the eastern edge of the Mimbres Groundwater Basin, which is adjacent to the West Mesa portion of the Mesilla Groundwater Basin to the east. Estimates for the total groundwater recharge in the Mimbres Basin range from 39,940 to 55,300 ac-ft/yr (49.3 million and 68.2 million m^3/yr). However, for the region around the proposed SEZ, the estimated recharge is only 1,740 ac-ft/yr (2.1 million m^3/yr). Thus, using wet cooling for a full build-out of the Mason Draw SEZ would consume up to 78% of the entire estimated recharge of the Mimbres Basin, while dry-cooling technologies could use up to 5% of the basin-wide recharge and up to 100% of the estimated recharge of the portion of the basin near the SEZ (Section 12.2.9.2.2).

While solar development of the proposed SEZ with water-intensive technologies that would use groundwater would likely be judged infeasible because of concerns for groundwater supplies, if employed, intensive groundwater withdrawals could cause drawdown of groundwater, disturbance of regional groundwater flow and recharge patterns and potentially affect ecological habitats. Cumulative impacts on groundwater could occur when combined with other current and future development in the region. Groundwater withdrawals from the Mimbres basin are concentrated near Deming, 25 mi (40 km) west of the SEZ, near the center of the basin. The City of Las Cruces has rights to 13,000 ac-ft/yr (16 million m^3/yr) from a planned well field in the West Mesa, which would exceed the estimated recharge of that basin (Section 12.1.9.2.4). Water use by solar energy facilities in the proposed Mason Draw SEZ could thus contribute to impacts on groundwater in the Mimbres basin and in the West Mesa portion of the Mesilla basin, where the nearby proposed Afton SEZ lies. Both the Mimbres and Mesilla groundwater basins could be cumulatively affected from solar facilities built in the two SEZs.

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/yr (23,000 to 183,000 m^3/yr) during the peak construction year and 1 to 29 ac-ft/yr (up to 36,000 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 326 to 587 ac-ft/yr (0.40 million to 0.72 million m^3/yr) of blowdown water from cooling towers. Blowdown water would need to be either treated on-site or sent to an off-site facility. Any on-site treatment of wastewater would have to ensure that treatment ponds are effectively lined to prevent any groundwater contamination. Thus, blowdown water would not contribute to cumulative effects on treatment systems or on groundwater.

12.2.22.4.9 Vegetation

The proposed Mason Draw SEZ is located primarily within the Chihuahuan Basins and Playas ecoregion, which supports communities of desert shrubs and grasses. The predominant cover types within the proposed SEZ are: Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe, Apacherian-Chihuahuan Mesquite Upland Scrub, and Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub. Dominant species are creosotebush, banana yucca, Torrey's yucca, soaptree yucca, tobosagrass, alkali sakaton, mesa dropseed, honey mesquite, and snakeweed. Sensitive habitats on the SEZ include desert dry washes, dry wash woodland, and sand dunes. Dry washes generally do not support wetland or riparian habitats, but woodlands occur along the margins of a number of the larger washes. In addition, one palustrine open water wetland covering about 2.5 acres (0.01 km^2) and seven riverine wetlands (Kimble

Draw and tributaries) occur on the SEZ. Cover types associated with wetland and riparian areas include North American Warm Desert Riparian Woodland and Shrubland, and North American Warm Desert Playa. In the 5-mi (8-km) area of indirect effects, the predominant cover types are Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe, Apacherian-Chihuahuan Mesquite Upland Scrub, and Chihuahuan Creosotebush, Mixed Desert and Thorn Scrub (Section 12.2.10.1). 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 small impacts on the various cover types (Section 12.2.10.2.1).

Intermittently flooded areas downgradient from solar projects could be affected by ground-disturbing activities. Alteration of surface drainage patterns or hydrology, sedimentation, and siltation could adversely affect on-site and downstream wetland communities. Nearby wetlands, such as those near Mason Draw, could also be affected by lower groundwater levels if solar projects were to draw heavily on this resource. Additional impacts from the nearby Afton SEZ could affect hydraulically shared areas. Wetland habitats along the Rio Grande River are likely too far away to be affected by actions on the proposed Mason Draw SEZ.

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 activities. The cumulative dust loading could result in reduced productivity or changes in plant community composition. 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 SEZ region, a number of species are relatively uncommon, representing less than 1% of the land area within the region. In addition, sensitive areas are present within the SEZ, including dune communities and shrubland communities, some likely with cryptogamic soil crusts. Thus, future solar facilities, including facilities within the nearby proposed Afton SEZ, and other ongoing and reasonably foreseeable future actions could have a cumulative effect on sensitive and rare cover types, as well as on more abundant species. Such effects would likely be small for foreseeable development due to the abundance of the primary species and the small number of foreseeable actions within the geographic extent of effects. Cumulative impacts would increase if both the proposed Mason Draw and Afton SEZs were fully developed with solar facilities.

12.2.22.4.10 Wildlife and Aquatic Biota

Wildlife species that could potentially be affected by the development of utility-scale solar energy facilities in the proposed Mason Draw 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, loss of connectivity between natural areas, and wildlife injury or mortality. In general, species with broad distributions and a variety of habitats would be less affected than species with narrowly defined habitats within a restricted area. The use of programmatic design features would reduce the severity of impacts on wildlife. These programmatic 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.

Impacts from full build-out over 80% of the proposed SEZ would result in small impacts on amphibian, reptile, bird, and mammal species (Section 12.2.11). Impacts from ongoing and foreseeable development within the 50-mi (80-km) geographic extent of effects, including solar development in the nearby proposed Afton SEZ, would add to those of the SEZ. Because few foreseeable projects have been identified, mainly transmission projects more than 30 mi (48 km) from the SEZ, cumulative effects in the region would be small for most species. Cumulative impacts would increase if both the proposed Mason Draw and Afton SEZs were fully developed with solar facilities. Two future actions have been identified that would benefit wildlife in the region: removing introduced exotic antelope oryx on the San Andres NWR and protecting desert bighorn sheep from predation by mountain lions in the San Andres Mountains.

There are no surface water bodies or perennial or intermittent streams present within the proposed Mason Draw SEZ or within a 5-mi (8-km) radius of indirect effects. Ephemeral washes on the SEZ drain into a dry plain and support minimal aquatic or riparian habitats. Such habitats do occur in some abundance, however, within the 50-mi (80-km) geographic extent of effects, most notably in the Rio Grande River and associated canals located 10 to 15 mi (16 to 24 km) to the east (Section 12.2.11.1). Disturbance of land areas within the SEZ for solar energy facilities could result in transport of soil into ephemeral washes on-site and in the area of indirect effects, but such transport would not likely reach the Rio Grande River and associated wetlands. Such impacts would be mitigated, and no contributions to cumulative impacts on aquatic biota and habitats in the Rio Grande River would be expected in addition to those from construction of solar facilities in the Afton SEZ to the southeast, for example, or from other foreseeable actions in the region. Groundwater drawdown from solar facilities that use wet cooling might contribute to small cumulative impacts on supported aquatic habitats, for example, in Mason Draw to the west, in combination with impacts from the proposed Afton SEZ.

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

On the basis of recorded occurrences or suitable habitat, as many as 29 special status species could occur within the proposed Mason Draw SEZ. Of these species, five are known or are likely to occur within the affected area of the SEZ (including the SEZ, the 5-mi [8-km] area of indirect effects): desert night-blooming cereus, Texas horned lizard, northern aplomado falcon, fringed myotis, and Townsend’s big-eared bat. In addition, the ESA-listed Sneed’s pincushion cactus may occur within the same area. Section 12.2.12.1 discusses the nature of the special status listing of these species within state and federal agencies. Numerous additional species that may occur on or in the vicinity of the SEZ are listed as threatened or endangered by the State of New Mexico or listed as a sensitive species by the BLM. 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 facilities in the SEZ and related facilities (e.g., access roads and transmission line connections) include avoidance of habitat and minimization of erosion, sedimentation, and dust deposition. Ongoing effects on special status species within the 50-mi (80-km) geographic extent of effects include those from roads, transmission lines, agriculture, and urban development in the area, particularly along the Rio Grande River. Special status species are also likely present in areas outside the SEZ within the 50-mi (80-km) geographic extent of effects that would be affected by future development, including possibly solar development in the proposed Afton SEZ located 3 mi (5 km) to the southeast. However, cumulative impacts on protected species are expected to be low for foreseeable development, because few projects have been identified (Section 12.2.22.2). Projects would employ mitigation measures to limit effects.

12.2.22.4.12 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 activities outside the proposed Mason Draw SEZ, including from solar facilities within the proposed Afton SEZ located 3 mi (5 km) to the southeast, 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, during construction of solar facilities the maximum 24-hour PM_{10} concentration at or near the SEZ boundaries could at times exceed the applicable standard of 150 $\mu g/m^3$. Dust generation from construction activities can be controlled by implementing aggressive dust control measures, such as increased watering frequency or road paving or treatment.

Ozone, PM_{10}, and $PM_{2.5}$ are of regional concern in the area because of high temperatures, abundant sunshine, and windblown dust from occasional high winds and dry soil conditions. Construction of solar facilities in the SEZ in addition to ongoing and potential future sources in the geographic extent of effects could contribute cumulatively to short-term ozone and PM increases. Cumulative air quality effects due to dust emissions are expected to be small and short term.

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 12.2.13.2.2, 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 Mason Draw SEZ were fully developed (80% of its acreage) with solar facilities, the quantity of pollutants avoided could be as large as 11% of all emissions from the current electric power systems in New Mexico.

12.2.22.4.13 Visual Resources

The proposed Mason Draw SEZ is located in Dona Ana County in southern New Mexico on West Mesa, about 15 mi (24 km) west of the Mesilla Valley and the Rio Grande. The SEZ lies within a flat, treeless, mesa, with the strong horizon line and surrounding mountain ranges being the dominant visual features (Section 12.2.14.1). Cultural modifications in and around the SEZ include dirt and gravel roads, transmission and telephone lines, and a pipeline ROW. In addition, I-10 runs along the southern SEZ boundary. The VRI values for the SEZ and immediate surroundings are mostly VRI Class III, but with some areas of Class IV values away from the I-10 corridor, indicating low and moderate visual values, respectively. The inventory indicates low scenic quality for the SEZ and its immediate surroundings, while many locations with high scenic value lie in the surrounding mountains. The inventory indicates high sensitivity for portions of the SEZ and its immediate surroundings because of the SEZ's proximity to the I-10 corridor, a high-use travel corridor.

Construction of utility-scale solar facilities on the SEZ would alter the natural scenic quality of the immediate area, while the broader area, which is already affected by urban, industrial, and agricultural development, would be further altered. 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. Visual impacts resulting from solar energy development within the SEZ would be in addition to impacts caused by other potential projects in the area, such as other solar facilities on private lands, transmission lines, and other renewable energy facilities, like windmills. The presence of new facilities would normally be accompanied by increased numbers of workers in the area, traffic on local roadways, and support facilities, all of which would add to cumulative visual impacts.

There are currently no pending solar applications on the SEZ and only one solar, one wind, and no geothermal applications on public lands within 50 mi (80 km) of the SEZ (Figure 12.2.22.2-1). While the number of foreseeable and potential projects within the geographic extent of visual effects is low, it may be concluded that the general visual character of the landscape on and within the immediate vicinity of the SEZ could be cumulatively affected by the presence of solar facilities on the SEZ in combination with solar facilities built on the nearby proposed Afton SEZ and any other new and existing infrastructure within the viewshed. The degree of cumulative visual impacts would depend in large part on the number and location of solar facilities built in the two proposed SEZs. Because of the topography of the region, solar facilities, located on mesa flats, would be visible at great distances from the surrounding mountains. 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 facilities would be expected to vary in appearance, and depending on the number and type of facilities, the resulting visual disharmony could exceed the visual absorption capability of the landscape and add significantly to the cumulative visual impact. Considering the low level of currently foreseeable development in the region, however, small to moderate cumulative visual impacts would occur within the geographic extent of effects from future solar and other existing and future development.

12.2.22.4.14 Acoustic Environment

The areas around the proposed Mason Draw SEZ are mostly rural. Existing noise sources around the SEZ include road traffic, railroad traffic, aircraft flyover, agricultural activities, livestock grazing, and quail hunting. The construction of solar energy facilities could increase the noise levels periodically for up to three years per facility, but there would be little or minor noise impacts during operation of solar facilities, except from solar dish engine facilities and from parabolic trough or power tower facilities using TES, which could affect nearby residences.

Other ongoing and reasonably foreseeable and potential future activities in the general vicinity of the SEZ are described in Section 12.2.22.2. Because few proposed projects lie nearby outside the SEZ and noise from facilities built within the SEZ would be short range, cumulative noise effects during the construction or operation of solar facilities are unlikely. The 3-mi (5-km) distance between the proposed Mason Draw and Afton SEZs is occupied by the I-10 corridor, where few residents live and noise from solar facilities would be largely masked by highway noise.

12.2.22.4.15 Paleontological Resources

The proposed Mason Draw SEZ has the potential to contain significant paleontological resources, although no known localities of paleontological resources have been recorded within the SEZ. One known locality is within 5 mi (8 km) to the west (Section 12.2.16.1). The Prehistoric Trackways National Monument, located within 8 to 11 mi (13 to 18 km) east of the SEZ, includes fossilized footprints of amphibians, reptiles, and insects, as well as fossilized plants and petrified wood dating back 280 million years. Given the high occurrence of significant fossil material in the region, particularly in the Santa Fe Formation, the SEZ would require further geological review and a paleontological survey prior to project approval in areas with potential to contain resources (Section 12.2.16.2). Any resources encountered during a paleontological survey would be mitigated to the extent possible by collecting detailed information and allowing for possible excavation and relocation of the resource. Cumulative impacts on paleontological resources would be dependent on whether significant resources are found within the SEZ and in additional project areas in the region, including in the proposed Afton SEZ located 3 mi (5 km) to the southeast, and the extent to which these resources would be collectively affected and/or removed.

12.2.22.4.16 Cultural Resources

The proposed Mason Draw SEZ is rich in cultural history, with settlements dating as far back as 12,000 years, and has the potential to contain significant cultural resources. Only about 2% of the area of the SEZ has been surveyed for cultural resources. Surveys have recorded three cultural resource sites within the SEZ. About 5% of the area within 5 mi (8 km) of the SEZ has been surveyed, resulting in the recording of 108 sites within this range (Section 12.2.17.1.5). Areas with potential for significant sites within the proposed SEZ include dune areas (Section 12.2.17.2). Little foreseeable development has been identified within the 25-mi (40-km) geographic extent of effects (Section 12.2.22.2). 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. However, visual impacts on the Butterfield Trail, El Camino Real de Tierra Adentro, and Mesilla Plaza, as well as potentially other NRHP-listed properties in Mesilla and Las Cruces, from multiple development projects in the area, including solar facilities in the proposed Afton SEZ 3 mi (5 km) to the southeast, would have a cumulative effect on these properties. Through ongoing consultation with the New Mexico SHPO and appropriate Native American governments, it is likely that most adverse effects on significant resources in the region could be mitigated to some degree, but this would depend on the results of future surveys and evaluations. Avoidance of all NRHP-eligible sites and mitigation of all impacts may not be possible.

12.2.22.4.17 Native American Concerns

Government-to-government consultation is under way with federally recognized Native American Tribes with possible traditional ties to the Mason Draw area. All such Tribes 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 Mason Draw SEZ. However, the Pueblo of Ysleta del Sur has requested that they be consulted if human remains or other NAGPRA materials are encountered during development, implying concern for human burials and objects of cultural patrimony. Impacts of solar development on water resources in the SEZ and in the surrounding area is likely to be of major concern to affected Tribes, as are intrusions on the landscape and impacts on plants and game and on traditional resources at specific locations (Section 12.2.18). The development of solar energy facilities in combination with the development of other foreseeable projects in the area could reduce the traditionally important plant and animal resources available to the Tribes. Such effects would be small for foreseeable development due to the abundance of the most culturally important plant species and the small number and minor effects of foreseeable actions within the geographic extent of effects. Effects would increase if both the Mason Draw SEZ and the nearby Afton SEZ were fully developed with solar facilities. Continued discussions with area Tribes through government-to-government consultation is necessary to effectively consider and address the Tribes' concerns tied to solar energy development in the Mason Draw SEZ.

12.2.22.4.18 Socioeconomics

Solar energy development projects in the proposed Mason Draw SEZ could cumulatively contribute to socioeconomic effects in the immediate vicinity of the SEZ 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 any other new development in the area, including other renewable energy projects. The number of workers involved in the construction of solar projects in the peak construction year could range from about 260 to 3,500—depending on the technology being employed—with solar PV facilities at the low end and solar trough facilities at the high end. The total number of jobs created in the area could range from approximately 800 (solar PV) to as high as 10,700 (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, including in the nearby proposed Afton SEZ.

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 facilities in the area. Additional employment could occur at other new, but not yet foreseen, facilities within 50 mi (80 km) of the proposed SEZ. Based on the assumption of full build-out of the SEZ (Section 12.2.19.2.2), the number of workers needed at the solar facilities in the SEZ would range from 23 to 450, with approximately 32 to 750 total jobs created in the region. 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.

12.2.22.4.19 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 (Section 12.2.20.2). Actual impacts would depend on where low-income populations are located relative to solar and other proposed facilities, including in the proposed nearby Afton SEZ, and on the geographic range and duration of effects. Overall, effects from facilities within the SEZ are expected to be small, while those from other foreseeable actions would be minor and would not likely combine with negative effects from the SEZ on minority or low-income populations, with the possible exception of dust impacts from concurrent development of solar facilities within the proposed Afton SEZ. It is not expected, however, that the proposed Mason Draw SEZ would contribute to cumulative impacts on minority and low-income populations.

12.2.22.4.20 Transportation

I-10 lies adjacent to the southern border of the proposed Mason Draw SEZ. The nearest public airport is Las Cruces International Airport, 9 mi (14 km) east of the SEZ and just north of I-10. The nearest railroad stop is in Las Cruces, about 20 mi (32 km) from the SEZ. During construction of utility-scale solar energy facilities, up to 1,000 workers could be commuting to the construction site at the SEZ at a given time, which could increase the AADT on these roads by 2,000 vehicle trips for each facility under construction. Traffic on I-10 would experience modest increases, and exits on I-10 might experience moderate impacts with some congestion during construction (Section 12.2.21.2). This increase in highway traffic from construction workers could likewise have small cumulative impacts in combination with existing traffic levels and increases from any additional future development in the area, including during construction of solar facilities in the nearby proposed Afton SEZ, should construction schedules overlap. Local road improvements might be necessary on affected portions of I-10 and on any other affected roads. 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 it would have little contribution to cumulative impacts.

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12.2.23 References

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

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