

DRAFT FOR PUBLIC COMMENT: Antonito Southeast Solar Energy Zone (SEZ): Resources, Impacts, & On-site Mitigation

In southeast Conejos County, La Jara Field Office - 9,712 developable acres, 17 acre wetland and lake non-development area; up to 1,554 MW generation capacity.

Sources: Summarized from Draft and Final Solar PEIS for the SEZ (<http://blmsolar.anl.gov/sez/co/antonito-southeast/>), with BLM Interdisciplinary Team Input.

Resource/Issue	Impacts ¹	Onsite Mitigation ²		Residual or Unavoidable Adverse Impacts? ³
		Avoidance	Minimization	
Acoustics Section 10.1.15 ⁴	<p>Direct: Increased noise levels during construction and operation of solar facilities with thermal energy storage could cause noise levels slightly exceeding the EPA guideline of 55 dBA at the nearest residences (about 0.5 mi [0.8 km] to the north and west), particularly for activities near the northwestern boundary of the SEZ. The EPA guideline could also be exceeded at the West Fork of the North Branch of the Old Spanish Trail which is located as close as 660 ft (200 m) west of the SEZ. A level of 55 dBA is similar to the noise of an air conditioning unit at 100 ft. Noise impacts during operation of PV facilities would be minimal.</p> <p>Indirect: Based on Solar PEIS modeling, increased noise levels during construction and operations near the SWern boundary are not expected to affect wildlife in the San Antonio WSA.</p> <p>Cumulative⁵: If multiple facilities were to be constructed close to the SEZ, residents and/or wildlife nearby could be affected by the noise generated, particularly at night when the noise is more discernible due to relatively low background levels.</p> <p>Data Gaps⁶: Impacts on wildlife from construction noise needs to be considered on a project-specific basis. Refined modeling and background measurements would be needed.</p>	<p>Programmatic design features include a requirement that projects will be designed to locate solar facilities far enough away from residences, or include engineering and/or operational methods, such that county, state, and/or federal regulations for noise are not exceeded.</p> <p>See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Noise.pdf</p>	<p>Programmatic design features include a requirement to limit the hours of daily activities, construct noise barriers if needed and practicable, and coordinate with nearby residents.</p> <p>See other programmatic design features at URL under Avoidance column.</p> <p>Additionally, recommend evaluation of construction timing restrictions in project-level NEPA alternatives to further minimize effects on wildlife (e.g., no construction during breeding season or in winter use concentration areas/critical winter range).</p>	<p>Maybe (for wildlife). Technology used and onsite mitigation implemented would be primary driver of residual impact for full build-out of SEZ.</p>

¹ The impacts assessment assumed 80% of the SEZ area will be used for solar development.

² Avoidance of sensitive areas of the SEZ or avoidance of activities at certain times of year. **Avoidance and minimization measures that are specified in the Record of Decision for the Final Solar PEIS will be required.** Additional avoidance and minimization measures could be introduced during the Solar Regional Mitigation Strategy process for identified unavoidable impacts. Monitoring is planned to verify the implementation and effectiveness of design features.

³ Residual or unavoidable impacts are residual effects that cannot be adequately mitigated onsite by avoidance and/or minimization. Preliminary assessments are provided for comment.

⁴ Section numbers are the same in both the Draft and Final Solar PEIS.

⁵ Sections 10.1.22.4 of the Draft and Final Solar PEIS address cumulative impacts, which consider ongoing and reasonably foreseeable activities in the vicinity of the SEZ such as wind, geothermal, mining, agricultural, and commercial development; new roads, traffic, and off-highway vehicle use; and infrastructure such as transmission lines and fences.

⁶ Data gaps have not been identified for all resources in this table. Additional data gaps may be identified during future SEZ- or project-specific assessments.

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<p>Air Quality Section 10.1.13</p>	<p>Direct: Fugitive dust and equipment exhaust emissions during construction could result in exceedance of Ambient Air Quality Standards (AAQS) for particulate matter (PM) at SEZ boundaries. Specifically, predicted 24-hour PM₁₀ concentration levels could exceed the AAQS at the nearest residence. The Prevention of Significant Deterioration increment at Wheeler Peak WA and Great Sand Dunes WA (Class I areas) would be exceeded.</p> <p>Disturbance of soils (particularly subsurface calcic soils) may produce fugitive dust, which may result in exposure to respirable particulates and/or microbes (human health impacts). About 60% of soils in the SEZ have been characterized as having low potential for wind erosion; 40% have moderate potential for wind erosion. Therefore contributions to PM load from development would likely be low to moderate.</p> <p>Indirect: Decreased visibility in nearby residential (as close as 0.5 mi [0.8 km] to the north and west) or specially-designated areas due to elevated PM levels from soil disturbance/grading during construction. Increased PM would also increase dust-on-snow accumulation, possibly changing stream runoff patterns. If used for dust abatement, magnesium chloride could be harmful to plants (due to increased chloride ions in runoff).</p> <p>Cumulative: Los Mogotes East and Antonito Southeast SEZs are within about 12 mi (19 km) of each other; construction of solar facilities at the two SEZs could have cumulative impacts with respect to generation of PM. In addition, unpaved roads and agricultural practices could have cumulative impacts with respect to generation of PM. Over the long term and across the region, the development of solar energy may have beneficial impacts on air quality in the region.</p> <p>Data Gaps: Monitoring for PM during all phases of development will be required to identify levels exceeding AAQS.</p>	<p>Programmatic design features for ecological resources include a requirement to develop a Vegetation Management Plan to maintain maximum acreage of native vegetation cover practicable during construction and operation to avoid dust sources.</p> <p>See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Air_Quality_Climate.pdf</p>	<p>Programmatic design features include a requirement to implement dust suppression measures during construction and operations.</p> <p>See other programmatic design features at URL under avoidance column.</p> <p>Recommend evaluation of solar panel mounting and other disturbance minimizing technologies in project-level NEPA alternatives (e.g. no grading of the site, retention of maximum native vegetation, use of low emission vehicles, placing gravel on roads, use of “drive and crush” installation). Recommend revegetation of the SEZ with native vegetation to increase soil stability as a plan of development feature to further minimize the amount of grading and surface disturbance and promote reduced dust emissions and PM levels.</p>	<p>Yes. Level of site grading and disturbance to native vegetation would be primary driver of residual impact for full build-out of SEZ.</p>

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Climate Change Section 5.11.4 of DPEIS for soil storage capacity; 10.1.13 for emissions avoided	<p>Direct: Possible impact through loss of carbon storage capacity of the soil (estimated at 100 g carbon/m²). Preliminary calculations show loss of CO₂ storage capacity as 1.6 tons/acre/yr (12,431 tons/yr for SEZ full build-out), less than 1% of the CO₂ emissions avoided by operation of a solar facility (see below).</p> <p>Positive impact: Solar power generation reduces demand for energy from fossil fuels, and thereby reduces greenhouse gas emissions (from about 1,494,000-2,689,000 tons/yr CO₂ avoided at full buildout depending on technology).</p> <p>Indirect: If PM is highly elevated and results in increased dust-on-snow accumulation effects of climate change may be exacerbated (through early and/or fast stream run-off coupled with decreased snowpack).</p> <p>Cumulative: Over the long term, the development of solar energy may contribute to reduced greenhouse gas emissions, if the development offsets electricity generation by fossil fuel plants). About 90% of electricity in CO is produced in fossil fuel plants.</p> <p>Data Gaps: None identified.</p>	<p>Programmatic design features include a requirement to develop a Vegetation Management Plan to maintain maximum acreage of native vegetation cover practicable during construction and operation to avoid dust sources.</p> <p>See other programmatic design features for vegetation at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf</p>	<p>See programmatic design features at URL under Avoidance column.</p>	<p>No</p>

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Cultural Section 10.1.17	<p>Direct: Visual impacts are likely on the Cumbres and Toltec Scenic Railroad (CTSR) National Historic Landmark. Impacts on the West Fork of the North Branch of the Old Spanish Trail are possible; however, further investigation is needed to determine the location and integrity of portions of the trail from which future potential development in the SEZ could be viewed. Impacts on the Picuris Trail and the Chili Line are also possible within the SEZ.</p> <p>Indirect: Impacts on significant cultural resources and cultural landscapes associated with American Latino heritage, such as within the Sangre de Cristo National Heritage Area, are possible throughout the San Luis Valley. Impacts on significant cultural resources and cultural landscapes associated with Native American groups are also possible. Erosion impacts on the cultural landscape outside of the SEZ resulting from land disturbances and modified hydrologic patterns, increased accessibility and potential for damage to eligible sites outside of the SEZ (if present).</p> <p>Cumulative: Dependent on whether eligible sites are found and impacted in the SEZ and adjacent areas.</p> <p>Data Gaps: Pre-development cultural inventory and evaluation will be completed, as part of the Section 106 consultation process. The potential significance of the Taos Valley Canal, the stagecoach route, and other possible historic or indigenous trail segments should be investigated further to determine whether solar energy development would adversely affect these resources. Further investigation of potential impacts to the West Fork of the North Branch of the Old Spanish Trail is needed to determine the location and integrity of portions of the Trail from which future potential development in the SEZ could be viewed.</p>	<p>Programmatic design features require that significant cultural resources clustered in specific areas which retain sufficient integrity will be avoided.</p> <p>Additionally, for projects located within the viewshed of the West Fork of the North Branch of the Old Spanish Trail, a National Trail inventory will be required to determine the area of possible adverse impact on resources, qualities, values, and associated settings of the Trail; to prevent substantial interference; and to determine any areas unsuitable for development.</p> <p>See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Cultural.pdf</p>	<p>Programmatic design features require that a Memorandum of Agreement be developed and executed if eligible sites are discovered within the SEZ, to determine how the eligible properties will be treated (avoided or mitigated to minimize impacts).</p> <p>See other programmatic design features at URL under Avoidance column.</p> <p>Additional coordination with the CTSR Commission is recommended to address possible mitigation measures for reducing visual impacts on the railroad.</p>	<p>Yes. Residual impacts to be evaluated based on results of Cultural Landscape Assessment analyses and coordination with stakeholders (federal, state, and local agencies, tribes, and public).</p>

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<p>Ecology: Vegetation and Riparian Areas; Invasive and Noxious Weeds Section 10.1.10</p>	<p>Direct: Development will adversely affect characteristic vegetation (e.g., big sagebrush, rubber rabbitbrush, winterfat, western wheatgrass, green needlegrass, and needle-and-thread) through destruction and loss of habitat. Development will result in moderate impacts to the following land types which comprise about 99% of the SEZ: Inter-Mountain Basins Semi-Desert Shrub Steppe (86%) and Inter-Mountain Basins Semi-Desert Grassland (13%). Sensitive habitats on the SEZ include wetlands, riparian areas, and ephemeral washes. Development, including vegetation removal, land clearing, grading, dust deposition, and lowered groundwater levels, may alter soils and vegetation communities and result in the establishment of invasive species and noxious weeds within the SEZ.</p> <p>Indirect: There may be loss of native vegetation outside the SEZ due to dust deposition from construction and operations, increased surface water runoff and related erosion, or through the introduction of invasive species. Establishment of noxious weeds in the SEZ may result in spread of weeds to adjacent areas.</p> <p>Cumulative: Solar energy development could be a contributor to cumulative impacts on some vegetation communities, depending on the type, number, and location of other developments in the region.</p> <p>Data Gaps: Colonization rates of weed species.</p>	<p>SEZ-specific programmatic design features require that all wetland and dry wash habitats within the SEZ be avoided to the extent practicable, and any impacts minimized and/or mitigated in consultation with appropriate agencies. A buffer area will be maintained around wetlands, dry washes, and riparian areas to reduce the potential for impacts on or near the SEZ and on riparian habitats associated with the Rio San Antonio, Rio de los Pinos, Conejos River, and Cove Lake Reservoir.</p> <p>See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf</p> <p>Additionally, the Vegetation Management Plan will require maintenance of the maximum acreage of native vegetation cover practicable, and compliance with applicable regulations and policies for the control of noxious weeds and invasive plant species (e.g., travel through weed-infested areas will be avoided; weeds will be treated), to maintain ecological integrity and decrease the probability of wildfires.</p>	<p>SEZ-specific programmatic design features require that appropriate engineering controls be used to minimize impacts on wetland, dry wash, 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 will be determined through agency consultation.</p> <p>See other programmatic design features at URL under Avoidance column.</p> <p>Additionally, surveying and treating invasive weeds, including henbane, should be conducted along access roads to the SEZ, and solar panel mounting and other disturbance minimizing technologies (e.g., no grading of the site) should be evaluated in project-level NEPA alternatives.</p> <p>Also, If project-specific impacts to groundwater are identified, purchase of existing water rights must be used to offset groundwater use, with additional quantities above what is projected to be used purchased so the excess water can be retired and returned to the groundwater table.</p>	<p>Yes. Level of site grading and disturbance to native vegetation would be primary driver of residual impact for full build-out of SEZ.</p>

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<p>Ecology: Terrestrial Wildlife Section 10.1.11</p>	<p>Direct: Loss of habitat and connectivity for several species of amphibians, reptiles, birds, invertebrates, and mammals including big game species (black bear, bighorn sheep, cougar, elk, mule deer, and pronghorn). Ground disturbance, fugitive dust generated by project activities, noise, lighting, vegetation clearing, spread of invasive species, accidental spills, harassment, and ephemeral stream loss could impact wildlife within the SEZ, and may cause mortalities. Noise could particularly impact migrating elk herds.</p> <p>Indirect: Outside the SEZ, impacts could occur from habitat loss or modification related to groundwater depletions, surface runoff, dust, noise, lighting, or accidental spills. Potential for adverse impacts from new roads and increased traffic. Increased noise levels in the vicinity of the SEZ could result in disruption of breeding, migration, wintering, foraging, and other behavioral activities.</p> <p>Cumulative: If development of solar facilities occurred at both Antonito Southeast and Los Mogotes SEZs, or if other actions occurred in the vicinity, there could be cumulative impacts on wildlife and aquatic biota habitat. Where projects are closely spaced, the cumulative impact on a particular species could be moderate to large.</p> <p>Data Gaps: Impacts on terrestrial wildlife from construction and operational noise would have to be considered on a project-specific basis.</p>	<p>The following SEZ-specific programmatic design features for avoidance will be required:</p> <p>Prairie dog colonies (if present) will be avoided to the extent practicable; doing so would reduce impacts on associated mammalian and avian species such as desert cottontail, burrowing owl, thirteen-lined ground squirrel, mountain plover, and ferruginous hawk.</p> <p>Construction will be curtailed during winter when big game species are present, particularly within elk critical winter range.</p> <p>Disturbance near elk and mule deer resident population areas will be avoided.</p> <p>Development in the 253-acre (1-km²) portion of the SEZ that overlaps the pronghorn summer concentration area will be avoided.</p> <p>Development will avoid any additional wetlands identified during future site-specific fieldwork.</p> <p>See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf</p>	<p>The following SEZ-specific programmatic design features for minimization will be required:</p> <p>Disruptions during lambing/calving/fawning season for big game (such as bighorn sheep/elk/pronghorn) will be minimized.</p> <p>Appropriate engineering controls will be used to minimize impacts resulting from surface water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition to wetland, dry wash, and riparian habitats.</p> <p>Where big game winter ranges intersect or are within close proximity to the SEZ, use of motorized vehicles and other human disturbances will be controlled (e.g., through road closures or seasonal restrictions).</p> <p>Undisturbed buffer areas and sediment and erosion controls will be maintained around Alta Lake and associated wetlands in the western portion of the SEZ.</p> <p>The use of heavy machinery and pesticides will be avoided within the immediate catchment basins for Alta Lake and its associated wetlands.</p> <p>See other programmatic design features at URL under Avoidance column.</p>	<p>Yes. Facility extent and level of site grading and disturbance to native vegetation would be primary driver of residual impact to functional habitat for full build-out of SEZ.</p>

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<p>Ecology: Migratory Birds Section 10.1.11.2</p>	<p>Direct: Loss of habitat and connectivity for several species. Noise, lighting, and vegetation clearing could impact migratory birds overflying, migrating, or using the SEZ. There is potential for migratory birds to be attracted to solar arrays (because solar arrays may appear to be water or wetlands, and may attract insects), resulting in collisions with solar arrays that cause injury or fatalities. Migratory birds may be behaviorally susceptible to flight collision with solar arrays in the San Luis Valley wetlands landscape. Avian injury or fatality from collision with solar arrays is a particular risk at Antonito Southeast SEZ due to the location of the SEZ in migratory bird paths. For power tower facilities, burning of wings in the solar radiation field between heliostats and power towers has been observed.</p> <p>Indirect: Outside the SEZ, impacts could occur from habitat loss or modification related to groundwater depletions, or habitat loss or modification through the introduction of invasive species. Establishment of noxious weeds in the SEZ may result in spread of weeds to adjacent areas. Increased noise levels in the vicinity of the SEZ could result in disruption of breeding, migration, wintering, foraging, and other behavioral activities.</p> <p>Cumulative: Impacts to migratory birds could occur, depending on the number and location of other developments in the region.</p> <p>Data Gaps: Additional research needed on solar development impacts on migratory birds; impacts on migratory birds from construction and operational noise would have to be considered on a project-specific basis.</p>	<p>SEZ-specific programmatic design features require that if present, prairie dog colonies (which could provide habitat or food resources for some bird species) will be avoided to the extent practicable; doing so would reduce impacts on associated bird species such as raptors.</p> <p>See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf</p>	<p>See programmatic design features at URL under Avoidance column.</p> <p>Additionally, recommend evaluation of construction timing restrictions in project-level NEPA alternatives to further reduce impacts. Timing limitation should be enforced from May 15-July 15 for any surface disturbing activities to protect migratory bird nesting and brood rearing,</p> <p>Raptor nest surveys should be conducted within a 0.5 mile radius of the project site, If any raptor nests are located, appropriate timing limitations should be applied.</p> <p>Migratory bird monitoring in the Antonito Southeast SEZ should be conducted.</p>	<p>Yes. Level of site grading and disturbance to native vegetation would be primary driver of residual impact for full build-out of SEZ.</p>

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<p>Ecology: Plant Special Status Species Section 10.1.12</p>	<p>Direct: Ground disturbance, land clearing and grading, fugitive dust generated by project activities, and the spread of invasive species would result in loss of special status plant species habitat, if present, and might result in loss of individual plants. See also impact summary above under Vegetation and Riparian Areas. No Endangered Species Act (ESA)-listed species have been identified that have suitable habitat within the SEZ. BLM local biologists indicate that Ripley's milkvetch⁷ and rock-loving aletes, BLM-sensitive species, may have suitable habitat within the SEZ.</p> <p>Indirect: Indirect impacts to individuals and habitat outside of the SEZ could occur from groundwater depletions, surface runoff, dust, or accidental spills. Suitable habitat for five BLM-sensitive plant species has been identified within 5 mi (8 km) of the SEZ boundary.</p> <p>Cumulative: There could be cumulative impacts on some special status plant species due to habitat destruction and overall development and fragmentation of the area.</p> <p>Data Gaps: Although habitat for listed species has not been identified within the SEZ, pre-disturbance surveys are required to identify the presence and abundance of special status species.</p>	<p>The following programmatic design features for avoidance will be required:</p> <p>Based on data from pre-disturbance surveys, disturbance to occupied habitats will be avoided to the extent practicable per BLM Manual 6840.</p> <p>Disturbance of wetland and riparian habitat within the SEZ will be avoided or minimized to the extent practicable.</p> <p>See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf</p> <p>See also avoidance measures listed for Vegetation and Riparian Areas, which would apply for Plant Special Status Species as well.</p>	<p>The following programmatic design features for minimization will be required:</p> <p>If avoidance is not possible for some species, translocation of individuals from areas of direct effects or compensatory mitigation (for example, through seed collection or reseeded at an appropriate offsite location) may be employed.</p> <p>Groundwater withdrawals will be avoided or limited to reduce impacts on groundwater-dependent special status species, including those species that may occur in riparian or aquatic habitats supported by groundwater.</p> <p>See other programmatic design features at URL under Avoidance column.</p> <p>See also minimization measures listed for Vegetation and Riparian Areas, which would apply for Plant Special Status Species as well.</p>	<p>Yes. Level of site grading and disturbance to native vegetation would be primary driver of residual impact for full build-out of SEZ.</p>

⁷ Species in bold text have been recorded or have designated critical habitat within 5 mi (8 km) of the SEZ boundary.

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<p>Ecology: Animal Special Status Species Section 10.1.12</p>	<p>Direct: Ground disturbance, land clearing and grading, and fugitive dust generated by project activities would result in loss of special status animal species habitat, if present, and might result in loss of individual animals. See also impact summaries above under Terrestrial Wildlife and Migratory Birds. Development on the SEZ could directly disturb individuals or habitat for one ESA-listed species (South Western willow flycatcher) and eleven BLM-Colorado and New Mexico sensitive special status animal species (including Gunnison's prairie dog⁸, ferruginous hawk, mountain plover, western burrowing owl, big free-tailed bat, and swift fox).</p> <p>Indirect: Indirect impacts to individuals and animal habitat outside of the SEZ could occur due to groundwater depletions, surface runoff, dust, noise, lighting, or accidental spills. Potential for impacts from new roads and increased traffic. Suitable habitat for three additional ESA-listed or candidate/proposed species (Mexican Spotted owl, Western yellow-billed cuckoo, and the New Mexico jumping mouse) and 5 additional BLM-sensitive animal species (including special status migratory waterfowl and shorebirds) occurs within 5 mi (8 km) of the SEZ boundary.</p> <p>Cumulative: There could be cumulative impacts on some special status animal species due to habitat destruction and overall development and fragmentation of the area.</p> <p>Data Gaps: Pre-disturbance surveys are required to identify the presence and abundance of special status species.</p>	<p>The following programmatic design features for avoidance will be required:</p> <p>Based on data from pre-disturbance surveys, disturbance to occupied habitats will be avoided to the extent practicable. (per BLM Manual 6840).</p> <p>Disturbance of wetland and riparian habitat within the SEZ will be avoided or minimized to the extent practicable.</p> <p>See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Ecological_Resources.pdf</p> <p>See also avoidance measures listed for Terrestrial Wildlife and Migratory Birds, which would apply for Animal Special Status Species as well.</p>	<p>The following programmatic design features for minimization will be required:</p> <p>If avoidance is not possible for some species, augmentation, reintroduction, or translocation of individuals from areas of direct effects or compensatory mitigation may be employed.</p> <p>Groundwater withdrawals will be avoided or limited to reduce impacts on groundwater-dependent special status species, including those species that may occur in riparian or aquatic habitats supported by groundwater. These species include the Southwestern willow flycatcher and the Western yellow-billed cuckoo.</p> <p>Consultations with the USFWS, CO Division of Wildlife and NM Division of Game & Fish will be conducted to address the potential for impacts on the Southwestern willow flycatcher, Gunnison's prairie dog, Northern leopard frog, and New Mexico meadow jumping mouse.</p> <p>See other programmatic design features at URL under Avoidance column.</p> <p>See also minimization measures listed for Terrestrial Wildlife and Migratory Birds, which would apply for Animal Special Status Species as well.</p>	<p>Yes. Facility extent and level of site grading and disturbance would be primary driver of residual impact to functional habitat for full build-out of SEZ.</p>

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

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Environmental Justice Section 10.1.20	<p>Direct: Disturbance of soils (particularly subsurface calcic soils) may produce fugitive dust, which may result in exposure to respirable particulates and/or microbes (human health impacts).</p> <p>Based on guidelines from the Council on Environmental Quality, there are low income and minority populations within a 50-mile (80-km) radius and potentially downwind of the SEZ, notably in Antonito and surrounding communities. Adverse health impacts to low-income and/or minority communities could result from degraded air quality and increased exposure to particulates generated at the SEZ by solar development.</p> <p>Indirect: None identified.</p> <p>Cumulative: Contributions from solar development would likely be small and would not be expected to significantly contribute to cumulative impacts on minority populations within the 50-mi geographic extent of effects.</p> <p>Data Gaps: None identified.</p>	<p>Programmatic design features for ecological resources include a requirement to develop a Vegetation Management Plan to maintain maximum acreage of native vegetation cover practicable during construction and operation to avoid dust sources.</p> <p>See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Environmental_Justice.pdf</p>	<p>Programmatic design features for air quality include a requirement to implement dust suppression measures during construction and operations.</p> <p>See other programmatic design features at URL under Avoidance column.</p>	<p>Maybe. Dependent on level of exposure of sensitive populations to fugitive dust generated by solar development.</p>

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<p>Hydrology: Surface Water and Water Quality Section 10.1.9</p>	<p>Direct: Land clearing, land leveling, vegetation removal, and spills and runoff associated with development of the SEZ have the potential to alter flow routing, change surface runoff, reduce infiltration/recharge, cause loss of ephemeral stream networks, reduce evapotranspiration rates, increase sediment transport (by water), change sediment transport (by wind), and degrade water quality.</p> <p>Indirect: Indirect impacts from development and groundwater use on ephemeral and perennial surface water features could occur.</p> <p>Cumulative: Alterations to ephemeral stream networks can alter groundwater recharge and surface runoff processes potentially impacting the basin-scale water balance and water quality aspects of water features receiving surface runoff.</p> <p>Data Gaps: None identified.</p>	<p>Programmatic design features for ecological resources include a requirement to develop a Vegetation Management Plan to maintain maximum acreage of native vegetation cover practicable during construction and operation, and to minimize land disturbance in ephemeral washes and dry lakebeds.</p> <p>See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Water.pdf</p> <p>Additionally, to avoid any impact to downstream properties, project-level NEPA alternatives should evaluate maintenance of existing flow patterns at the site boundary, by avoiding ephemeral drainages and/or providing detention and/or retention facilities. Detention can be provided on the SEZ to capture the volume of flow that is represented by the increase between existing and proposed conditions. Retention could be utilized to capture all the additional flow volume with little to no overland surface water release.</p>	<p>See programmatic design features at URL given under Avoidance column.</p>	<p>Maybe. Dependent on level of retention of native plant cover.</p>

Resource/Issue	Impacts ¹	Onsite Mitigation ²		Residual or Unavoidable Adverse Impacts? ³
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Hydrology: Groundwater Quality and Groundwater Availability Section 10.1.9	<p>Direct: The Antonito Southeast SEZ is located in the Rio Grande Basin. Groundwater withdrawals for development may cause declines in groundwater elevations that can impact water availability for surface water features, vegetation, ecological habitats, regional groundwater flow paths, and other groundwater users in the basin.</p> <p>Spills associated with development of the SEZ have the potential to degrade groundwater quality.</p> <p>Indirect: Groundwater withdrawals for solar energy facilities have the potential to affect other groundwater users in the basin.</p> <p>Cumulative: Groundwater depletion has continued in the San Luis Valley aquifer system since 1950 due to withdrawal for agricultural and other purposes. Groundwater use for solar energy development may result in additional use of groundwater. However, the strict management of water resources in the Rio Grande Basin acts to ensure that any impacts from a new water use would continue to be equivalent to or less than those from current uses and that no net increase in the total amount of water used would occur.</p> <p>Data Gaps: None identified.</p>	<p>Groundwater use analyses suggest that full build-out of wet-cooled technologies is not feasible.</p> <p>See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Water.pdf</p> <p>Additionally, if project-specific impacts to groundwater are identified, purchase of existing water rights must be used to offset groundwater use, with additional quantities above what is projected to be used purchased so the excess water can be retired and returned to the groundwater table.</p>	<p>Programmatic design features require that, for mixed-technology development scenarios, any proposed projects would have to reduce water requirements to a level sufficient to secure water rights and comply with water management in the San Luis Valley.</p> <p>Augmentation/ compensation is required by the State of Colorado.</p> <p>See other programmatic design features at URL under Avoidance column.</p>	<p>Maybe, depending on compensation requirements.</p>

Resource/Issue	Impacts ¹	Onsite Mitigation ²		Residual or Unavoidable Adverse Impacts? ³
		Avoidance	Minimization	
Lands & Realty Section 10.1.2	<p>Direct: Development of the SEZ could disturb 9,712 acres (39.3 km²). Solar development could isolate an approximately 1,240 acre (5 km²) parcel of public land abutting the west end of the SEZ from the rest of the public lands in the SEZ making it difficult to manage.</p> <p>Indirect: Increased traffic and increased access to previously remote areas also could change the overall character of the landscape.</p> <p>Cumulative: The contribution to cumulative impacts of utility-scale solar projects on public lands on and around the Antonito Southeast SEZ could be significant, particularly if the SEZ is fully developed with solar projects.</p> <p>Data Gaps: None identified.</p>	<p>SEZ-specific programmatic design features require that management of the 1,240-acre (5.0-km²) area of public land west of the SEZ boundary should be addressed as part of the site-specific analysis of any future development within the SEZ.</p> <p>See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Lands_and_Realty.pdf</p>	<p>See programmatic design features at URL under Avoidance column.</p>	<p>No</p>
Livestock Grazing Section 10.1.4.1	<p>Direct: Portions of three seasonal grazing allotments (San Antonio, South Hills, and Alta Lake) used by five permittees would be lost (64%, 67%, and 100%, respectively), and it is estimated in the Solar PEIS that solar development in the SEZ would result in a total loss of 575 animal unit months of forage per year. It is possible that solar development would result in the entire area of the three allotments being lost. The loss of use of grazing permits could result in a significant adverse economic impact on the permittees, and also possibly an adverse social impact, since for many permittees, operating on public lands has been a longstanding tradition. Two wells are present on the allotments and could be lost. Permittees would lose the ability to sell the allotments. The county would lose tax revenues (minor impact), and BLM would also lose some revenue.</p> <p>Indirect: None identified.</p> <p>Cumulative: Other development in the area of the SEZ could result in cumulative impacts on grazing.</p> <p>Data Gaps: None identified.</p>	<p>See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Rangeland_Resources.pdf</p>	<p>See programmatic design features at URL under Avoidance column.</p>	<p>Yes. Residual impacts to be evaluated based on locations of development within the SEZ and project-level NEPA.</p>

Resource/Issue	Impacts ¹	Onsite Mitigation ²		Residual or Unavoidable Adverse Impacts? ³
		Avoidance	Minimization	
Military & Civilian Aviation Section 10.1.6	<p>Direct: The SEZ is located under two military training routes (MTRs) that have a floor elevation of 200 ft (322 m) above ground level (AGL). In comments on the Solar PEIS, the military indicated that at that time it had no concerns about potential impacts on its activities associated with solar development.</p> <p>There are no civilian aviation facilities in the vicinity of the SEZ.</p> <p>Indirect: None identified.</p> <p>Cumulative: Cumulative impacts would be small.</p> <p>Data Gaps: None identified.</p>	<p>See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Military_Civilian_Aviation.pdf</p>	<p>Coordination with the military will be required on a project-specific basis to ensure that solar facilities do not interfere with operations.</p> <p>See other programmatic design features at URL under Avoidance column.</p>	No
Minerals Section 10.1.8 and Section 10.1.24 of the Final Solar PEIS	<p>Direct: The SEZ does not contain existing oil and gas leases, mining claims, or geothermal leases. The SEZ has been withdrawn from receiving new mining claims for a period of 20 years, precluding impacts from many types of mining activities.</p> <p>Indirect: None identified.</p> <p>Cumulative: None identified.</p> <p>Data Gaps: None identified.</p>	Not applicable	Not applicable	No

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		Avoidance	Minimization	
<p>Native American Concerns Section 10.1.18</p>	<p>Direct: It is likely that some plants traditionally important to Native Americans will be destroyed and that habitat of traditionally important animals will be lost. A portion of the Picuris Trail (Route to Cuartelejo) likely runs through the SEZ and has significance to the Picuris Pueblo, the Jicarilla Apache, and possibly the Ute. It is also significant to the Navajo as a former "War Trail."</p> <p>Indirect: Indirect visual and auditory impacts are possible. For example, it is possible that there will be Native American concerns about potential visual effects and the effects of noise from solar energy development in the SEZ on Blanca Peak, Ute Mountain and San Antonio Peak. There would be general habitat loss with vegetation clearing and water reduction that could affect plant and wildlife species and ecosystem health. No impacts are likely to occur on the following known culturally significant areas outside of the SEZ (i.e., San Luis Lakes and the Great Sand Dunes).</p> <p>Cumulative: Impacts on significant cultural resources and cultural landscapes associated with Native American groups are possible. The viewsheds of Los Mogotes Peaks and San Antonio Mountain, both significant to the Ute and Jicarilla Apache Tribes, may be impacted. It is possible that the development of utility-scale solar energy projects in the SEZ, when added to other potential projects likely to occur in the area, could contribute cumulatively to visual impacts in the valley as viewed from Blanca Peak and to the loss of traditionally important plant species and animal habitat.</p> <p>Data Gaps: Government-to-government consultation will be required to determine issues of Native American concern.</p>	<p>The following SEZ-specific programmatic design features for avoidance will be required:</p> <p>Known human burial sites and rock art (panels of petroglyphs and/or pictographs) will be avoided. Where there is a reasonable probability of encountering undetected human remains and associated funerary objects by a solar project, the BLM will carry out discussions with Indian tribes before the project is authorized, in order to provide general guidance on the treatment of any cultural items that might be exposed.</p> <p>Visual intrusion on sacred sites will be avoided to the extent practicable.</p> <p>Springs and other water sources that are or may be sacred or culturally important will be avoided to the extent practicable. Culturally important plant and wildlife species will be avoided to be extent practicable.</p> <p>See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Native_American_Concerns.pdf</p>	<p>See programmatic design features at URL under Avoidance column.</p>	<p>Yes. Residual impacts to be evaluated based on results of Cultural Landscape Assessment analyses and coordination with tribes.</p>

Resource/Issue	Impacts ¹	Onsite Mitigation ²		Residual or Unavoidable Adverse Impacts? ³
		Avoidance	Minimization	
Paleontology Section 10.1.16	<p>Direct: Impacts on significant paleontological resources are possible in those areas where the Alamosa Formation is determined to be at a depth that could be affected by solar energy development.</p> <p>Indirect: The potential for impacts from looting or vandalism north of the SEZ in areas classified as PFYC Class 4 or 5 is unknown, but not likely if the Alamosa Formation is not exposed at the surface.</p> <p>Cumulative: The SEZ has a low to undetermined potential for paleontological resources. Therefore, will not have a cumulative impact on paleontological resources.</p> <p>Data Gaps: A more detailed look at the local geological deposits and their depth is needed to verify that the assignment of a PFYC of Class 1 is valid by determining whether the Alamosa Formation is exposed and whether paleontological resources are present at the surface.</p>	<p>SEZ-specific programmatic design features require that PFYC Class 4 or 5 areas be avoided to the extent possible for development within the SEZ (e.g., the 4-acre [0.016-km²] parcel in the north part of the SEZ) and any other parcels identified through additional surveys.</p> <p>See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Paleo.pdf</p>	<p>Programmatic design features require that the BLM be notified immediately upon discovery of fossils. Work will be halted at the fossil site and continued elsewhere until qualified personnel, such as a paleontologist, can visit the site, determine the significance of the find, and, if significant, make site specific recommendations for collection or other resource protection.</p> <p>See other programmatic design features at URL under Avoidance column.</p>	<p>No</p>

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		Avoidance	Minimization	
Recreation Section 10.1.5	<p>Direct: Solar development will preclude current recreational activities that may occur within the SEZ boundary. Vehicle routes currently open within the SEZ could be closed or rerouted. The SEZ will be readily visible to travelers on U.S. 285 and on the Los Caminos Antiguos Scenic Byway. Only a small impact to pronghorn antelope hunting is likely because only a small portion of available habitat occurs within the SEZ.</p> <p>There could be an impact on potential future recreational use of the Chili Line (could be used for hiking/biking).</p> <p>Indirect: Indirect effects could occur on lands near the solar facilities or on viewsheds of surrounding areas and would result from the change in the overall character of undeveloped BLM-administered lands to an industrialized, developed area, displacing people who are seeking more rural or primitive surroundings for recreation. Great Sand Dunes National Park and Preserve, the Old Spanish National Historic Trail, two scenic railroads, the Los Caminos Antiguos Scenic Byway, the Sangre de Cristo Mountains, three national wildlife refuges, and numerous designated wilderness areas are among the highlights of the recreational and tourism opportunities of the area.</p> <p>Because the route of the West Fork of the North Branch of the Old Spanish Trail is so near the SEZ, it is anticipated that the viewshed of the Trail would be adversely affected and the potential future recreational attraction of the Trail might be reduced. However, the integrity and historical significance of the portion of the Trail near to the SEZ remain undetermined.</p> <p>Cumulative: Multiple developments in the vicinity of the SEZ could cumulatively reduce recreational opportunities.</p> <p>Data Gaps: None identified.</p>	<p>See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Public_Access_and_Recreation.pdf</p>	<p>SEZ-specific programmatic design features require that, as projects are proposed for the SEZ, the potential impacts on tourism will be considered and reviewed with local community leaders.</p> <p>See other programmatic design features at URL under Avoidance column.</p>	<p>Maybe, depending on mitigation measures implemented on the basis of project-level NEPA.</p>

Resource/Issue	Impacts ¹	Onsite Mitigation ²		Residual or Unavoidable Adverse Impacts? ³
		Avoidance	Minimization	
Socio-economics Section 10.1.19	<p>Direct: Impacts to local economy as a result of expenditures of wages and salaries and the collection of state sales and income taxes. From 124 to 1,641 direct construction jobs and 17 to 339 direct operations jobs could be created (least for PV; most for parabolic trough facilities). Adverse impacts could occur due to the need for services for new workers during project construction and operation (e.g., housing, police, fire-fighters).</p> <p>Indirect: From 94 to 1,244 indirect construction jobs and 7 to 191 indirect operations jobs could be created. Positive impacts from project wages and salaries, and tax revenues subsequently circulating through the economy would be minor.</p> <p>As estimated in the Solar PEIS, loss of livestock grazing could result in the loss of 7 jobs, and a decline in grazing fees payable to the BLM and the county.</p> <p>Cumulative: 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.</p> <p>Data Gaps: None identified.</p>	<p>See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Socioeconomics.pdf</p>	<p>See programmatic design features at URL under Avoidance column.</p>	<p>Maybe, for grazing impacts, depending on mitigation measures implemented on the basis of project-level NEPA.</p>

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Soils/Erosion Section 10.1.7	<p>Direct: 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. Soils within the SEZ are predominantly very stony loams and cobbly loams of the Travelers and Garita Series, which together make up about 96% of the soil coverage at the site. Soil loss through sediment transport may occur. Soil contamination from spills could occur.</p> <p>Disturbance of soils (particularly subsurface calcic soils) may produce fugitive dust. About 60% of soils in the SEZ have been characterized as having low potential for wind erosion; 40% have moderate potential. Therefore, increased wind erosion may be moderate if grading occurs.</p> <p>Indirect: Disturbance of soil can lead to introduction of invasive species. Elevated PM levels could result from soil disturbance/grading activities during construction.</p> <p>Cumulative: Cumulative impacts would occur from the disturbance of several renewable energy projects, connecting linear facilities, and other projects in the vicinity of the SEZ, but would be limited through application of design features.</p> <p>Data Gaps: None identified.</p>	<p>Programmatic design features for ecological resources include a requirement to develop a Vegetation Management Plan to maintain maximum acreage of native vegetation cover practicable during construction and operation to avoid dust sources.</p> <p>See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Soil_Geologic_Hazards.pdf</p>	<p>See programmatic design features at URL under Avoidance column.</p>	<p>Yes. Level of site grading would be primary driver of residual impact for full build-out of SEZ.</p>

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<p>Specially Designated Areas and Lands with Wilderness Characteristics Section 10.1.3</p>	<p>Direct: Specially designated areas (SDAs) within 25 miles (40 km) of the SEZ that could be impacted by solar development include the following: Alamosa National Wildlife Refuge, South San Juan Wilderness Area (WA), Latir Peak WA, Cruces Basin WA, San Luis Hills Area of Critical Environmental Concern (ACEC), Cumbres & Toltec Scenic Railroad (CTSR) ACEC, Rio Grande River Corridor ACEC, San Antonio Gorge ACEC, San Luis Hills Wilderness Study Area (WSA), San Antonio WSA, Rio Grande Natural Area, Rio Grande Wild and Scenic River, Rio Grande Corridor Special Recreation Management Area (SRMA), Los Caminos Antiguos Scenic Byway, Continental Divide National Scenic Trail, Sangre de Cristo National Heritage Area (NHA), and the West Fork of the North Branch of the Old Spanish Trail.</p> <p>Moderate to strong visual contrasts could be experienced in the San Antonio WSA, the Los Caminos Antiguos Scenic Byway, along portions of the West Fork of the North Branch of the Old Spanish Trail, San Luis Hills WSA and ACEC, and the CTSR ACEC. There would also be strong visual contrasts for some viewpoints within the newly designated Rio Grande del Norte National Monument. Impacts could include adverse visual effects on the viewshed (including impacts on night sky viewing and annoyance from glint and glare), reduced recreation use, fragmentation of biologically linked areas, and loss of public access.</p> <p>A recent inventory of wilderness characteristics determined that public lands within the SEZ do not contain wilderness characteristics.</p> <p>Indirect: None identified.</p> <p>Cumulative: Development of solar facilities and other facilities may result in cumulative effects, particularly visual impacts, on SDAs.</p> <p>Data Gaps: Additional data from key observation points in specially designated areas is needed.</p> <p>For projects in the Antonito Southeast SEZ that are located within the viewshed of the West Fork of the North Branch of the Old Spanish Trail, a National Trail inventory will be required to determine the area of possible adverse impact.</p>	<p>See programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/SDAs_and_LWC.pdf</p>	<p>SEZ-specific programmatic design features require that early consultation be initiated with the entity responsible for developing the management plan for the Sangre de Cristo NHA, in order to understand how development of the SEZ could be consistent with NHA plans/goals.</p> <p>See other programmatic design features at URL under Avoidance column.</p>	<p>Yes. Residual impacts to be evaluated based on locations of development within the SEZ and project-level NEPA.</p>

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Transportation and Public Access Sections 10.1.2 and 10.1.21	<p>Direct: Development will add traffic to existing roads serving the area. U.S. 285 provides a regional traffic corridor that could experience moderate impacts for single projects, an increase during construction of nearly twice the current annual average daily traffic value for this route. Local roads would also be impacted.</p> <p>Glint and glare from solar facilities may affect aircraft pilots, motorists on nearby roads, or crew/passengers on nearby railways.</p> <p>Indirect: Potential for adverse impacts to wildlife from new roads and increased traffic (see Ecology-Wildlife section).</p> <p>Cumulative: Cumulative impacts to traffic could occur with multiple developments in the region.</p> <p>Data Gaps: None identified.</p>	<p>Programmatic design features for visual resources include a requirement to minimize glint and glare.</p> <p>See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Transportation.pdf</p>	<p>The following SEZ-specific programmatic design features for minimization will be required:</p> <p>Public access to roads will be maintained through transportation management plan.</p> <p>Local roads improvements will be made to accommodate additional traffic.</p> <p>Construction activities will be planned to minimize impacts (e.g., send trucks in tandem).</p> <p>See other programmatic design features at URL under Avoidance column.</p>	<p>No</p>

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Visual Section 10.1.14	<p>Direct: About 40% of the SEZ lands are classified as Visual Resource Inventory (VRI) Class III lands, indicating moderate scenic quality in those areas. The other SEZ lands are classified as VRI Class IV lands, indicating low scenic quality, except for 1% of the lands which are VRI II indicating high scenic quality. Impacts could include adverse visual effects on the viewshed (including impacts on night sky viewing and annoyance from glint and glare).</p> <p>The Solar PEIS identified strong visual contrasts for some viewpoints in the San Antonio WSA, Los Caminos Antiguos Scenic Byway, West Fork of the North Branch of the Old Spanish Trail, and for the community of Antonito. There would also be strong visual contrasts for some viewpoints within the newly designated Rio Grande del Norte National Monument. Moderate visual contrast levels would be expected for high-elevation viewpoints in the San Luis Hills WSA, San Luis Hills ACEC, and for railroad passengers in portions of the CTSR Corridor and the CTSR Corridor ACEC.</p> <p>Indirect: None identified.</p> <p>Cumulative: If several projects become visible from one location or in succession as viewers move through the landscape (such as driving on local roads, these cumulative impacts may make the area less visually appealing.</p> <p>Data Gaps: Additional data from key observation points is needed.</p>	<p>SEZ-specific programmatic design features state that the development of power tower facilities within the SEZ should be prohibited.</p> <p>Additionally, there is a requirement to minimize glint and glare.</p> <p>See other programmatic design features at http://blmsolar.anl.gov/documents/docs/peis/programmatic-design-features/Visual.pdf</p>	<p>SEZ-specific programmatic design features state that special visual impact mitigation will be considered for solar development on lands in the SEZ visible from and within 3 mi (5 km) of the centerline of the West Fork of the North Branch of the Old Spanish Trail, and on lands in the SEZ visible from and within 3 mi (5 km) of the CTSR ACEC and San Antonio WSA. Special mitigation should also be considered for impacts to the Los Caminos Antiguos Scenic Byway.</p> <p>See other programmatic design features at URL under Avoidance column.</p>	<p>Yes. Residual impacts to be evaluated based on locations of development within the SEZ and project-level NEPA</p>
Wild Horses and Burros Section 10.1.4.2	<p>There are no designated wild horse and burrow herds present in the area. There would be no effect on designated wild horse and burro herds from solar energy development of the SEZ.</p> <p>Data Gaps: None identified.</p>	<p>Not applicable</p>	<p>Not applicable</p>	<p>No</p>