

Potential Impacts of Solar Development on Resources in Colorado Solar Energy Zones

Presented by:

BLM Interdisciplinary Team

Colorado SEZ Solar Regional Mitigation Strategy, BLM
Public Workshop

Alamosa, Colorado

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The Solar PEIS examined impacts and mitigation measures for 20 resource areas:

Acoustic Environment	Air Quality and Climate Change	Cultural Resources	Vegetation and Riparian Areas
Wildlife and Aquatic Biota (including Migratory Birds)	Special Status Species	Environmental Justice	Hydrology - Surface Water and Groundwater
Lands and Realty	Rangeland Resources - Grazing	Military and Civilian Aviation	Minerals
Native American Concerns	Paleontology	Recreation	Socioeconomics
Soils/Erosion	Specially Designated Areas	Transportation	Visual

Resources in **bold** considered likely to have or possibly to have unavoidable impacts from solar development for one or more solar energy zone



SEZ Summary Tables: Impacts and On-Site Mitigation

- Prepared on basis of Solar PEIS impact assessments; assumes a full SEZ build out scenario over - 80% of area used for solar facilities over a 20-yr period
- Include summary of required Solar Program design features (complete list of 250+ in the 2012 Solar Record of Decision)
- Supplemented by local BLM Interdisciplinary team; recommend evaluation of additional onsite mitigation through project-level NEPA analyses
- Include BLM initial assessment of resources for which solar development in the SEZ would cause **residual** or unavoidable impacts
- Public comments sought by October 1, 2014



Acoustic Environment (Noise)

- **Construction and operations could cause short-term and long-term noise impacts**
 - **Closest residences:**
 - *Antonito Southeast SEZ* - ~0.5 mi to the north and west
 - *De Tilla Gulch SEZ* - ~ 0.3 mi east
 - *Los Mogotes East SEZ* - ~ 0.4 mi to the north and east
- **Design Features to Mitigate Impacts:**
 - **Limit hours of daily activities**
 - **Construct noise barriers**
 - **Coordinate with nearby residents**



Special Status Animal Species & Habitat in Colorado SEZs



Mexican Free-Tailed Bat



Burrowing Owl



Golden Eagle



Ferruginous Hawk



Swift Fox



Pronghorn

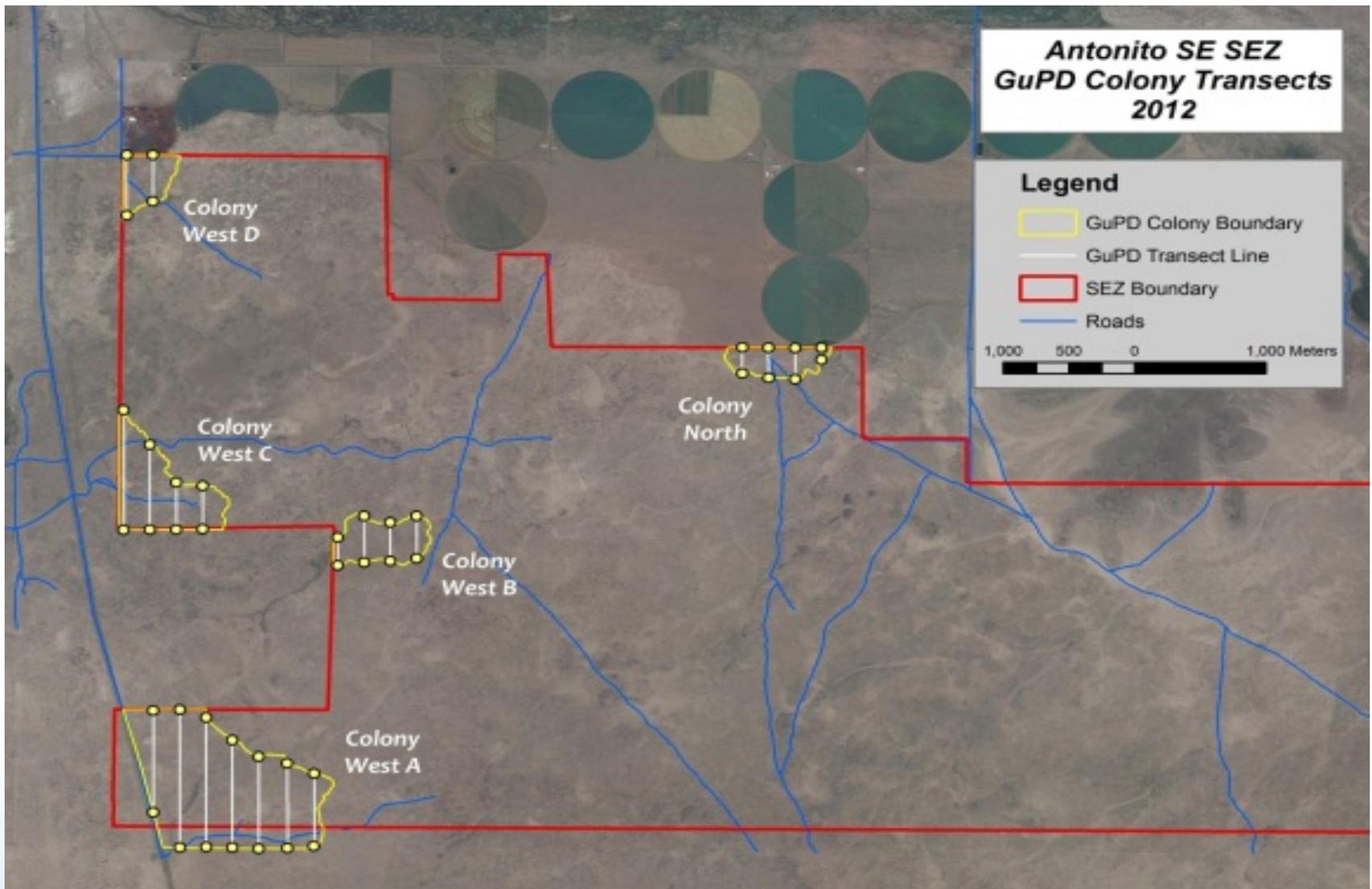


Mountain Plover

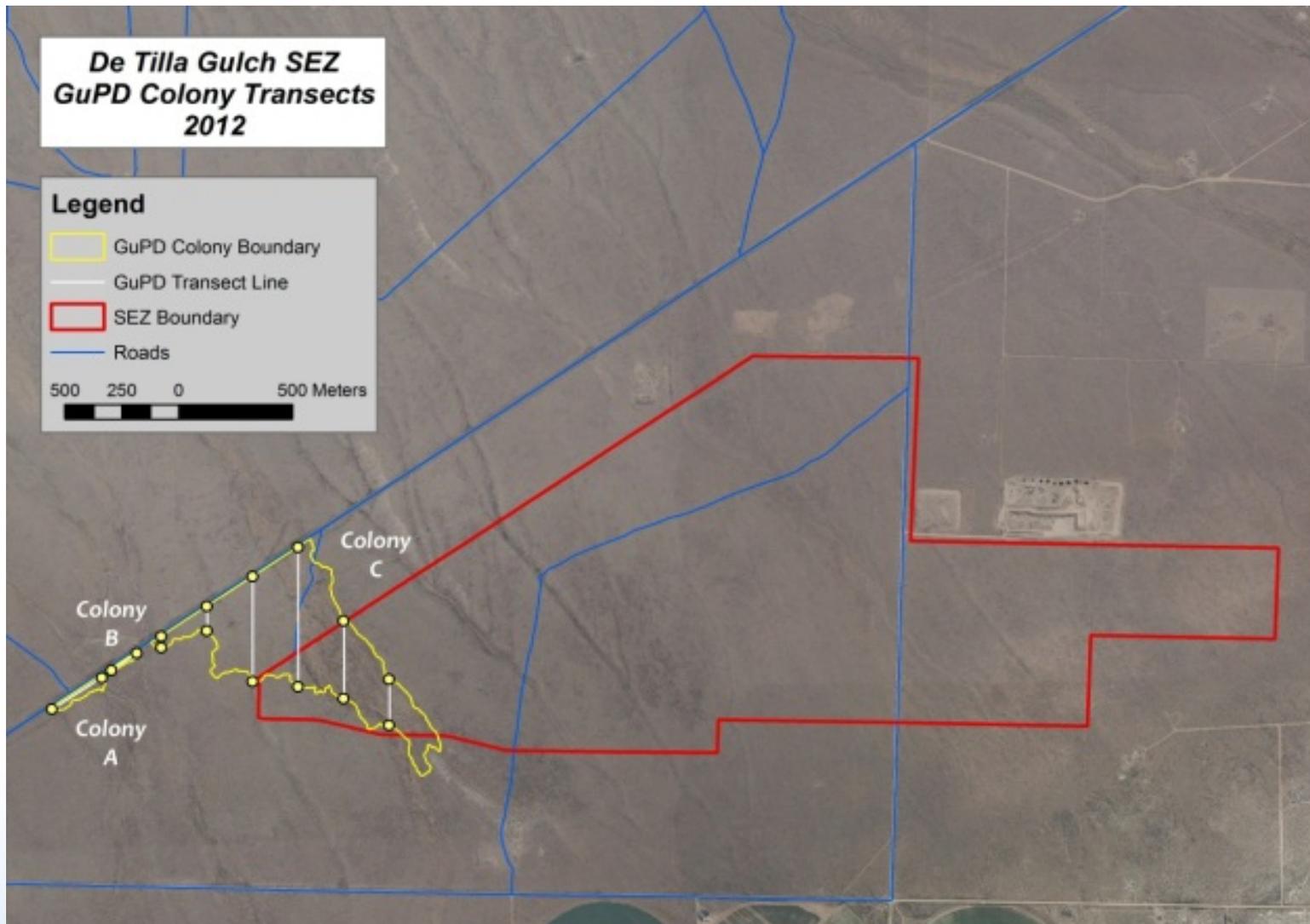
Gunnison's Prairie Dog



Getty Images/Visuals Unlimited



Baseline: Gunnison Prairie Dog Colonies – Antonito Southeast SEZ Survey. Source: BLM 2012.



Baseline: Gunnison Prairie Dog Colonies – De Tilla Gulch SEZ Survey. Source: BLM 2012.

Ecology: Special Status Animal Species

- **Impacts due to:**

- **Loss of habitat, habitat connectivity, or fragmentation,**
- **Possible behavior/breeding disturbance & mortality due to construction and operation activities from:**
 - › **ground disturbance,** **noise,**
 - › **lighting,** **dust,**
 - › **spills,** **ephemeral drainage loss**
- **Similar indirect impacts outside of the SEZ from new roads and transmission lines and increased traffic**

- **Design features:**

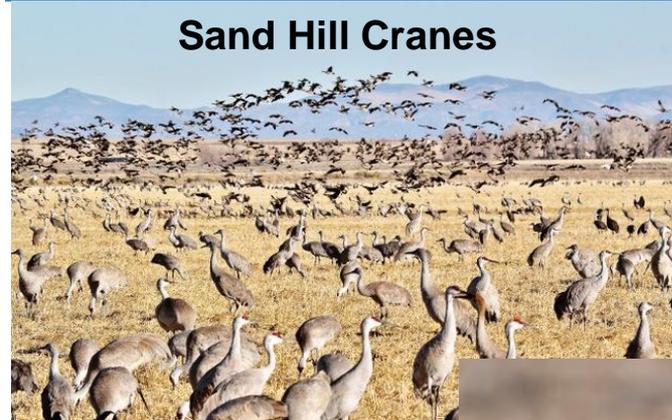
- **Avoidance areas: prairie dog colonies , ephemeral drainages**
- **Avoiding construction during winter when big game species are present,**

Ecology: Migratory Birds



Ferruginous Hawk

Sand Hill Cranes



White Faced Ibis



Mountain Plover



Impacts due to:

- Loss of habitat and connectivity (linkages)
- Potential for water birds to be attracted to solar fields (because they look like water) and collide with solar panels
- Potential for night sky impacts and effects to migration routes/behavior.

Design features:

- No development of power towers
- Avoid wetlands, washes, and ephemeral drainages to extent practicable
- Other tall structures should be located to avoid known flight paths

Ecology: Special Status Plant Species

- Habitat loss and loss of individual plants, if present, would occur due to land clearing and grading, fugitive dust, and spread of invasive species
- Species potentially present:
 - Antonito Southeast SEZ: Ripley's milkvetch and rock-loving aletes
 - De Tilla Gulch SEZ and Los Mogotes SEZ: None within the SEZs; rock-loving aletes within 5 miles
- **Design features:** If pre-disturbance surveys identify special status species plants, occupied habitats will be avoided, or other mitigation will be done (for example seed collection, reseeding elsewhere)



Ecology: Vegetation and Riparian Areas

- Characteristic vegetation includes:
 - Antonito Southeast SEZ: big sagebrush, winterfat, western wheatgrass, green needlegrass)
 - Los Mogotes East SEZ: Shadscale, fourwing saltbush, greasewood
 - De Tilla Gulch SEZ: Western wheatgrass, green needlegrass, blue gramma, needle-and-thread
- Sensitive habitats include wetlands, riparian areas, and ephemeral washes
- Potential Impacts: weed infestations, loss of vegetation cover, adverse impacts from dust deposition

Design Features:

- Control spread of invasive/noxious plant species
- Early coordination and compliance with regulations.



Riparian Habitat along Conejos River
on BLM's Simpson Property



Blanca Wetlands. Source:
BLM

Vegetation:

Inter-Mountain Basins Semi-Desert Shrub Steppe



Characteristic vegetation of all 3 Colorado SEZs

Ecology: Terrestrial Wildlife

- Species that may occur within the SEZs:
 - >10 amphibian and reptile species
 - Big game includes pronghorn, black bear, bighorn sheep, cougar, elk, and muledeer
- Potential impacts associated with direct mortality, habitat loss/alteration, and loss of corridors

Design features:

- Minimize disruptions during lambing/calving/fawning season
- Control use of motorized vehicles
- Use engineering controls for minimizing impact to wetlands, dry wash, riparian habitats
- Augment, reintroduce, or translocate individuals from areas of direct effects



Mule Deer



Bighorn Sheep



Elk

Soils within Los Mogotes SEZ

Soils/Erosion

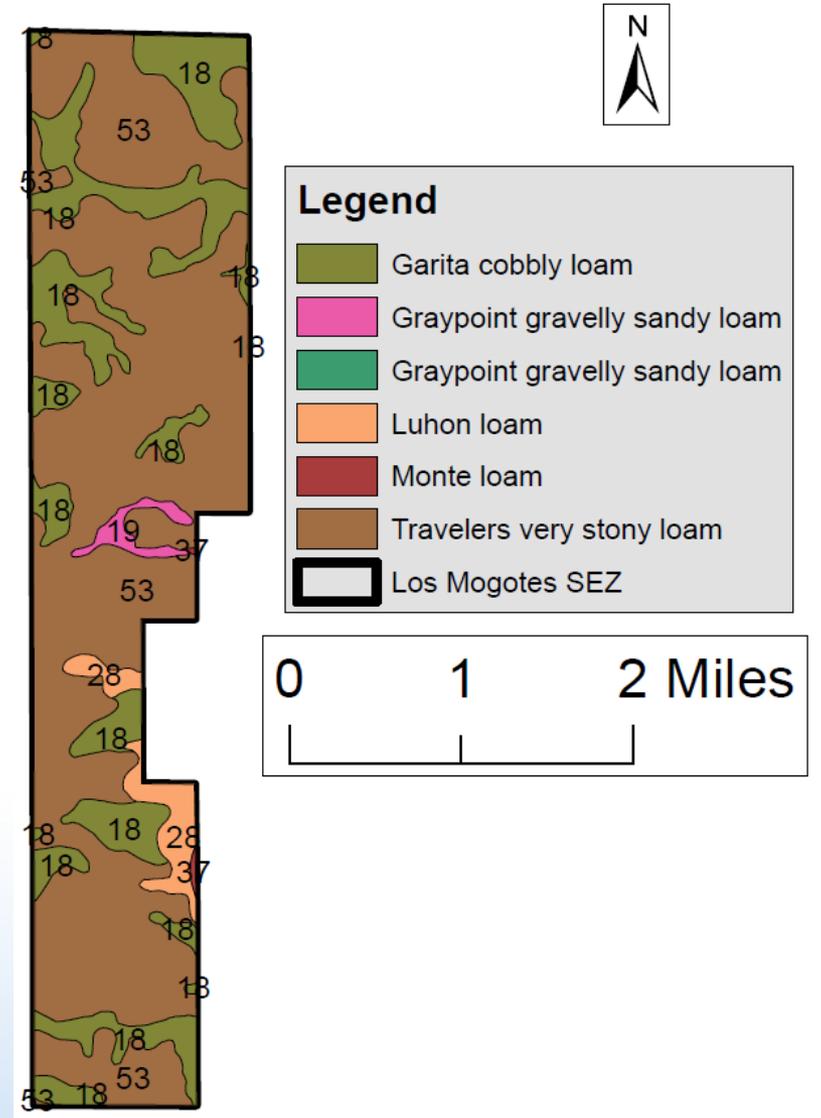
1. Soil types

Antonito Southeast and Los Mogotes SEZs

- predominantly very stony loams and cobbly loams

De Tilla Gulch SEZ

- gravelly to gravelly sandy loams

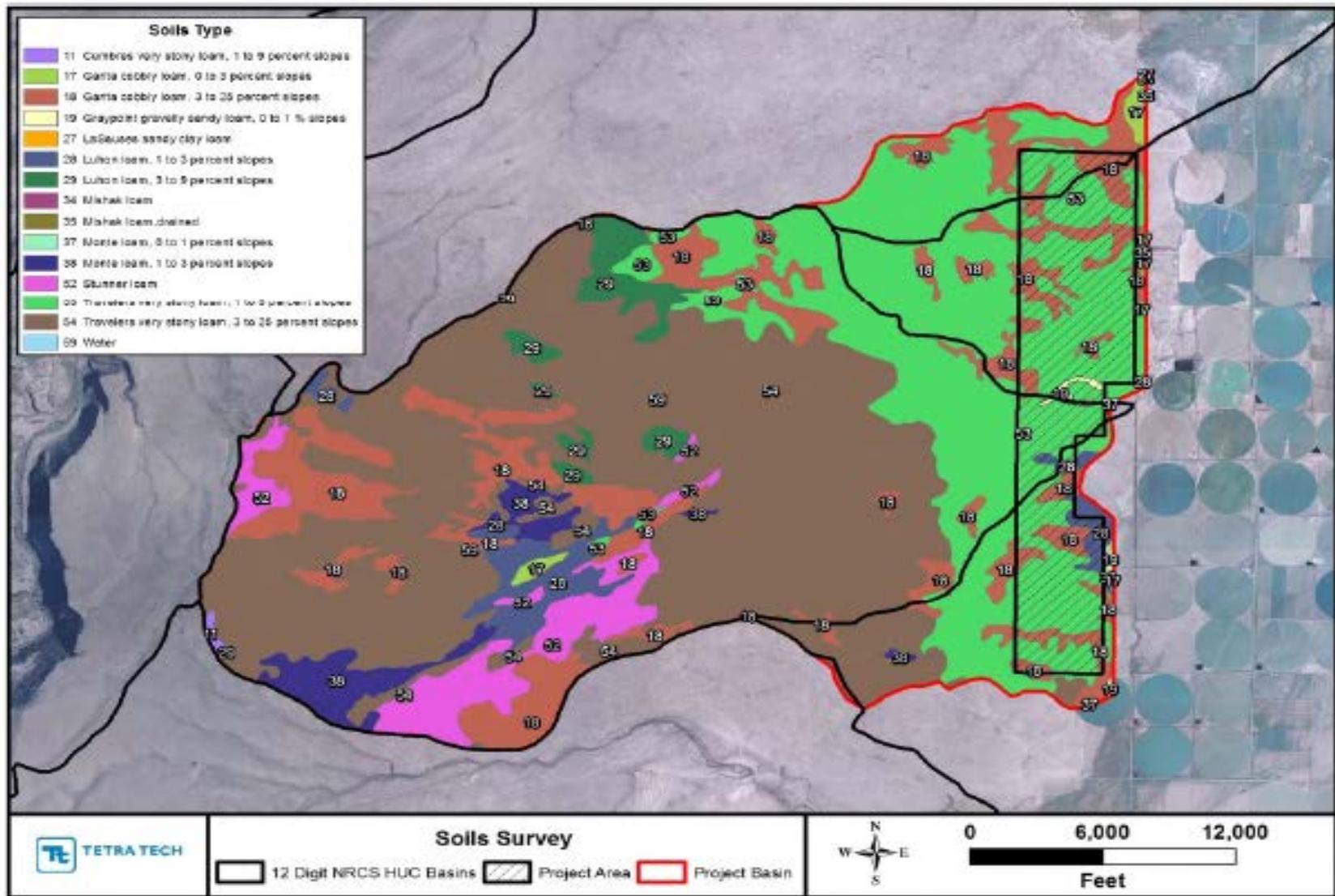


2. Impacts: Ground disturbance would be the greatest impact on soil resources including:

- soil compaction;
- soil horizon mixing;
- soil erosion and deposition by wind, water;
- surface runoff;
- sedimentation;
- possibly soil contamination.

3. Design Features:

- Avoid, minimize, and/or mitigate potential impacts and geologic hazards.
- including measures to avoid erosion and stabilize disturbed areas.



Soil series, texture, and slopes in Los Mogotes East Solar Energy Zone and contributing drainage. Source: Tetrattech 2014.

Air Quality and Climate Change

- Decreased air quality Fugitive dust (particulate matter) and equipment exhaust emissions generated during construction and operations:
 - Solar PEIS modeling showed that high dust concentrations should be limited to the immediate areas surrounding the SEZ boundary and decrease quickly with distance
 - Possible cumulative impacts are of concern; study ongoing
- Generation of fugitive dust may result in exposure to respirable particulates and/or microbes (possible human health impacts)
- Possible climate change impact through loss of carbon storage capacity of the soil
- Positive impact: Solar power generation reduces demand for energy from fossil fuels, and thereby reduces greenhouse gas emissions
- **Design Features:**
 - Dust suppression measures will be implemented during all phases of development

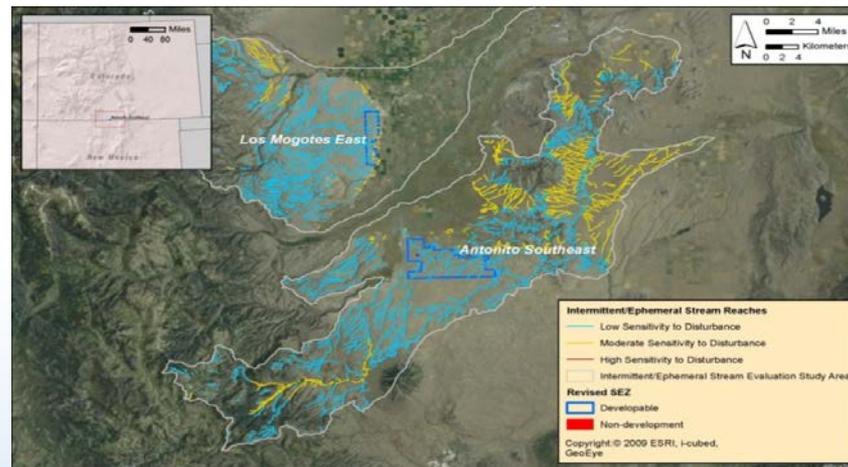


Dust storm: San Luis Valley,
Colorado

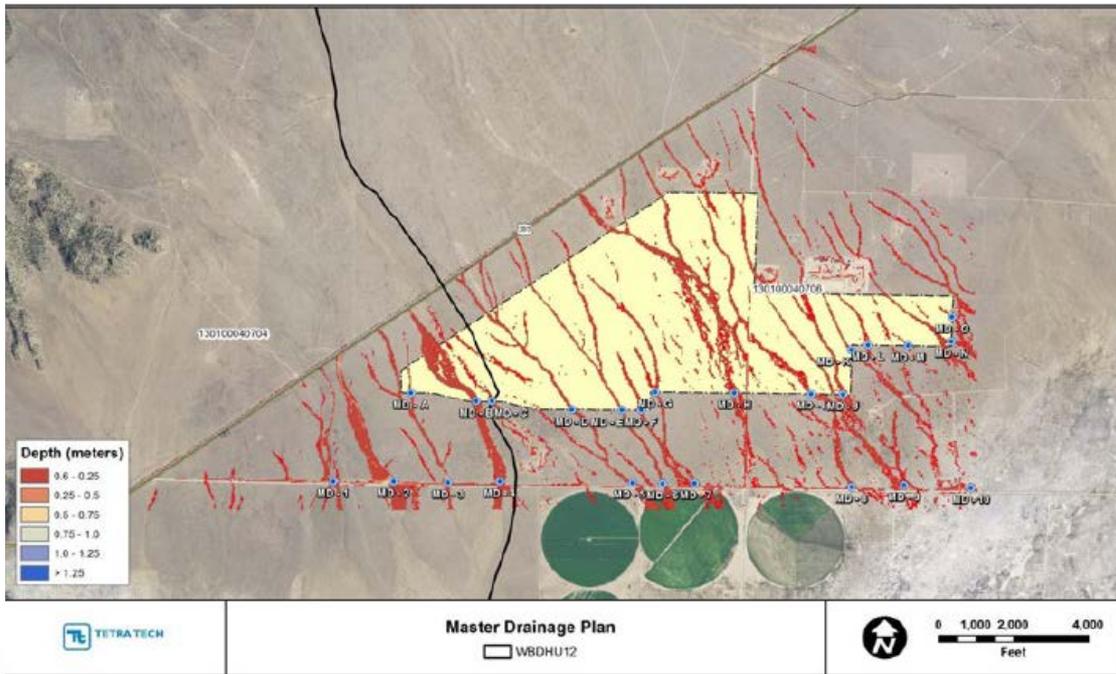
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Surface Water Hydrology

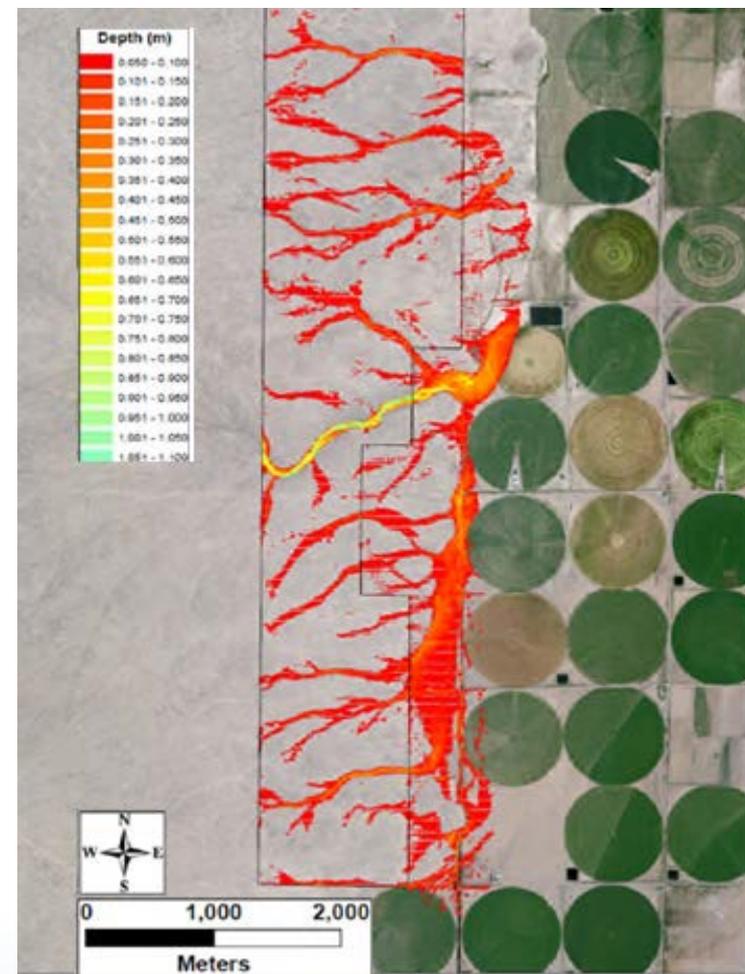
- Antonito Southeast SEZ contains a small lake and surrounding wetlands (17 acres); there are no other perennial surface water features in the SEZs
- In general, ephemeral drainages have low or moderate potential for water erosion
- **Design features:** specify developing vegetation plan to minimize disturbance to ephemeral washes and dry lakebeds. Also will avoid drainages and/or provide detention or retention facilities



Surface Water Features in the Hydrologic Basin that includes the Antonito Southeast SEZ. Source: BLM 2012 – Solar PEIS.



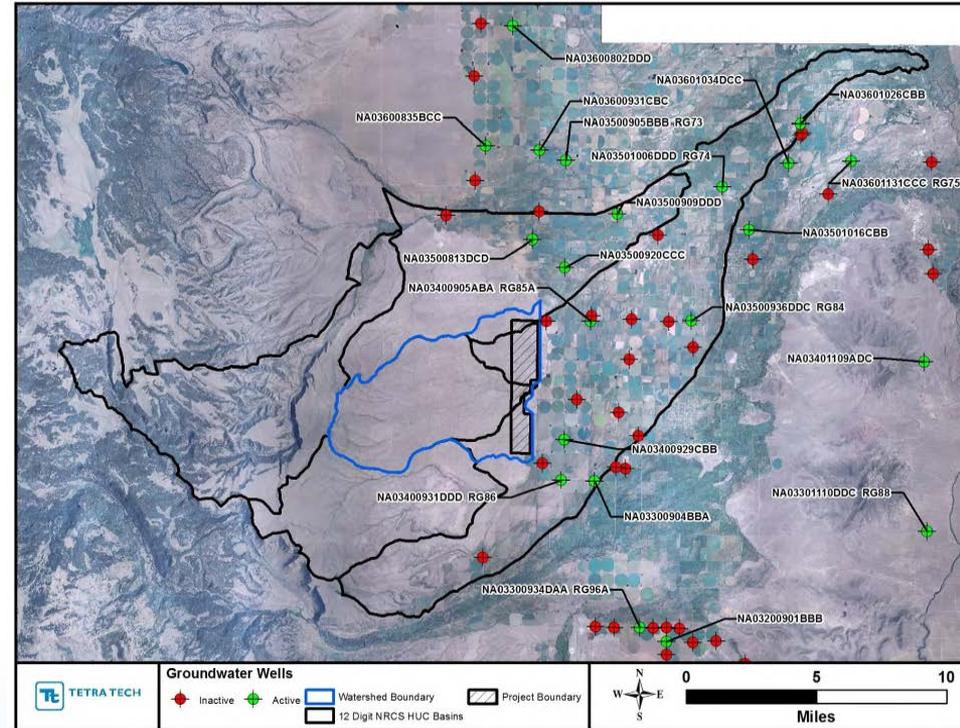
Dry wash ephemeral drainage and maximum 24-hour rainfall flow depths (m) for 100-yr flood event – De Tilla Gulch SEZ. Source: Tetrattech 2014.



Dry wash ephemeral drainage and maximum 24-hour rainfall flow depths (m) for 100-yr flood event – Los Mogotes East EZ. Source: Tetrattech 2013.

Hydrology: Groundwater

- If projects use groundwater, then lower groundwater elevations will impact connected surface waters and other users in the basins
- Possibility of impacts to groundwater quality due to accidental spills of chemicals
- **Design features:** Specify that groundwater use must be offset through purchase and retirement of water rights. Augmentation/compensation is required by the State of Colorado



Wells in the vicinity of the Los Mogotes East SEZ.
Source: Tetratech 2014

Cultural Resources & Native American Concerns

Applies to all Colorado SEZs



Cultural Resources

- Impacts could include disturbance to eligible archaeological sites if present within the SEZs
- Erosion caused by modified hydrologic patterns could increase accessibility to sites outside of the SEZs
- Resources and landscapes important for Hispano heritage could be effected, both through visual and auditory impacts
- **Design Features:** Significant cultural resources clustered in areas that retain sufficient integrity will be avoided; coordination with the Cumbres and Toltec Scenic Railroad Commission and Old Spanish Trail Association is recommended



Native American Concerns

- Visual and auditory impacts on traditional cultural landscapes, and destruction of or disturbance to traditionally important plants and wildlife habitat
- Erosion caused by modified hydrologic patterns could increase accessibility to cultural sites outside of the SEZs
- For Antonito Southeast SEZ, a portion of the Picuris Trail could be impacted
- **Design features:**
 - Consultation with Native American governments regarding on-site mitigation will continue
 - Springs and other culturally important water sources and culturally important plant and animal species will be avoided to extent practicable
 - Visual intrusions on sacred sites will be avoided to extent practicable



Recreation

- SEZ lands support limited OHV use, camping, and hunting
 - OHV routes currently open within the SEZs could be closed or rerouted
 - Only a small impact to pronghorn hunting is likely – small amount of habitat within the SEZs
 - Development on the SEZs would eliminate future recreation activities from developed areas.
- Indirect effects on viewsheds of recreational areas outside the SEZs are possible. Areas possibly affected include:
 - Great Sand Dunes National Park and Preserve
 - Old Spanish National Historic Trail
 - Los Caminos Antiguos and proposed Cochetopa Scenic Byway
 - Sangre de Cristo Mountains
 - National wildlife refuges and designated wilderness areas
- **Design features:** include consideration of potential impacts on tourism and consultation with local community leaders



Camping in San Luis Valley

Visual Resources

- Scenic quality of the SEZs is mixed, 40% of Antonito Southeast SEZ has moderate visual quality (VRI Class III), while all of De Tilla Gulch and Los Mogotes SEZs have moderate visual quality
- Moderate to strong visual impacts may occur in many specially designated areas near the SEZs (field verification ongoing)

Alamosa solar facility



Visual Resources - Design Features

- No development of power tower facilities
- Site and design facilities to minimize glint and glare and unnecessary lighting
- Assess degree of impact at key observation points (for example scenic overlooks, trails, campgrounds); avoid siting within viewshed of the KOPs
- Where facilities cannot be sited outside the viewshed of KOPs, maximize distance from the KOPs



Fenced Sun Edison Solar Facility, Vegetation Undisturbed



Glare from Solar One Trough Facility near Las Vegas NV

Specially Designated Areas (SDAs)

- SDAs near the SEZs include wilderness areas, wildlife refuges, areas of critical environmental concern, special recreation management areas, national trails, and others
- Impacts could include:
 - Adverse visual effects on viewsheds
 - Reduced recreational use
 - Fragmentation of biologically-linked areas
 - Loss of public access
- Design Features:
 - Initiate early consultation with Sangre de Cristo NHA management

South San Juan Wilderness Area



Rio Grande Natural Area



Livestock Grazing

- Portions of allotments would be lost on all three SEZs – estimate loss of 575 animal unit months (AUMs) on Antonito Southeast SEZ and 188 AUMs on Los Mogotes East SEZ.
- Permittees would be reimbursed for value of range improvements; however, this would not completely cover their economic loss.
- Permittees would lose the ability to sell the allotments.
- County and BLM would lose some revenue (minor impact).

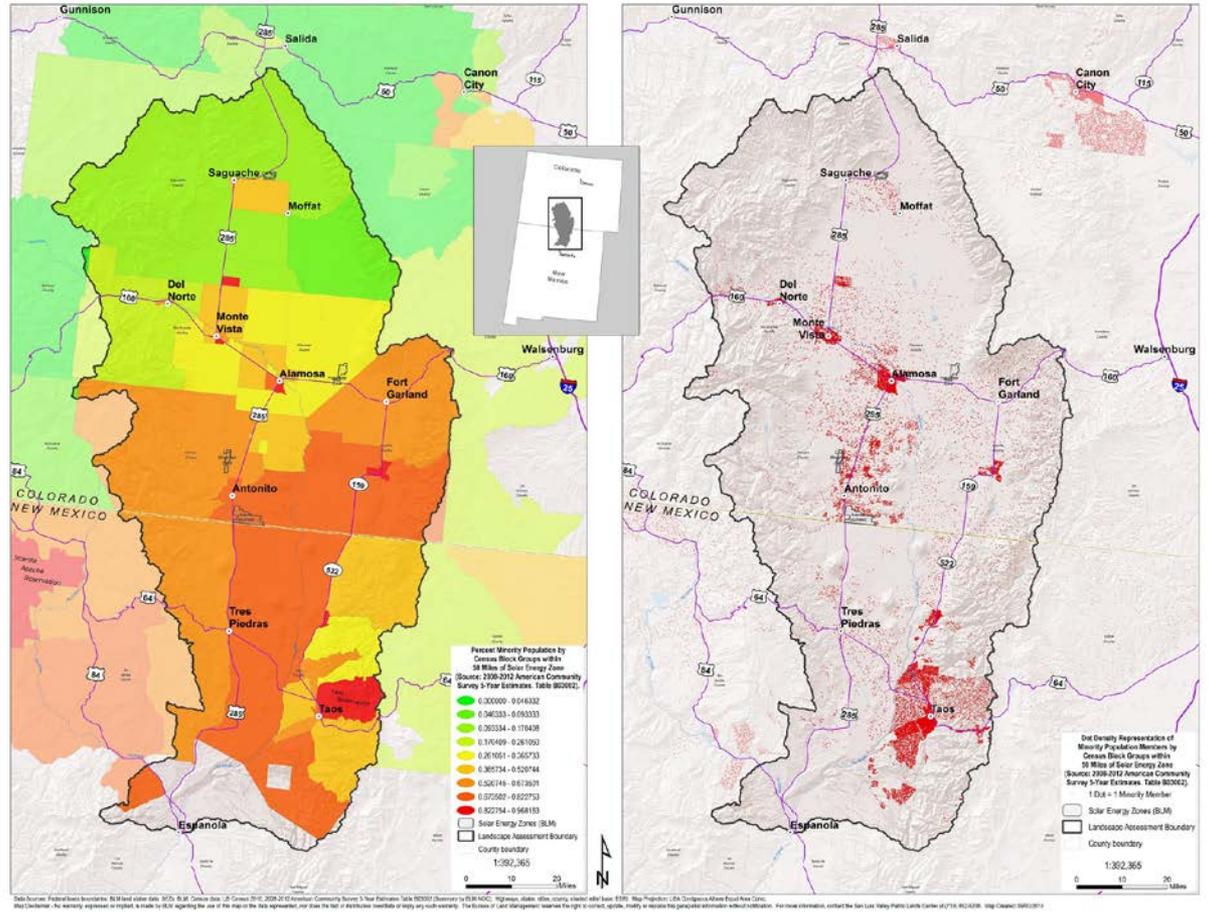


Photo Credit: BLM

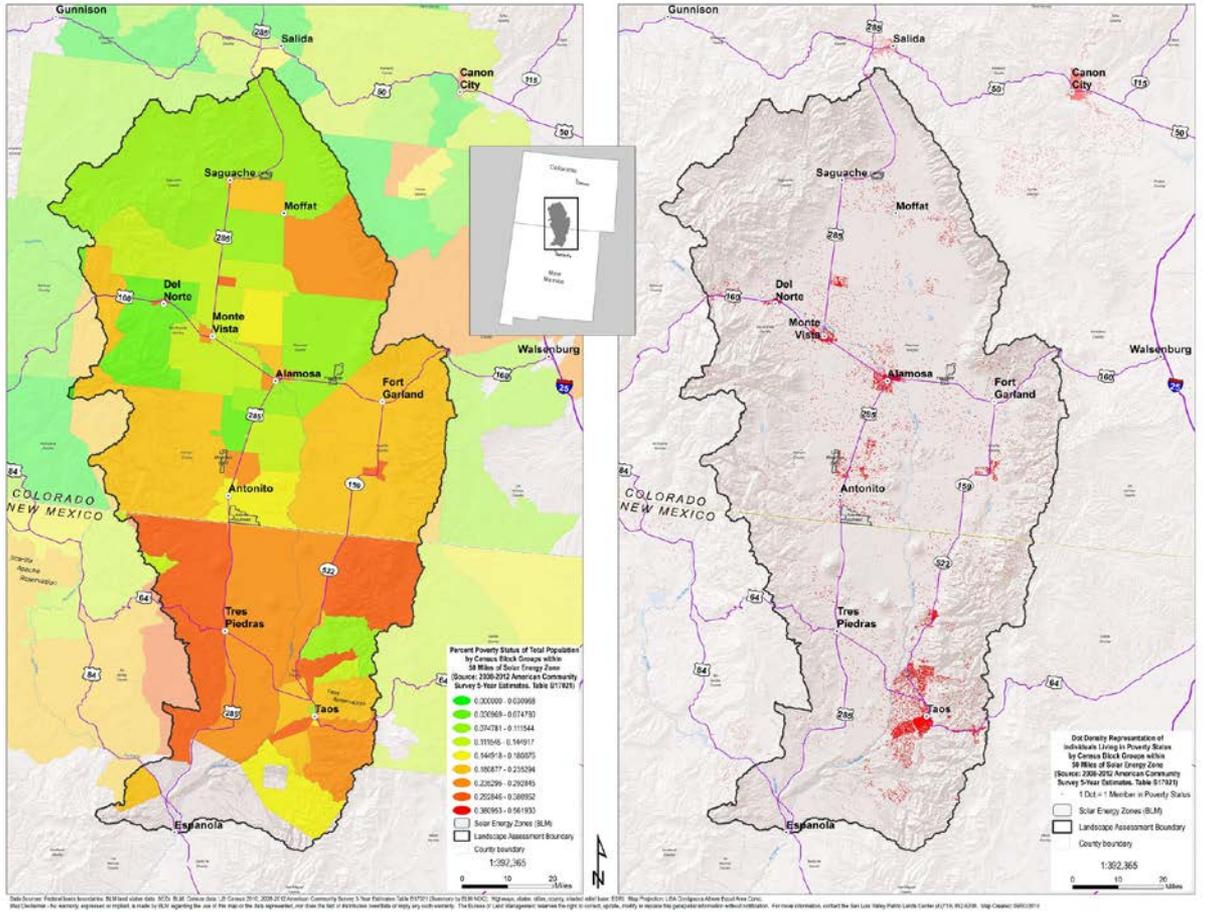
Design Features:

- Consider options to avoid, minimize, and/or mitigate adverse impacts such as relocation of range improvements and fencing, access to water.

Socioeconomics – US Census Minority Population



Socioeconomics – US Census Low Income Population



Socioeconomics

Applies to all Colorado SEZs

- Impacts to local economy as a result of expenditures of wages and salaries and the collection of state sales and income taxes,
- Impacts to housing, as well of cost of services.
- Temporary construction and some long-term operations jobs created (least for PV; most for parabolic trough facilities)
- Loss of livestock grazing could result in the future loss of jobs and a decline in grazing fees payable to the BLM and the county.



Source: <http://www.energy.ca.gov/tour/ivanpah/>