NOTATION

The following is a list of acronyms and abbreviations, chemical names, and units of measure used in this document. Some acronyms used only in tables may be defined only in those tables.

GENERAL ACRONYMS AND ABBREVIATIONS

AADT	annual average daily traffic
AASHTO	American Association of State Highway and Transportation Officials
AC	alternating current
ACC	air-cooled condenser
ACEC	Area of Critical Environmental Concern
ADEQ	Arizona Department of Environmental Quality
ACHP	Advisory Council on Historic Preservation
ADOT	Arizona Department of Transportation
ADWR	Arizona Department of Water Resources
AERMOD	AMS/EPA Regulatory Model
AFC	Application for Certification
AGL	above ground level
AIM	Assessment, Inventory and Monitoring
AIRFA	American Indian Religious Freedom Act
AMA	active management area
AML	animal management level
ANHP	Arizona National Heritage Program
APE	area of potential effect
APLIC	Avian Power Line Interaction Committee
APP	Avian Protection Plan
APS	Arizona Public Service
AQCR	Air Quality Control Region
AQRV	air quality–related value
ARB	Air Resources Board
ARRA	American Recovery and Reinvestment Act of 2009
ARRTIS	Arizona Renewable Resource and Transmission Identification Subcommittee
ARS	Agricultural Research Service
ARZC	Arizona and California
ATSDR	Agency for Toxic Substances and Disease Registry
AUM	animal unit month
AVSE	Arlington Valley Solar Energy
AVWS	Audio Visual Warning System
AWBA	Arizona Water Banking Authority
AWEA	American Wind Energy Association
AWRM	Active Water Resource Management
AZDA	Arizona Department of Agriculture
AZGFD	Arizona Game and Fish Department

AZGS	Arizona Geological Survey
BA	biological assessment
BAP	base annual production
BEA	Bureau of Economic Analysis
BISON-M	Biota Information System of New Mexico
BLM	Bureau of Land Management
BLM-CA	Bureau of Land Management, California
BMP	best management practice
BNSF	Burlington Northern Santa Fe
BO	biological opinion
BOR	U.S. Bureau of Reclamation
BPA	Bonneville Power Administration
BRAC	Blue Ribbon Advisory Council on Climate Change
BSE	Beacon Solar Energy
BSEP	Beacon Solar Energy Project
BTS	Bureau of Transportation Statistics
CAA	Clean Air Act
CAAQS	California Air Quality Standards
CAISO	California Independent System Operator
Caltrans	California Department of Transportation
C-AMA	California-Arizona Maneuver Area
CAP	Central Arizona Project
CARB	California Air Resources Board
CAReGAP	California Regional Gap Analysis Project
CASQA	California Stormwater Quality Association
CASTNET	Clean Air Status and Trends NETwork
CAWA	Colorado Agricultural Water Alliance
CCC	Civilian Conservation Corps
CDC	Centers for Disease Control and Prevention
CDCA	California Desert Conservation Area
CDFG	California Department of Fish and Game
CDNCA	California Desert National Conservation Area
CDOT	Colorado Department of Transportation
CDOW	Colorado Division of Wildlife (now Colorado Parks and Wildlife)
CDPHE	Colorado Department of Public Health and Environment
CDWR	California Department of Water Resources
CEC	California Energy Commission
CEQ	Council on Environmental Quality
CES	constant elasticity of substitution
CESA	California Endangered Species Act
CESF	Carrizo Energy Solar Farm
CFR	*Code of Federal Regulations*
CGE	computable general equilibrium
CHAT	crucial habitat assessment tool

CIRA	Cooperative Institute for Research in the Atmosphere
CLFR	compact linear Fresnel reflector
CNDDB	California Natural Diversity Database
CNEL	community noise equivalent level
CNHP	Colorado National Heritage Program
Colorado DWR	Colorado Division of Water Resources
CO_2e	carbon dioxide equivalent
CPC	Center for Plant Conservation
CPUC	California Public Utilities Commission
CPV	concentrating photovoltaic
CRBSCF	Colorado River Basin Salinity Control Forum
CREZ	competitive renewable energy zone
CRPC	Cultural Resources Preservation Council
CRSCP	Colorado River Salinity Control Program
CSA	Candidate Study Area
CSC	Coastal Services Center
CSFG	carbon-sequestration fossil generation
CSP	concentrating solar power
CSQA	California Stormwater Quality Association
CSRI	Cultural Systems Research, Incorporated
CTG	combustion turbine generator
CTPG	California Transmission Planning Group
CTSR	Cumbres & Toltec Scenic Railroad
CUP	Conditional Use Permit
CVP	Central Valley Project
CWA	Clean Water Act
CWCB	Colorado Water Conservation Board
CWHRS	California Wildlife Habitat Relationship System
DC	direct current
DEM	digital elevation model
DHS	U.S. Department of Homeland Security
DIMA	Database for Inventory, Monitoring and Assessment
DLT	dedicated-line transmission
DNA	Determination of NEPA Adequacy
DNI	direct normal insulation
DNL	day-night average sound level
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DOL	U.S. Department of Labor
DOT	U.S. Department of Transportation
DRECP	California Desert Renewable Energy Conservation Plan
DSM	demand-side management
DSRP	Decommissioning and Site Reclamation Plan
DTC/C-AMA	Desert Training Center/California–Arizona Maneuver Area

DWMA	Desert Wildlife Management Area
DWR	Division of Water Resources
EA	environmental assessment
EBID	Elephant Butte Irrigation District
ECAR	East Central Area Reliability Coordination Agreement
ECOS	Environmental Conservation Online System (USFWS)
EERE	Energy Efficiency and Renewable Energy (DOE)
Eg	band gap energy
EIA	Energy Information Administration (DOE)
EIS	environmental impact statement
EISA	Energy Independence and Security Act of 2007
EMF	electromagnetic field
E.O.	Executive Order
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
EQIP	Environmental Quality Incentives Program
ERCOT	Electric Reliability Council of Texas
ERO	Electric Reliability Organization
ERS	Economic Research Service
ESA	Endangered Species Act of 1973
ESRI	Environmental Systems Research Institute
FAA	Federal Aviation Administration
FBI	Federal Bureau of Investigation
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FLPMA	Federal Land Policy and Management Act of 1976
FONSI	Finding of No Significant Impact
FR	*Federal Register*
FRCC	Florida Reliability Coordinating Council
FSA	Final Staff Assessment
FTE	full-time equivalent
FY	fiscal year
G&TM	generation and transmission modeling
GCRP	U.S. Global Climate Research Program
GDA	generation development area
GHG	greenhouse gas
GIS	geographic information system
GMU	game management unit
GPS	global positioning system
GTM	Generation and Transmission Model

GUAC	Groundwater Users Advisory Council
GWP	global warming potential
HA	herd area
HAP	hazardous air pollutant
HAZCOM	hazard communication
HCE	heat collection element
HCP	Habitat Conservation Plan
HMA	herd management area
HMMH	Harris Miller Miller & Hanson, Inc.
HRSG	heat recovery steam generator
HSPD	Homeland Security Presidential Directive
HTF	heat transfer fluid
HUC	hydrologic unit code
HVAC	heating, ventilation, and air-conditioning
I	Interstate
IARC	International Agency for Research on Cancer
IBA	important bird area
ICE	internal combustion engine
ICPDS	Imperial County Planning & Development Services
ICWMA	Imperial County Weed Management Area
IDT	interdisplinary team
IEC	International Electrochemical Commission
IFR	instrument flight rule
IID	Imperial Irrigation District
IM	Instruction Memorandum
IMPS	Iron Mountain Pumping Station
IMS	interim mitigation strategy
INA	Irrigation Non-Expansion Area
IOP	Interagency Operating Procedure
IOU	investor-owned utility
IPCC	Intergovernmental Panel on Climate Change
ISA	Independent Science Advisor; Instant Study Area
ISB	Intermontane Seismic Belt
ISCC	integrated solar combined cycle
ISDRA	Imperial Sand Dunes Recreation Area
ISEGS	Ivanpah Solar Energy Generating System
ISO	independent system operator; iterative self-organizing
ITFR	Interim Temporary Final Rulemaking
ITP	incidental take permit
IUCNNR	International Union for Conservation of Nature and Natural Resources
IUCNP	International Union for Conservation of Nature Pakistan
KGA	known geothermal resources area
KML	keyhole markup language

KOP	key observation point
KSLA	known sodium leasing area
LCC	Landscape Conservation Cooperative
LCCRDA	Lincoln County Conservation, Recreation, and Development Act of 2004
LCOE	levelized cost of energy
L_{dn}	day-night average sound level
LDWMA	Low Desert Weed Management Area
L_{eq}	equivalent sound pressure level
LiDAR	light detection and ranging
LLA	limited land available
LLRW	low-level radioactive waste (waste classification)
LPN	listing priority number
LRG	Lower Rio Grande
LSA	lake and streambed alteration
LSE	load-serving entity
LTMP	long-term monitoring and adaptive management plan
LTVA	long-term visitor area
MAAC	Mid-Atlantic Area Council
MAIN	Mid-Atlantic Interconnected Network
MAPP	methyl acetylene propadiene stabilizer; Mid-Continent Area Power Pool
MCAS	Marine Corps Air Station
MCL	maximum contaminant level
MEB	Marine Expeditionary Brigade
MFP	Management Framework Plan
MIG	Minnesota IMPLAN Group
MLA	maximum land available
MOA	military operating area
MOU	Memorandum of Understanding
MPDS	maximum potential development scenario
MRA	Multiple Resource Area
MRI	Midwest Research Institute
MRO	Midwest Reliability Organization
MSDS	Material Safety Data Sheet
MSL	mean sea level
MTR	military training route
MVEDA	Mesilla Valley Economic Development Alliance
MWA	Mojave Water Agency
MWD	Metropolitan Water District
MWMA	Mojave Weed Management Area
NAAQS	National Ambient Air Quality Standard(s)
NADP	National Atmospheric Deposition Program
NAGPRA	Native American Graves Protection and Repatriation Act
NAHC	Native American Heritage Commission (California)
NAIC	North American Industrial Classification System

NASA	National Aeronautics and Space Administration
NCA	National Conservation Area
NCCAC	Nevada Climate Change Advisory Committee
NCDC	National Climatic Data Center
NCES	National Center for Education Statistics
NDAA	National Defense Authorization Act
NDCNR	Nevada Department of Conservation and Natural Resources
NDEP	Nevada Division of Environmental Protection
NDOT	Nevada Department of Transportation
NDOW	Nevada Department of Wildlife
NDWP	Nevada Division of Water Planning
NDWR	Nevada Division of Water Resources
NEAP	Natural Events Action Plan
NEC	National Electric Code
NED	National Elevation Database
NEP	Natural Events Policy
NEPA	National Environmental Policy Act of 1969
NERC	North American Electricity Reliability Corporation
NGO	non-governmental organization
NHA	National Heritage Area
NHD	National Hydrography Dataset
NHNM	National Heritage New Mexico
NHPA	National Historic Preservation Act of 1966
NID	National Inventory of Dams
NLCS	National Landscape Conservation System
NMAC	*New Mexico Administrative Code*
NMBGMR	New Mexico Bureau of Geology and Mineral Resources
NMDGF	New Mexico Department of Game and Fish
NM DOT	New Mexico Department of Transportation
NMED	New Mexico Environment Department
NMED-AQB	New Mexico Environment Department-Air Quality Board
NMFS	National Marine Fisheries Service
NMOSE	New Mexico Office of the State Engineer
NMSU	New Mexico State University
NNHP	Nevada Natural Heritage Program
NNL	National Natural Landmark
NNSA	National Nuclear Security Administration
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NP	National Park
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NPV	net present value
NRA	National Recreation Area

NRCS	Natural Resources Conservation Service
NREL	National Renewable Energy Laboratory
NRHP	*National Register of Historic Places*
NRS	*Nevada Revised Statutes*
NSC	National Safety Council
NSO	no surface occupancy
NSTC	National Science and Technology Council
NTHP	National Trust for Historic Preservation
NTS	Nevada Test Site
NTTR	Nevada Test and Training Range
NVCRS	Nevada Cultural Resources Inventory System
NV DOT	Nevada Department of Transportation
NWCC	National Wind Coordinating Committee
NWI	National Wetlands Inventory
NWIS	National Water Information System (USGS)
NWPP	Northwest Power Pool
NWR	National Wildlife Refuge
NWSRS	National Wild and Scenic River System
O&M	operation and maintenance
ODFW	Oregon Department of Fish and Wildlife
OHV	off-highway vehicle
ONA	Outstanding Natural Area
ORC	organic Rankine cycle
OSE/ISC	Office of the State Engineer/Interstate Stream Commission
OSHA	Occupational Safety and Health Administration
OTA	Office of Technology Assessment
PA	Programmatic Agreement
PAD	Preliminary Application Document
PAH	polycyclic aromatic hydrocarbon
PAT	peer analysis tool
PCB	polychlorinated biphenyl
PCM	purchase change material
PCS	power conditioning system
PCU	power converting unit
PEIS	programmatic environmental impact statement
PFYC	potential fossil yield classification
PGH	Preliminary General Habitat
PIER	Public Interest Energy Research
P.L.	Public Law
PLSS	Public Land Survey System
PM	particulate matter
$PM_{2.5}$	particulate matter with a diameter of 2.5 μm or less
PM_{10}	particulate matter with a diameter of 10 μm or less
PPA	Power Purchase Agreement

P-P-D	population-to-power density
PPH	Preliminary Priority Habitat
POD	plan of development
POU	publicly owned utility
PPA	Power Purchase Agreement
PPE	personal protective equipment
PSD	Prevention of Significant Deterioration
PURPA	Public Utility Regulatory Policy Act
PV	photovoltaic
PVID	Palo Verde Irrigation District
PWR	public water reserve
QRA	qualified resource area
R&I	relevance and importance
RAC	Resource Advisory Council
RCE	Reclamation Cost Estimate
RCI	residential, commercial, and industrial (sector)
RCRA	Resource Conservation and Recovery Act of 1976
RD&D	research, development, and demonstration; research, development, and deployment
RDBMS	Relational Database Management System
RDEP	Restoration Design Energy Project
REA	Rapid Ecoregional Assessment
REAT	Renewable Energy Action Team
REDA	Renewable Energy Development Area
REDI	Renewable Energy Development Infrastructure
REEA	Renewable Energy Evaluation Area
ReEDS	Regional Energy Deployment System
REPG	Renewable Energy Policy Group
RETA	Renewable Energy Transmission Authority
RETAAC	Renewable Energy Transmission Access Advisory Committee
RETI	Renewable Energy Transmission Initiative
REZ	renewable energy zone
RF	radio frequency
RFC	Reliability First Corporation
RFDS	reasonably foreseeable development scenario
RGP	Rio Grande Project
RGWCD	Rio Grande Water Conservation District
RMP	Resource Management Plan
RMPA	Rocky Mountain Power Area
RMZ	Resource Management Zone
ROD	Record of Decision
ROI	region of influence
ROS	recreation opportunity spectrum
ROW	right-of-way

RPG	renewable portfolio goal
RPS	Renewable Portfolio Standard
RRC	Regional Reliability Council
RSEP	Rice Solar Energy Project
RSI	Renewable Systems Interconnection
RTO	regional transmission organization
RTTF	Renewable Transmission Task Force
RV	recreational vehicle
SAAQS	State Ambient Air Quality Standard(s)
SAMHSA	Substance Abuse and Mental Health Services Administration
SCADA	supervisory control and data acquisition
SCE	Southern California Edison
SCRMA	Special Cultural Resource Management Area
SDRREG	San Diego Regional Renewable Energy Group
SDWA	Safe Drinking Water Act of 1974
SEGIS	Solar Energy Grid Integration System
SEGS	Solar Energy Generating System
SEI	Sustainable Energy Ireland
SEIA	Solar Energy Industrial Association
SES	Stirling Energy Systems
SETP	Solar Energy Technologies Program (DOE)
SEZ	solar energy zone
SHPO	State Historic Preservation Office(r)
SIP	State Implementation Plan
SLRG	San Luis & Rio Grande
SMA	Special Management Area
SMART	specific, measurable, achievable, relevant, and time sensitive
SMP	suggested management practice
SNWA	Southern Nevada Water Authority
SPP	Southwest Power Pool
SRMA	Special Recreation Management Area
SSA	Socorro Seismic Anomaly
SSI	self-supplied industry
ST	solar thermal
STG	steam turbine generator
SUA	special use airspace
SWAT	Southwest Area Transmission
SWIP	Southwest Intertie Project
SWPPP	Stormwater Pollution Prevention Plan
SWReGAP	Southwest Regional Gap Analysis Project
TAP	toxic air pollutant
TCC	Transmission Corridor Committee
TDS	total dissolved solids
TEPPC	Transmission Expansion Planning Policy Committee

TES	thermal energy storage
TRACE	Transmission Routing and Configuration Estimator
TSA	Transportation Security Administration
TSCA	Toxic Substances Control Act of 1976
TSDF	treatment, storage, and disposal facility
TSP	total suspended particulates
UACD	Utah Association of Conservation Districts
UBWR	Utah Board of Water Resources
UDA	Utah Department of Agriculture
UDEQ	Utah Department of Environmental Quality
UDNR	Utah Department of Natural Resources
UDOT	Utah Department of Transportation
UDWQ	Utah Division of Water Quality
UDWR	Utah Division of Wildlife Resources
UGS	Utah Geological Survey
UNEP	United Nations Environmental Programme
UNPS	Utah Native Plant Society
UP	Union Pacific
UREZ	Utah Renewable Energy Zone
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USC	*United States Code*
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
Utah DWR	Utah Division of Water Rights
UTTR	Utah Test and Training Range
UWS	Underground Water Storage, Savings and Replenishment Act
VACAR	Virginia–Carolinas Subregion
VCRS	Visual Contrast Rating System
VFR	visual flight rule
VOC	volatile organic compound
VRHCRP	Virgin River Habitat Conservation & Recovery Program
VRI	Visual Resource Inventory
VRM	Visual Resource Management
WA	Wilderness Area
WECC	Western Electricity Coordinating Council
WECC CAN	Western Electricity Coordinating Council–Canada
WEG	wind erodibility group
Western	Western Area Power Administration
WGA	Western Governors' Association
WGFD	Wyoming Game and Fish Department

WHA	wildlife habitat area
WHO	World Health Organization
WIA	Wyoming Infrastructure Authority
WRAP	Water Resources Allocation Program; Western Regional Air Partnership
WRCC	Western Regional Climate Center
WREZ	Western Renewable Energy Zones
WRRI	Water Resources Research Institute
WSA	Wilderness Study Area
WSC	wildlife species of special concern
WSMR	White Sands Missile Range
WSR	Wild and Scenic River
WSRA	Wild and Scenic Rivers Act of 1968
WWII	World War II
WWP	Western Watersheds Project
YPG	Yuma Proving Ground
ZITA	zone identification and technical analysis
ZLD	zero liquid discharge

CHEMICALS

CH_4	methane	NO_2	nitrogen dioxide
CO	carbon monoxide	NO_x	nitrogen oxides
CO_2	carbon dioxide		
		O_3	ozone
H_2S	hydrogen sulfide		
Hg	mercury	Pb	lead
N_2O	nitrous oxide	SF_6	sulfur hexafluoride
NH_3	ammonia	SO_2	sulfur dioxide
		SO_x	sulfur oxides

UNITS OF MEASURE

ac-ft	acre-foot (feet)	dBA	A-weighted decibel(s)
bhp	brake horsepower		
		°F	degree(s) Fahrenheit
°C	degree(s) Celsius	ft	foot (feet)
cf	cubic foot (feet)	ft^2	square foot (feet)
cfs	cubic foot (feet) per second	ft^3	cubic foot (feet)
cm	centimeter(s)		
		g	gram(s)
dB	decibel(s)	gal	gallon(s)

GJ	gigajoule(s)
gpcd	gallon per capita per day
gpd	gallon(s) per day
gpm	gallon(s) per minute
GW	gigawatt(s)
GWh	gigawatt hour(s)
GWh/yr	gigawatt hour(s) per year
h	hour(s)
ha	hectare(s)
Hz	hertz
in.	inch(es)
J	joule(s)
K	degree(s) Kelvin
kcal	kilocalorie(s)
kg	kilogram(s)
kHz	kilohertz
km	kilometer(s)
km^2	square kilometer(s)
kPa	kilopascal(s)
kV	kilovolt(s)
kVA	kilovolt-ampere(s)
kW	kilowatt(s)
kWh	kilowatt-hour(s)
kWp	kilowatt peak
L	liter(s)
lb	pound(s)
m	meter(s)
m^2	square meter(s)
m^3	cubic meter(s)
mg	milligram(s)
Mgal	million gallons
mi	mile(s)
mi^2	square mile(s)
min	minute(s)
mm	millimeter(s)
MMt	million metric ton(s)
MPa	megapascal(s)
mph	mile(s) per hour
MVA	megavolt-ampere(s)
MW	megawatt(s)
MWe	megawatt(s) electric
MWh	megawatt-hour(s)
ppm	part(s) per million
psi	pound(s) per square inch
psia	pound(s) per square inch absolute
rpm	rotation(s) per minute
s	second(s)
scf	standard cubic foot (feet)
TWh	terawatt hour(s)
VdB	vibration velocity decibel(s)
W	watt(s)
yd^2	square yard(s)
yd^3	cubic yard(s)
yr	year(s)
µg	microgram(s)
µm	micrometer(s)

10 UPDATE TO AFFECTED ENVIRONMENT AND IMPACT ASSESSMENT FOR PROPOSED SOLAR ENERGY ZONES IN COLORADO

The U.S. Department of the Interior Bureau of Land Management (BLM) has carried 17 solar energy zones (SEZs) forward for analysis in this Final Solar Programmatic Environmental Impact Statement (PEIS). These SEZs total approximately 285,000 acres (1,153 km^2) of land potentially available for development. This chapter includes analyses of potential environmental impacts for the proposed SEZs in Colorado—Antonito Southeast, De Tilla Gulch, Fourmile East, and Los Mogotes East. The SEZ-specific analyses provide documentation from which the BLM will tier future project authorizations, thereby limiting the required scope and effort of project-specific National Environmental Policy Act of 1969 (NEPA) analyses.

The BLM is committed to collecting additional SEZ-specific resource data and conducting additional analysis in order to more efficiently facilitate future development in SEZs. The BLM developed action plans for each of the 17 SEZs carried forward as part of the Supplement to the Draft Solar PEIS (BLM and DOE 2011). These action plans described additional data that could be collected for individual SEZs and proposed data sources and methods for the collection of those data. Work is under way to collect additional data as specified under these action plans (e.g., additional data collection to support evaluation of cultural, visual, and water resources has begun). As the data become available, they will be posted on the project Web site (http://solareis.anl.gov) for use by applicants and the BLM and other agency staff.

To accommodate the flexibility described in the BLM's program objectives and in light of anticipated changes in technologies and environmental conditions over time, the BLM has removed some of the prescriptive SEZ-specific design features presented in the Draft Solar PEIS (BLM and DOE 2010) and the Supplement to the Draft (e.g., height restrictions on technologies used to address visual resource impacts). Alternatively, the BLM will give full consideration to any outstanding conflicts in SEZs as part of the competitive process being developed through rulemaking (see Section 2.2.2.2.1).

In preparing selected parcels for competitive offer, the BLM will review all existing analysis for an SEZ and consider any new or changed circumstances that may affect the development of the SEZ. The BLM will also work with appropriate federal, state, and local agencies, and affected tribes, as necessary, to discuss SEZ-related issues. This work would ultimately inform how a parcel would be offered competitively (e.g., parcel size and configuration, technology limitations, mitigation requirements, and parcel-specific competitive process). Prior to issuing a notice of competitive offer, the BLM would complete appropriate NEPA analysis to support the offer. This analysis would tier to the analysis for SEZs in the Solar PEIS to the extent practicable.

It is the BLM's goal to compile all data, information, and analyses for SEZs from the Draft Solar PEIS, the Supplement to the Draft, and this Final PEIS into a single location

accessible via the project Web site (http://solareis.anl.gov) for ease of use by applicants and the BLM and other agency staff.

This chapter is an update to the information on Colorado SEZs presented in the Draft Solar PEIS. The information presented in this chapter supplements and updates, but does not replace, the information provided in the corresponding Chapter 10 on proposed SEZs in Colorado in the Draft Solar PEIS. Corrections to incorrect information in Sections 10.1, 10.2, 10.3, and 10.4 of the Draft Solar PEIS and in Sections C.3.1, C.3.2, C.3.3, and C.3.4 of the Supplement to the Draft are provided in Sections 10.1.26, 10.2.26, 10.3.26, and 10.4.26 of this Final Solar PEIS.

10.1 ANTONITO SOUTHEAST

10.1.1 Background and Summary of Impacts

10.1.1.1 General Information

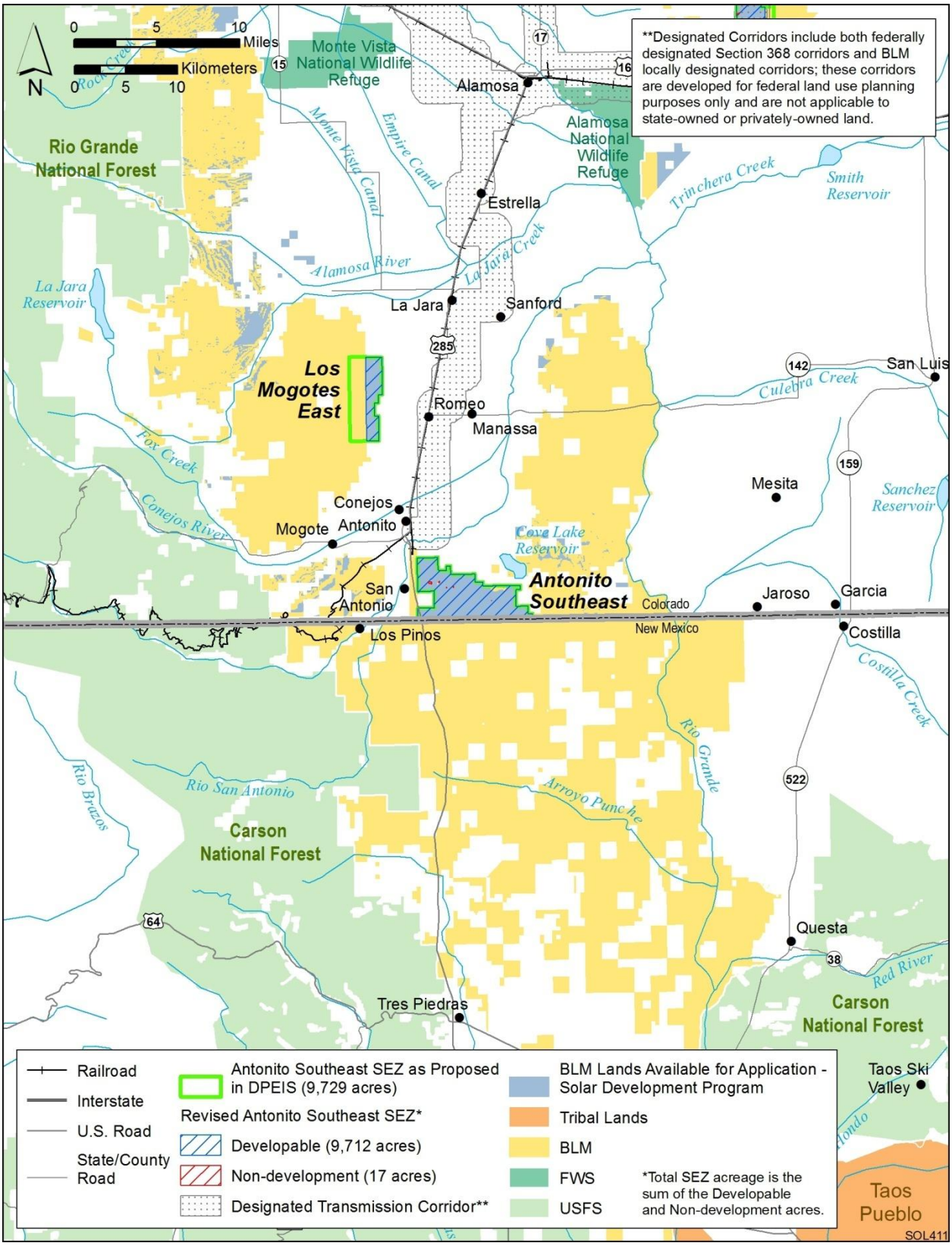
The proposed Antonito Southeast SEZ is located in southeastern Conejos County, on the southern Colorado state boundary with New Mexico. In 2008, the county population was 8,232, while the surrounding six-county region in Colorado and New Mexico had a population of 116,511. The largest nearby town of Alamosa, which had a 2008 population of 8,745, is about 34 mi (55 km) to the north. Several small towns lie closer to the SEZ, with Antonito, Colorado, about 2 mi (3 km) to the northwest. The area is served by the San Luis & Rio Grande (SLRG) Railroad. As of October 28, 2011, there were no pending solar project applications within the SEZ.

As published in the Draft Solar PEIS, the proposed Antonito Southeast SEZ had a total area of 9,729 acres (39.4 km^2) (see Figure 10.1.1.1-1). In the Supplement to the Draft Solar PEIS (BLM and DOE 2011), no boundary revisions were identified for the proposed SEZ. However, areas specified for non-development were mapped, where data were available. For the proposed Antonito Southeast SEZ, 17 acres (0.07 km^2) of wetland and lake areas were identified as non-development areas (see Figure 10.1.1.1-2). The remaining developable area within the SEZ is 9,712 acres (39.3 km^2).

The analyses in the following sections update the affected environment and potential environmental, cultural, and socioeconomic impacts associated with utility-scale solar energy development in the proposed Antonito Southeast SEZ as described in the Draft Solar PEIS.

10.1.1.2 Development Assumptions for the Impact Analysis

Maximum development of the proposed Antonito Southeast SEZ was assumed to be 80% of the developable SEZ area over a period of 20 years, a maximum of 7,770 acres



1

2 **FIGURE 10.1.1.1-1 Proposed Antonito Southeast SEZ as Revised**

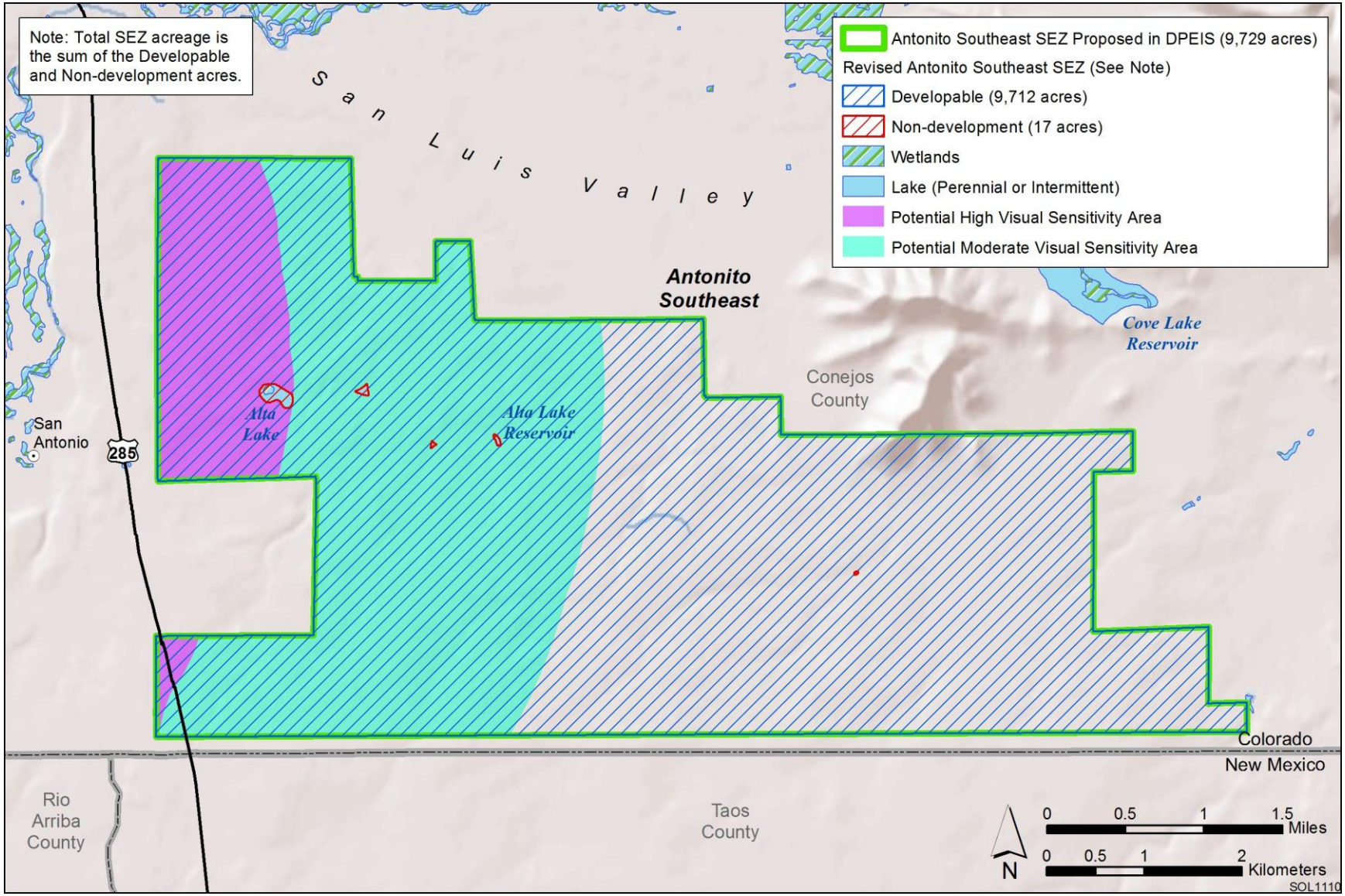


FIGURE 10.1.1.1-2 Developable and Non-development Areas for the Proposed Antonito Southeast SEZ as Revised

(31.4 km^2) (Table 10.1.1.2-1). Full development of the Antonito Southeast SEZ would allow development of facilities with an estimated total of between 863 MW (dish engine or photovoltaic [PV] technologies, 9 acres/MW [0.04 km^2/MW]) and 1,554 MW (solar trough technologies, 5 acres/MW [0.02 km^2/MW]) of electrical power capacity.

Availability of transmission from SEZs to load centers will be an important consideration for future development in SEZs. For the proposed Antonito Southeast SEZ, updated data indicate that the nearest existing transmission line is a 69-kV line located about 10 mi (16 km) west of the SEZ (the Draft Solar PEIS had indicated that the closest existing line was a 69-kV line 4 mi north of the SEZ). It is possible that a new transmission line could be constructed from the SEZ to the nearest existing line, but the 69-kV capacity of the line would be inadequate for the possible 1,554 MW of new capacity. Therefore, at full build-out capacity, new transmission lines and/or upgrades of existing transmission lines would be required to bring electricity from the proposed Antonito Southeast SEZ to load centers. An assessment of the most likely load center destinations for power generated at the Antonito Southeast SEZ and a general assessment of the impacts of constructing and operating new transmission facilities to those load centers is provided in Section 10.1.23. In addition, the generic impacts of transmission and associated infrastructure construction and of line upgrades for various resources are discussed in Chapter 5 of this Final Solar PEIS. Project-specific analyses would also be required to identify the specific impacts of new transmission construction and line upgrades for any projects proposed within the SEZ.

TABLE 10.1.1.2-1 Assumed Development Acreages, Solar MW Output, and Nearest Major Access Road and Transmission Line for the Proposed Antonito Southeast SEZ as Revised

Total Developable 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 Road ROW	Distance to Nearest BLM-Designated Transmission Corridor[e]
9,712 acres[a] and 7,770 acres	863 MW[b] 1,554 MW	Adjacent (U.S. 285)	10 mi[c,d] and 69 kV	0 acres	NA[f]

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

[d] In the Draft Solar PEIS, the nearest transmission line identified was a 69-kV line 4 mi from the SEZ; this information has been updated.

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

[f] NA = no BLM-designated corridor is near the proposed Antonito Southeast SEZ.

The transmission assessment for the Antonito Southwest SEZ has been updated, and the hypothetical transmission corridor assessed in the Draft Solar PEIS is no longer applicable. For this updated assessment, the 121 acres (0.5 km^2) of land disturbance for a hypothetical transmission corridor to the existing transmission line is no longer assumed (although the impacts of required new transmission overall are addressed in Section 10.1.23).

For the proposed Antonito Southeast SEZ, existing road access should be adequate to support construction and operation of solar facilities, because U.S. 285 runs along the western boundary of the SEZ. Thus, no additional road construction outside of the SEZ was assumed to be required to support solar development of the SEZ, as summarized in Table 10.1.1.2-1.

10.1.1.3 Programmatic and SEZ-Specific Design Features

The proposed programmatic design features for each resource area to be required under the BLM Solar Energy Program are presented in Section A.2.2 of Appendix A of this Final Solar PEIS. These programmatic design features are intended to avoid, minimize, and/or mitigate adverse impacts from solar energy development and will be required for development on all BLM-administered lands including SEZ and non-SEZ lands..

The discussions below addressing potential impacts from solar energy development on specific resource areas (Sections 10.1.2 through 10.1.22) also provide an assessment of the effectiveness of the programmatic design features in mitigating adverse impacts from solar development within the SEZ. SEZ-specific design features to address impacts specific to the proposed Antonito Southeast SEZ may be required in addition to the programmatic design features. The proposed SEZ-specific design features for the Antonito Southeast SEZ have been updated on the basis of revisions to the SEZ since the Draft Solar PEIS (such as boundary changes and the identification of non-development areas), and on the basis of comments received on the Draft and Supplement to the Draft Solar PEIS. All applicable SEZ-specific design features identified to date (including those from the Draft Solar PEIS that are still applicable) are presented in Sections 10.1.2 through 10.1.22.

10.1.2 Lands and Realty

10.1.2.1 Affected Environment

The proposed Antonito Southeast SEZ is a well blocked area of BLM-administered public lands that is rural and largely undeveloped. The SEZ is bordered to the north by private lands, and there are 1,280 acres (5.2 km^2) of state lands located to the east and west of the area. Land to the south of the SEZ in New Mexico is also public land. Section 10.1.2.1 of the Draft Solar PEIS contained a statement that there was one solar facility operating in the San Luis Valley near Mosca. There actually are several operating facilities in that area. The description in the Draft Solar PEIS of the condition of the SEZ and surrounding area in regard to lands and realty issues remains valid.

10.1.2.2 Impacts

Solar development in the proposed SEZ would establish a large industrial area that would exclude many existing and potential uses of the land, perhaps in perpetuity. Because the SEZ is undeveloped and rural, utility-scale solar development would introduce a new and discordant land use in the area.

The description of impacts in the Draft Solar PEIS identified a strip of public lands of about 1,240 acres (5.0 km^2) abutting the west end of the proposed SEZ that would be isolated by solar development from the rest of the public lands in the SEZ, and indicated that it would be difficult to manage. While the area may be managed differently from the lands in the SEZ, the presence of the highway and cultural resource values in the area make this unavoidable.

Access to public lands south and east of the proposed SEZ could be affected by development of solar facilities that could sever existing roads and trails.

10.1.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on lands and realty are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the programmatic design features will provide some mitigation for the identified impacts but will not completely mitigate adverse impacts. For example, impacts related to the exclusion of many existing and potential uses of the public land, the visual impact of an industrial-type solar facility within an otherwise rural area, and induced land use changes, if any, on nearby or adjacent state and private lands may not be fully mitigated.

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, the following proposed SEZ-specific design feature for the revised Antonito Southeast SEZ has been identified:

- Management of the 1,240-acre (5.0-km^2) area of public land west of the proposed SEZ boundary should be addressed as part of the site-specific analysis of any future development within the SEZ.

The need for additional SEZ-specific design features will be established for parcels within the proposed Antonito Southeast SEZ through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

10.1.3 Specially Designated Areas and Lands with Wilderness Characteristics

10.1.3.1 Affected Environment

There are nine specially designated areas within 25 mi (40 km) of the proposed Antonito Southeast SEZ. The Draft Solar PEIS accurately describes these areas with one addition. A

recently maintained inventory of wilderness characteristics determined that public lands within the proposed SEZ do not contain wilderness characteristics.

10.1.3.2 Impacts

As stated in the Draft Solar PEIS, solar energy development within the SEZ will result in the development of a very large industrial site in an area that otherwise is currently rural. Visual impacts on specially designated areas would be affected by the types of solar technologies deployed within the SEZ. Lower height facilities, facilities with less reflectivity, and facilities that do not use wet cooling would be expected to have less potential for adverse visual impact on surrounding areas (see Section 10.1.14 for a more detailed discussion). Elevated viewpoints, such as the slightly elevated portions of the Cumbres & Toltec Scenic Railroad (CTSR) or nearby viewpoints, such as the San Antonio WSA, the West Fork of the North Branch of the Old Spanish Trail, or the Los Caminos Antiguos Scenic Byway, would have significant views of development within the SEZ and would likely be adversely affected. Site-specific analysis, including consideration of the potential for visible glint and glare from solar panels and the visibility of structures, will need to be completed before impacts can be fully assessed and potential mitigation measures considered. Travelers coming south or east on the Los Antiguos Scenic Byway would be looking directly into the SEZ, and development within the SEZ would be very visible, having the potential to detract from the visitor experience. The route of a portion of the West Branch of the North Fork of the Old Spanish Trail passes within 0.25 mi (0.4 km) of the SEZ; thus solar development in the SEZ may have a major impact on the historic and visual integrity of the Trail, depending on the determination of the integrity and historical significance of the portion of the Trail from which solar development could be seen. Finally, development within the SEZ may be inconsistent with the purposes for which the Sangre de Cristo National Heritage Area (NHA) was designated.

10.1.3.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on specially designated areas are described in Section A.2.2 of Appendix A of this Final Solar PEIS (design features for specially designated areas, cultural resources, and visual resources would address impacts). Implementing the programmatic design features will provide some mitigation for the identified impacts but may not mitigate impacts on the CTSR and the San Antonio WSA. Programmatic design features will be applied to address SEZ-specific resources and conditions, for example:

- 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 on resources, qualities, values, and associated settings of the Trail; to prevent substantial interference; and to determine any areas unsuitable for development. Residual impacts will be avoided, minimized, and/or mitigated to the extent practicable according to program policy

standards. Programmatic design features have been included in BLM's Solar Energy Program to address impacts on National Historic Trails (see Section A.2.2.23 of Appendix A).

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, the following proposed SEZ-specific design features have been identified:

- The SEZ-specific design features for visual resources specified in Section 10.1.14.3 should be adopted, as they would provide some protection for visual related impacts on the CTSR and the San Antonio WSA.

- Early consultation should be initiated with the entity responsible for developing the management plan for the Sangre de Cristo NHA to understand how development of the SEZ could be consistent with NHA plans/goals.

The need for additional SEZ-specific design features will be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

10.1.4 Rangeland Resources

10.1.4.1 Livestock Grazing

10.1.4.1.1 Affected Environment

The proposed Antonito Southeast SEZ overlaps large portions of three seasonal grazing allotments. These allotments are used by five grazing permittees and provide 669 animal unit months (AUMs) of forage per year

10.1.4.1.2 Impacts

The general discussion in the Draft Solar PEIS regarding determining the impact on grazing operations remains valid. Should the proposed SEZ be fully developed for solar energy production, it is likely that the BLM grazing permits for all three allotments would be cancelled and the permittees would be displaced. While the specific situation of each of the grazing permittees is not known, it is clear that loss of all or part of their grazing permits would be a significant adverse impact on them. Economic losses would not be limited to the value of the lost grazing opportunity but would extend also to the value of the overall ranch operation including any private lands tied to the grazing operation. While permittees would be reimbursed for their portion of the value of range improvements on their permits, this reimbursement would not cover their economic loss.

10.1.4.1.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on livestock grazing are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the programmatic design features will provide some mitigation for identified impacts should only portions of grazing permits be affected, but they will not mitigate a complete loss of grazing permits, the loss of livestock AUMs, or the loss of value in ranching operations including private land values.

No SEZ-specific design features to protect livestock grazing have been identified in this Final Solar PEIS. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

10.1.4.2 Wild Horses and Burros

10.1.4.2.1 Affected Environment

The information presented in the Draft Solar PEIS remains valid. There are no wild horse or burro herd management areas (HMAs) within the proposed Antonito Southeast SEZ or in proximity to it; however, there have been occasional reports of feral horses seen in the SEZ.

10.1.4.2.2 Impacts

As presented in the Draft Solar PEIS, solar energy development within the proposed Antonito Southeast SEZ would not affect wild horses and burros.

10.1.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, no SEZ-specific design features to address wild horses and burros are required for the proposed Antonito Southeast SEZ.

10.1.5 Recreation

10.1.5.1 Affected Environment

The area of the proposed Antonito Southeast SEZ has not changed from that presented in the Draft Solar PEIS.

Comments have pointed out that most of the recreational discussion in the Draft Solar PEIS was focused internally within the SEZ and did not address the larger part that public and other federal lands play in the landscape and tourism economy of the San Luis Valley. A summary of the better known attractions within the valley includes Great Sand Dunes National Park and Preserve, the Old Spanish Trail, two scenic railroads, the Los Caminos Antiguos Scenic Byway, the Sangre de Cristo Mountains, three national wildlife refuges, and numerous designated wilderness areas. These areas are among the highlights of the recreational and tourism opportunities in the area. The Antonito Southeast SEZ is adjacent to U.S. 285, which is the major access route into the valley from the south, and also is very visible from CO 17, which accesses the valley from the west and is a part of the Los Caminos Antiguos Scenic Byway, which accesses the valley from the west. Tourism is an important part of the valley economy and an important focus for future economic growth.

While the public land within the proposed SEZ is flat and generally unremarkable, it is also large and conspicuous because it is undeveloped and is readily accessible to recreational users. It also adjoins a large block of public lands to the south in New Mexico. As described in the Draft Solar PEIS, the area supports a range of dispersed recreational activities, although it is believed that levels of recreational use are low. The Colorado Division of Wildlife (CDOW)[1] has commented the area is habitat for pronghorn antelope, an important species for hunting in the area. More detailed information on impacts on these species can be found in Section 10.1.11.3.2 of the Draft Solar PEIS.

10.1.5.2 Impacts

As stated in the Draft Solar PEIS, solar development of the SEZ will be readily visible to travelers on U.S. 285 and on the Los Caminos Antiguos Scenic Byway. Since the proposed SEZ is large, solar development of the area has the potential to influence the impressions of recreational and tourism visitors entering the San Luis Valley via routes near the SEZ. Whether there would be a potential impact on recreation and tourism in the valley because of the solar development along these access routes is unknown. There may be potential to provide interpretive activities focused on solar energy and development that would be of interest to travelers.

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 by solar development within the SEZ and might reduce the potential future recreational attraction of the Trail. However, the integrity and historical significance of the portion of the Trail near to the proposed SEZ remain undetermined.

Visual impacts on surrounding recreational use areas would be greater with taller solar facilities such as power towers and facilities with wet cooling. Visitors to areas located at higher elevations than the SEZ (e.g., San Luis Hills ACEC and WSA, and the CTSR) will see the solar

[1] Note that on July 1, 2011, Colorado State Parks and the Colorado Division of wildlife were merged to form Colorado State Parks and Wildlife.

development within the SEZ, but the impact on recreational use of these areas is unknown at this time. The types of solar technologies employed and whether there is significant glint or glare from reflective surfaces of solar facilities would play a large role in the extent of visibility of solar development. The focus and intent of the relatively new Sangre de Cristo NHA is not yet well defined, so it has not been possible to assess how solar development may interact with the objectives of the NHA.

The CDOW has commented there is a specific concern with the loss of pronghorn antelope habitat in Game Management Unit (GMU) 81, where the SEZ is located. There are limited antelope hunting permits issued in the GMU, and the reduction in habitat that would occur due to solar development within the SEZ could result in a reduction in antelope hunting opportunities. However, the overall impact on pronghorn was estimated to be small in this assessment (see Section 10.1.11.4.2 of the Draft Solar PEIS), because only a small portion of the available habitat in the valley occurs within the proposed SEZ.

In addition, lands that are outside of the proposed SEZ may be acquired or managed for mitigation of impacts on other resources (e.g., sensitive species). Managing these lands for mitigation could further exclude or restrict recreational use, potentially leading to additional losses in recreational opportunities in the region. The impact of acquisition and management of mitigation lands would be considered as a part of the environmental analysis of specific solar energy projects.

10.1.5.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on recreational resources are described in Section A.2.2 of Appendix A of this Final Solar PEIS (design features for both specially designated areas and visual resources also would address some impacts). Implementing the programmatic design features will provide some mitigation for the identified impacts but will not mitigate the loss of recreational access to public lands developed for solar energy production. Likewise, a loss of wildlife-related hunting recreation will not be mitigated.

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, the following proposed SEZ-specific design feature for the proposed Antonito Southeast SEZ has been identified:

- Tourism is an important economic growth area for the San Luis Valley, and the Antonito Southeast SEZ is located in a visible location adjacent to principal highway routes into the valley. Because of its location, there is potential to influence visitors' perception of the tourism climate in the valley. As projects are proposed for the SEZ, the potential impacts on tourism should be considered and reviewed with local community leaders.

The need for additional SEZ-specific design features will be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

10.1.6 Military and Civilian Aviation

10.1.6.1 Affected Environment

As stated in the Draft Solar PEIS, the proposed Antonito Southeast SEZ is located under two military training routes (MTRs) and is identified by the BLM as an area of required consultation with the U.S. Department of Defense (DoD).

10.1.6.2 Impacts

Through comments on the Draft Solar PEIS, the military has indicated that it has no concerns about potential impacts on its activities associated with solar development. There also are no anticipated impacts on civilian aviation.

10.1.6.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on military and civilian aviation are described in Section A.2.2 of Appendix A of this Final Solar PEIS. The programmatic design features require early coordination with the DoD to identify and avoid, minimize, and/or mitigate, if possible, any potential impacts on the use of military airspace.

No SEZ-specific design features for military and civilian aviation have been identified in this Final Solar PEIS. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

10.1.7 Geologic Setting and Soil Resources

10.1.7.1 Affected Environment

10.1.7.1.1 Geologic Setting

Data provided in the Draft Solar PEIS remain valid. The boundaries of the proposed Antonito Southeast SEZ remain the same, but about 17 acres (0.069 km^2) of wetland and lake areas are now designated as non-development areas.

10.1.7.1.2 Soil Resources

Data provided in the Draft Solar PEIS remain valid, with the following update:

- Table 10.1.7.1-1 provides revised areas for soil map units taking into account the non-development area within the Antonito Southeast SEZ.

10.1.7.2 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. Because the developable area of the SEZ has changed by less than 1%, the assessment of impacts provided in the Draft Solar PEIS remains valid, with the following update:

- Impacts related to wind erodibility are somewhat reduced because the identification of non-development areas eliminates about 5 acres (0.020 km^2) of moderately erodible soils from development (the playa areas are not rated for wind erodibility).

10.1.7.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on soils are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the programmatic design features will reduce the potential for soil impacts during all project phases.

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, no SEZ-specific design features for soil resources were identified at the proposed Antonito Southeast SEZ. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

10.1.8 Minerals (Fluids, Solids, and Geothermal Resources)

A mineral potential assessment for the proposed Antonito Southeast SEZ has been prepared and reviewed by BLM mineral specialists knowledgeable about the region where the SEZ is located (BLM 2012). The BLM is proposing to withdraw the SEZ from settlement, sale, location, or entry under the general land laws, including the mining laws, for a period of 20 years (see Section 2.2.2.2.4 of the Final Solar PEIS). The potential impacts of this withdrawal are discussed in Section 10.1.24.

10.1.8.1 Affected Environment

There are no oil and gas leases, mining claims, or geothermal leases located in the proposed SEZ. The description of the mineral resources in the Draft Solar PEIS remains valid.

TABLE 10.1.7.1-1 Summary of Soil Map Units within the Proposed Antonito Southeast SEZ as Revised

Map Unit Symbol[a]	Map Unit Name	Erosion Potential		Description	Area in Acres[d] (Percentage of SEZ)
		Water[b]	Wind[c]		
53	Travelers very stony loam (1 to 3% slope)	Slight	Low (WEG 8)[e]	Nearly level soils on mesas and hillslopes capped by basalts, andesite, and/or rhyolite. Parent material consists of thin calcareous sediments weathered from basalt. Shallow and well to somewhat excessively drained, with medium surface-runoff potential and moderate to moderately rapid permeability. Available water capacity is very low. Used mainly as rangeland. Susceptible to compaction.	5,445 (56.0)[f]
17	Garita cobbly loam (0 to 3% slope)	Slight	Moderate (WEG 4)	Nearly level soils on alluvial fans and fan terraces. Parent material consists of thick calcareous sediments from basalt. Deep and well drained, with very low surface-runoff potential and moderate permeability. Available water capacity is low. Used mainly as native pastureland. Susceptible to compaction.	2,707 (27.8)[g]
18	Garita cobbly loam (3 to 25% slope)	Slight	Moderate (WEG 4)	Nearly level to gently sloping soils on alluvial fans and fan terraces. Parent material consists of thick calcareous and gravelly alluvium from basalt. Deep and well drained, with low surface-runoff potential and moderate permeability. Available water capacity is low. Used mainly as native pastureland. Susceptible to compaction.	1,060 (10.9)[h]
38	Monte loam (1 to 3% slope)	Slight	Moderate (WEG 4)	Nearly level soils on alluvial fans and floodplains. Parent material consists of alluvium from rhyolite and latite. Deep and well drained, with low surface-runoff potential and moderate permeability. Available water capacity is high. Used mainly for native rangeland and irrigated cropland; prime farmland if irrigated.[i] Susceptible to compaction; severe rutting hazard.	209 (2.2)

TABLE 10.1.7.1-1 (Cont.)

Map Unit Symbol[a]	Map Unit Name	Erosion Potential		Description	Area in Acres[d] (Percentage of SEZ)
		Water[b]	Wind[c]		
54	Travelers very stony loam (3 to 25% slope)	Slight	Low (WEG 8)	Nearly level to gently sloping soils on mesas and hillslopes capped by basalts, andesite, and/or rhyolite. Parent material consists of thin calcareous material weathered from basalt. Shallow and well to somewhat excessively drained, with high surface-runoff potential (very low infiltration) and moderate to moderately rapid permeability. Available water capacity is very low. Used mainly as rangeland. Susceptible to compaction.	209 (2.1)[j]
28	Luhon loam (1 to 3% slope)	Slight	Moderate (WEG 4)	Nearly level soils on alluvial fans and valley side slopes. Parent material consists of mixed calcareous alluvium. Deep and well drained, with low surface-runoff potential and moderate permeability. Available water capacity is high. Used mainly as native pastureland; prime farmland if irrigated. Susceptible to compaction; severe rutting hazard.	79 (<1)
60	Playas	Not rated	Not rated	Very poorly drained soils formed in playas; moderately to strongly saline. Compaction resistance not rated; severe rutting hazard.	20 (<1)[k]

[a] Map unit symbols are shown in Figure 10.1.7.1-7 of the Draft Solar PEIS.

[b] Water erosion potential rates the hazard of soil loss from off-road and off-trail areas after disturbance activities that expose the soil surface. The ratings are based on slope and soil erosion factor K and represent soil loss caused by sheet or rill erosion where 50 to 75% of the surface has been exposed by ground disturbance. A rating of "slight" indicates that erosion is unlikely under ordinary climatic conditions.

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

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

Footnotes continued on next page.

TABLE 10.1.7.1-1 (Cont.)

[e] 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 (4,000 m^2) per year, for each of the wind erodibility groups: WEG 1, 220 tons (200 metric tons) per acre (4,000 m^2) per year (average); WEG 2, 134 tons (122 metric tons) per acre (4,000 m^2) per year; WEGs 3 and 4 (and 4L), 86 tons (78 metric tons) per acre (4,000 m^2) per year; WEG 5, 56 tons (51 metric tons) per acre (4,000 m^2) per year; WEG 6, 48 tons (44 metric tons) per acre (4,000 m^2) per year; WEG 7, 38 tons (34 metric tons) per acre (4,000 m^2) per year; and WEG 8, 0 tons per acre per year.

[f] A total of 5 acres (0.020 km^2) of the Travelers very stony loam (1 to 3% slopes) is currently categorized as a non-development area.

[g] Less than 1 acre (0.0040 km^2) of the Garita cobbly loam (0 to 3% slopes) is currently categorized as a non-development area.

[h] Less than 1 acre (0.0040 km^2) of the Garita cobbly loam (3 to 25% slopes) is currently categorized as a non-development area.

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

[j] A total of 5 acres (0.020 km^2) of the Travelers very stony loam (3 to 35% slopes) is currently categorized as a non-development area.

[k] A total of 6 acres (0.024 km^2) of the playa areas is currently categorized as a non-development area.

Source: NRCS (2009).

10.1.8.2 Impacts

There are no anticipated impacts on mineral resources from the development of solar energy facilities in the proposed SEZ. The analysis of impacts on mineral resources in the Draft Solar PEIS remains valid.

10.1.8.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that will reduce impacts on mineral resources are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the programmatic design features will provide adequate protection of mineral resources.

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, no SEZ-specific design features for minerals have been identified in this Final Solar PEIS. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

10.1.9 Water Resources

10.1.9.1 Affected Environment

The description of the affected environment given in the Draft Solar PEIS relevant to water resources at the proposed Antonito Southeast SEZ remains valid and is summarized in the following paragraphs.

The Antonito Southeast SEZ is within the Rio Grande Headwaters subbasin of the Rio Grande hydrologic region. The SEZ is located in the San Luis Valley bounded by the San Juan Mountains to the west and the Sangre de Cristo Mountains to the east. Precipitation and snowfall in the valley is around 7 in./yr (18 cm/yr) and 25 in./yr (64 cm), respectively, with much greater amounts in the surrounding mountains. Pan evaporation rates are estimated to be on the order of 54 in./yr (137 cm/yr). Surface water features within the SEZ include Alta Lake and several intermittent/ephemeral washes. Alta Lake covers an area of approximately 2 acres (0.0040 km^2), and the existing intermittent/ephemeral washes are generally shallow and flow from southwest to northeast. Three palustrine wetlands have been identified within the SEZ, which are temporally flooded throughout the year. Alta Lake and these wetland areas have been identified as non-development areas covering 17 acres (0.07 km^2) in total. Flood hazards have not been identified, but intermittent flooding may occur along the intermittent/ephemeral washes and Alta Lake. Groundwater in the San Luis Valley is primarily in basin-fill deposits with an upper unconfined aquifer and a lower confined aquifer, which are separated by a series of confining clay layers and unfractured volcanic rocks. There are no confining clay layers in the vicinity of the Antonito Southeast SEZ; however, a basalt layer that is near the surface acts as a confining unit over the basin-fill aquifer. Groundwater monitoring wells within the SEZ have reported depths to groundwater ranging from 200 to 300 ft (61 to 91 m) below the surface that

indicate a groundwater flow from west to east toward the Rio Grande. Water quality in the aquifers of the San Luis Valley varies, with good water quality along the edges of the valley and poor water quality in the vicinity of the depression around San Luis Lake.

The Antonito Southeast SEZ is located in the Colorado Division 3 management zone (Rio Grande Basin) of the Colorado Division of Water Resources (Colorado DWR), where both surface water and groundwater rights are overappropriated. The Rio Grande Compact of 1938 obligates Colorado to meet water delivery schedules to New Mexico and governs much of the water management decision making in the San Luis Valley. In order to balance water uses within the San Luis Valley and to meet treaty obligations, several water management mechanisms have been developed that affect existing water rights and water right transfers. The two primary water management considerations affecting solar energy development are the need for an augmentation water plan, and the rules set by the recently formed Special Improvement District Number 1 (Subdistrict #1). Augmentation water plans were described in the Draft Solar PEIS (Section 10.1.9.1.3) and essentially require junior water right holders to have additional water reserves to ensure that more senior water rights are not hindered. The water management plan for Subdistrict #1 was ruled on in June 2010, putting restrictions on groundwater withdrawals in an effort to restore groundwater levels in the unconfined aquifer. None of the Colorado SEZs are located within the boundaries of Subdistrict #1, which primarily includes central portions of the San Luis Valley that are currently used for agriculture. However, given that water rights are overappropriated in the San Luis Valley and largely clustered within Subdistrict #1, it is likely that any new water diversions and water right transfers would involve these new groundwater management considerations.

In addition to the water resources information provided in the Draft Solar PEIS, this section provides a planning-level inventory of available climate, surface water, and groundwater monitoring stations within the immediate vicinity of the proposed Antonito Southeast SEZ and surrounding basin. Additional data regarding climate, surface water, and groundwater conditions are presented in Tables 10.1.9.1-1 through 10.1.9.1-7 and in Figures 10.1.9.1-1 and 10.1.9.1-2. Fieldwork and hydrologic analyses needed to determine 100-year floodplains and jurisdictional water bodies would need to be coordinated with appropriate federal, state, and local agencies. Areas within the Antonito Southeast SEZ that are found to be within a 100-year floodplain will be identified as non-development areas. Any water features within the Antonito Southeast SEZ determined to be jurisdictional will be subject to the permitting process described in the Clean Water Act (CWA).

10.1.9.2 Impacts

10.1.9.2.1 Land Disturbance Impacts on Water Resources

The discussion of land disturbance effects on water resources in the Draft Solar PEIS remains valid. As stated in the Draft Solar PEIS, land disturbance impacts in the vicinity of the proposed Antonito Southeast SEZ could potentially affect drainage patterns, Alta Lake, several small wetlands, and groundwater recharge. The alteration of natural drainage pathways during

TABLE 10.1.9.1-1 Watershed and Water Management Basin Information Relevant to the Proposed Antonito Southeast SEZ as Revised

Basin	Name	Area (acres)[b]
Subregion (HUC4)[a]	Rio Grande Headwaters (1301)	4,871,782
Cataloging unit (HUC8)	Alamosa–Trinchera (13010002)	1,625,212
Cataloging unit (HUC8)	Conejos (13010005)	490,998
Groundwater basin	San Luis Valley	2,000,000
SEZ	Antonito Southeast	9,729

[a] HUC = Hydrologic Unit Code; a USGS system for characterizing nested watersheds that includes large-scale subregions (HUC4) and small-scale cataloging units (HUC8).

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

TABLE 10.1.9.1-2 Climate Station Information Relevant to the Proposed Antonito Southeast SEZ as Revised

Climate Station (COOP ID[a])	Elevation[b] (ft)[c]	Distance to SEZ (mi)[d]	Period of Record	Mean Annual Precipitation (in.)[e]	Mean Annual Snowfall (in.)
Chama, New Mexico (291664)	7,850	36	1893–2011	21.33	107.00
Conejos 3 NNW, Colorado (051816)	7,907	9	1904–1960	7.93	21.40
Manassa, Colorado (055322)	7,690	11	1893–2011	7.27	24.80
Skarda, New Mexico (298352)	8,507	15	1942–1983	13.21	58.40

[a] National Weather Service's Cooperative Station Network station identification code.

[b] Surface elevations for the proposed Antonito Southeast SEZ range from 7,715 to 8,035 ft.

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

[d] To convert mi to km, multiply by 1.6093.

[e] To convert in. to cm, multiply by 2.540.

Source: NOAA (2012).

construction can lead to impacts related to flooding, loss of water delivery to downstream regions, and sedimentation in Alta Lake and wetland areas, along with alterations to riparian vegetation and habitats. Within the SEZ, 17 acres (0.069 km^2) have been identified as non-development areas, including Alta Lake and several small wetlands.

Land clearing, land leveling, and vegetation removal during the development of the SEZ have the potential to disrupt intermittent/ephemeral stream channels. Several programmatic

TABLE 10.1.9.1-3 Total Lengths of Selected Streams at the Subregion, Cataloging Unit, and SEZ Scale Relevant to the Proposed Antonito Southeast SEZ as Revised

Water Feature	Subregion, HUC4 (ft)[a]	Cataloging Unit, HUC8		SEZ (ft)
		Alamosa–Trinchera (ft)	Conejos (ft)	
Unclassified streams	19,502	6,556	858	0
Perennial streams	14,694,407	3,488,426	1,740,886	0
Intermittent/ephemeral streams	94,288,163	30,056,019	9,101,096	102,884
Canals	12,151,458	5,521,867	963,558	26,940

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

Source: USGS (2012a).

TABLE 10.1.9.1-4 Stream Discharge Information Relevant to the Proposed Antonito Southeast SEZ as Revised

Parameter	Station (USGS ID)			
	Conejos River near Mogote, Colorado (08246500)	San Antonio River at Ortiz, Colorado (08247500)	Rio Grande near Lobatos, Colorado (08251500)	Rio Grande at Colorado–New Mexico State Line (08252000)
Period of record	1903–2010	1920–2010	1900–2010	1954–1982
No. of observations	102	87	111	29
Discharge, median (ft^3/s)[a]	2,260	469	2,500	1,440
Discharge, range (ft^3/s)	441–9,000	40–1,750	280–13,200	357–5,000
Discharge, most recent observation (ft^3/s)	2,330	964	1,640	1,920
Distance to SEZ (mi)[b]	13	5	11	12

[a] To convert ft^3 to m^3, multiply by 0.0283.

[b] To convert mi to km, multiply by 1.6093.

Source: USGS (2012b).

design features described in Section A.2.2 of Appendix A of this Final Solar PEIS would avoid, minimize, and/or mitigate impacts associated with the disruption of intermittent/ephemeral water features. Additional analyses of intermittent/ephemeral streams are presented in this update, including an evaluation of functional aspects of stream channels with respect to groundwater recharge, flood conveyance, sediment transport, geomorphology, and ecological habitats. Only a summary of the results from these surface water analyses is presented in this section; more information on methods and results is presented in Appendix O.

TABLE 10.1.9.1-5 Surface Water Quality Data Relevant to the Proposed Antonito Southeast SEZ as Revised

Parameter	Station (USGS ID)[a]				
	08246500	08247500	08251500	08252000	08249200
Period of record	1967–1987	1978–1986	1919–2011	1978–1982	1957–1969
No. of records	208	158	742	86	537
Temperature (°C)[b]	6 (0–19.5)	3 (0–25)	12 (0–210)	10.25 (0–23)	10 (0–25)
Total dissolved solids (mg/L)	70 (37–77)	NA[c]	177.5 (73–690)	NA	229 (94)
Dissolved oxygen (mg/L)	8.4	NA	8.9 (4.7–87)	NA	661
pH	7.1 (6.8–8.3)	NA	8.2 (6.4–9)	NA	7.6 (6.6–8.9)
Total nitrogen (mg/L)	<0.14	NA	0.37 (0.11–1.2)	NA	NA
Phosphorus (mg/L as P)	0.015	NA	0.37 (0.11–1.2)	NA	NA
Organic carbon (mg/L)	1.8	NA	0.06 (0.006–0.41)	NA	NA
Calcium (mg/L)	13 (6–16)	NA	26 (10–98)	NA	38 (13–88)
Magnesium (mg/L)	1.7 (1–2.7)	NA	5.1 (1.3–24)	NA	7.3 (1–20)
Sodium (mg/L)	2.7 (1–3.2)	NA	19 (6.2–100)	NA	32 (8.2–183)
Chloride (mg/L)	1.1 (0.5–2.5)	NA	5.95 (1.2–33)	NA	7.6 (1.5–33)
Sulfate (mg/L)	4.2 (2.41–5)	NA	39.5 (7.92–320)	NA	53 (15–296)
Arsenic (µg/L)	1	NA	2.95 (1–6)	NA	NA

[a] Median values are listed; the range in values is shown in parentheses.

[b] To convert °C to °F, multiply by 1.8, then add 32.

[c] NA = no data collected for this parameter.

Source: USGS (2012b).

TABLE 10.1.9.1-6 Water Quality Data from Groundwater Samples Relevant to the Proposed Antonito Southeast SEZ as Revised

Parameter	Station (USGS ID)[a]	
	370140105593701	370142105561101
Period of record	2011	1982
No. of records	1	1
Temperature (°C)[b]	1	14.5
Total dissolved solids (mg/L)	NA[c]	136
Dissolved oxygen (mg/L)	1	NA
pH	1	7.9
Nitrate + nitrite (mg/L as N)	NA	0.62
Phosphate (mg/L)	NA	NA
Organic carbon (mg/L)	NA	NA
Calcium (mg/L)	NA	22
Magnesium (mg/L)	NA	3.8
Sodium (mg/L)	NA	7.1
Chloride (mg/L)	NA	2
Sulfate (mg/L)	NA	6
Arsenic (µg/L)	NA	NA

[a] Median values are listed.

[b] To convert °C to °F, multiply by 1.8, then add 32.

[c] NA = no data collected for this parameter.

Source: USGS (2012b).

TABLE 10.1.9.1-7 Groundwater Surface Elevations Relevant to the Proposed Antonito Southeast SEZ as Revised

Parameter	Station (USGS ID)			
	370140105593701	370056105564301	370142105561101	370326105575501
Period of record	1982	1982	1981–1982	2001–2011
No. of observations	1	1	2	120
Surface elevation (ft)[a]	7,928	7,865	7,782	7,815
Well depth (ft)	333	337	230	65
Depth to water, median (ft)	262.08	293.74	216.18	56.61
Depth to water, range (ft)	–[b]	–	216.06–216.3	47.21–61.93
Depth to water, most recent observation (ft)	262.08	293.74	216.3	55.84
Distance to SEZ (mi)[c]	3	0	1	3

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

[b] A dash indicates only one data point at this site.

[c] To convert mi to km, multiply by 1.6093.

Source: USGS (2012b).

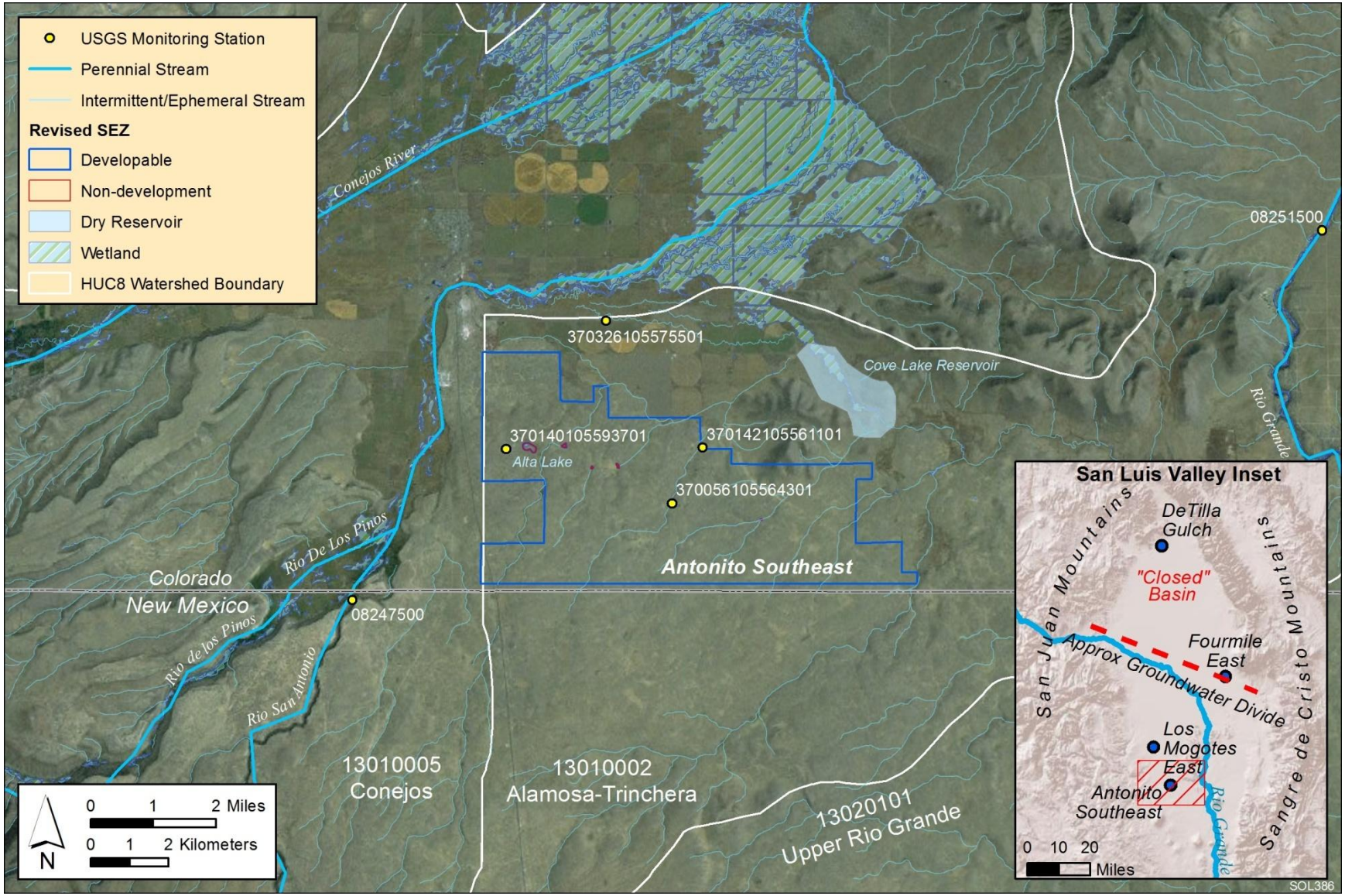


FIGURE 10.1.9.1-1 Water Features near the Proposed Antonito Southeast SEZ as Revised

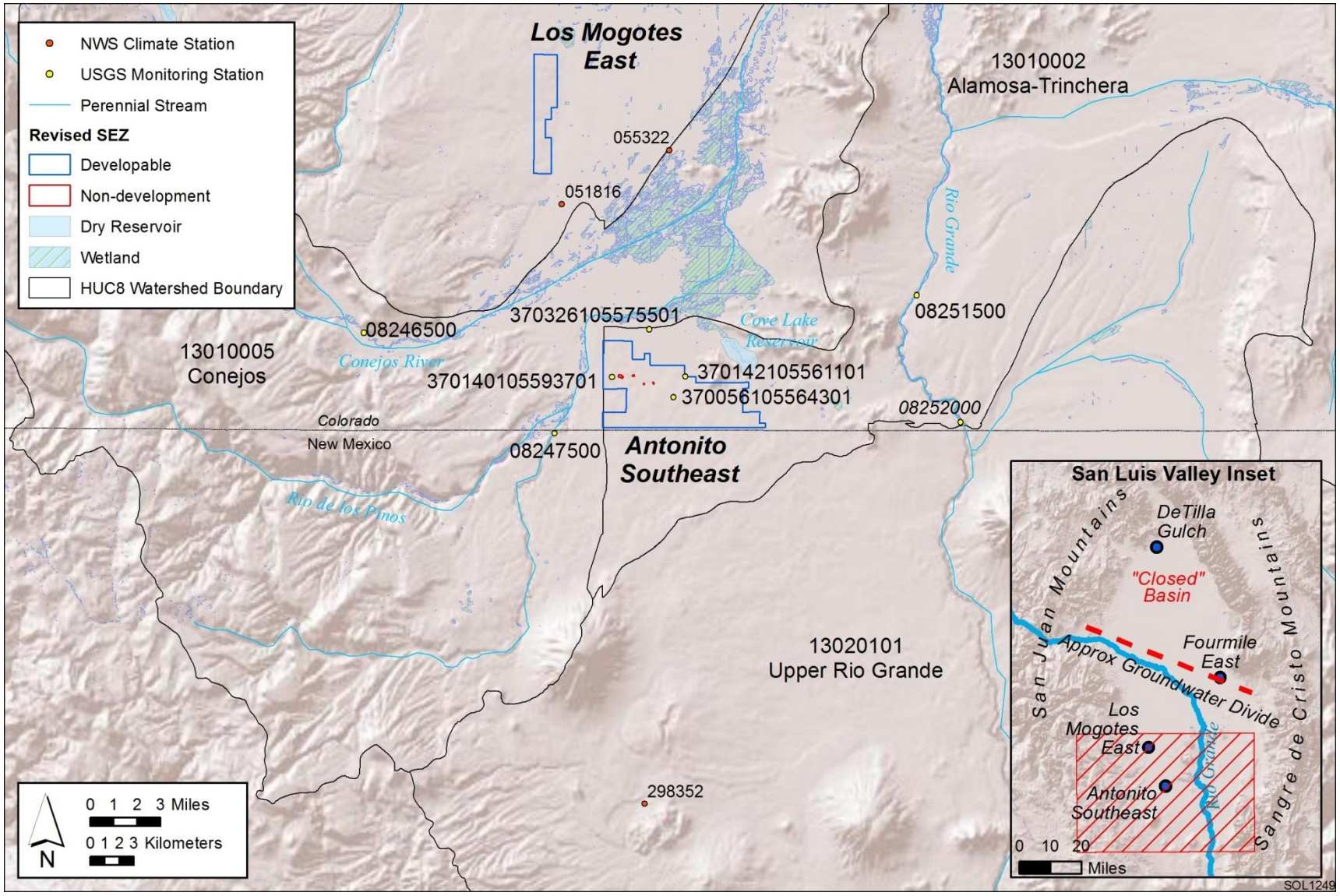


FIGURE 10.1.9.1-2 Water Features within the Alamosa–Trinchera and Conejos Watersheds, Which Include the Proposed Antonito Southeast SEZ as Revised

The study region considered for the intermittent/ephemeral stream evaluation relevant to the Antonito Southeast SEZ is a subset of the Alamosa–Trinchera and Conejos watersheds (HUC8), for which information regarding stream channels is presented in Tables 10.1.9.1-3 and 10.1.9.1-4 of this Final Solar PEIS. The results of the intermittent/ephemeral stream evaluation are shown in Figure 10.1.9.2-1, which depicts flow lines from the National Hydrography Dataset (USGS 2012a) labeled as low, moderate, and high sensitivity to land disturbance. Within the study area, 63% of the intermittent/ephemeral stream channels had low sensitivity and 37% had moderate sensitivity to land disturbance. All the intermittent/ephemeral channel reaches within the Antonito SEZ were classified as having low sensitivity to land disturbance.

10.1.9.2.2 Water Use Requirements for Solar Energy Technologies

The water use requirements for full build-out scenarios of the Antonito Southeast SEZ have not changed from the values presented in the Draft Solar PEIS (see Tables 10.1.9.2-1 and 10.1.9.2-2 in the Draft Solar PEIS). This section presents additional analyses of groundwater, which includes a basin-scale water budget and a simplified, one-dimensional groundwater model to assess groundwater drawdown for various development scenarios. Only a summary of the results from these groundwater analyses is presented in this section; more information on methods and results is presented in Appendix O.

The Antonito Southeast SEZ is located in the San Luis Valley, where both surface waters and groundwater are managed conjunctively. Previous studies on water resources in the San Luis Valley typically present a basin-scale water balance, which considers inputs and outputs of water via precipitation, surface water flows, and groundwater (e.g., Mayo et al. 2007). Table 10.1.9.2-1 presents an example water balance for the San Luis Valley that considers all water inputs and outputs from the valley. As noted by Mayo et al. (2007), it is difficult to reconcile some of the historical water budget presented for the San Luis Valley; however, it can be generally stated that the water budget is predominately a balance of precipitation and stream flow inputs with output dominated by evapotranspiration by agricultural lands, riparian areas, and meadows.

The estimated total water use requirements during the peak construction year are as high as 964 ac-ft/yr (1.2 million m^3/yr), which does not constitute a significant amount given the short duration of this water demand relative to water resources within the region. The long duration of groundwater pumping during operations (20 years) poses a greater threat to groundwater resources. This analysis considered low, medium, and high groundwater pumping scenarios that represent full build-out of the SEZ assuming PV, dry-cooled parabolic trough, and wet-cooled parabolic trough, respectively (a 30% operational time was considered for all solar facility types on the basis of operations estimates for proposed utility-scale solar energy facilities). The low, medium, and high pumping scenarios result in groundwater withdrawals that range from 44 to 7,805 ac-ft/yr (54,300 to 9.6 million m^3/yr), or 880 to 155,820 ac-ft (1.1 million to 192 million m^3) over the 20-year operational period. From a groundwater budgeting perspective,

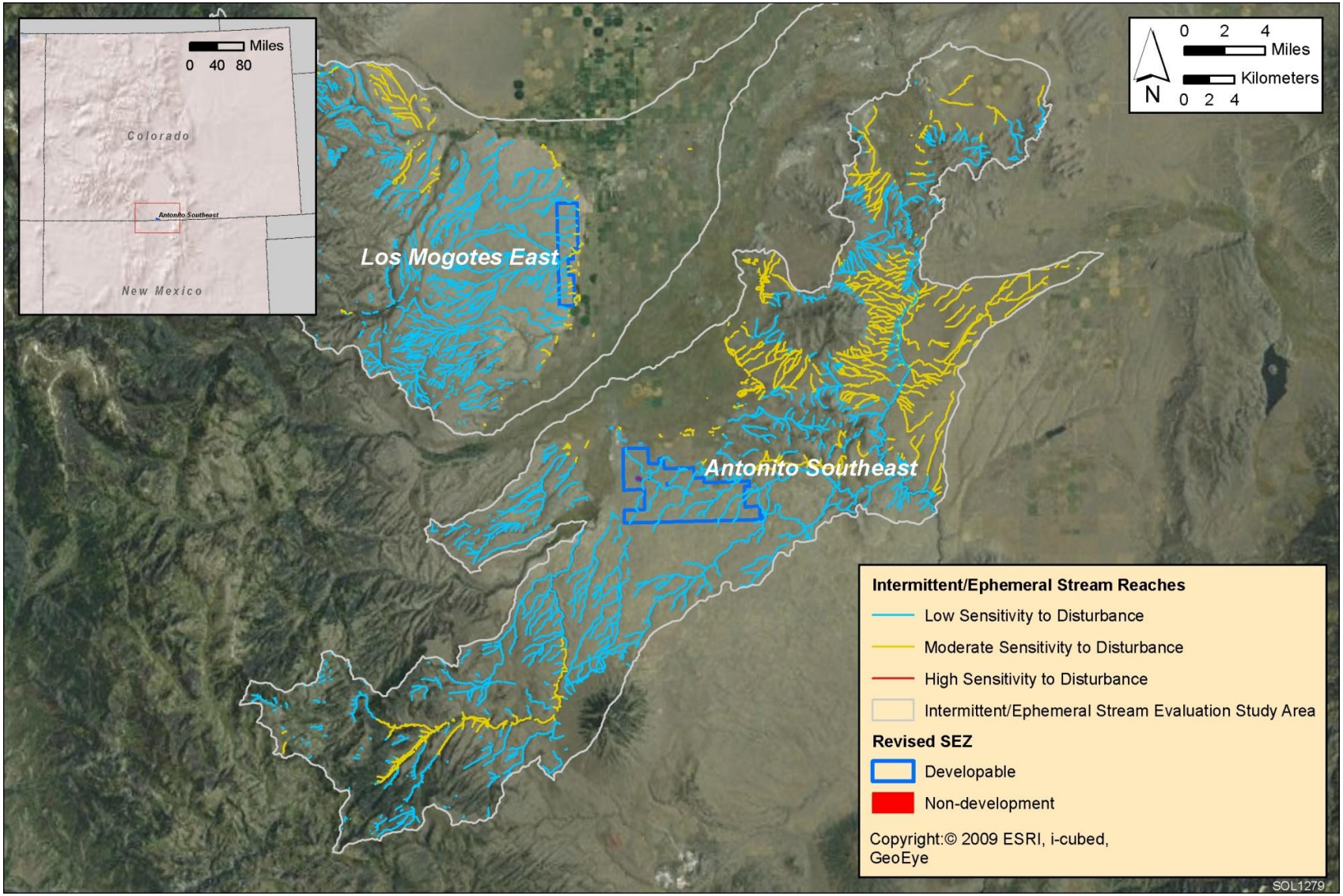


FIGURE 10.1.9.2-1 Intermittent/Ephemeral Stream Channel Sensitivity to Surface Disturbances in the Vicinity of the Proposed Antonito Southeast SEZ as Revised

TABLE 10.1.9.2-1 Water Budget for the San Luis Valley, Which Includes the Proposed Antonito Southeast SEZ as Revised

Process	Amount
Inputs	
Precipitation (ac-ft/yr)[a]	1,086,356
Streams draining Sangre de Cristo Mts. (ac-ft/yr)	214,839
Streams draining San Juan Mts. (ac-ft/yr)	1,321,463
Groundwater underflow (ac-ft/yr)	721,535
Outputs	
Evapotranspiration (ac-ft/yr)	2,245,676
Rio Grande discharge (ac-ft/yr)	332,392
Groundwater underflow (ac-ft/yr)	72,964
Groundwater pumping (ac-ft/yr)[b]	641,214
Groundwater storage	
Storage (ac-ft)	2,026,783

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

[b] Colorado DWR (2004).

Source: Mayo et al. (2007).

the high pumping scenario over the 20-year analysis period represents 8% of the groundwater storage, and its annual pumping rate is on the order of 1.2% of the current annual groundwater withdrawals in the basin. The amounts of estimated groundwater withdrawals for the low and medium pumping scenarios do not represent significant quantities in comparison to the water budget of the San Luis Valley.

Examining groundwater withdrawals with respect to a basin-scale water budget allows for an assessment of potential impacts only to an order of magnitude approximation of basin-scale estimates of complex groundwater processes. In addition, a water budget approach ignores the temporal and spatial components of how groundwater withdrawals affect groundwater surface elevations, groundwater flow rates, and connectivity to surface water features such as streams, wetlands, playas, and riparian vegetation. A one-dimensional groundwater modeling analysis was performed to present a simplified depiction of the spatial and temporal effects of groundwater withdrawals by examining groundwater drawdown in a radial direction around the center of the SEZ for the low, medium, and high pumping scenarios considering pumping from the upper unconfined aquifer and lower confined aquifer separately. A detailed discussion of the groundwater modeling analysis is presented in Appendix O. It should be noted, however, that the aquifer parameters used for the one-dimensional groundwater model (Table 10.1.9.2-2) represent available literature data, and that the model aggregates these value ranges into a simplistic representation of the aquifers.

TABLE 10.1.9.2-2 Aquifer Characteristics and Assumptions Used in the One-Dimensional Groundwater Model for the Proposed Antonito Southeast SEZ as Revised

Parameter	Value[a]
Upper, unconfined aquifer	
Aquifer type/conditions	Unconfined/basin fill
Aquifer thickness (ft)[b,c]	100
Hydraulic conductivity (ft/day)	200
Transmissivity (ft^2/day)	20,000
Specific yield	0.24
Lower, confined aquifer	
Aquifer type/conditions	Confined/basin fill
Aquifer thickness (ft)	500
Hydraulic conductivity (ft/day)	50
Transmissivity (ft^2/day)	25,000
Storage coefficient	0.0000025
Upper and lower aquifers	
Analysis period (yr)	20
High pumping scenario (ac-ft/yr)[d]	7,791
Medium pumping scenario (ac-ft/yr)	1,111
Low pumping scenario (ac-ft/yr)	44

[a] Values used for model in parentheses.

[b] Mayo et al. (2007).

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

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

Source: Colorado DWR (2004).

Depth to groundwater in the unconfined aquifer is typically on the order of 50 ft (15 m) in the vicinity of the Antonito Southeast SEZ, and the confined aquifer is on the order of 200 to 300 ft (61 to 91 m) below the surface. The one-dimensional groundwater modeling results for the upper unconfined aquifer suggest that groundwater drawdown in the vicinity of the SEZ (approximately a 2-mi [3.2-km] radius) ranges up to 60 ft (18 m) for the high pumping scenario, up to 10 ft (3 m) for the medium pumping scenario, and less than 1 ft (0.3 m) for the low pumping scenario (Figure 10.1.9.2-2). The extent of groundwater drawdown is primarily restricted to the vicinity of the SEZ for all pumping scenarios, except the high pumping scenario, which has 5 ft (1.5 m) of drawdown occurring 5 mi (8 km) away from the SEZ. The modeling results for the lower confined aquifer suggest significant groundwater drawdown occurs for the high pumping scenario, ranging from 30 to 80 ft (9 to 24 m) and extending more than 50 mi (80 km) from the SEZ (Figure 10.1.9.2-2). The low and medium pumping scenarios have a much lower impact on groundwater drawdown, from 0 to 10 ft (0 to 3 m).

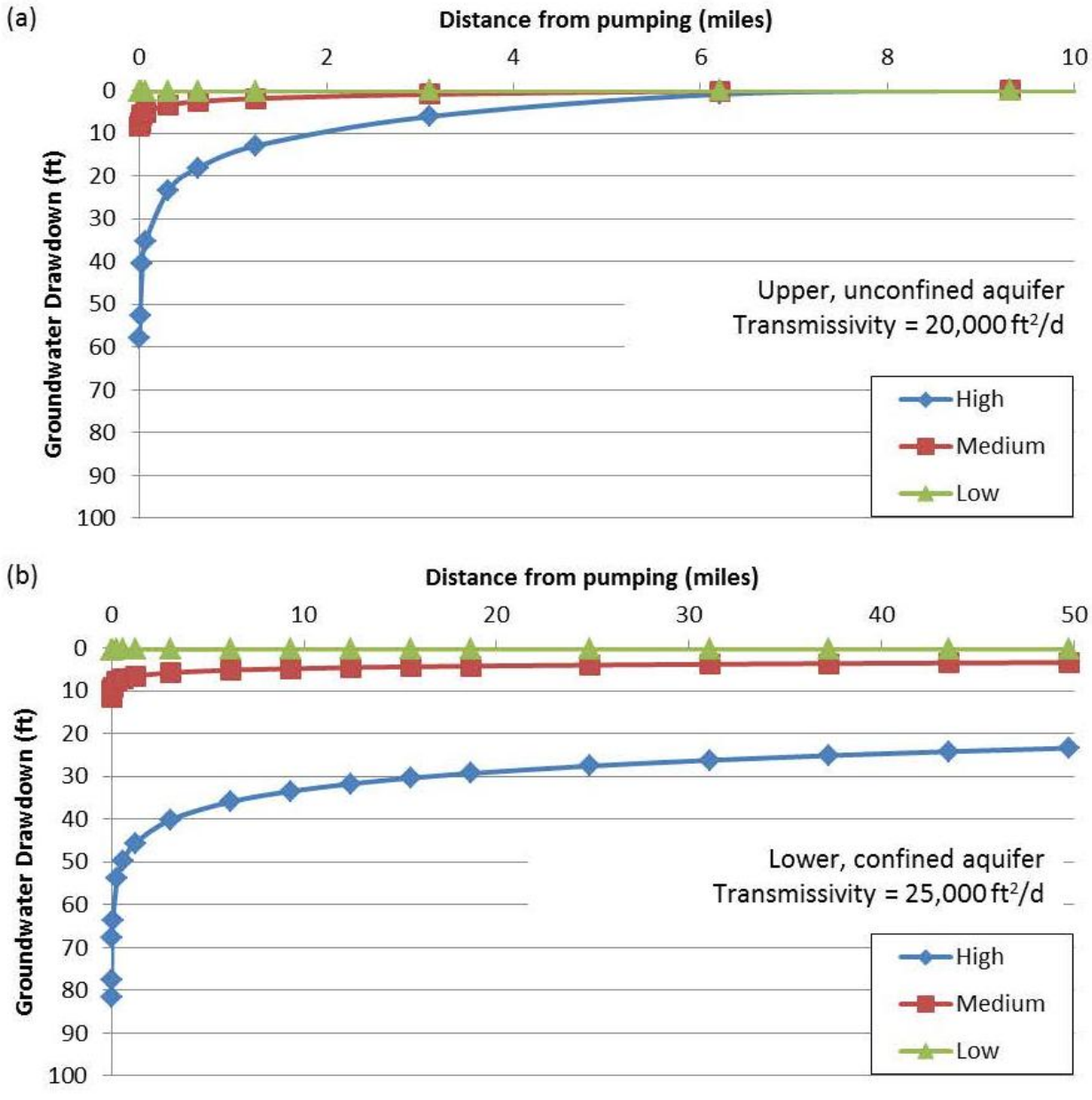


FIGURE 10.1.9.2-2 Estimated One-Dimensional Groundwater Drawdown in (a) Upper Unconfined Aquifer and (b) Lower Confined Aquifer Resulting from High, Medium, and Low Groundwater Pumping Scenarios over the 20-Year Operational Period at the Proposed Antonito Southeast SEZ as Revised

The comparison of water use requirements to the basin-scale water budget and the one dimensional groundwater modeling gives mixed results. From a groundwater budgeting perspective, the three pumping scenarios considered are not significant relative to the amounts of water moved through the San Luis Valley. Groundwater modeling results suggest that the high pumping scenario would have a localized groundwater drawdown effect if groundwater were extracted from the unconfined aquifer, but a more significant impact extending more than 50 mi (80 km) away from the SEZ if withdrawn from the confined aquifer. As stated in Section 10.1.9.1, water management of the San Luis Valley is restrictive given its overappropriated water rights and its obligations to maintain flows in the Rio Grande. Ultimately, any proposed groundwater withdrawals for solar energy facilities would be reviewed for impacts by the Colorado DWR and would be subject to the rules and court decisions outlined in Case Numbers 06CV64 and 07CW52 (Colorado District Court 2010).

10.1.9.2.3 Off-Site Impacts: Roads and Transmission Lines

As stated in the Draft Solar PEIS, impacts associated with the construction of roads and transmission lines primarily deal with water use demands for construction, water quality concerns related to potential chemical spills, and land disturbance effects on the natural hydrology. Water needed for transmission line construction activities (e.g., for soil compaction, dust suppression, and potable supply for workers) could be trucked to the construction area from an off-site source. If this occurred, water use impacts at the SEZ would be negligible. The Draft Solar PEIS assessment of impacts on water resources from road and transmission line construction remains valid.

10.1.9.2.4 Summary of Impacts on Water Resources

The additional information and analyses of water resources presented in this update agree with the information provided in the Draft Solar PEIS, which indicates that the San Luis Valley is a high-elevation basin, with predominately agricultural land use, and is the headwaters of the Rio Grande, where surface water and groundwater processes are coupled and managed jointly. Groundwater in the San Luis Valley is found both in the upper unconfined aquifer and lower confined aquifer, and historical diversions of both surface water and groundwater for irrigation have affected streamflows and groundwater levels. Water management plays a significant role in the San Luis Valley as it pertains to ensuring river flows in the Rio Grande according to the Rio Grande Compact, which is the primary responsibility of the Colorado DWR.

Disturbance to intermittent/ephemeral stream channels within the Antonito Southeast SEZ should not have a significant impact on the critical functions of groundwater recharge, sediment transport, flood conveyance, and ecological habitat, given the relatively small footprint of the SEZ with respect to the study area, and the low sensitivity to land disturbances of identified intermittent/ephemeral streams. Groundwater withdrawals pose the greatest threat to water resources in the San Luis Valley. The water budgeting and groundwater modeling analyses suggest that significant groundwater drawdown could occur both locally and off-site under the high pumping scenario if groundwater were extracted from either the unconfined or confined

aquifer. The low and medium pumping scenarios are preferable, because estimated groundwater drawdown is much less. Ultimately, the process of transferring water rights established by the Colorado DWR will determine how much water can be used by proposed solar facilities. As stated in the Draft Solar PEIS, given the restrictive nature of water rights and the need for augmentation water reserves, it would be difficult for any projects seeking an amount of water more than 1,000 ac-ft/yr (1.2 million m^3/yr) to be successful in obtaining the needed water rights (McDermott 2010).

Predicting impacts associated with groundwater withdrawal is often difficult given the heterogeneity of aquifer characteristics, the long time period between the onset of pumping and its effects, and limited data. Another consideration relevant to the San Luis Valley is that the transfer of water rights will likely come from the purchase of existing irrigation water rights, which will result in a change in the location of the point of diversion and change land use patterns in the basin, both of which can affect groundwater processes. One of the primary mitigation measures to protect water resources is the implementation of long-term monitoring and adaptive management (see Section A.2.4 of Appendix A). For groundwater, this requires a combination of monitoring and modeling to fully identify the temporal and spatial extent of potential impacts. Water management in the San Luis Valley relies on several water monitoring and modeling tools developed by the Colorado DWR and the Colorado Water Conservation Board (CWCB) that are a part of the Colorado's Decision Support Systems (available at http://cdss.state.co.us/Pages/CDSSHome.aspx), and these tools should be implemented with respect to long-term monitoring and adaptive management strategies for solar energy development occurring within the San Luis Valley.

10.1.9.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on surface water and groundwater are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the programmatic design features will provide some protection of and reduce impacts on water resources.

On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those analyses, and consideration of comments received as applicable, the following SEZ-specific design feature has been identified:

- Groundwater analyses suggest full build-out of wet-cooled technologies is not feasible; for mixed-technology development scenarios, any proposed wet-cooled projects would have to reduce water requirements to less than approximately 1,000 ac-ft/yr (1.2 million m^3/yr) in order to secure water rights and comply with water management in the San Luis Valley.

The need for additional SEZ-specific design features will be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

10.1.10 Vegetation

10.1.10.1 Affected Environment

Several wetlands mapped by the National Wetlands Inventory (NWI) within the proposed Antonito Southeast SEZ, with a total of about 17 acres (0.07 km^2), were identified as non-development areas in the Supplement to the Draft Solar PEIS.

As presented in Section 10.1.10.1 of the Draft Solar PEIS, 7 cover types were identified within the area of the proposed SEZ, while 26 cover types were identified within the area of indirect effects, including the previously assumed transmission line corridor, and within 5 mi (8 km) of the SEZ boundary. For this updated assessment, a specifically located hypothetical transmission line is no longer being assumed (see Section 10.1.23 for an updated transmission assessment for this SEZ). Sensitive habitats on the SEZ include wetlands and ephemeral washes. Figure 10.1.10.1-1 shows the cover types within the affected area of the Antonito Southeast SEZ as revised.

10.1.10.2 Impacts

As presented the Draft Solar PEIS, the construction of solar energy facilities within the proposed Antonito Southeast SEZ would result in direct impacts on plant communities because of the removal of vegetation within the facility footprint during land-clearing and land-grading operations. With full development of the SEZ, approximately 80% of the SEZ would be expected to be cleared. Taking the newly identified non-development area into account, approximately 7,770 acres (31.4 km^2) would be cleared.

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; and (3) *large*: >10% of a cover type would be lost.

10.1.10.2.1 Impacts on Native Species

The analysis presented in the Draft Solar PEIS for the original Antonito Southeast SEZ developable area indicated that development would result in a moderate impact on three land cover types and a small impact on all other land cover types occurring within the SEZ (Table 10.1.10.1-1 in the Draft Solar PEIS). Development within the revised Antonito Southeast SEZ could still directly affect all the cover types evaluated in the Draft Solar PEIS; the reduction in the developable area would result in slightly reduced impact levels on some cover types in the affected area, but the impact magnitudes on all land cover types would remain unchanged compared to original estimates in the Draft Solar PEIS.

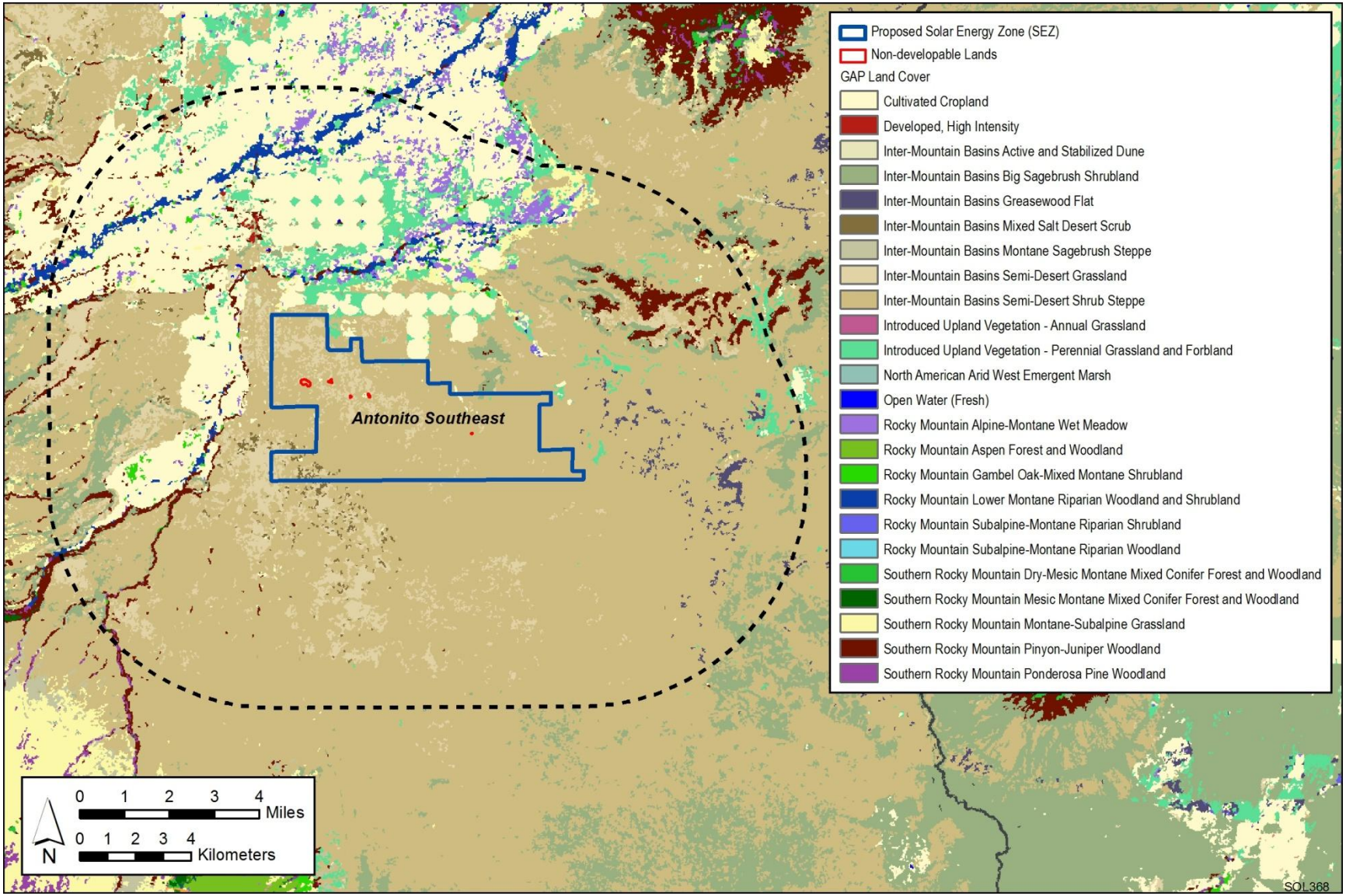


FIGURE 10.1.10.1-1 Land Cover Types within the Proposed Antonito Southeast SEZ as Revised

Direct impacts on the NWI-mapped wetlands, such as Alta Lake, that occur within the non-developable portions of the SEZ, or the previously identified transmission corridor, would not occur. However, direct impacts on unmapped wetlands within the remaining developable areas of the SEZ could still occur. In addition, indirect impacts on wetlands within or near the SEZ, as described in the Draft Solar PEIS, could occur.

10.1.10.2.2 Impacts from Noxious Weeds and Invasive Plant Species

As presented the Draft Solar PEIS, land disturbance from project activities and indirect effects of construction and operation within the Antonito Southeast SEZ could potentially result in the establishment or expansion of noxious weeds and invasive species populations, potentially including those species listed in Section 10.1.10.1 in the Draft Solar PEIS. Impacts such as reduced restoration success and possible widespread habitat degradation could still occur.

10.1.10.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features are described in Section A.2.2 of Appendix A of this Final Solar PEIS. SEZ-specific species and habitats will determine how programmatic design features are applied, for example:

- All wetland and dry wash habitats within the SEZ shall be avoided to the extent practicable, and any impacts minimized and/or mitigated in consultation with appropriate agencies. A buffer area shall be maintained around wetlands, dry washes, and riparian areas to reduce the potential for impacts on wetlands 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.

- Appropriate engineering controls shall 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.

- Groundwater withdrawals shall be limited to reduce the potential for indirect impacts on wetland habitats along the Rio San Antonio or the Conejos River, or on springs associated with groundwater discharge.

It is anticipated that implementation of these programmatic design features will reduce a high potential for impacts from invasive species and impacts on wetlands, springs, dry washes, and riparian habitats to a minimal potential for impact. Residual impacts on wetlands could result from remaining groundwater withdrawal and so forth; however, it is anticipated that these impacts would be avoided in the majority of instances.

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, no SEZ-specific design features for vegetation have been identified. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

10.1.11 Wildlife and Aquatic Biota

For the assessment of potential impacts on wildlife and aquatic biota, overall impact magnitude categories were based on professional judgment and include (1) *small*: a relatively small proportion (≤1%) of the species' habitat within the SEZ region would be lost; (2) *moderate*: an intermediate proportion (>1 but ≤10%) of the species' habitat would be lost; and (3) *large*: >10% of the species' habitat would be lost.

10.1.11.1 Amphibians and Reptiles

10.1.11.1.1 Affected Environment

As presented in the Draft Solar PEIS, amphibian and reptile species expected to occur within the Antonito Southeast SEZ include the Woodhouse's toad (*Bufo woodhousii*), fence lizard (*Sceloporus undulatus*), gopher snake (*Pituophis catenifer*), western rattlesnake (*Crotalus viridis*), and western terrestrial garter snake (*Thamnophis elegans*). The potential for these species to occur in the SEZ has not changed, because the boundaries of the Antonito Southeast SEZ have not changed.

10.1.11.1.2 Impacts

As presented in the Draft Solar PEIS, solar energy development within the Antonito Southeast SEZ could affect potentially suitable habitats for several amphibian and reptile species. The analysis presented in the Draft Solar PEIS indicated that development would result in a small overall impact on representative amphibian and reptile species (Table 10.1.11.1-1 in the Draft Solar PEIS). Development within the Antonito Southeast SEZ could still affect the same species evaluated in the Draft Solar PEIS; however, the reduction in the developable wetland and lake areas would, in particular, minimize potential impacts on amphibians. Non-development in the wetland and lake areas would result in reduced (and still small) impact levels on amphibians and reptiles in the Antonito Southeast SEZ compared to original estimates in the Draft Solar PEIS.

10.1.11.1.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that will reduce impacts on amphibian and reptile species are described in Section A.2.2 of Appendix A of this Final Solar PEIS. With

implementation of required programmatic design features, impacts on amphibian and reptile species would be small.

Because of the change in the developable area within the SEZ and the elimination of consideration of a specific route for a new transmission line, the SEZ-specific design features identified in Section 10.1.11.1.3 of the Draft Solar PEIS (i.e., Alta Lake and surrounding wetlands should be avoided; engineering controls should be used to minimize impacts on aquatic habitats) are no longer applicable. On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, no SEZ-specific design features for reptiles and amphibians have been identified. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

10.1.11.2 Birds

10.1.11.2.1 Affected Environment

As presented in the Draft Solar PEIS, a large number of bird species could occur or have potentially suitable habitat within the affected area of the proposed Antonito Southeast SEZ. Representative bird species identified in the Draft Solar PEIS included the killdeer (*Charadrius vociferus*), Brewer's blackbird (*Euphagus cyanocephalus*), Brewer's sparrow (*Spizella breweri*), common nighthawk (*Chordeiles minor*), horned lark (*Eremophila alpestris*), vesper sparrow (*Pooecetes gramineus*), western meadowlark (*Sturnella neglecta*), the American kestrel (*Falco sparverius*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), short-eared owl (*Asio flammeus*), Swainson's hawk (*Buteo swainsoni*), turkey vulture (*Cathartes aura*), and the mourning dove (*Zenaida macroura*). The potential for these species to occur in the SEZ has not changed because the boundaries of the Antonito Southeast SEZ have not changed.

10.1.11.2.2 Impacts

As presented in the Draft Solar PEIS, solar energy development within the Antonito Southeast SEZ could affect potentially suitable habitats of bird species. The analysis presented in the Draft Solar PES for the original Antonito Southeast SEZ indicated that development would result in a small overall impact on the representative bird species. Non-development in the wetland and lake areas would result in reduced (and still small) impact levels on birds in the Antonito Southeast SEZ compared to original estimates in the Draft Solar PEIS. The reduction in the developable wetland and lake areas would, in particular, minimize potential impacts on the killdeer.

10.1.11.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on bird species are described in Section A.2.2 of Appendix A of this Final Solar PEIS. With the implementation of required programmatic design features, impacts on bird species would be reduced.

On the basis of impact analyses conducted for the Draft Solar PEIS, and consideration of comments received as applicable, the following SEZ-specific design feature for birds has been identified:

- If present, prairie dog colonies (which could provide habitat or a food source for some raptor species) should be avoided to the extent practicable.

If SEZ-specific design features are implemented in addition to required programmatic design features, it is anticipated that impacts on bird species would be small. The need for additional SEZ-specific design features will be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

10.1.11.3 Mammals

10.1.11.3.1 Affected Environment

As presented in the Draft Solar PEIS, a large number of mammal species were identified that could occur or have potentially suitable habitat within the affected area of the proposed Antonito Southeast SEZ. Representative mammal species identified in the Draft Solar PEIS included (1) big game species: the American black bear (*Ursus americanus*), bighorn sheep (*Ovis canadensis*), cougar (*Puma concolor*), elk (*Cervis canadensis*), mule deer (*Odocoileus hemionus*), and pronghorn (*Antilocapra americana*); (2) furbearers and small game species: the American badger (*Taxidea taxus*), coyote (*Canis latrans*), desert cottontail (*Sylvilagus audubonii*), red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*), and white-tailed jackrabbit (*Lepus townsendii*); and (3) small nongame species: the big brown bat (*Eptesicus fuscus*), deer mouse (*Peromyscus maniculatus*), least chipmunk (*Tamias minimus*), little brown myotis (*Myotis lucifugus*), northern pocket gopher (*Thomomys talpoides*), Ord's kangaroo rat (*Dipodomys ordii*), thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*), and western small-footed myotis (*Myotis ciliolabrum*). The potential for these species to occur in the SEZ has not changed because the boundaries of the Antonito Southeast SEZ have not changed.

10.1.11.3.2 Impacts

As presented in the Draft Solar PEIS, solar energy development within the Antonito Southeast SEZ could affect potentially suitable habitats of mammal species. The analysis presented in the Draft Solar PEIS for the original Antonito Southeast SEZ indicated that development would result in a small overall impact on all representative mammal species

analyzed (Table 10.1.11.3-1 in the Draft Solar PEIS). Development within the Antonito Southeast SEZ could still affect the same representative mammal species evaluated in the Draft Solar PEIS; however, the reduction in the developable wetland and lake areas would result in slightly reduced (and still small) impact levels compared to original estimates in the Draft Solar PEIS. Based on mapped activity areas, no notable changes in the magnitude of impacts on elk or mule deer activity areas result from reconfigured solar energy development within the Antonito Southeast SEZ. This includes a moderate impact on elk severe winter range and pronghorn summer concentration area (Tables 10.1.11.3-3 and 10.1.11.3-5 in the Draft Solar PEIS, respectively). Impacts on all other elk, mule deer, and pronghorn activity areas would remain as small to none (see Tables 10.1.11.3-3 through 10.1.11.3-5 in the Draft Solar PEIS).

10.1.11.3.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on mammal species are described in Section A.2.2 of Appendix A of this Final Solar PEIS. SEZ-specific resources and conditions will determine how programmatic design features are applied, for example:

- Prairie dog colonies shall be avoided to the extent practicable to reduce impacts on species such as desert cottontail and thirteen-lined ground squirrel.

If the programmatic design features are implemented, impacts on mammal species will be reduced. On the basis of impact analyses conducted for the Draft Solar PEIS, updates to the analyses due to changes to the SEZ boundaries, and consideration of comments received as applicable, the following SEZ-specific design features for mammals have been identified:

- Construction should be curtailed during winter when big game species are present, particularly within elk severe winter range.

- Disturbance near the elk and mule deer resident population areas should be avoided.

- Where big game winter ranges intersect or are within close proximity to the SEZ, use of motorized vehicles and other human disturbances should be controlled (e.g., through road closures).

- Development in the 253-acre (1-km^2) portion of the SEZ that overlaps the pronghorn summer concentration area should be avoided.

If these SEZ-specific design features are implemented in addition to required programmatic design features, impacts on mammal species would be small. The need for additional SEZ-specific design features will be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

10.1.11.4 Aquatic Biota

10.1.11.4.1 Affected Environment

Ephemeral washes and Alta Lake and its associated wetlands are the primary surface water features on the Antonito Southeast SEZ. Because the boundaries of the Antonito Southeast SEZ given in the Draft Solar PEIS have not changed, the amount of surface water features within the area of direct and indirect effects is still valid. The following updates to the Draft Solar PEIS have been identified:

- The wetlands in the SEZ (including Alta Lake) have now been identified as non-development areas.

- A specific route for a new transmission line corridor is no longer assumed.

Aquatic biota present in the surface water features of the Antonito Southeast SEZ have not been characterized. As stated in Appendix C of the Supplement to the Draft Solar PEIS, site surveys can be conducted at the project-specific level to characterize aquatic biota, if present.

10.1.11.4.2 Impacts

The types of impacts from the development of utility-scale solar energy facilities that could affect aquatic habitats and biota are identified in Section 5.10.3 of the Draft Solar PEIS and this Final Solar PEIS. Aquatic habitats present on or near the Antonito Southeast SEZ could be affected by solar energy development in a number of ways, including (1) direct disturbance, (2) deposition of sediments, (3) changes in water quantity, and (4) degradation of water quality. The impact assessment provided in the Draft Solar PEIS remains valid, with the following update:

- Because Alta Lake and other wetlands in the SEZ have been identified as non-development areas, direct impacts on them would not occur. However, as described in the Draft Solar PEIS, the wetlands could be affected indirectly by solar development activities within the SEZ.

10.1.11.4.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features applicable to aquatic biota are described in Section A.2.2 of Appendix A of this Final Solar PEIS. SEZ-specific resources and conditions will guide how programmatic design features are applied, for example:

- Undisturbed buffer areas and sediment and erosion controls shall be maintained around Alta Lake and associated wetlands in the western portion of the SEZ.

- The use of heavy machinery and pesticides shall be avoided within the immediate catchment basins for Alta Lake and its associated wetlands.

- Development shall avoid any additional wetlands identified during future site-specific fieldwork.

It is anticipated that implementation of the programmatic design features will reduce impacts on aquatic biota, and if the utilization of water from groundwater or surface water sources is adequately controlled to maintain sufficient water levels in nearby aquatic habitats, the potential impacts on aquatic biota from solar energy development at the Antonito Southeast SEZ would be small.

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, no SEZ-specific design features for aquatic biota have been identified. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

10.1.12 Special Status Species

10.1.12.1 Affected Environment

Thirty-eight special status species that could occur or have potentially suitable habitat within the affected area of the proposed Antonito Southeast SEZ were identified in the Draft Solar PEIS. Since publication of the Draft Solar PEIS, there have been no revisions to the boundaries of the proposed SEZ; however, approximately 17 acres (0.07 km^2) of wetland and playa habitat within the SEZ have been identified as non-development areas. Exclusion of these wetland areas from development does not reduce the number of species that could be affected by development on the Antonito Southeast SEZ.

Since publication of the Draft Solar PEIS, three additional special status species (Mexican spotted owl [*Strix occidentalis lucida*], western yellow-billed cuckoo [*Coccyzus americanus occidentalis*], and fringed myotis [*Myotis thysanodes*]) have been identified that could occur in the affected area based on known occurrences and the presence of potentially suitable habitat. These three additional species are discussed in the remainder of this section.

Following the publication of the Draft Solar PEIS, the BLM conducted field surveys for special status bat species, as well as for Gunnison prairie dog (*Cynomys gunnisoni*) and western burrowing owl (*Athene cunicularia*), in the Antonito Southeast SEZ. Surveys for bat species were conducted in the SEZ by using passive and active acoustic monitoring techniques at various times between June 16, 2011, and October 15, 2011 (Rodriguez 2011). The big free-tailed bat (*Nyctinomops macrotis*) was the only special status bat species recorded on the SEZ. However, the documented presence of the fringed myotis (*Myotis thysanodes*) in the DeTilla Gulch SEZ suggests that the fringed myotis could occur throughout the San Luis Valley and potentially

within the Antonito Southeast SEZ. No roosting habitat for this species was observed on the SEZ (Rodriguez 2011).

Field surveys for Gunnison prairie dog and western burrowing owl were conducted between June 6, 2011, and September 9, 2011 (Garcia and Harvey 2011). Gunnison prairie dog activity was noted in five distinct areas in the western and northern portions of the SEZ within a total approximate area of 592.4 acres (2.4 km^2). Burrowing owls were not recorded on the SEZ during the field survey. However, burrowing owls may be associated with prairie dog colonies on private land west of the SEZ and may utilize the SEZ (particularly the western portion of the SEZ) for nesting and/or foraging. A single burrowing owl was seen on the ground approximately 5 mi (8 km) east of the SEZ on June 21, 2011 (Garcia and Harvey 2011).

Mexican Spotted Owl. The Mexican spotted owl was listed as a threatened species under the ESA on March 16, 1993 (USFWS 1993). Critical habitat for this species was designated on June 6, 1995 (USFWS 1995), but several court rulings resulted in the U.S. Fish and Wildlife Service (USFWS) removing the critical habitat designation on March 25, 1998 (USFWS 1998). In March 2000, the USFWS was ordered by the courts to propose critical habitat; this resulted in the current designation that includes 4.6 million acres (0.02 km^2) in Arizona, Colorado, New Mexico, and Utah on federal lands (USFWS 2004). A recovery plan for the Mexican spotted owl was published in December 1995 and later revised in June 2011 (USFWS 2011). At the time of federal listing in 1993, the total population of Mexican spotted owls was estimated at 2,100.

The Mexican spotted owl occurs from southern British Columbia, Canada, to central Mexico. The primary habitat of the spotted owl is steep rocky canyons, although mature coniferous forests are also important habitat. The spotted owl occupies closed canopy forests in steep canyons with uneven-aged tree stands with a high basal area, and an abundance of snags and downed logs (NatureServe 2010; USFWS 2011).

The Mexican spotted owl feeds mainly on rodents but also consumes rabbits, birds, reptiles, and insects. Nest sites are in trees (typically those with broken tops), tree trunk cavities, and cliffs along canyon walls. Breeding takes place in the spring (March) with egg-laying in late March or early April. After a 30-day incubation period, hatching occurs and fledging takes place in 4 to 5 weeks. The young depend on the adults for food in the summer and eventually disperse from the nesting area in the fall (NatureServe 2010; USFWS 2011).

The Mexican spotted owl is known to occur in Conejos County, Colorado, and potentially suitable habitat for this species may occur in the affected area of the Antonito Southeast SEZ. Potentially suitable habitat for this species does not occur on the SEZ. However, the SWReGAP habitat suitability model for the spotted owl identified approximately 4,900 acres (20 km^2) of potentially suitable habitat within the area of indirect effects (Figure 10.1.12.1-1; Table 10.1.12.1-1). Designated critical habitat for the Mexican spotted owl does not occur in the affected area.

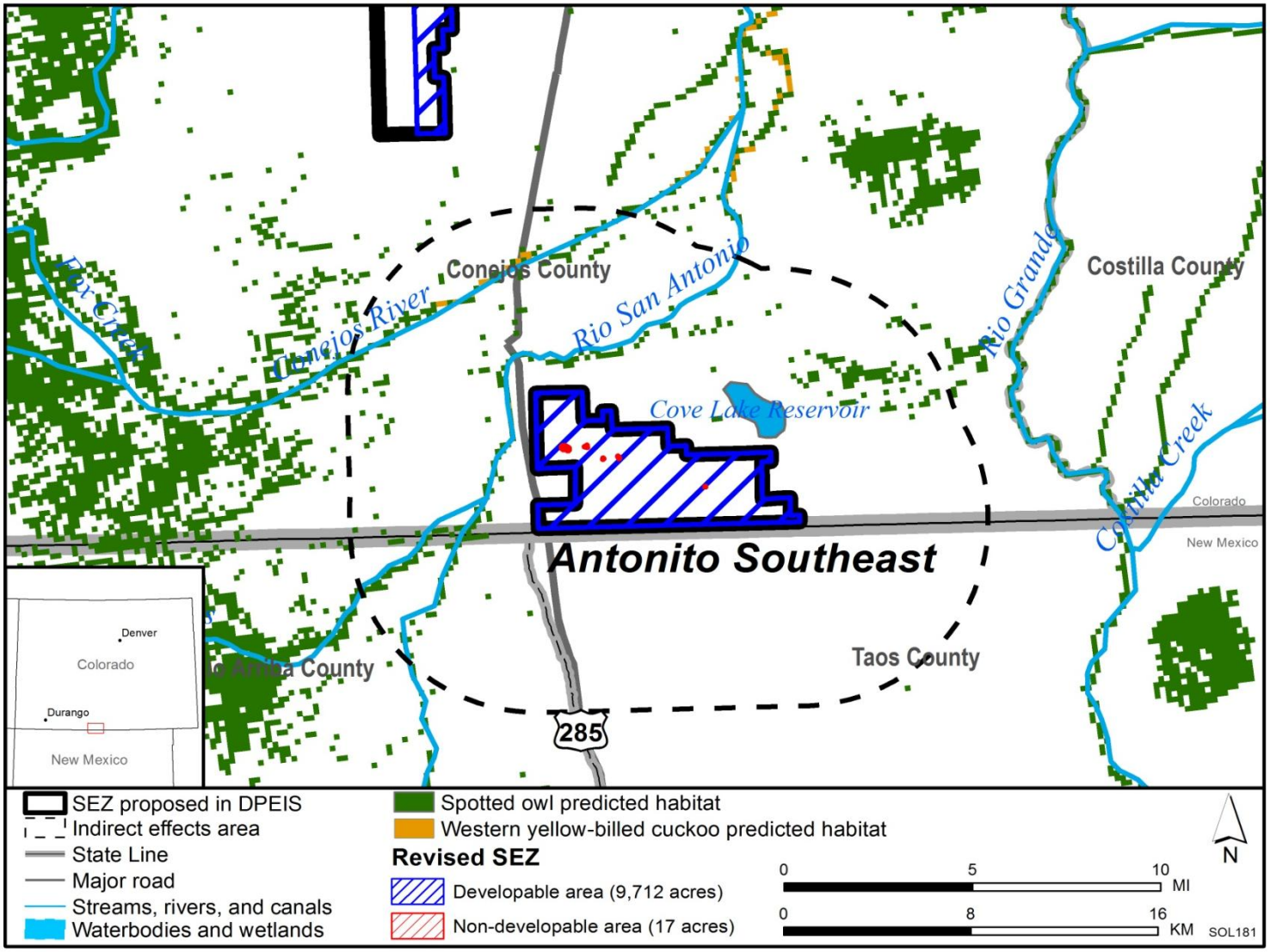


FIGURE 10.1.12.1-1 Developable Area for the Proposed Antonito Southeast SEZ as Revised and Distribution of Potentially Suitable Habitat for the Mexican Spotted Owl and Western Yellow-Billed Cuckoo

TABLE 10.1.12.1-1 Habitats, Potential Impacts, and Potential Mitigation for Additional Special Status Species That Could Be Affected by Solar Energy Development on the Proposed Antonito Southeast SEZ as Revised[a]

Common Name	Scientific Name	Listing Status[b]	Habitat[c]	Maximum Area of Potential Habitat Affected[d]		Overall Impact Magnitude[g] and Species-Specific Mitigation[h]
				Within SEZ (Direct Effects)[e]	Outside SEZ (Indirect Effects)[f]	
Birds						
Mexican spotted owl	*Strix occidentalis lucida*	ESA-T; CO-T; CO-S1	Inhabits deep, sheer-walled canyons in old-age, mixed coniferous forests. Known to occur in Conejos County, Colorado. About 698,700 acres[i] of potentially suitable habitat occurs in the SEZ region.	0 acres	4,900 acres of potentially suitable habitat (0.7% of available potentially suitable habitat)	Small overall impact; no direct impact. No species-specific mitigation is warranted.
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	ESA-C	Breeds in scattered areas along the lower Colorado River and larger bodies of water in the southwestern United States. Primarily associated with riparian cottonwood and willow forests with dense understory foliage. Known to occur in Conejos County, Colorado. About 2,800 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	250 acres of potentially suitable habitat (9% of available potentially suitable habitat)	Small overall impact; no direct impact. Avoiding or limiting groundwater withdrawals for solar energy development on the SEZ could reduce impacts on this species.
Mammal						
Fringed myotis	*Myotis thysanodes*	BLM-S; FWS-SC	Summer or year-round resident in wide range of habitats, including woodland, riparian, and shrubland habitats. Roosts in caves, crevices, and buildings. About 3,500,000 acres of potentially suitable habitat occurs within the SEZ region.	9,700 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	122,500 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	Small overall impact; direct impact on foraging habitat only. Avoidance of direct impacts on foraging habitat is not feasible, because suitable foraging habitat is widespread in the area of direct effects.

Footnotes on next page.

TABLE 10.1.12.1-1 (Cont.)

[a] The species presented in this table represent new species identified following publication of the Draft Solar PEIS or a re-evaluation of those species that were determined to have moderate or large impacts in the Draft Solar PEIS. The other special status species for this SEZ are identified in Table 10.1.12.1-1 of the Draft Solar PEIS.

[b] BLM-S = listed as a sensitive species by the BLM; CO-S1 = ranked as S1 in the state of Colorado; CO-T = listed as threatened in the state of Colorado; ESA-C = candidate for listing under the ESA; ESA-T = listed as threatened under the ESA; FWS-SC = USFWS species of concern.

[c] Potentially suitable habitat was determined using SWReGAP habitat suitability models (USGS 2004, 2007). 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.

[d] 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 models (USGS 2004, 2007). This approach probably overestimates the amount of suitable habitat in the project area.

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

[f] 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 developments. The potential degree of indirect effects would decrease with increasing distance away from the SEZ.

[g] Overall impact magnitude categories were based on professional judgment and are as follows: (1) *small*: ≤1% of the population or its habitat would be lost and the activity would not result in a measurable change in carrying capacity or population size in the affected area; (2) *moderate*: >1 but ≤10% of the population or its habitat would be lost and the activity would result in a measurable but moderate (not destabilizing) change in carrying capacity or population size in the affected area; and (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. Design features would reduce most indirect effects to negligible levels.

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

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

Western Yellow-Billed Cuckoo. The western yellow-billed cuckoo is a candidate for listing under the ESA and has the potential to occur in the affected area. The western yellow-billed cuckoo is a neotropical migrant bird that inhabits large riparian woodlands in the western United States. This species is not known to occur in Conejos County, Colorado, but it has been documented in nearby counties, such as La Plata and Rio Grande Counties, Colorado. Although the SWReGAP habitat suitability model for the western yellow-billed cuckoo does not identify any suitable habitat for this species within the SEZ, approximately 250 acres (1 km^2) of potentially suitable riparian habitat occurs within the area of indirect effects along the Conejos River (Figure 10.1.12.1-1; Table 10.1.12.1-1). Potentially suitable habitat may also occur in the area of indirect effects along the Rio San Antonio and Cove Lake Reservoir. Additional basic information on life history, habitat needs, and threats to populations of this species is provided in Appendix J.

Fringed Myotis. The fringed myotis is a year-round resident in western Colorado, where it forages in a variety of habitats including ponderosa pine woodlands, greasewood flats, oakbrush, and shrublands. This species was not evaluated for the Antonito Southeast SEZ in the Draft Solar PEIS. The species roosts in caves, rock crevices, or buildings. The fringed myotis was not recorded on the Antonito Southeast SEZ during field surveys conducted in 2011 (Rodriguez 2011). However, fringed myotis was recorded on the DeTilla Gulch SEZ, suggesting that the species could occur elsewhere in the San Luis Valley and potentially within the Antonito Southeast SEZ. According to the SWReGAP habitat suitability model, potentially suitable foraging habitat for the fringed myotis could occur on the SEZ and throughout portions of the area of indirect effects (Table 10.1.12.1-1). There is no potentially suitable roosting habitat (rocky cliffs and outcrops) in the area of direct effects.

10.1.12.2 Impacts

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

As presented in the Draft Solar PEIS, solar energy development within the Antonito Southeast SEZ could affect potentially suitable habitats of special status species. The analysis presented in the Draft Solar PEIS for the original Antonito Southeast SEZ developable area indicated that development would result in no impact or a small overall impact on all special status species (Table 10.1.12.1-1 in the Draft Solar PEIS). Because the boundaries of the Antonito Southeast SEZ have not changed, development within the SEZ could still affect the same 38 species evaluated in the Draft Solar PEIS; however, the reduction in the developable area would result in reduced (but still small) impact levels compared to original estimates in the Draft Solar PEIS.

Field surveys were conducted for the BLM following the publication of the Draft Solar PEIS to determine the potential occurrence of Gunnison prairie dog, western burrowing owl, and special status bat species in the Colorado SEZs (Garcia and Harvey 2011; Rodriguez 2011). Results of these surveys have documented the presence of the Gunnison prairie dog in the western and northern portions of the Antonito Southeast SEZ within an area of approximately 592.4 acres (2.4 km^2) (Garcia and Harvey 2011). In the Draft Solar PEIS, it was determined that as much as 8,293 acres (34 km^2) of potentially suitable habitat for the Gunnison prairie dog could be directly affected by solar energy development within the Antonito Southeast SEZ, resulting in a small overall impact magnitude compared to available habitat in the SEZ region. Development within the revised developable area of the Antonito Southeast SEZ will not affect any more potentially suitable habitat than what was presented in the Draft Solar PEIS; therefore, the overall impact magnitude for the Gunnison prairie dog remains small.

The western burrowing owl was not observed on the Antonito Southeast SEZ during field surveys in 2011 (Garcia and Harvey 2011). However, this species may be associated with prairie dog colonies in close proximity to the SEZ and may utilize the SEZ for nesting and/or foraging. In the Draft Solar PEIS, it was determined that as much as 9,700 acres (39 km^2) of potentially suitable habitat for the western burrowing owl could be directly affected by solar energy development within the Antonito Southeast SEZ, resulting in a small overall impact magnitude compared to available habitat in the SEZ region. Development within the revised developable area of the Antonito Southeast SEZ will not affect any more potentially suitable habitat than what was presented in the Draft Solar PEIS; therefore, the overall impact magnitude for the western burrowing owl remains small.

On the basis of field surveys for special status bat species and comments received on the Draft Solar PEIS, there are three additional special status species that may occur in the affected area of the Antonito Southeast SEZ—Mexican spotted owl, western yellow-billed cuckoo, and fringed myotis. Impacts on these species are discussed below and in Table 10.1.12.1-1. The impact assessment for these additional species was carried out in the same way as for those species analyzed in the Draft Solar PEIS (Section 10.1.12.2 of the Draft Solar PEIS).

Mexican Spotted Owl. The Mexican spotted owl is known to occur in Conejos County, Colorado, and, according to the SWReGAP habitat suitability model for the spotted owl, suitable habitat for the species does not occur anywhere within the Antonito Southeast SEZ. However, approximately 4,900 acres (20 km^2) of potentially suitable year-round habitat occurs within the area of indirect effects (Figure 10.1.12.1-1). The amount of potentially suitable habitat within the indirect effects area represents about 0.7% of the available suitable habitat in the region (Table 10.1.12.1-1).

The overall impact on the Mexican spotted owl from construction, operation, and decommissioning of utility-scale solar energy facilities within the Antonito Southeast SEZ is considered small, because suitable habitat for this species does not occur in the SEZ and only indirect effects are possible. The implementation of design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Western Yellow-Billed Cuckoo. The western yellow-billed cuckoo is known to occur in Conejos County, Colorado, and potentially suitable habitat occurs in the affected area of the Antonito Southeast SEZ. According to the SWReGAP habitat suitability model, suitable habitat for this species does not occur on the SEZ. However, the SWReGAP habitat suitability model indicates approximately 250 acres (1 km^2) of potentially suitable habitat occurs in the area of indirect effects, primarily along the Conejos River (Figure 10.1.12.1-1). This indirect effects area represents about 9% of the available suitable habitat in the region (Table 10.1.12.1-1).

The overall impact on the western yellow-billed cuckoo from construction, operation, and decommissioning of utility-scale solar energy facilities within the Antonito Southeast 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 design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Fringed Myotis. The fringed myotis is a year-round resident in southwestern Colorado and is known to occur within the San Luis Valley. Although this species is not known to occur in the Antonito Southeast SEZ, field surveys conducted in 2011 documented the presence of this species in the DeTilla Gulch SEZ (Rodriguez 2011). According to the SWReGAP habitat suitability model, approximately 9,700 acres (39 km^2) of suitable foraging habitat on the Antonito Southeast SEZ may be directly affected by construction and operations (Table 10.1.12.1-1). This direct effects area represents 0.3% of potentially suitable habitat in the SEZ region. About 122,500 acres (496 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 3.5% of the available suitable habitat in the region (Table 10.1.12.1-1). Most of the potentially suitable habitat in the affected area is foraging habitat represented by desert shrubland. There is no potentially suitable roosting habitat (rocky cliffs and outcrops) in the area of direct effects; however, it is possible for individuals to roost in nearby habitats within the area of indirect effects (Rodriguez 2011).

The overall impact on the fringed myotis from construction, operation, and decommissioning of utility-scale solar energy facilities within the Antonito Southeast 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 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.

10.1.12.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features are described in Section A.2.2 of Appendix A of this Final Solar PEIS. SEZ-specific resources conditions will guide how programmatic design features are applied, for example:

- Pre-disturbance surveys shall be conducted within the SEZ (i.e., area of direct effects) to determine the presence and abundance of special status species including those identified in Table 10.1.12.1-1 of the Draft Solar PEIS as well as those identified in Table 10.1.12.1-1 in this Final Solar PEIS. Disturbance to occupied habitats for these species shall be avoided or minimized to the extent practicable. If avoiding or minimizing impacts on occupied habitats is not possible, translocation of individuals from areas of direct effects or compensatory mitigation of direct effects on occupied habitats may be used to reduce impacts. A comprehensive mitigation strategy for special status species that uses one or more of these options to offset the impacts of projects shall be developed in coordination with the appropriate federal and state agencies.

- Disturbance of wetland and riparian habitat within the SEZ shall be avoided or minimized to the extent practicable. Alta Lake and other identified wetlands have been identified as non-developable areas. Pre-disturbance surveys shall be conducted to determine the presence of additional wetland and riparian habitat in the developable area; development of these habitats shall be avoided or minimized. Adverse impacts on the following special status species could be reduced with the avoidance of wetland and riparian habitats: halfmoon milkvetch (*Astragalus allochrous* var. *playanus*), least moonwort (*Botrychium simplex)*, Rocky Mountain blazing-star (*Liatris ligulistylis)*, Rio Grande chub (*Gila Pandora*), Rio Grande sucker (*Catostomus plebeius)*, milk snake *(Lampropeltis triangulum),* bald eagle (*Haliaeetus leucocephalu)*, Barrow's goldeneye (*Bucephala islandica)*, ferruginous hawk (*Buteo regalis)*, and southwestern willow flycatcher (*Empidonax traillii extimus)*.

- Avoiding or limiting groundwater withdrawals for solar energy development on the SEZ shall be employed 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.

- Consultations with the USFWS and CDOW shall be conducted to address the potential for impacts on the southwestern willow flycatcher, a species listed as endangered under the Endangered Species Act (ESA). Consultation would identify an appropriate survey protocol, avoidance measures, and, if appropriate, reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions for incidental take statements.

- Coordination with the USFWS and CDOW shall be conducted to address the potential for impacts on the Gunnison's prairie dog and northern leopard frog (*Rana pipiens)*—species that are either candidates or under review for listing under the ESA. Coordination would identify an appropriate survey protocol, avoidance measures, and, potentially, translocation or compensatory mitigation.

If the programmatic design features are implemented, it is anticipated that the majority of impacts on the special status species from habitat disturbance and groundwater use will be reduced.

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, no SEZ-specific design features for special status species have been identified. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis. Projects will comply with terms and conditions set forth by the USFWS Biological Opinion resulting from the programmatic consultation and any necessary project-specific ESA Section 7 consultations.

10.1.13 Air Quality and Climate

10.1.13.1 Affected Environment

Except as noted below, the information for air quality and climate presented for the affected environment of the Draft Solar PEIS remains essentially unchanged.

10.1.13.1.1 Existing Air Emissions

The Draft Solar PEIS presented Conejos County emissions data for 2002. More recent data for 2008 (CDPHE 2011) were reviewed for this Final Solar PEIS. The two emissions inventories used different sources and assumptions. All emissions in the 2008 data were lower than those in the 2002 data, and all criteria air pollutants were much lower, but volatile organic compounds (VOCs) were about half of those in the 2002 data. These changes would not affect the modeled air quality impacts presented in this update.

10.1.13.1.2 Air Quality

The calendar quarterly average National Ambient Air Quality Standard (NAAQS) of 1.5 $\mu g/m^3$ for lead (Pb) presented in Table 10.1.13.1-2 of the Draft Solar PEIS has been replaced by the rolling 3-month standard (0.15 $\mu g/m^3$). The federal 24-hour and annual sulfur dioxide (SO_2), 1-hour ozone (O_3), and annual PM_{10} (particulate matter with a diameter of 10 µm or less) standards have been revoked as well (EPA 2011). All Colorado State Ambient Air Quality Standards (SAAQS), except the 3-hour SO_2 standard of 700 $\mu g/m^3$, have been revoked since the publication of the Draft Solar PEIS. These changes would not affect the modeled air quality impacts presented in this update.

The developable area of the proposed Antonito Southeast SEZ was reduced by about 0.2%, from 9,729 acres (39.4 km^2) to 9,712 acres (39.3 km^2). This reduction was effected by removing interior portions of the proposed SEZ from potentially developable areas. The

boundaries of the SEZ were not changed, and distances to all receptors of interest remain the same as in the Draft Solar PEIS.

10.1.13.2 Impacts

10.1.13.2.1 Construction

Methods and Assumptions

The methods and modeling assumptions have not changed from those presented in the Draft Solar PEIS. The reduction in the developable area of the proposed Antonito Southeast SEZ by less than 1% would cause only a negligible impact on modeled air quality impacts; thus air quality impacts were not remodeled.

Results

Since the annual PM_{10} standard has been rescinded, the discussion of annual PM_{10} impacts in the Draft Solar PEIS is no longer applicable, and Table 10.1.13.2-1 has been updated for this Final Solar PEIS.

Since the air quality impacts remain the same as those presented in the Draft Solar PEIS, the discussion and conclusions in the Draft Solar PEIS remain valid.[2] Predicted 24-hour PM_{10} and 24-hour $PM_{2.5}$ (particulate matter with a diameter of 2.5 μm or less) concentration levels could exceed the standard level used for comparison at the SEZ boundaries and in the immediate surrounding areas during the construction of a solar facility. However, these high particulate concentrations would be limited to the immediate vicinity of the proposed SEZ boundary and would decrease quickly with distance. At the nearest residence located about 0.5 mi (0.8 km) north of the SEZ, the 24-hour PM_{10} standard level used for comparison would be exceeded, but the 24-hour and annual $PM_{2.5}$ standard levels would not be exceeded at any nearby residences or communities.

The conclusions in the Draft Solar PEIS concerning impacts in nearby Prevention of Significant Deterioration (PSD) Class I areas remain valid. Predicted 24-hour PM_{10} concentration increments at the nearest Class I Area—Wheeler Peak WA, New Mexico—

[2] At this programmatic level, detailed information on construction activities, such as facility size, type of solar technology, heavy equipment fleet, activity level, work schedule, and the like, is not known; thus air quality modeling cannot be conducted. It has been assumed that an area of 3,000 acres (12.1 km^2) in total would be disturbed continuously; thus the modeling results and discussion here should be interpreted in that context. During the site-specific project phase, more detailed information would be available and more realistic air quality modeling analysis could be conducted. It is likely that impacts on ambient air quality predicted for specific projects would be much lower than those in this Final Solar PEIS.

TABLE 10.1.13.2-1 Maximum Air Quality Impacts from Emissions Associated with Construction Activities for the Proposed Antonito Southeast SEZ as Revised

			Concentration (μg/m^3)				Percentage of NAAQS	
Pollutant[a]	Averaging Time	Rank[b]	Maximum Increment[b]	Background	Total	NAAQS	Increment	Total
PM_{10}	24 hours	H6H	569	27	596	150	380	398
$PM_{2.5}$	24 hours	H8H	40.0	16	56.0	35	114	160
	Annual	–[c]	10.6	4	14.6	15	70	97

[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] A dash indicates not applicable.

Source: Chick (2009) for background concentration data.

would exceed the PSD increment for Class I Areas. When distances, prevailing winds, and topography are considered, concentration increments at the Great Sand Dunes Wilderness Area (WA) would be similar to those at Wheeler Peak WA but would be much lower than those at the Weminuche WA.

Overall, the conclusions of the Draft Solar PEIS remain valid. Predicted 24-hour PM_{10} and 24-hour $PM_{2.5}$ concentration levels could exceed the standard level used for comparison at the SEZ boundaries and in immediate surrounding areas during the construction of a solar facility. To reduce potential impacts on ambient air quality and in compliance with required programmatic design features, aggressive dust control measures would be used. Predicted total concentrations for annual $PM_{2.5}$ would be below the standard level used for comparison at the site boundary. Potential air quality impacts on neighboring communities would be much lower. Modeling indicates that construction activities are anticipated to exceed Class I PSD PM_{10} increments at the nearest federal Class I areas (Wheeler Peak WA, New Mexico, and Great Sand Dunes WA). Construction activities are not subject to the PSD program, and the comparison provides only a screen to gauge the size of the impact. Accordingly, it is anticipated that impacts of construction activities on ambient air quality would be moderate and temporary.

Since there were no boundary changes to the proposed Antonito Southeast SEZ, any potential impacts on air quality-related values (AQRVs) at nearby federal Class I areas would be the same as in the Draft Solar PEIS and the conclusions in the Draft remain valid. Emissions

from construction-related equipment and vehicles are temporary and would cause some unavoidable but short-term impacts.

10.1.13.2.2 Operations

The reduction in developable area of the proposed Antonito Southeast SEZ by less than 1% reduces the generating capacity and annual power generation by a similar percentage and thus reduces the potentially avoided emissions presented in the Draft Solar PEIS. Updated estimates for emissions potentially avoided by a solar facility can be obtained from Table 10.1.13.2-2 in the Draft Solar PEIS by reducing the tabulated emissions by about 0.18%. Maximum emissions avoided would be up to 3,600 tons/yr for SO_2, 4,151 tons/yr for NO_x, and 2,690,000 tons/yr for carbon dioxide (CO_2); other reductions are too small to show. These small reductions would not affect the analysis presented in the Draft Solar PEIS, and the conclusion presented therein that solar facilities built in the proposed Antonito Southeast SEZ could avoid relatively more fuel emissions in Colorado than those built in other states with less reliance on fossil fuel–generated power remains valid.

10.1.13.2.3 Decommissioning and Reclamation

The discussion in the Draft Solar PEIS remains valid. Decommission and reclamation activities would be of short duration, and their potential impacts would be moderate and temporary.

10.1.13.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce air quality impacts are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Limiting dust generation during construction and operations is a required programmatic design feature under the BLM Solar Energy Program. These extensive fugitive dust control measures would keep off-site particulate matter (PM) levels as low as possible during construction.

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, no SEZ-specific design features for air quality have been identified. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

10.1.14 Visual Resources

10.1.14.1 Affected Environment

No boundary revisions were identified for the proposed Antonito Southeast SEZ; however, 17 acres (0.07 km^2) of non-development wetland and lake areas were identified. The remaining developable area within the SEZ is 9,712 acres (39.3 km^2).

An updated Visual Resources Inventory (VRI) map for the SEZ and surrounding lands is shown in Figure 10.1.14.1-1; it provides information from the BLM's September 2010 VRI, which was finalized in October 2011 (BLM 2011a). As shown, the VRI values for the SEZ now are VRI Class II, III, and IV. The western portion of the SEZ still is VRI Class III, indicating moderate relative visual values, while much of the eastern portion now is VRI Class IV, indicating low relative visual values. These portions of the SEZ are located within the Antonito Southeast scenic quality rating unit. This unit is identified as having low scenic quality and moderate levels of sensitivity. A small portion of the SEZ remains as VRI Class II, indicating high relative visual values; this part of the SEZ is located within the San Luis Hills scenic quality rating unit. This unit is characterized as having high scenic quality and high sensitivity.

Within the La Jara Field Office, lands within the 25-mi (40-km), 650-ft (198-m) viewshed of the SEZ contain 31,253 acres (126.5 km^2) of VRI Class II lands, 36,225 acres (146.6 km^2) of VRI Class III lands, and 25,345 acres (102.6 km^2) of VRI Class IV lands.

10.1.14.2 Impacts

The summary of impacts provided in the Draft Solar PEIS remains valid. In general, the Antonito Southeast SEZ is located 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 Antonito Southeast SEZ is likely to result in strong visual contrasts for some viewpoints in the San Antonio WSA, along some portions of the Los Caminos Antiguos Scenic Byway, along portions of the West Fork of the North Branch of the Old Spanish Trail, and where there are clear views to the SEZ for residents of and visitors to the community of Antonito. Moderate visual contrast levels would be expected for high-elevation viewpoints in the San Luis Hills WSA and ACEC and for portions of the CTSR Corridor and CTSR Corridor ACEC. Residents and visitors to Conejos likely would observe lower levels of contrasts; minimal to weak visual contrasts would be expected for some viewpoints within other sensitive visual resource areas within the 25-mi (40-km) viewshed of the SEZ.

Solar development on lands in the SEZ visible from and in close proximity to the West Fork of the North Branch of the Old Spanish Trail has a higher potential to have visual impacts on the Trail. The BLM has identified areas in the SEZ visible from and within 1 mi (1.6 km) of the West Fork as potential high visual sensitivity areas, where solar development would be subject to specific, additional design features that would be identified when project-specific environmental analyses are conducted. In addition, the BLM has identified areas in the SEZ visible from 1 to 3 mi (1.6 to 4.8 km) from the Trail as potential moderate visual sensitivity areas. Solar development within these areas also would be subject to specific, additional design features identified as part of a project specific analysis.

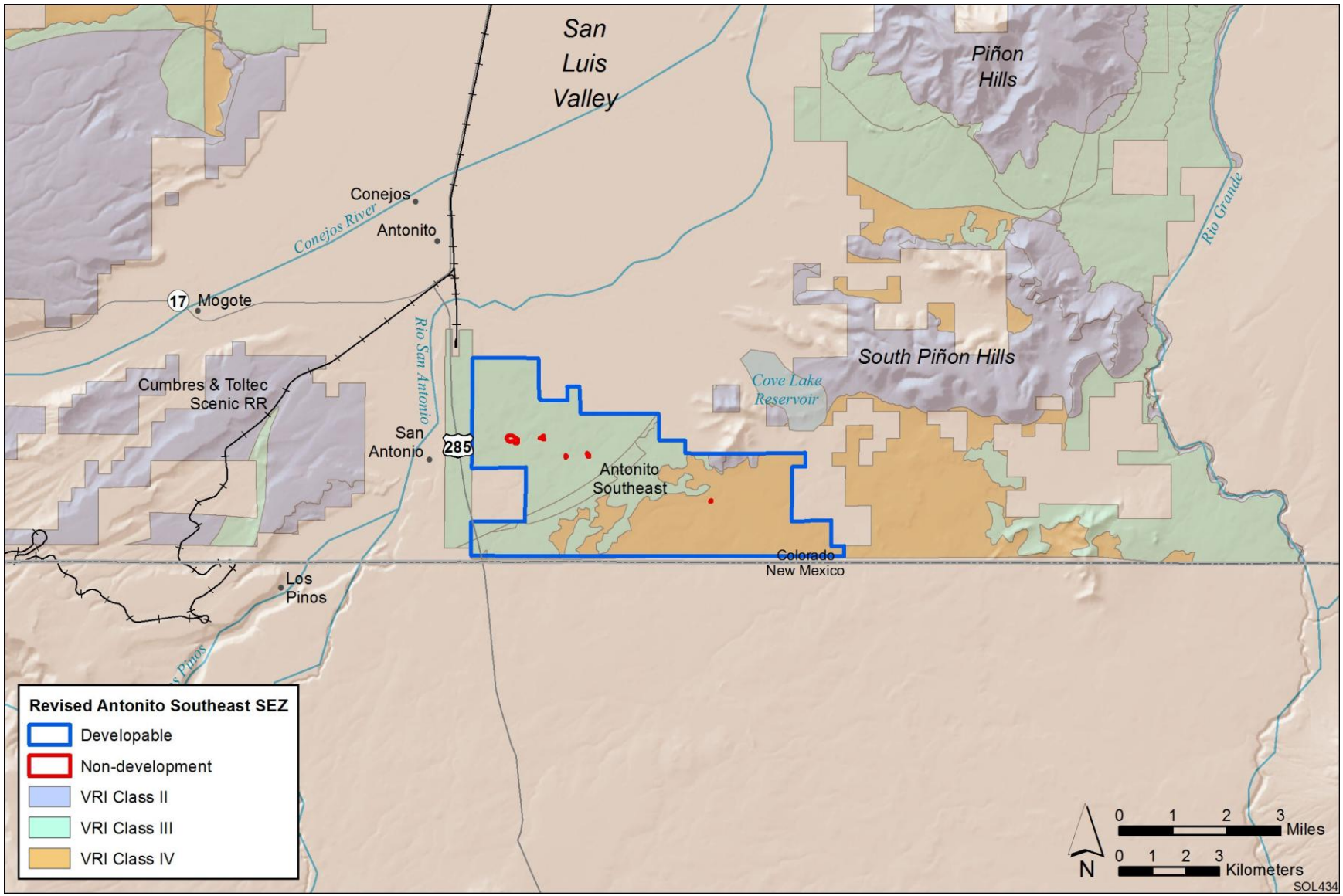


FIGURE 10.1.14.1-1 Visual Resource Inventory Values for the Proposed Antonito Southeast SEZ as Revised

In addition, the BLM has identified areas in the SEZ visible from and within 3 mi (4.8 km) of the CTSR ACEC and San Antonio WSA as potential moderate visual sensitivity areas. In these areas, solar development also would be subject to specific, additional design features to be identified in conjunction with project-specific analyses.

10.1.14.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on visual resources are described in Section A.2.2 of Appendix A of this Final Solar PEIS. While application of the programmatic design features would reduce potential visual impacts somewhat, 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 generally would be limited. Utility-scale solar energy development using any of the solar technologies analyzed in this Solar PEIS and at the scale analyzed would be expected to result in large adverse visual impacts that could not be mitigated.

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, the following proposed SEZ-specific design features for visual resources have been identified:

- The development of power tower facilities should be prohibited within the SEZ. The San Luis Valley is a regionally important tourist destination and is an area with many small communities and numerous important historic, cultural, and recreational resources. The valley contains numerous historic sites, two scenic railways, two scenic highways, several wildlife refuges, Great Sand Dunes NP and Preserve, the Rio Grande WSR, congressionally designated WAs, the Sangre de Cristo NHA, and various other attractions that draw tourists to the region. A number of these areas overlook the San Luis Valley from the surrounding mountains and include elevated viewpoints that would have clear views of power tower facilities in the Valley. The height of solar power tower receiver structures, combined with the intense light generated by the receiver atop the tower, would be expected to create strong visual contrasts that could not be effectively screened from view for most areas surrounding the SEZ. The effective area of impact from power tower structures is much larger than that for comparably rated lower height facilities, which makes it more likely that they would conflict with the growing tourism focus of the Valley. In addition, for power towers exceeding 200 ft (61 m) in height, hazard navigation lighting that could be visible for very long distances would likely be required. Prohibiting the development of power tower facilities would remove these sources of impacts, thus substantially reducing potential visual impacts on the CTSR, its depot, and the associated ACEC; the West Fork of the North Branch of the Old Spanish Trail; other sensitive visual

resource areas as identified in the Draft Solar PEIS; the community of Antonito; travelers on U.S. 285; and other residents and visitors to the San Luis Valley.

- Special visual impact mitigation shall 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. Solar development on lands in the SEZ visible from and in close proximity to the West Fork of the North Branch of the Old Spanish Trail has a higher potential to cause visual impacts on the Trail. Therefore, the BLM has identified areas in the SEZ visible from and within 1 mi (1.6 km) of the West Fork of the North Branch of the Old Spanish Trail as potential high visual sensitivity areas, where solar development would be subject to specific additional design features that will be identified when project-specific environmental analyses are conducted. In addition, the BLM has identified areas in the SEZ visible from and within 3 mi (5 km) of the West Fork of the North Branch of the Old Spanish Trail as potential moderate visual sensitivity areas, where solar development would also be subject to specific additional design features that will be identified when project-specific environmental analyses are conducted.

- Special visual impact mitigation shall be considered for solar development on lands in the SEZ visible from and within 3 mi (5 km) of the CTSR ACEC and San Antonio WSA. Solar development on lands in the SEZ visible from and in close proximity to the CTSR ACEC and San Antonio WSA has a higher potential to cause visual impacts on the ACEC and the WSA. Therefore, the BLM has identified areas in the SEZ visible from and within 3 mi (5 km) of the CTSR ACEC and San Antonio WSA as potential moderate visual sensitivity areas, where solar development would be subject to specific additional design features that will be identified when project-specific environmental analyses are conducted.

The need for additional SEZ-specific design features will be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

10.1.15 Acoustic Environment

10.1.15.1 Affected Environment

The developable area of the proposed Antonito Southeast SEZ was reduced by less than 1%, from 9,729 acres (39.4 km^2) to 9,712 acres (39.3 km^2). The boundaries of the SEZ were not changed, and thus the information for acoustic environment remains the same as presented in the Draft Solar PEIS.

10.1.15.2 Impacts

Given the small reduction in the developable area of the Antonito Southeast SEZ and the lack of change in the boundaries, the conclusions presented in the Draft Solar PEIS remain valid except for construction and operations impacts on specially designated areas and impacts from operating dish engine facilities.

10.1.15.2.1 Construction

Except as noted below, for impacts in specially designated areas, the assessment in the Draft Solar PEIS remains valid.

On the basis of comments received and recent references as applicable, this Final Solar PEIS used an updated approximate significance threshold of 55 dBA corresponding to the onset of adverse physiological impacts (Barber et al. 2010) to update the analysis of potential noise impacts on terrestrial wildlife in areas of special concern. As a result of this updated analysis, the conclusion in the Draft Solar PEIS that wildlife would not be adversely affected has been updated for this Final Solar PEIS as follows. For construction activities occurring near the southwestern SEZ boundary, the estimated noise level at the boundary of the San Antonio WSA in New Mexico (about 1.6 mi [2.6 km] to the southwest) would be about 37 dBA. This estimated level is below the significance threshold; thus noise from construction in the proposed Antonito Southeast SEZ is not anticipated to adversely affect wildlife in the nearby specially designated areas. However, as discussed in Section 5.10.2 of this Final Solar PEIS, there is the potential for other effects to occur at lower noise levels (Barber et al. 2011). Because of the potential for impacts at lower noise levels, impacts on terrestrial wildlife from construction noise would have to be considered on a project-specific basis, including site-specific background levels and hearing sensitivity for site-specific terrestrial wildlife of concern. However, even with potential impacts at these lower noise levels, construction noise at the SEZ would not be anticipated to affect wildlife in nearby specially designated areas.

For construction activities occurring near the western SEZ boundary, the estimated noise level at the West Fork of the North Branch of the Old Spanish Trail (as close as 660 ft [200 m] to the west) would be about 66 dBA, which is well above the typical daytime mean rural background level of 40 dBA. Accordingly, construction occurring near the western SEZ boundary could result in adverse noise impacts on the Old Spanish Trail, but these impacts would be temporary.

Construction within the proposed Antonito Southeast SEZ would cause some unavoidable but localized short-term noise impacts on neighboring communities, particularly activities occurring near the northern or western proposed SEZ boundaries, close to the nearby residences. No adverse vibration impacts are anticipated from construction activities, including pile driving for dish engines.

10.1.15.2.2 Operations

Given the small reduction in the developable area of the proposed Antonito Southeast SEZ, the assessment presented in the Draft Solar PEIS remains valid, except as noted below for impacts from thermal energy storage (TES) and dish engine facilities near residence or in specially designated areas.

Parabolic Trough and Power Tower

As stated above under construction impacts, for this Final Solar PEIS an updated approximate significance threshold of 55 dBA was used to evaluate potential noise impacts on terrestrial wildlife in areas of special concern. With TES operating near the southwestern SEZ boundary, estimated daytime and nighttime noise levels at the boundary of the San Antonio WSA in New Mexico would be about 37 and 47 dBA, respectively. These estimated levels are below the significance threshold; thus noise from operations in the proposed Antonito Southeast SEZ is not anticipated to considerably affect wildlife in the nearby specially designated areas. However, as discussed in Section 5.10.2 of this Final Solar PEIS, there is the potential for other effects to occur at lower noise levels (Barber et al. 2011). Because of these impacts and the potential for impacts at lower noise levels, noise impacts on terrestrial wildlife from a parabolic trough or power tower facility equipped with TES would have to be considered on a project-specific basis, including site-specific background levels and hearing sensitivity for site-specific terrestrial wildlife of concern.

For operations of a parabolic trough or power tower facility equipped with TES near the western SEZ boundary, the estimated daytime and nighttime noise levels at the West Fork of the North Branch of the Old Spanish Trail (as close as 660 ft [200 m] to the west) would be about 49 and 59 dBA, respectively, which are significantly above the typical daytime and nighttime mean rural background levels of 40 and 30 dBA. Accordingly, a solar facility with TES located near the western SEZ boundary could result in adverse noise impacts on the North Branch of the Old Spanish Trail.

Dish Engines

As stated above under construction impacts, for this Final Solar PEIS an updated approximate significance threshold of 55 dBA was used to evaluate potential noise impacts on terrestrial wildlife in areas of special concern. Estimated noise level from operation of a dish engine solar facility at the boundary of the San Antonio WSA in New Mexico would be about 43 dBA. This estimated level is below the significance threshold; thus noise from operations in the proposed Antonito Southeast SEZ is not anticipated to adversely affect wildlife in the nearby specially designated area. However, as discussed in Section 5.10.2 of this Final Solar PEIS, there is the potential for other effects to occur at lower noise levels (Barber et al. 2011). With these impacts and the potential for impacts at lower noise levels, noise impacts on terrestrial wildlife from a dish engine facility would have to be considered on a project-specific basis, including

site-specific background levels and hearing sensitivity for site-specific terrestrial wildlife of concern.

On the basis of a full build-out of the SEZ with dish engine facilities, the estimated noise level at the West Fork of the North Branch of the Old Spanish Trail (as close as 660 ft [200 m] to the west) would be about 55 dBA, which is well above the typical daytime mean rural background level of 40 dBA. Therefore, dish engine noise from the SEZ could result in adverse noise impacts on the West Fork of the North Branch of the Old Spanish Trail.

With no changes in the boundaries of the proposed Antonito Southeast SEZ, the discussions of vibration, transformer and switchyard noise, and transmission line corona discharge presented in the Draft Solar PEIS remain valid. Noise impacts from these sources would be minimal to negligible.

10.1.15.2.3 Decommissioning and Reclamation

The conclusions on decommissioning and reclamation in the proposed Antonito Southeast SEZ as presented in the Draft Solar PEIS remain valid. Decommissioning and reclamation activities would be of short duration, and their potential noise impacts would be minor and temporary. Potential noise and vibration impacts on surrounding communities would be minimal.

10.1.15.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce noise impacts are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the programmatic design features will provide some protection from noise impacts.

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, no SEZ-specific design features for noise were identified. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

10.1.16 Paleontological Resources

10.1.16.1 Affected Environment

Data provided in the Draft Solar PEIS remain valid, with the following update:

- The BLM Regional Paleontologist may have additional information regarding the paleontological potential of the SEZ and be able to verify the potential

fossil yield classification (PFYC) of the SEZ as Class 1 and 4/5 as used in the Draft Solar PEIS.

10.1.16.2 Impacts

The assessment provided in the Draft Solar PEIS remains valid. 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. However, a more detailed look at the geological deposits is necessary to determine whether a paleontological survey is warranted.

10.1.16.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features are described in Appendix A of this Final Solar PEIS. 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 Section A.2.2 of Appendix A.

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, the following SEZ-specific design feature has been identified:

- Avoidance of PFYC Class 4 or 5 areas is recommended for development within the proposed Antonito Southeast SEZ (i.e., the 4-acre [0.016-km^2] parcel in the north part of the SEZ). Where avoidance of Class 4 or 5 deposits is not possible, a paleontological survey or monitoring would be required by the BLM.

The need for and nature of additional SEZ-specific design features will depend on the findings of future paleontological investigations and may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

As additional information on paleontological resources (e.g., from regional paleontologists or from new surveys) becomes available, the BLM will post the data to the project Web site (http://solareis.anl.gov) for use by applicants, the BLM, and other stakeholders.

10.1.17 Cultural Resources

10.1.17.1 Affected Environment

Data provided in the Draft Solar PEIS remain valid, with the following updates:

- A study by the National Park Service (NPS) was recently conducted to identify "opportunities to preserve and interpret nationally significant American Latino heritage sites within the San Luis Valley and central Sangre de Cristo Mountains, as well as opportunities for conservation of the area's landscape, environment, and natural resources" (NPS 2011). This area, including the Sangre de Cristo National Heritage Area, has been recognized and celebrated for its rich natural and cultural resources, much of it associated with America's Latino heritage. The findings of the reconnaissance survey indicated that the "resources and traditions existing within the survey area meet National Park Service criteria for national significance and possess exceptional value in illustrating and interpreting the theme of American Latino heritage" (NPS 2011).

- The San Luis Valley and central Sangre de Cristo Mountains were initially part of Mexico's northern frontier, and settlement of the area was facilitated by the approval of land grants from the Mexican government. The three land grants from the Mexican government in the San Luis Valley were the Conejos Grant, the Luis Maria Baca No. 4 Land Grant, and the Sangre de Cristo Grant. The Conejos Grant (2.5 million acres [10,117 km^2]) was one of the oldest in Colorado, having been established in 1833. The portion of the grant near the Colorado–New Mexico border, in the western part of the San Luis Valley, was initially settled by Hispanic immigrants from the lower Chama Valley in New Mexico, and their settlements included Conejos, Mogote, Las Mesitas, and Rincones. The U.S. government decided not to honor the land grant and dissolved it, settling the northern portion under U.S. laws. The Luis Maria Baca Land Grant (100,000 acres[405 km^2]) was originally granted in 1821, but because of conflicting claims in the early 1860s, the Baca heirs agreed to accept five parcels in three different states, one of which is this land grant (No. 4). This land grant is notable for having been owned by two different Colorado governors and then by mining investors who extracted more than $50 million in gold. The Sangre de Cristo Grant (1 million acres [4,047 km^2]) was established in 1843 and was settled in the eastern San Luis Valley in Costilla County by Hispanic settlers from Taos after the Mexican–American War. This land grant is notable for being the focus of an 1876 Supreme Court decision, *Tameling v. United States Freehold & Emigration Co.*, in which its large acreage was upheld, changing the way that Mexican land grant claims were processed (NPS 2011).

- An ethnographic study of Hispanic heritage in association with the Old Spanish Trail was published in 2008 (Stoffle et al. [2008]). The North Branch of the Old Spanish Trail running through the San Luis Valley (including both East and West Forks) was one of five segments of the Old Spanish Trail that were investigated; others included segments of the Old Spanish Trail in New Mexico and California. The study identified important heritage sites and resources in the San Luis Valley associated with the northern Old Spanish Trail route from Taos to California on the basis of interviews conducted in the

community of San Luis. Several land grants were issued (as discussed above) between 1821 and 1863 encouraging settlement in the area. San Luis, the oldest surviving town in Colorado, was founded in 1851 in what was then part of New Mexico. Although this is after the period of significance of the Old Spanish Trail (1829–1849), permanent settlement of the area in the 1840s was evident prior to the official founding of this town. Acequias (irrigation canals) were established in the permanent settlements in the valley to create common watershed areas and represent the oldest water rights in Colorado. When asked why the valley was selected for Hispanic settlement, it was stated that the valley was attractive for grazing and agriculture; a number of plants and animals were identified in the study as traditionally harvested or hunted. Interviews identified key locations of significance within the San Luis Valley, such as Mt. Blanca (Blanca Peak), Culebra Mountains, La Vega, Fort Massachusetts, Taylor Ranch, the San Luis estate, several hot springs (Ojo Caliente, Mineral Hot Springs, Indian Springs), and trails, such as the California Trail and Jacale Road (where the jacales, or earliest adobe homes in the area, were built). Concerns about the Old Spanish Trail included a fear of damage from visitors, especially from vehicles, and a desire to keep portions of the Trail a secret from outsiders to protect it (Stoffle et al. 2008).

- Trujillo Homestead was designated a National Historic Landmark in January 2012. It encompasses approximately 35 acres (0.14 km^2) of land about 15 mi (24 km) north of the Fourmile East SEZ and consists of two nineteenth-century Hispanic ranch properties: the Teofilo and Adrellita Homestead dating to 1865 and the Pedro and Sofia Trujillo Homestead dating to 1879. The homesteads consist of two discontiguous pieces of land with two standing buildings, one structure, and concentrations of historic debris associated with the homesteads. The sites were designated a landmark because they are representative of the movement of Hispanic Americans into the northern frontier and offer important information on early livestock economy, ethnic and racial conflicts, and settlement and subsistence patterns, as well as assimilation efforts of early Hispanic Americans (DOI 2012; Simmons and Simmons 2003).

- Additional information may be available to characterize the SEZ and its surrounding area in the future (after the Final Solar PEIS is completed), as follows:
  - Results of an ethnographic study currently being conducted by TRC Solutions, which focuses on Native American use of lands being analyzed for solar development within the San Luis Valley. The study will discuss sensitive and traditional use areas. Interviews with tribal members and field visits will facilitate the identification of resources and sites of traditional and religious importance to tribes.
  - Results of a Class II sample survey of the SEZ designed to obtain a statistically valid sample of archeological properties and their distribution within the SEZ. Results from the ethnographic study and the sample

inventory can be combined to project cultural sensitivity zones as an aid in planning future solar developments. Identification of the integrity and historical significance of the portion of the West Fork of the North Branch of the Old Spanish Trail in the vicinity of the SEZ, and viewshed analyses from key observation points along the Trail. If this portion of the Trail is determined significant, a mitigation strategy would need to be developed to address unavoidable impacts on the Trail.

– Continuation of government-to-government consultation as described in Section 2.4.3 of the Supplement to the Draft Solar PEIS and IM 2012-032 (BLM 2011b), including follow-up to recent ethnographic studies covering some SEZs in Nevada and Utah with tribes not included in the original studies to determine whether those tribes have similar concerns.

10.1.17.2 Impacts

Impacts on significant cultural resources are possible in the proposed Antonito Southeast SEZ. 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. 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. Visual impacts are likely on the CTSR ACEC; however, the general area is not pristine and significant development is already present in the area. The assessment provided in the Draft Solar PEIS remains valid with the following update:

- Impacts on significant cultural resources and cultural landscapes associated with American Latino heritage are possible throughout the San Luis Valley.

10.1.17.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on cultural resources are described in Section A.2.2. of Appendix A of this Final Solar PEIS. Programmatic design features will be applied to address SEZ-specific resources and conditions, for example:

- 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 on resources, qualities, values, and associated settings of the Trail; to prevent substantial interference; and to determine any areas unsuitable for development. Residual impacts will be avoided, minimized, and/or mitigated to the extent practicable according to program policy standards. Programmatic design features have been included in BLM's Solar Energy Program to address impacts in National Historic Trails (see Section A.2.2.23 of Appendix A).

Programmatic design features also assume that the necessary surveys, evaluations, and consultations will occur. Ongoing consultation with the Colorado State Historic Preservation Office (SHPO) and the appropriate Native American governments would be conducted during the development of the proposed Antonito Southeast SEZ. It is likely that adverse effects on significant resources in the valley could be mitigated to some degree through such efforts, although not enough to eliminate the adverse effects unless a significant resource is avoided entirely.

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, the following SEZ-specific design features have been identified:

- Development of a Memorandum of Agreement (MOA) may be needed among the BLM, Colorado SHPO, and other parties, such as the Advisory Council on Historic Preservation (ACHP) to address the adverse effects of solar energy development on historic properties. The agreement may specify avoidance, minimization, and/or mitigation measures. Should an MOA be developed to resolve adverse effects on the Old Spanish National Historic Trail or the West Fork of the North Branch of the Old Spanish Trail, the Trail Administration for the Old Spanish Trail (BLM-NMSO and NPS Intermountain Trails Office, Santa Fe) should be included in the development of that MOA.

- Additional coordination with the CTSR Commission is recommended to address possible mitigation measures for reducing visual impacts on the railroad.

The need for and nature of additional SEZ-specific design features will be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

10.1.18 Native American Concerns

10.1.18.1 Affected Environment

Data provided in the Draft Solar PEIS remain valid but will be supplemented in the future by the results of the ethnographic study being completed in the San Luis Valley (see Section 10.1.17.1).

10.1.18.2 Impacts

The description of potential concerns provided in the Draft Solar PEIS remains valid. No direct impacts from solar energy development are likely to occur to known culturally significant areas (i.e., San Luis Lakes, the Great Sand Dunes, and Blanca Peak); however,

indirect visual and auditory impacts are possible. It is likely that traditional plant resources and animal habitats would be directly affected with solar energy development in the proposed Antonito Southeast SEZ.

10.1.18.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on Native American concerns are described in Section A.2.2. of Appendix A of this Final Solar PEIS. For example, impacts would be minimized through the avoidance of sacred sites, water sources, and tribally important plant and animal species. Programmatic design features require that the necessary surveys, evaluations, and consultations would occur. The tribes would be notified regarding the results of archaeological surveys, and they would be contacted immediately upon any discovery of Native American human remains and associated cultural items.

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, no SEZ-specific design features to address Native American concerns have been identified. The need for and nature of SEZ-specific design features would be determined during government-to-government consultation with affected tribes, as part of the process of preparing parcels for competitive offer and subsequent project-specific analysis. Potentially significant sites and landscapes in the vicinity of the SEZ associated with Blanca Peak, Great Sand Dunes, and San Luis Lakes, as well as trail systems, mountain springs, mineral resources, burial sites, ceremonial areas, water resources, and plant and animal resources, should be considered and discussed during consultation.

10.1.19 Socioeconomics

10.1.19.1 Affected Environment

The developable area of the proposed Antonito Southeast SEZ has changed by less than 1%. The socioeconomic region of influence (ROI), the area in which site employees would live and spend their wages and salaries, and into which any in-migration would occur, includes the same counties and communities as described in the Draft Solar PEIS, meaning that no updates to the affected environment information given in the Draft Solar PEIS are required.

10.1.19.2 Impacts

Socioeconomic resources in the ROI around the SEZ could be affected by solar energy development through the creation of direct and indirect employment and income, the generation of direct sales and income taxes, SEZ acreage rental and capacity payments to BLM, the in-migration of solar facility workers and their families, and impacts on local housing markets and on local community service employment. Since the boundaries of the proposed Antonito Southeast SEZ remain unchanged and the reduction of the developable area was small (less

than 1%), the impacts for full build-out of the SEZ estimated in the Draft Solar PEIS remain essentially unchanged. During construction, between 218 and 2,885 jobs and between $11.6 million and $154 million in income could be associated with solar development in the SEZ. During operations at full build-out, between 24 and 529 jobs and between $0.7 million and $16.6 million in income could be produced. In-migration of workers and their families would mean between 48 and 631 rental housing units would be needed during construction, and between 7 and 134 owner-occupied units during operations.

10.1.19.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce socioeconomic impacts are described in Section A.2.2. of Appendix A of this Final Solar PEIS. Implementing the programmatic design features will reduce the potential for socioeconomic impacts during all project phases.

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, no SEZ-specific design features to address socioeconomic impacts have been identified. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

10.1.20 Environmental Justice

10.1.20.1 Affected Environment

The data presented in the Draft Solar PEIS for the proposed Antonito Southeast SEZ have not changed substantially. While there are minority populations in the Colorado or New Mexico portions of the 50-mi (80-km) radius of the SEZ taken as a whole, there are no low-income populations in this area (as a whole).

In the Colorado portion of the 50-mi (80-km) radius, more than 50% of the population in all but one of the block groups in Conejos County consists of minority population groups, together with all the block groups in adjacent Costilla County. Block groups in the cities of Alamosa (Alamosa County), Monte Vista, and Del Norte (both in Rio Grande County) are also more than 50% minority. In the New Mexico portion of the radius, Rio Arriba County has three block groups in which the minority population is more than 20 percentage points higher than the state average and one block group that is more than 50% minority. Taos County has six block groups with more than 50% minority, and five block groups in the vicinity of the City of Taos (Taos County) have minority populations that are 20 percentage points higher than the state average.

Low-income populations in the 50-mi (80-km) radius are limited to two block groups in the Colorado portion in the cities of San Luis (Costilla County) and Alamosa, both of which have low-income population shares that are more than 20 percentage points higher than the state

average. Figure 10.1.20.1-1 shows the locations of the low-income population groups within the 50-mi (80-km) radius of the SEZ.

10.1.20.2 Impacts

Potential impacts (e.g., from noise and dust during construction and operations, visual impacts, cultural impacts, and effects on property values) on low-income and minority populations could be incurred as a result of the construction and operation of solar facilities involving each of the four technologies. Although impacts are likely to be small, there are minority populations defined by Council on Environmental Quality (CEQ) guidelines (CEQ 1997) (see Section 10.1.20.1 of the Draft Solar PEIS) within the 50-mi (80-km) radius around the boundary of the SEZ. This means that any adverse impacts of solar projects could disproportionately affect minority populations. Further analysis of these impacts would be included in subsequent National Environmental Policy Act of 1969 (NEPA) reviews of individual solar projects. Because there are no low-income populations within the 50-mi (80-km) radius as a whole, there would not be impacts on low-income populations.

10.1.20.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce potential environmental justice impacts are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the programmatic design features will reduce the potential for environmental justice impacts.

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, no SEZ-specific design features for environmental justice have been identified. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

10.1.21 Transportation

10.1.21.1 Affected Environment

The reduction in developable area of the proposed Antonito Southeast SEZ of less than 1% does not change the information on affected environment for transportation provided in the Draft Solar PEIS.

10.1.21.2 Impacts

As stated in the Draft Solar PEIS, the primary transportation impacts are anticipated to be from commuting worker traffic. U.S. 285 provides a regional traffic corridor that could

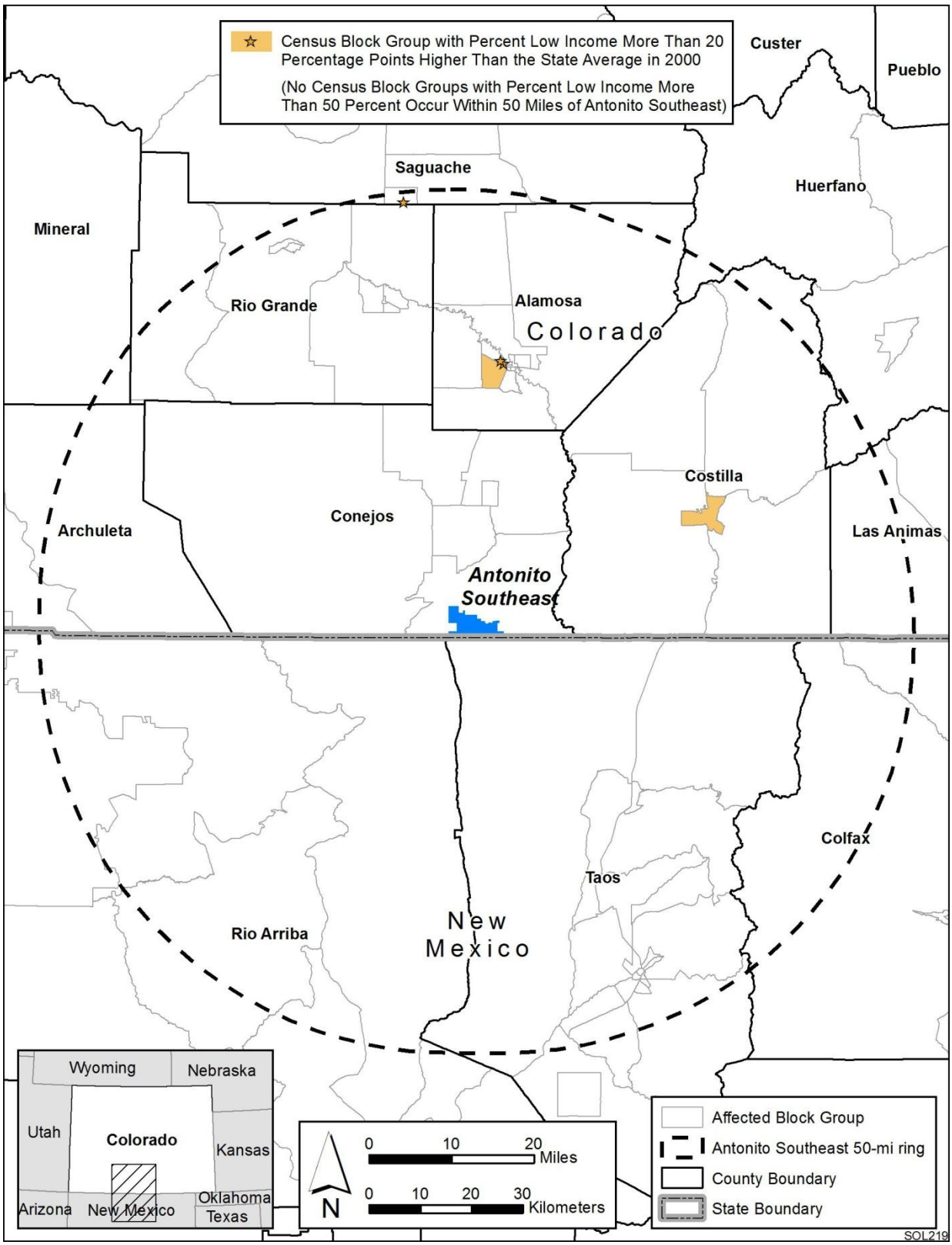


FIGURE 10.1.20.1-1 Low-Income Populations within the 50-mi (80-km) Radius Surrounding the Proposed Antonito Southwest SEZ as Revised

experience moderate impacts for single projects that may have up to 1,000 daily workers with an additional 2,000 vehicle trips per day (maximum), an increase nearly twice the current annual average daily traffic (AADT) value for this route. In addition, local road improvements would be necessary in any portion of the SEZ that might be developed so as not to overwhelm the local roads near any site access point(s).

Solar development within the SEZ would affect public access along off-highway vehicle (OHV) routes that are designated open and available for public use. Although open routes crossing areas granted rights-of-way (ROWs) for solar facilities could be redesignated as closed (see Section 5.5.1 of the Draft Solar PEIS), a programmatic design feature has been included under Recreation (Section A.2.2.6.1 of Appendix A) that requires consideration of replacement of lost OHV route acreage and of access across and to public lands.

10.1.21.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce transportation impacts are described in Section A.2.2. of Appendix A of this Final Solar PEIS. The programmatic design features, including local road improvements, multiple site access locations, staggered work schedules, and ride-sharing, will all provide some relief to traffic congestion on local roads leading to the SEZ. Depending on the location of solar facilities within the SEZ, more specific access locations and local road improvements could be implemented.

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, no SEZ-specific design features to address transportation have been identified. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

10.1.22 Cumulative Impacts

The analysis of potential impacts in the vicinity of the proposed Antonito Southeast SEZ presented in the Draft Solar PEIS is still generally applicable for this Final Solar PEIS. The following sections include an update to the information presented in the Draft Solar PEIS regarding cumulative effects for the proposed Antonito Southeast SEZ.

10.1.22.1 Geographic Extent of the Cumulative Impact Analysis

The geographic extent of the cumulative impact analysis has not changed. The extent varies on the basis of the nature of the resource being evaluated and the distance at which an impact may occur (thus, e.g., air quality impacts may have a greater regional extent than visual resource impacts). Lands around the SEZ are privately owned, administered by the U.S. Forest Service (USFS), or administered by the BLM. The BLM administers approximately 11% of the lands within a 50-mi (80-km) radius of the SEZ.

10.1.22.2 Overview of Ongoing and Reasonably Foreseeable Future Actions

The Draft Solar PEIS included three other proposed SEZs in Colorado: Fourmile East, DeTilla Gulch, and Los Mogotes East. All of these proposed SEZs are being carried forward to the Final Solar PEIS; the areas of the De Tilla Gulch, Fourmile East, and Los Mogotes East SEZs have been decreased.

The ongoing and reasonably foreseeable future actions described below are grouped into two categories: (1) actions that relate to energy production and distribution 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 10.1.22.2.2). 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.

10.1.22.2.1 Energy Production and Distribution

The list of reasonably foreseeable future actions near the proposed Antonito Southeast SEZ has been updated and is presented in Table 10.1.22.2-1. Projects listed in the table are shown in Figure 10.1.22.2-1.

Xcel Energy (Public Service Company of Colorado) has submitted a transmission planning report to the Colorado Public Utility Commission stating that it intends to end its involvement in the proposed San Luis Valley–Calumet-Comanche Transmission Project (Heide 2011). The project itself has not been cancelled.

10.1.22.2.2 Other Actions

None of the major ongoing and foreseeable actions within 50 mi (80 km) of the proposed Antonito Southeast SEZ that were listed in Table 10.1.22.2-3 of the Draft Solar PEIS have had a change in their status. An additional mining and mineral processing activity is the Taos Gravel Products Torres Pit, a subsurface sand and gravel products mining activity in Taos County, New Mexico, approximately 35 mi (56 km) south of the SEZ. The existing Torres Pit occupies 51 acres (0.21 km^2), and it is proposed to extend the mining operation on 84 acres (0.34 km^2), all privately owned land. Water is used only for fugitive dust control and is provided by an on-site well (BLM 2011c).

10.1.22.3 General Trends

The information on general trends presented in the Draft Solar PEIS remains valid.

TABLE 10.1.22.2-1 Ongoing and Reasonably Foreseeable Future Actions Related to Energy Development and Distribution near the Proposed Antonito Southeast SEZ and in the San Luis Valley[a]

Description	Status	Resources Affected	Primary Impact Location
Renewable Energy Development			
San Luis Valley Generation Development Area (GDA) (Solar) Designation	Ongoing	Land use	San Luis Valley
Xcel Energy/SunEdison Project, 8.2-MW PV	**Operating**	Land use, ecological resources, visual	San Luis Valley GDA
San Luis Valley Solar Ranch (formerly Alamosa Solar Generating Project), 30-MW PV	**Operating[b]**	Land use, ecological resources, visual	San Luis Valley GDA
Greater Sandhill Solar Project, 9-MW PV	**Operating[b]**	Land use, ecological resources, visual	San Luis Valley GDA
San Luis Valley Solar Project, Tessera Solar, 200-MW dish engine, **changed to 145 MW, 1,500 acres**[c,d]	**New proposal[d]**	Land use, ecological resources, visual, cultural	San Luis Valley GDA
Solar Reserve, 200-MW solar tower	**Application submitted for land use permit[e]**	Land use, ecological resources, visual	San Luis Valley GDA (Saguache)
Alamosa Solar Generating Project (formerly Cogentrix Solar Services), 30-MW high-concentration PV	**Under construction**	Land use, ecological resources, visual	San Luis Valley GDA
Lincoln Renewables, 37-MW PV	County permit approved	Land use, ecological resources, visual	San Luis Valley GDA
NextEra, 30-MW PV	County permit approved	Land use, ecological resources, visual	San Luis Valley GDA
Transmission and Distribution Systems			
San Luis Valley–Calumet-Comanche Transmission Project	**Proposed[f]**	Land use, ecological resources, visual, cultural	San Luis Valley (select counties)

[a] Projects with status changed from that given in the Draft Solar PEIS are shown in bold text.

[b] See SEIA (2012) for details.

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

[d] See Solar Feeds (2012) for details.

[e] See Tetra Tech EC, Inc. (2011), for details.

[f] See Heide (2011) for details.

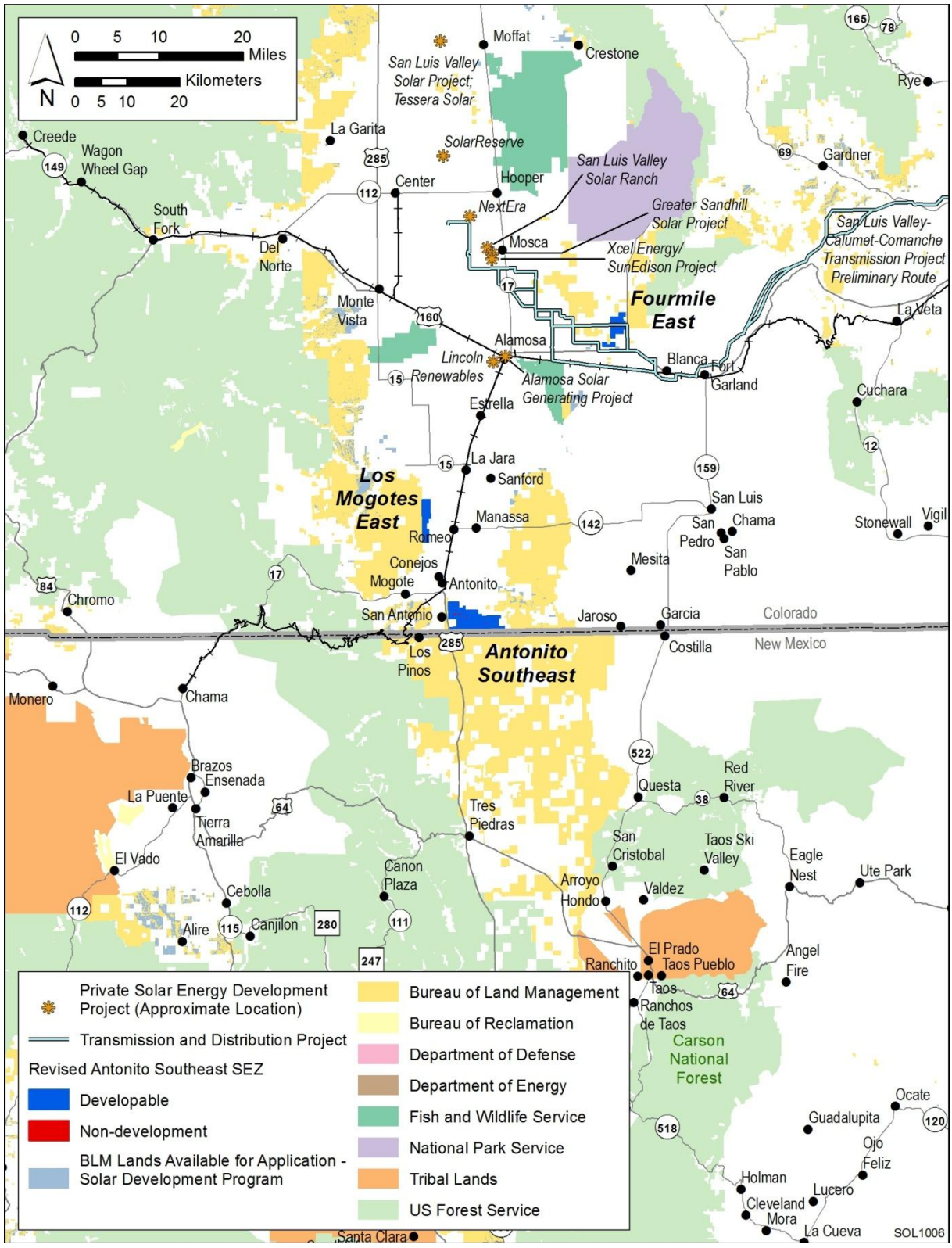


FIGURE 10.1.22.2-1 Locations of Existing and Reasonably Foreseeable Renewable Energy Projects on Public Land within a 50-mi (80-km) Radius of the Proposed Antonito Southeast SEZ as Revised

10.1.22.4 Cumulative Impacts on Resources

Total disturbance over 20 years in the proposed Antonito Southeast SEZ is assumed to be about 7,700 acres (31.2 km^2), or 80% of the entire proposed SEZ. This development would contribute incrementally to the impacts from other past, present, and reasonably foreseeable future actions in the region as described in the Draft Solar PEIS. Primary impacts from development in the Antonito Southeast SEZ may include impacts on water quantity and quality, air quality, ecological resources such as habitat and species, cultural and visual resources, and specially designated lands.

One additional project, the expansion of the Torres Gravel Pit, has been identified within 50 mi (80 km) of the SEZ. As a result of the reduction in the developable areas of the nearby Los Mogotes East and Fourmile East SEZs, the incremental cumulative impacts associated with development in the proposed Antonito Southeast SEZ during construction, operation, and decommissioning are expected to be the same or less than those projected in the Draft Solar PEIS.

On the basis of comments received on the Draft Solar PEIS, cumulative impacts on recreation in the San Luis Valley have been reconsidered. While it is unlikely that the Antonito Southeast SEZ individually would have a large impact on recreation and tourism throughout the valley, cumulative impacts on the overall tourism and recreation environment of the area could be significant, because it is one of four proposed SEZs totaling about 16,300 acres (66 km^2) on public lands and there is additional solar energy development on private lands. Because most of the land on the valley floor of the San Luis Valley is private and heavily developed for agricultural use, undeveloped public lands around the valley provide accessible areas for public recreation. Although it is believed the recreational use of the proposed SEZ is low, the loss of public access to such areas cumulatively leads to an overall reduction in the availability of recreation that can become significant.

10.1.23 Transmission Analysis

The methodology for this transmission analysis is described in Appendix G of this Final Solar PEIS. This section presents the results of the transmission analysis for the Antonito Southeast SEZ, including the identification of potential load areas to be served by power generated at the SEZ and the results of the dedicated-line-transmission (DLT) analysis. Unlike Sections 10.1.2 through 10.1.22, this section is not an update of previous analysis for the Antonito Southeast SEZ; this analysis was not presented in the Draft Solar PEIS. However, the methodology and a test case analysis were presented in the Supplement to the Draft Solar PEIS. Comments received on the material presented in the Supplement were used to improve the methodology for the assessment presented in this Final Solar PEIS.

On the basis of its size, the assumption of a minimum of 5 acres (0.02 km^2) of land required per MW, and the assumption of a maximum of 80% of the land area developed, the Antonito Southeast SEZ is estimated to have the potential to generate 1,554 MW of marketable solar power at full build-out.

10.1.23.1 Identification and Characterization of Load Areas

The primary candidates for Antonito Southeast SEZ load areas are the major surrounding cities. Figure 10.1.23.1-1 shows the possible load areas for the Antonito Southeast SEZ and the estimated portion of their market that could be served by solar generation. Possible load areas for the Antonito Southeast SEZ include Pueblo, Colorado Springs, and Denver, Colorado; Farmington, Albuquerque, and Santa Fe, New Mexico; Salt Lake City, Utah; Phoenix, Arizona; and Las Vegas, Nevada.

The two load area groups examined for the Antonito Southeast SEZ are as follows:

1. Pueblo, Colorado Springs, and Denver, Colorado; and

2. Farmington and Albuquerque, New Mexico; Salt Lake City, Utah; and Phoenix, Arizona.

Figure 10.1.23.1-2 shows the most economically viable transmission scheme for the Antonito Southeast SEZ (transmission scheme 1), and Figure 10.1.23.1-3 shows an alternative transmission scheme (transmission scheme 2) that represents a logical choice should transmission scheme 1 be infeasible. As described in Appendix G, the alternative shown in

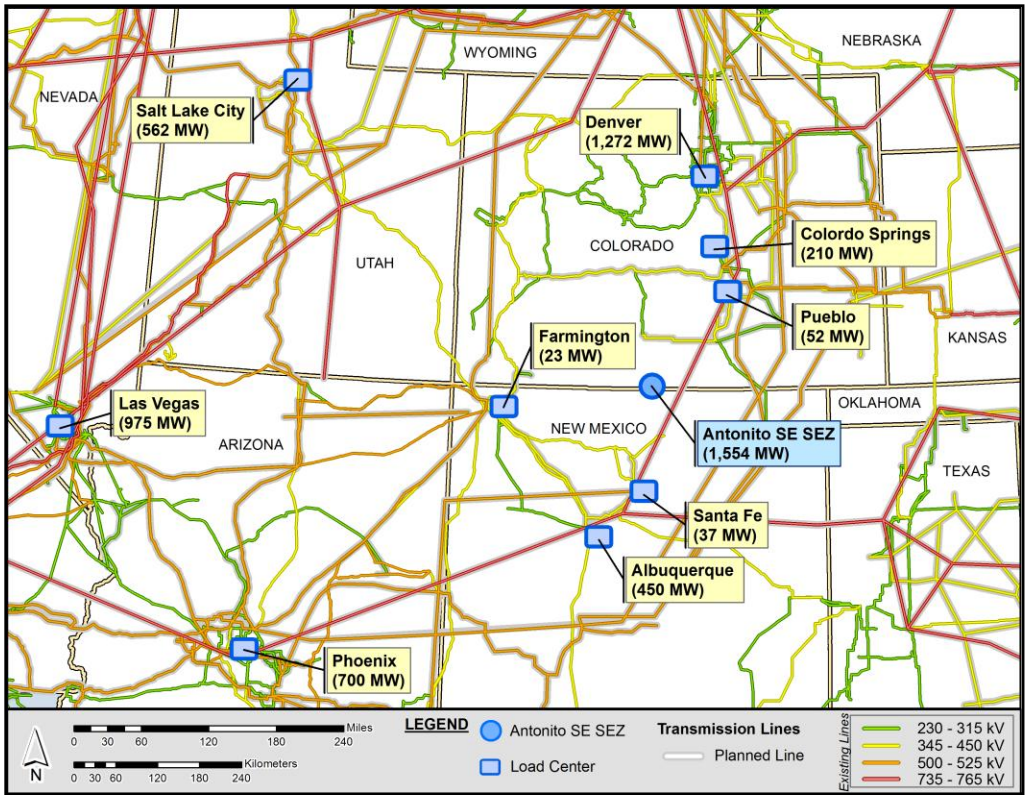


FIGURE 10.1.23.1-1 Location of the Proposed Antonito Southeast SEZ and Possible Load Areas (Source for background map: Platts 2011)

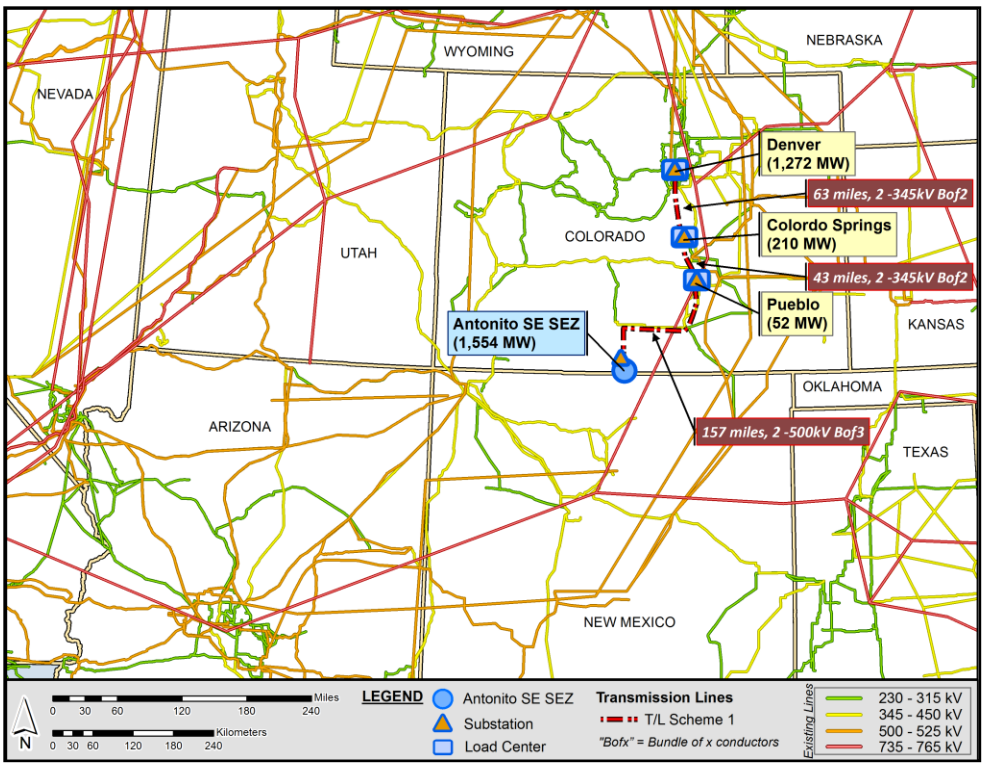


FIGURE 10.1.23.1-2 Transmission Scheme 1 for the Proposed Antonito Southeast SEZ (Source for background map: Platts 2011)

transmission scheme 2 represents the optimum choice if one or more of the primary linkages in transmission scheme 1 are excluded from consideration. The groups provide for linking loads along alternative routes so that the SEZ's output of 1,554 MW could be fully allocated.

Table 10.1.23.1-1 summarizes and groups the load areas according to their associated transmission scheme and provides details on how the megawatt load for each area was estimated.

10.1.23.2 Findings for the DLT Analysis

The DLT analysis approach assumes that the Antonito Southeast SEZ will require all new construction for transmission lines (i.e., dedicated lines) and substations. The new transmission lines(s) would be designed to be able to directly convey the 1,554-MW output of the Antonito Southeast SEZ to the prospective load areas for each possible transmission scheme. Note that the combined solar market for the Pueblo, Colorado Springs, and Denver region during the initial year is only about 1,534 MW (or about 20 MW short of the SEZ's maximum output). However, the total load of the region is projected to grow to 1,559 MW by the second year of the study period, assuming a population load growth of 2% a year. Thus by the second year, the Denver region should be able to absorb all of the SEZ's maximum power output. The approach also assumes that all existing transmission lines in the Western Electricity Coordinating Council

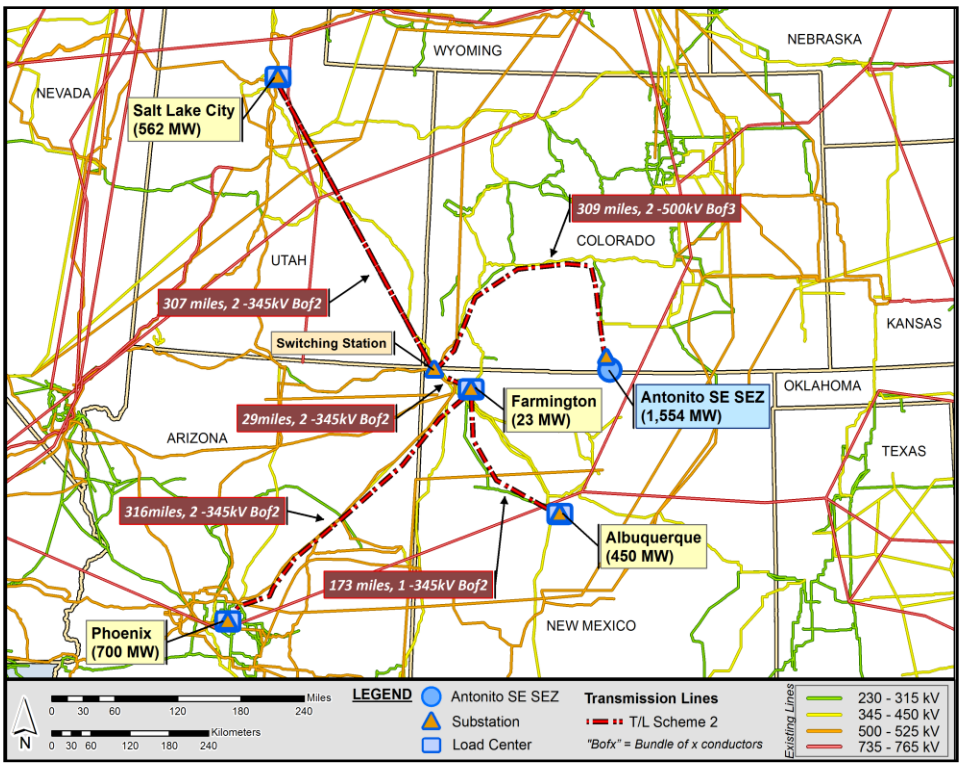


FIGURE 10.1.23.1-3 Transmission Scheme 2 for the Proposed Antonito Southeast SEZ (Source for background map: Platts 2011)

TABLE 10.1.23.1-1 Candidate Load Area Characteristics for the Proposed Antonito Southeast SEZ

Transmission Scheme	City/Load Area Name	Position Relative to SEZ	2010 Population[c]	Estimated Total Peak Load (MW)	Estimated Peak Solar Market (MW)
1	Pueblo, Colorado[a]	North	105,000	262	52
	Colorado Springs, Colorado[a]	North	420,000	1,050	210
	Denver, Colorado[b]	North	2,543,000	6,358	1,272
2	Farmington, New Mexico[a]	Southwest	46,000	115	23
	Albuquerque, New Mexico[b]	South	908,000	2,269	450
	Salt Lake City, Utah[b]	Northwest	1,124,000	2,810	562
	Phoenix, Arizona[a]	Southwest	1,400,000	3,616	700

[a] The load area represents the city named.

[b] The load area represents the metropolitan area (i.e., the identified city plus adjacent communities).

[c] City and metropolitan area population data are from 2010 Census data (U.S. Bureau of the Census 2010).

(WECC) region are saturated and have little or no available capacity to accommodate the SEZ's output throughout the entire 10-year study horizon.

Figures 10.1.23.1-2 and 10.1.23.1-3 display the pathways that new dedicated lines might follow to distribute solar power generated at the Antonio Southeast SEZ via the two identified transmission schemes described in Table 10.1.23.1-1. These pathways parallel existing 500-, 345-, 230-kV, and/or lower voltage lines. The intent of following existing lines is to avoid pathways that may be infeasible due to topographical limitations or other concerns.

For transmission scheme 1, serving load centers to the north, a new line would be constructed to connect with Pueblo (52 MW), Colorado Springs (210 MW), and Denver (1,272 MW), so that the 1,554-MW output of the Antonio Southeast SEZ could be fully utilized by the second year of the study based on nominal anticipated load growth as noted above. This particular scheme has three segments. The first segment extends about 157 mi (253 km) northeast to Pueblo. To efficiently convey the full SEZ output of 1,554 MW over this segment, a double-circuit 500-kV line (2–500 kV) bundle of three conductors (Bof3) would be required. The second segment, from Pueblo to Colorado Springs, is about 43 mi (69 km) long. The third and last segment, from Colorado Springs to Denver, is about 63 mi (101 km) long. In general, the transmission configuration options for each leg, or segment, may vary and were determined by using the line "loadability" curve provided in American Electric Power's *Transmission Facts* (AEP 2010). Appendix G documents the line options used for this analysis and describes how the load area groupings were determined.

For transmission scheme 2, primarily serving load centers to the southwest and northwest, new lines would be constructed to connect with Farmington (23 MW), Albuquerque (450 MW), Phoenix (700 MW), and Salt Lake City (562 MW). The scheme assumes that marketing power to nearby Denver, Pueblo, and Colorado Springs is no longer feasible. The alternate scheme has five segments. The length and transmission line configurations associated with each segment are shown in Figure 10.1.23.1-3.

Table 10.1.23.2-1 summarizes the distances to the various load areas over which new transmission lines would need to be constructed, as well as the assumed number of substations that would be required. One substation is assumed to be installed at each load area and an additional one at the SEZ. Thus, in general, the total number of substations per scheme is simply equal to the number of load areas associated with the scheme plus one. Substations at the load areas would consist of one or more step-down transformers, while the originating substation at the SEZ would consist of several step-up transformers. For schemes that require the branching of the lines, a switching substation is assumed to be constructed at the appropriate junction. In general, switching stations carry no local load but are assumed to be equipped with switching gears (e.g., circuit breakers and connecting switches) to reroute power as well as, in some cases, with additional equipment to regulate voltage. The originating substation would have a combined substation rating of at least 1,554 MW (to match the plant's output), while the combined load substations would have a similar total rating of 1,554 MW.

Table 10.1.23.2-2 provides an estimate of the total land area disturbed for construction of new transmission facilities under each of the schemes evaluated. The most favorable

TABLE 10.1.23.2-1 Potential Transmission Schemes, Estimated Solar Markets, and Distances to Load Areas for the Proposed Antonito Southeast SEZ

Transmission Scheme	City/Load Area Name	Estimated Peak Solar Market (MW)[c]	Total Solar Market (MW)	Sequential Distance (mi)[d]	Total Distance (mi)[d]	Line Voltage (kV)	No. of Substations
1	Pueblo, Colorado[a]	52	1,534	157	263	500,	4
	Colorado Springs, Colorado[a]	210		43		345	
	Denver, Colorado[b]	1,272		63			
2	Switching Station	0	1,735	309	1,134	500,	6
	Farmington, New Mexico[a]	23		29		345	
	Albuquerque, New Mexico[b]	450		173			
	Salt Lake City, Utah[b]	562		307			
	Phoenix, Arizona[a]	700		316			

[a] The load area represents the city named.

[b] The load area represents the metropolitan area (i.e., the identified city plus adjacent communities).

[c] From Table 10.1.23.1-1.

[d] To convert mi to km, multiply by 1.6093.

TABLE 10.1.23.2-2 Comparison of the Various Transmission Line Configurations with Respect to Land Use Requirements for the Proposed Antonito Southeast SEZ

Transmission Scheme	City/Load Area Name	Total Distance (mi)[c]	No. of Substations	Land Use (acres)[d]		
				Transmission Line	Substation	Total
1	Pueblo, Colorado[a] Colorado Springs, Colorado[a] Denver, Colorado[b]	263	4	6,054.5	37.3	6,091.8
2	Switching Station Farmington, New Mexico[a] Albuquerque, New Mexico[b] Salt Lake City, Utah[b] Phoenix, Arizona[a]	1,134	6	24,990.9	74.6	25,065.5

[a] The load area represents the city named.

[b] The load area represents the metropolitan area (i.e., the identified city plus adjacent communities).

[c] To convert mi to km, multiply by 1.6093.

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

transmission scheme with respect to minimizing the costs and area disturbed would be scheme 1, which would serve the Pueblo, Colorado Springs, and Denver markets and for which the construction of new transmission lines and substations is estimated to disturb about 6,092 acres (24.7 km^2) of land. The less favorable transmission scheme with respect to minimizing the costs and area disturbed would be scheme 2. For scheme 2, the construction of new transmission lines and substations is estimated to disturb a land area on the order of 25,066 acres (101.4 km^2).

Table 10.1.23.2-3 shows the estimated net present value (NPV) of both transmission schemes and takes into account the cost of constructing the lines, the substations, and the projected revenue stream over the 10-year horizon. A positive NPV indicates that revenues more than offset investments. This calculation does not include the cost of producing electricity.

The most economically attractive configuration (transmission scheme 1) has the highest positive NPV and serves the Colorado cities of Pueblo, Colorado Springs, and Denver. The secondary case (transmission scheme 2), which excludes one or more of the primary pathways used in scheme 1, is less economically attractive and focuses on delivering power to the cities of Farmington, Albuquerque, Phoenix, and Salt Lake City.

Table 10.1.23.2-4 shows the effect of varying the value of the utilization factor on the NPV of the transmission schemes. The table shows that at about 40% utilization, the NPVs for both schemes are positive. It also shows that as the utilization factor is increased, the economic viability of the lines also increases. Utilization factors can be raised by allowing the new dedicated lines to market other power generation outputs in the region in addition to that of its associated SEZ.

TABLE 10.1.23.2-3 Comparison of Potential Transmission Lines with Respect to NPV (Base Case) for the Proposed Antonito Southeast SEZ

Transmission Scheme	City/Load Area Name	Present Value Transmission Line Cost ($ million)	Present Value Substation Cost ($ million)	Annual Sales Revenue ($ million)	Present Worth of Revenue Stream ($ million)	NPV ($ million)
1	Pueblo, Colorado[a] Colorado Springs, Colorado[a] Denver, Colorado[b]	951.9	102.6	272.3	2,102.3	1,047.9
2	Switching Station Farmington, New Mexico[a] Albuquerque, New Mexico[b] Salt Lake City, Utah[b]	3,362.5	205.1	272.3	2,102.3	–1,465.3

[a] The load area represents the city named.

[b] The load area represents the metropolitan area (i.e., the identified city plus adjacent communities).

TABLE 10.1.23.2-4 Effect of Varying the Utilization Factor on the NPV of the Transmission Schemes for the Proposed Antonito Southeast SEZ

Transmission Scheme	City/Load Area Name	NPV ($ million) at Different Utilization Factors					
		20%	30%	40%	50%	60%	70%
1	Pueblo, Colorado[a] Colorado Springs, Colorado[a] Denver, Colorado[b]	1,047.9	2,099.0	3,150.2	4,201.4	5,252.5	6,303.7
2	Switching Station Farmington, New Mexico[a] Albuquerque, New Mexico[b] Salt Lake City, Utah[b] Phoenix, Arizona[a]	–1,465.3	–414.1	637.0	1,688.2	2.739.4	3,790.5

[a] The load area represents the city named.

[b] The load area represents the metropolitan area (i.e., the identified city plus adjacent communities).

The findings of the DLT analysis for the proposed Antonito Southeast SEZ are as follows:

- Transmission scheme 1, which identifies the cities of Pueblo, Colorado Springs, and Denver (in that specific sequence) as the primary markets, represents the most favorable option based on NPV and land use requirements. This scheme would result in new land disturbance of about 6,092 acres (24.7 km^2).

- Transmission scheme 2 represents an alternative configuration in which electricity would be marketed to the geographically dispersed load areas of Farmington, Albuquerque, Salt Lake City, and Phoenix, but would result in a considerably lower NPV and greater amounts of new land disturbance, on the order of 25,066 acres (101.4 km^2).

- Other load area configurations are possible but would be less favorable than scheme 1 in terms of NPV and, in most cases, also in terms of land use requirements. If new electricity generation at the proposed Antonito Southeast SEZ is not sent to either of the two markets identified above, the potential upper-bound impacts in terms of cost would be greater.

- The analysis of transmission requirements for the proposed Antonito Southeast SEZ would be expected to show lower costs and less land disturbance if solar-eligible load assumptions were increased, although the magnitude of those changes would vary due to a number of factors. In general, for cases such as the Antonito Southeast SEZ that show multiple load areas

being served to accommodate the specified capacity, the estimated costs and land disturbance would be affected by increasing the solar-eligible load assumption. By increasing the eligible loads at all load areas, the transmission routing and configuration solutions can take advantage of shorter line distances and deliveries to fewer load areas, thus reducing costs and land disturbed. In general, SEZs that show the greatest number of load areas served and greatest distances required for new transmission lines (e.g., Riverside East) would show the greatest decrease in impacts as a result of increasing the solar-eligible load assumption from 20% to a higher percentage.

10.1.24 Impacts of the Withdrawal

The BLM is proposing to withdraw 9,729 acres (39 km^2) of public land comprising the proposed Antonito Southeast SEZ from settlement, sale, location, or entry under the general land laws, including the mining laws, for a period of 20 years (see Section 2.2.2.2.4 of the Final Solar PEIS). The public lands would be withdrawn, subject to valid existing rights, from settlement, sale, location, or entry under the general land laws, including the mining laws. This means that the lands could not be appropriated, sold, or exchanged during the term of the withdrawal, and new mining claims could not be filed on the withdrawn lands. Mining claims filed prior to the segregation or withdrawal of the identified lands would take precedence over future solar energy development. The withdrawn lands would remain open to the mineral leasing, geothermal leasing, and mineral material laws, and the BLM could elect to lease the oil, gas, coal, or geothermal steam resources, or to sell common-variety mineral materials, such as sand and gravel, contained in the withdrawn lands. In addition, the BLM would retain the discretion to authorize linear and renewable energy ROWs on the withdrawn lands.

The purpose of the proposed land withdrawal is to minimize the potential for conflicts between mineral development and solar energy development for the proposed 20-year withdrawal period. Under the land withdrawal, there would be no mining-related surface development, such as the establishment of open pit mining, construction of roads for hauling materials, extraction of ores from tunnels or adits, or construction of facilities to process the material mined, that could preclude use of the SEZ for solar energy development. For the Antonito Southeast SEZ, the impacts of the proposed withdrawal on mineral resources and related economic activity and employment are expected to be negligible because the mineral potential of the lands within the SEZ is low (BLM 2012). There has been no documented mining within the SEZ, and there are no known locatable mineral deposits within the land withdrawal area. According to the Legacy Rehost 2000 System (LR2000) (accessed in January 2012), there are no recorded mining claims within the land withdrawal area.

Although the mineral potential of the lands within the Antonito Southeast SEZ is low, the proposed withdrawal of lands within the SEZ would preclude many types of mining activity over a 20-year period, resulting in the avoidance of potential mining-related adverse impacts. Impacts commonly related to mining development include increased soil erosion and sedimentation, water use, generation of contaminated water in need of treatment, creation of lagoons and ponds (hazardous to wildlife), toxic runoff, air pollution, establishment of noxious weeds and invasive

species, habitat destruction or fragmentation, disturbance of wildlife, blockage of migration corridors, increased visual contrast, noise, destruction of cultural artifacts and fossils and/or their context, disruption of landscapes and sacred places of interest to tribes, increased traffic and related emissions, and conflicts with other land uses (e.g., recreational).

10.1.25 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 Final Solar PEIS. It is likely that at the time of publication of this Final Solar PEIS, some of these Web pages may no longer be available or the URL addresses may have changed. The original information has been retained and is available through the Public Information Docket for this Final Solar PEIS.

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10.1.26 Errata for the Proposed Antonito Southeast SEZ

This section presents corrections to material presented in the Draft Solar PEIS and the Supplement to the Draft. The need for these corrections was identified in several ways: through comments received on the Draft Solar PEIS and the Supplement to the Draft (and verified by the authors), through new information obtained by the authors subsequent to publication of the Draft Solar EIS and the Supplement to the Draft, or through additional review of the original material by the authors. Table 10.1.26-1 provides corrections to information presented in the Draft Solar PEIS and the Supplement to the Draft.

TABLE 10.1.26-1 Errata for the Proposed Antonito Southeast SEZ (Section 10.1 of the Draft Solar PEIS and Section C.3.1 of the Supplement to the Draft Solar PEIS)

Section No.	Page No.	Line No.	Figure No.	Table No.	Correction
10.1.11.2					All uses of the term "neotropical migrants" in the text and tables of this section should be replaced with the term "passerines."