

FES 12-24 • DOE/EIS-0403

Final Programmatic Environmental Impact Statement (PEIS) for Solar Energy Development in Six Southwestern States

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Chapter 10

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Final Programmatic Environmental Impact Statement (PEIS) for Solar Energy Development in Six Southwestern States (FES 12-24; DOE/EIS-0403)

Responsible Agencies: The U.S. Department of the Interior (DOI) Bureau of Land Management (BLM) and the U.S. Department of Energy (DOE) are co-lead agencies. Nineteen cooperating agencies participated in the preparation of this PEIS: U.S. Department of Defense; U.S. Bureau of Reclamation; U.S. Fish and Wildlife Service; U.S. National Park Service; U.S. Environmental Protection Agency, Region 9; U.S. Army Corps of Engineers, South Pacific Division; Arizona Game and Fish Department; California Energy Commission; California Public Utilities Commission; Nevada Department of Wildlife; N-4 Grazing Board, Nevada; Utah Public Lands Policy Coordination Office; Clark County, Nevada, including Clark County Department of Aviation; Doña Ana County, New Mexico; Esmeralda County, Nevada; Eureka County, Nevada; Lincoln County, Nevada; Nye County, Nevada; and Saguache County, Colorado.

Locations: Arizona, California, Colorado, Nevada, New Mexico, and Utah.

Contacts: *For further information about this PEIS, contact:* Shannon Stewart, BLM Washington Office, e-mail: shannon_stewart@blm.gov, phone: (202) 912-7219; or Jane Summerson, DOE Solar PEIS Document Manager, e-mail: jane.summerson@ee.doe.gov, phone: (202) 287-6188; or visit the PEIS Web site at <http://solareis.anl.gov>.

Abstract: The BLM and DOE have jointly prepared this PEIS to evaluate actions that the agencies are considering taking to further facilitate utility-scale solar energy development in six southwestern states.¹ For the BLM, this includes the evaluation of a new Solar Energy Program applicable to solar development on BLM-administered lands. For DOE, it includes the evaluation of developing new guidance to further facilitate utility-scale solar energy development and maximize the mitigation of associated environmental impacts. This Solar PEIS evaluates the potential environmental, social, and economic effects of the agencies' proposed actions and alternatives in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality's regulations for implementing NEPA (Title 40, Parts 1500–1508 of the *Code of Federal Regulations* [40 CFR Parts 1500–1508]), and applicable BLM and DOE authorities.

For the BLM, the Final Solar PEIS analyzes a no action alternative, under which solar energy development would continue on BLM-administered lands in accordance with the terms and conditions of the BLM's existing solar energy policies, and two action alternatives that involve implementing a new BLM Solar Energy Program that would allow the permitting of future solar energy development projects on public lands to proceed in a more efficient, standardized, and environmentally responsible manner. The proposed program would establish right-of-way authorization policies and design features applicable to all utility-scale solar energy development. It would identify categories of lands to be excluded from utility-scale solar energy development and specific locations well suited for utility-scale production of solar energy where the BLM would prioritize development (i.e., solar energy zones or SEZs). The proposed action would also allow for responsible utility-scale solar development on lands outside of priority areas.

¹ Utility-scale facilities are defined as projects that generate electricity that is delivered into the electricity transmission grid, generally with capacities greater than 20 megawatts (MW).

For DOE, the Final PEIS analyzes a no action alternative, under which DOE would continue to address environmental concerns for DOE-supported solar projects on a case-by-case basis, and an action alternative, under which DOE would adopt programmatic environmental guidance for use in DOE-supported solar projects.

The BLM and DOE initiated the Solar PEIS process in May 2008. On December 17, 2010, the BLM and DOE published the Draft Solar PEIS. Subsequently, on October 28, 2011, the lead agencies published the Supplement to the Draft Solar PEIS, in which adjustments were made to elements of BLM's proposed Solar Energy Program to better meet BLM's solar energy objectives, and in which DOE's proposed programmatic environmental guidance was presented.

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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

10	AADT	annual average daily traffic
11	AASHTO	American Association of State Highway and Transportation Officials
12	AC	alternating current
13	ACC	air-cooled condenser
14	ACEC	Area of Critical Environmental Concern
15	ADEQ	Arizona Department of Environmental Quality
16	ACHP	Advisory Council on Historic Preservation
17	ADOT	Arizona Department of Transportation
18	ADWR	Arizona Department of Water Resources
19	AERMOD	AMS/EPA Regulatory Model
20	AFC	Application for Certification
21	AGL	above ground level
22	AIM	Assessment, Inventory and Monitoring
23	AIRFA	American Indian Religious Freedom Act
24	AMA	active management area
25	AML	animal management level
26	ANHP	Arizona National Heritage Program
27	APE	area of potential effect
28	APLIC	Avian Power Line Interaction Committee
29	APP	Avian Protection Plan
30	APS	Arizona Public Service
31	AQCR	Air Quality Control Region
32	AQRV	air quality-related value
33	ARB	Air Resources Board
34	ARRA	American Recovery and Reinvestment Act of 2009
35	ARRTIS	Arizona Renewable Resource and Transmission Identification Subcommittee
36	ARS	Agricultural Research Service
37	ARZC	Arizona and California
38	ATSDR	Agency for Toxic Substances and Disease Registry
39	AUM	animal unit month
40	AVSE	Arlington Valley Solar Energy
41	AVWS	Audio Visual Warning System
42	AWBA	Arizona Water Banking Authority
43	AWEA	American Wind Energy Association
44	AWRM	Active Water Resource Management
45	AZDA	Arizona Department of Agriculture
46	AZGFD	Arizona Game and Fish Department

1	AZGS	Arizona Geological Survey
2		
3	BA	biological assessment
4	BAP	base annual production
5	BEA	Bureau of Economic Analysis
6	BISON-M	Biota Information System of New Mexico
7	BLM	Bureau of Land Management
8	BLM-CA	Bureau of Land Management, California
9	BMP	best management practice
10	BNSF	Burlington Northern Santa Fe
11	BO	biological opinion
12	BOR	U.S. Bureau of Reclamation
13	BPA	Bonneville Power Administration
14	BRAC	Blue Ribbon Advisory Council on Climate Change
15	BSE	Beacon Solar Energy
16	BSEP	Beacon Solar Energy Project
17	BTS	Bureau of Transportation Statistics
18		
19	CAA	Clean Air Act
20	CAAQS	California Air Quality Standards
21	CAISO	California Independent System Operator
22	Caltrans	California Department of Transportation
23	C-AMA	California-Arizona Maneuver Area
24	CAP	Central Arizona Project
25	CARB	California Air Resources Board
26	CAReGAP	California Regional Gap Analysis Project
27	CASQA	California Stormwater Quality Association
28	CASTNET	Clean Air Status and Trends NETwork
29	CAWA	Colorado Agricultural Water Alliance
30	CCC	Civilian Conservation Corps
31	CDC	Centers for Disease Control and Prevention
32	CDCA	California Desert Conservation Area
33	CDFG	California Department of Fish and Game
34	CDNCA	California Desert National Conservation Area
35	CDOT	Colorado Department of Transportation
36	CDOW	Colorado Division of Wildlife (now Colorado Parks and Wildlife)
37	CDPHE	Colorado Department of Public Health and Environment
38	CDWR	California Department of Water Resources
39	CEC	California Energy Commission
40	CEQ	Council on Environmental Quality
41	CES	constant elasticity of substitution
42	CESA	California Endangered Species Act
43	CESF	Carrizo Energy Solar Farm
44	CFR	<i>Code of Federal Regulations</i>
45	CGE	computable general equilibrium
46	CHAT	crucial habitat assessment tool

1	CIRA	Cooperative Institute for Research in the Atmosphere
2	CLFR	compact linear Fresnel reflector
3	CNDDDB	California Natural Diversity Database
4	CNEL	community noise equivalent level
5	CNHP	Colorado National Heritage Program
6	Colorado DWR	Colorado Division of Water Resources
7	CO ₂ e	carbon dioxide equivalent
8	CPC	Center for Plant Conservation
9	CPUC	California Public Utilities Commission
10	CPV	concentrating photovoltaic
11	CRBSCF	Colorado River Basin Salinity Control Forum
12	CREZ	competitive renewable energy zone
13	CRPC	Cultural Resources Preservation Council
14	CRSCP	Colorado River Salinity Control Program
15	CSA	Candidate Study Area
16	CSC	Coastal Services Center
17	CSFG	carbon-sequestration fossil generation
18	CSP	concentrating solar power
19	CSQA	California Stormwater Quality Association
20	CSRI	Cultural Systems Research, Incorporated
21	CTG	combustion turbine generator
22	CTPG	California Transmission Planning Group
23	CTSR	Cumbres & Toltec Scenic Railroad
24	CUP	Conditional Use Permit
25	CVP	Central Valley Project
26	CWA	Clean Water Act
27	CWCB	Colorado Water Conservation Board
28	CWHR	California Wildlife Habitat Relationship System
29		
30	DC	direct current
31	DEM	digital elevation model
32	DHS	U.S. Department of Homeland Security
33	DIMA	Database for Inventory, Monitoring and Assessment
34	DLT	dedicated-line transmission
35	DNA	Determination of NEPA Adequacy
36	DNI	direct normal insulation
37	DNL	day-night average sound level
38	DoD	U.S. Department of Defense
39	DOE	U.S. Department of Energy
40	DOI	U.S. Department of the Interior
41	DOL	U.S. Department of Labor
42	DOT	U.S. Department of Transportation
43	DRECP	California Desert Renewable Energy Conservation Plan
44	DSM	demand-side management
45	DSRP	Decommissioning and Site Reclamation Plan
46	DTC/C-AMA	Desert Training Center/California–Arizona Maneuver Area

1	DWMA	Desert Wildlife Management Area
2	DWR	Division of Water Resources
3		
4	EA	environmental assessment
5	EBID	Elephant Butte Irrigation District
6	ECAR	East Central Area Reliability Coordination Agreement
7	ECOS	Environmental Conservation Online System (USFWS)
8	EERE	Energy Efficiency and Renewable Energy (DOE)
9	Eg	band gap energy
10	EIA	Energy Information Administration (DOE)
11	EIS	environmental impact statement
12	EISA	Energy Independence and Security Act of 2007
13	EMF	electromagnetic field
14	E.O.	Executive Order
15	EPA	U.S. Environmental Protection Agency
16	EPRI	Electric Power Research Institute
17	EQIP	Environmental Quality Incentives Program
18	ERCOT	Electric Reliability Council of Texas
19	ERO	Electric Reliability Organization
20	ERS	Economic Research Service
21	ESA	Endangered Species Act of 1973
22	ESRI	Environmental Systems Research Institute
23		
24	FAA	Federal Aviation Administration
25	FBI	Federal Bureau of Investigation
26	FEMA	Federal Emergency Management Agency
27	FERC	Federal Energy Regulatory Commission
28	FHWA	Federal Highway Administration
29	FIRM	Flood Insurance Rate Map
30	FLPMA	Federal Land Policy and Management Act of 1976
31	FONSI	Finding of No Significant Impact
32	FR	<i>Federal Register</i>
33	FRCC	Florida Reliability Coordinating Council
34	FSA	Final Staff Assessment
35	FTE	full-time equivalent
36	FY	fiscal year
37		
38	G&TM	generation and transmission modeling
39	GCRP	U.S. Global Climate Research Program
40	GDA	generation development area
41	GHG	greenhouse gas
42	GIS	geographic information system
43	GMU	game management unit
44	GPS	global positioning system
45	GTM	Generation and Transmission Model
46		

1	GUAC	Groundwater Users Advisory Council
2	GWP	global warming potential
3		
4	HA	herd area
5	HAP	hazardous air pollutant
6	HAZCOM	hazard communication
7	HCE	heat collection element
8	HCP	Habitat Conservation Plan
9	HMA	herd management area
10	HMMH	Harris Miller Miller & Hanson, Inc.
11	HRSG	heat recovery steam generator
12	HSPD	Homeland Security Presidential Directive
13	HTF	heat transfer fluid
14	HUC	hydrologic unit code
15	HVAC	heating, ventilation, and air-conditioning
16		
17	I	Interstate
18	IARC	International Agency for Research on Cancer
19	IBA	important bird area
20	ICE	internal combustion engine
21	ICPDS	Imperial County Planning & Development Services
22	ICWMA	Imperial County Weed Management Area
23	IDT	interdisciplinary team
24	IEC	International Electrochemical Commission
25	IFR	instrument flight rule
26	IID	Imperial Irrigation District
27	IM	Instruction Memorandum
28	IMPS	Iron Mountain Pumping Station
29	IMS	interim mitigation strategy
30	INA	Irrigation Non-Expansion Area
31	IOP	Interagency Operating Procedure
32	IOU	investor-owned utility
33	IPCC	Intergovernmental Panel on Climate Change
34	ISA	Independent Science Advisor; Instant Study Area
35	ISB	Intermontane Seismic Belt
36	ISCC	integrated solar combined cycle
37	ISDRA	Imperial Sand Dunes Recreation Area
38	ISEGS	Ivanpah Solar Energy Generating System
39	ISO	independent system operator; iterative self-organizing
40	ITFR	Interim Temporary Final Rulemaking
41	ITP	incidental take permit
42	IUCNNR	International Union for Conservation of Nature and Natural Resources
43	IUCNP	International Union for Conservation of Nature Pakistan
44		
45	KGA	known geothermal resources area
46	KML	keyhole markup language

1	KOP	key observation point
2	KSLA	known sodium leasing area
3		
4	LCC	Landscape Conservation Cooperative
5	LCCRDA	Lincoln County Conservation, Recreation, and Development Act of 2004
6	LCOE	levelized cost of energy
7	L _{dn}	day-night average sound level
8	LDWMA	Low Desert Weed Management Area
9	L _{eq}	equivalent sound pressure level
10	LiDAR	light detection and ranging
11	LLA	limited land available
12	LLRW	low-level radioactive waste (waste classification)
13	LPN	listing priority number
14	LRG	Lower Rio Grande
15	LSA	lake and streambed alteration
16	LSE	load-serving entity
17	LTMP	long-term monitoring and adaptive management plan
18	LTVA	long-term visitor area
19		
20	MAAC	Mid-Atlantic Area Council
21	MAIN	Mid-Atlantic Interconnected Network
22	MAPP	methyl acetylene propadiene stabilizer; Mid-Continent Area Power Pool
23	MCAS	Marine Corps Air Station
24	MCL	maximum contaminant level
25	MEB	Marine Expeditionary Brigade
26	MFP	Management Framework Plan
27	MIG	Minnesota IMPLAN Group
28	MLA	maximum land available
29	MOA	military operating area
30	MOU	Memorandum of Understanding
31	MPDS	maximum potential development scenario
32	MRA	Multiple Resource Area
33	MRI	Midwest Research Institute
34	MRO	Midwest Reliability Organization
35	MSDS	Material Safety Data Sheet
36	MSL	mean sea level
37	MTR	military training route
38	MVEDA	Mesilla Valley Economic Development Alliance
39	MWA	Mojave Water Agency
40	MWD	Metropolitan Water District
41	MWMA	Mojave Weed Management Area
42	NAAQS	National Ambient Air Quality Standard(s)
43	NADP	National Atmospheric Deposition Program
44	NAGPRA	Native American Graves Protection and Repatriation Act
45	NAHC	Native American Heritage Commission (California)
46	NAIC	North American Industrial Classification System

1	NASA	National Aeronautics and Space Administration
2	NCA	National Conservation Area
3	NCCAC	Nevada Climate Change Advisory Committee
4	NCDC	National Climatic Data Center
5	NCES	National Center for Education Statistics
6	NDAA	National Defense Authorization Act
7	NDCNR	Nevada Department of Conservation and Natural Resources
8	NDEP	Nevada Division of Environmental Protection
9	NDOT	Nevada Department of Transportation
10	NDOW	Nevada Department of Wildlife
11	NDWP	Nevada Division of Water Planning
12	NDWR	Nevada Division of Water Resources
13	NEAP	Natural Events Action Plan
14	NEC	National Electric Code
15	NED	National Elevation Database
16	NEP	Natural Events Policy
17	NEPA	National Environmental Policy Act of 1969
18	NERC	North American Electricity Reliability Corporation
19	NGO	non-governmental organization
20	NHA	National Heritage Area
21	NHD	National Hydrography Dataset
22	NHNM	National Heritage New Mexico
23	NHPA	National Historic Preservation Act of 1966
24	NID	National Inventory of Dams
25	NLCS	National Landscape Conservation System
26	NMAC	<i>New Mexico Administrative Code</i>
27	NMBGMR	New Mexico Bureau of Geology and Mineral Resources
28	NMDGF	New Mexico Department of Game and Fish
29	NM DOT	New Mexico Department of Transportation
30	NMED	New Mexico Environment Department
31	NMED-AQB	New Mexico Environment Department-Air Quality Board
32	NMFS	National Marine Fisheries Service
33	NMOSE	New Mexico Office of the State Engineer
34	NMSU	New Mexico State University
35	NNHP	Nevada Natural Heritage Program
36	NNL	National Natural Landmark
37	NNSA	National Nuclear Security Administration
38	NOA	Notice of Availability
39	NOAA	National Oceanic and Atmospheric Administration
40	NOI	Notice of Intent
41	NP	National Park
42	NPDES	National Pollutant Discharge Elimination System
43	NPL	National Priorities List
44	NPS	National Park Service
45	NPV	net present value
46	NRA	National Recreation Area

1	NRCS	Natural Resources Conservation Service
2	NREL	National Renewable Energy Laboratory
3	NRHP	<i>National Register of Historic Places</i>
4	NRS	<i>Nevada Revised Statutes</i>
5	NSC	National Safety Council
6	NSO	no surface occupancy
7	NSTC	National Science and Technology Council
8	NTHP	National Trust for Historic Preservation
9	NTS	Nevada Test Site
10	NTTR	Nevada Test and Training Range
11	NVCRS	Nevada Cultural Resources Inventory System
12	NV DOT	Nevada Department of Transportation
13	NWCC	National Wind Coordinating Committee
14	NWI	National Wetlands Inventory
15	NWIS	National Water Information System (USGS)
16	NWPP	Northwest Power Pool
17	NWR	National Wildlife Refuge
18	NWSRS	National Wild and Scenic River System
19		
20	O&M	operation and maintenance
21	ODFW	Oregon Department of Fish and Wildlife
22	OHV	off-highway vehicle
23	ONA	Outstanding Natural Area
24	ORC	organic Rankine cycle
25	OSE/ISC	Office of the State Engineer/Interstate Stream Commission
26	OSHA	Occupational Safety and Health Administration
27	OTA	Office of Technology Assessment
28		
29	PA	Programmatic Agreement
30	PAD	Preliminary Application Document
31	PAH	polycyclic aromatic hydrocarbon
32	PAT	peer analysis tool
33	PCB	polychlorinated biphenyl
34	PCM	purchase change material
35	PCS	power conditioning system
36	PCU	power converting unit
37	PEIS	programmatic environmental impact statement
38	PFYC	potential fossil yield classification
39	PGH	Preliminary General Habitat
40	PIER	Public Interest Energy Research
41	P.L.	Public Law
42	PLSS	Public Land Survey System
43	PM	particulate matter
44	PM _{2.5}	particulate matter with a diameter of 2.5 µm or less
45	PM ₁₀	particulate matter with a diameter of 10 µm or less
46	PPA	Power Purchase Agreement

1	P-P-D	population-to-power density
2	PPH	Preliminary Priority Habitat
3	POD	plan of development
4	POU	publicly owned utility
5	PPA	Power Purchase Agreement
6	PPE	personal protective equipment
7	PSD	Prevention of Significant Deterioration
8	PURPA	Public Utility Regulatory Policy Act
9	PV	photovoltaic
10	PVID	Palo Verde Irrigation District
11	PWR	public water reserve
12		
13	QRA	qualified resource area
14		
15	R&I	relevance and importance
16	RAC	Resource Advisory Council
17	RCE	Reclamation Cost Estimate
18	RCI	residential, commercial, and industrial (sector)
19	RCRA	Resource Conservation and Recovery Act of 1976
20	RD&D	research, development, and demonstration; research, development, and
21		deployment
22	RDBMS	Relational Database Management System
23	RDEP	Restoration Design Energy Project
24	REA	Rapid Ecoregional Assessment
25	REAT	Renewable Energy Action Team
26	REDA	Renewable Energy Development Area
27	REDI	Renewable Energy Development Infrastructure
28	REEA	Renewable Energy Evaluation Area
29	ReEDS	Regional Energy Deployment System
30	REPG	Renewable Energy Policy Group
31	RETA	Renewable Energy Transmission Authority
32	RETAAC	Renewable Energy Transmission Access Advisory Committee
33	RETI	Renewable Energy Transmission Initiative
34	REZ	renewable energy zone
35	RF	radio frequency
36	RFC	Reliability First Corporation
37	RFDS	reasonably foreseeable development scenario
38	RGP	Rio Grande Project
39	RGWCD	Rio Grande Water Conservation District
40	RMP	Resource Management Plan
41	RMPA	Rocky Mountain Power Area
42	RMZ	Resource Management Zone
43	ROD	Record of Decision
44	ROI	region of influence
45	ROS	recreation opportunity spectrum
46	ROW	right-of-way

1	RPG	renewable portfolio goal
2	RPS	Renewable Portfolio Standard
3	RRC	Regional Reliability Council
4	RSEP	Rice Solar Energy Project
5	RSI	Renewable Systems Interconnection
6	RTO	regional transmission organization
7	RTTF	Renewable Transmission Task Force
8	RV	recreational vehicle
9		
10	SAAQS	State Ambient Air Quality Standard(s)
11	SAMHSA	Substance Abuse and Mental Health Services Administration
12	SCADA	supervisory control and data acquisition
13	SCE	Southern California Edison
14	SCRMA	Special Cultural Resource Management Area
15	SDRREG	San Diego Regional Renewable Energy Group
16	SDWA	Safe Drinking Water Act of 1974
17	SEGIS	Solar Energy Grid Integration System
18	SEGS	Solar Energy Generating System
19	SEI	Sustainable Energy Ireland
20	SEIA	Solar Energy Industrial Association
21	SES	Stirling Energy Systems
22	SETP	Solar Energy Technologies Program (DOE)
23	SEZ	solar energy zone
24	SHPO	State Historic Preservation Office(r)
25	SIP	State Implementation Plan
26	SLRG	San Luis & Rio Grande
27	SMA	Special Management Area
28	SMART	specific, measurable, achievable, relevant, and time sensitive
29	SMP	suggested management practice
30	SNWA	Southern Nevada Water Authority
31	SPP	Southwest Power Pool
32	SRMA	Special Recreation Management Area
33	SSA	Socorro Seismic Anomaly
34	SSI	self-supplied industry
35	ST	solar thermal
36	STG	steam turbine generator
37	SUA	special use airspace
38	SWAT	Southwest Area Transmission
39	SWIP	Southwest Intertie Project
40	SWPPP	Stormwater Pollution Prevention Plan
41	SWReGAP	Southwest Regional Gap Analysis Project
42		
43	TAP	toxic air pollutant
44	TCC	Transmission Corridor Committee
45	TDS	total dissolved solids
46	TEPPC	Transmission Expansion Planning Policy Committee

1	TES	thermal energy storage
2	TRACE	Transmission Routing and Configuration Estimator
3	TSA	Transportation Security Administration
4	TSCA	Toxic Substances Control Act of 1976
5	TSDF	treatment, storage, and disposal facility
6	TSP	total suspended particulates
7		
8	UACD	Utah Association of Conservation Districts
9	UBWR	Utah Board of Water Resources
10	UDA	Utah Department of Agriculture
11	UDEQ	Utah Department of Environmental Quality
12	UDNR	Utah Department of Natural Resources
13	UDOT	Utah Department of Transportation
14	UDWQ	Utah Division of Water Quality
15	UDWR	Utah Division of Wildlife Resources
16	UGS	Utah Geological Survey
17	UNEP	United Nations Environmental Programme
18	UNPS	Utah Native Plant Society
19	UP	Union Pacific
20	UREZ	Utah Renewable Energy Zone
21	USACE	U.S. Army Corps of Engineers
22	USAF	U.S. Air Force
23	USC	<i>United States Code</i>
24	USDA	U.S. Department of Agriculture
25	USFS	U.S. Forest Service
26	USFWS	U.S. Fish and Wildlife Service
27	USGS	U.S. Geological Survey
28	Utah DWR	Utah Division of Water Rights
29	UTTR	Utah Test and Training Range
30	UWS	Underground Water Storage, Savings and Replenishment Act
31		
32	VACAR	Virginia–Carolinas Subregion
33	VCRS	Visual Contrast Rating System
34	VFR	visual flight rule
35	VOC	volatile organic compound
36	VRHCRP	Virgin River Habitat Conservation & Recovery Program
37	VRI	Visual Resource Inventory
38	VRM	Visual Resource Management
39		
40	WA	Wilderness Area
41	WECC	Western Electricity Coordinating Council
42	WECC CAN	Western Electricity Coordinating Council–Canada
43	WEG	wind erodibility group
44	Western	Western Area Power Administration
45	WGA	Western Governors’ Association
46	WGFD	Wyoming Game and Fish Department

1	WHA	wildlife habitat area
2	WHO	World Health Organization
3	WIA	Wyoming Infrastructure Authority
4	WRAP	Water Resources Allocation Program; Western Regional Air Partnership
5	WRCC	Western Regional Climate Center
6	WREZ	Western Renewable Energy Zones
7	WRI	Water Resources Research Institute
8	WSA	Wilderness Study Area
9	WSC	wildlife species of special concern
10	WSMR	White Sands Missile Range
11	WSR	Wild and Scenic River
12	WSRA	Wild and Scenic Rivers Act of 1968
13	WWII	World War II
14	WWP	Western Watersheds Project
15		
16	YPG	Yuma Proving Ground
17		
18	ZITA	zone identification and technical analysis
19	ZLD	zero liquid discharge

20
21

22 **CHEMICALS**

23				
24	CH ₄	methane	NO ₂	nitrogen dioxide
25	CO	carbon monoxide	NO _x	nitrogen oxides
26	CO ₂	carbon dioxide		
27			O ₃	ozone
28	H ₂ S	hydrogen sulfide		
29	Hg	mercury	Pb	lead
30				
31	N ₂ O	nitrous oxide	SF ₆	sulfur hexafluoride
32	NH ₃	ammonia	SO ₂	sulfur dioxide
			SO _x	sulfur oxides

33
34

35 **UNITS OF MEASURE**

36				
37	ac-ft	acre-foot (feet)	dB	A-weighted decibel(s)
38	bhp	brake horsepower		
39			°F	degree(s) Fahrenheit
40	°C	degree(s) Celsius	ft	foot (feet)
41	cf	cubic foot (feet)	ft ²	square foot (feet)
42	cfs	cubic foot (feet) per second	ft ³	cubic foot (feet)
43	cm	centimeter(s)		
44			g	gram(s)
45	dB	decibel(s)	gal	gallon(s)

1	GJ	gigajoule(s)	MWe	megawatt(s) electric
2	gpcd	gallon per capita per day	MWh	megawatt-hour(s)
3	gpd	gallon(s) per day		
4	gpm	gallon(s) per minute	ppm	part(s) per million
5	GW	gigawatt(s)	psi	pound(s) per square inch
6	GWh	gigawatt hour(s)	psia	pound(s) per square inch absolute
7	GWh/yr	gigawatt hour(s) per year		
8			rpm	rotation(s) per minute
9	h	hour(s)		
10	ha	hectare(s)	s	second(s)
11	Hz	hertz	scf	standard cubic foot (feet)
12				
13	in.	inch(es)	TWh	terawatt hour(s)
14				
15	J	joule(s)	VdB	vibration velocity decibel(s)
16				
17	K	degree(s) Kelvin	W	watt(s)
18	kcal	kilocalorie(s)		
19	kg	kilogram(s)	yd ²	square yard(s)
20	kHz	kilohertz	yd ³	cubic yard(s)
21	km	kilometer(s)	yr	year(s)
22	km ²	square kilometer(s)		
23	kPa	kilopascal(s)	µg	microgram(s)
24	kV	kilovolt(s)	µm	micrometer(s)
25	kVA	kilovolt-ampere(s)		
26	kW	kilowatt(s)		
27	kWh	kilowatt-hour(s)		
28	kWp	kilowatt peak		
29				
30	L	liter(s)		
31	lb	pound(s)		
32				
33	m	meter(s)		
34	m ²	square meter(s)		
35	m ³	cubic meter(s)		
36	mg	milligram(s)		
37	Mgal	million gallons		
38	mi	mile(s)		
39	mi ²	square mile(s)		
40	min	minute(s)		
41	mm	millimeter(s)		
42	MMt	million metric ton(s)		
43	MPa	megapascal(s)		
44	mph	mile(s) per hour		
45	MVA	megavolt-ampere(s)		
46	MW	megawatt(s)		

ENGLISH/METRIC AND METRIC/ENGLISH EQUIVALENTS

The following table lists the appropriate equivalents for English and metric units.

Multiply	By	To Obtain
<i>English/Metric Equivalents</i>		
acres	0.004047	square kilometers (km ²)
acre-feet (ac-ft)	1,234	cubic meters (m ³)
cubic feet (ft ³)	0.02832	cubic meters (m ³)
cubic yards (yd ³)	0.7646	cubic meters (m ³)
degrees Fahrenheit (°F) –32	0.5555	degrees Celsius (°C)
feet (ft)	0.3048	meters (m)
gallons (gal)	3.785	liters (L)
gallons (gal)	0.003785	cubic meters (m ³)
inches (in.)	2.540	centimeters (cm)
miles (mi)	1.609	kilometers (km)
miles per hour (mph)	1.609	kilometers per hour (kph)
pounds (lb)	0.4536	kilograms (kg)
short tons (tons)	907.2	kilograms (kg)
short tons (tons)	0.9072	metric tons (t)
square feet (ft ²)	0.09290	square meters (m ²)
square yards (yd ²)	0.8361	square meters (m ²)
square miles (mi ²)	2.590	square kilometers (km ²)
yards (yd)	0.9144	meters (m)
<hr style="border-top: 1px dashed black;"/>		
<i>Metric/English Equivalents</i>		
centimeters (cm)	0.3937	inches (in.)
cubic meters (m ³)	0.00081	acre-feet (ac-ft)
cubic meters (m ³)	35.31	cubic feet (ft ³)
cubic meters (m ³)	1.308	cubic yards (yd ³)
cubic meters (m ³)	264.2	gallons (gal)
degrees Celsius (°C) +17.78	1.8	degrees Fahrenheit (°F)
hectares (ha)	2.471	acres
kilograms (kg)	2.205	pounds (lb)
kilograms (kg)	0.001102	short tons (tons)
kilometers (km)	0.6214	miles (mi)
kilometers per hour (kph)	0.6214	miles per hour (mph)
liters (L)	0.2642	gallons (gal)
meters (m)	3.281	feet (ft)
meters (m)	1.094	yards (yd)
metric tons (t)	1.102	short tons (tons)
square kilometers (km ²)	247.1	acres
square kilometers (km ²)	0.3861	square miles (mi ²)
square meters (m ²)	10.76	square feet (ft ²)
square meters (m ²)	1.196	square yards (yd ²)

1
2
3
4

5

1 **10 UPDATE TO AFFECTED ENVIRONMENT AND IMPACT ASSESSMENT**
2 **FOR PROPOSED SOLAR ENERGY ZONES IN COLORADO**
3
4

5 The U.S. Department of the Interior Bureau of Land Management (BLM) has carried
6 17 solar energy zones (SEZs) forward for analysis in this Final Solar Programmatic
7 Environmental Impact Statement (PEIS). These SEZs total approximately 285,000 acres
8 (1,153 km²) of land potentially available for development. This chapter includes analyses of
9 potential environmental impacts for the proposed SEZs in Colorado—Antonito Southeast,
10 De Tilla Gulch, Fourmile East, and Los Mogotes East. The SEZ-specific analyses provide
11 documentation from which the BLM will tier future project authorizations, thereby limiting the
12 required scope and effort of project-specific National Environmental Policy Act of 1969 (NEPA)
13 analyses.
14

15 The BLM is committed to collecting additional SEZ-specific resource data and
16 conducting additional analysis in order to more efficiently facilitate future development in
17 SEZs. The BLM developed action plans for each of the 17 SEZs carried forward as part of
18 the Supplement to the Draft Solar PEIS (BLM and DOE 2011). These action plans described
19 additional data that could be collected for individual SEZs and proposed data sources and
20 methods for the collection of those data. Work is under way to collect additional data as
21 specified under these action plans (e.g., additional data collection to support evaluation of
22 cultural, visual, and water resources has begun). As the data become available, they will be
23 posted on the project Web site (<http://solareis.anl.gov>) for use by applicants and the BLM and
24 other agency staff.
25

26 To accommodate the flexibility described in the BLM’s program objectives and in light
27 of anticipated changes in technologies and environmental conditions over time, the BLM has
28 removed some of the prescriptive SEZ-specific design features presented in the Draft Solar PEIS
29 (BLM and DOE 2010) and the Supplement to the Draft (e.g., height restrictions on technologies
30 used to address visual resource impacts). Alternatively, the BLM will give full consideration to
31 any outstanding conflicts in SEZs as part of the competitive process being developed through
32 rulemaking (see Section 2.2.2.2.1).
33

34 In preparing selected parcels for competitive offer, the BLM will review all existing
35 analysis for an SEZ and consider any new or changed circumstances that may affect the
36 development of the SEZ. The BLM will also work with appropriate federal, state, and local
37 agencies, and affected tribes, as necessary, to discuss SEZ-related issues. This work would
38 ultimately inform how a parcel would be offered competitively (e.g., parcel size and
39 configuration, technology limitations, mitigation requirements, and parcel-specific competitive
40 process). Prior to issuing a notice of competitive offer, the BLM would complete appropriate
41 NEPA analysis to support the offer. This analysis would tier to the analysis for SEZs in the Solar
42 PEIS to the extent practicable.
43

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

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

3
4 This chapter is an update to the information on Colorado SEZs presented in the Draft
5 Solar PEIS. The information presented in this chapter supplements and updates, but does not
6 replace, the information provided in the corresponding Chapter 10 on proposed SEZs in
7 Colorado in the Draft Solar PEIS. Corrections to incorrect information in Sections 10.1, 10.2,
8 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
9 Supplement to the Draft are provided in Sections 10.1.26, 10.2.26, 10.3.26, and 10.4.26 of this
10 Final Solar PEIS.

11 12 13 **10.1 ANTONITO SOUTHEAST**

14 15 16 **10.1.1 Background and Summary of Impacts**

17 18 19 **10.1.1.1 General Information**

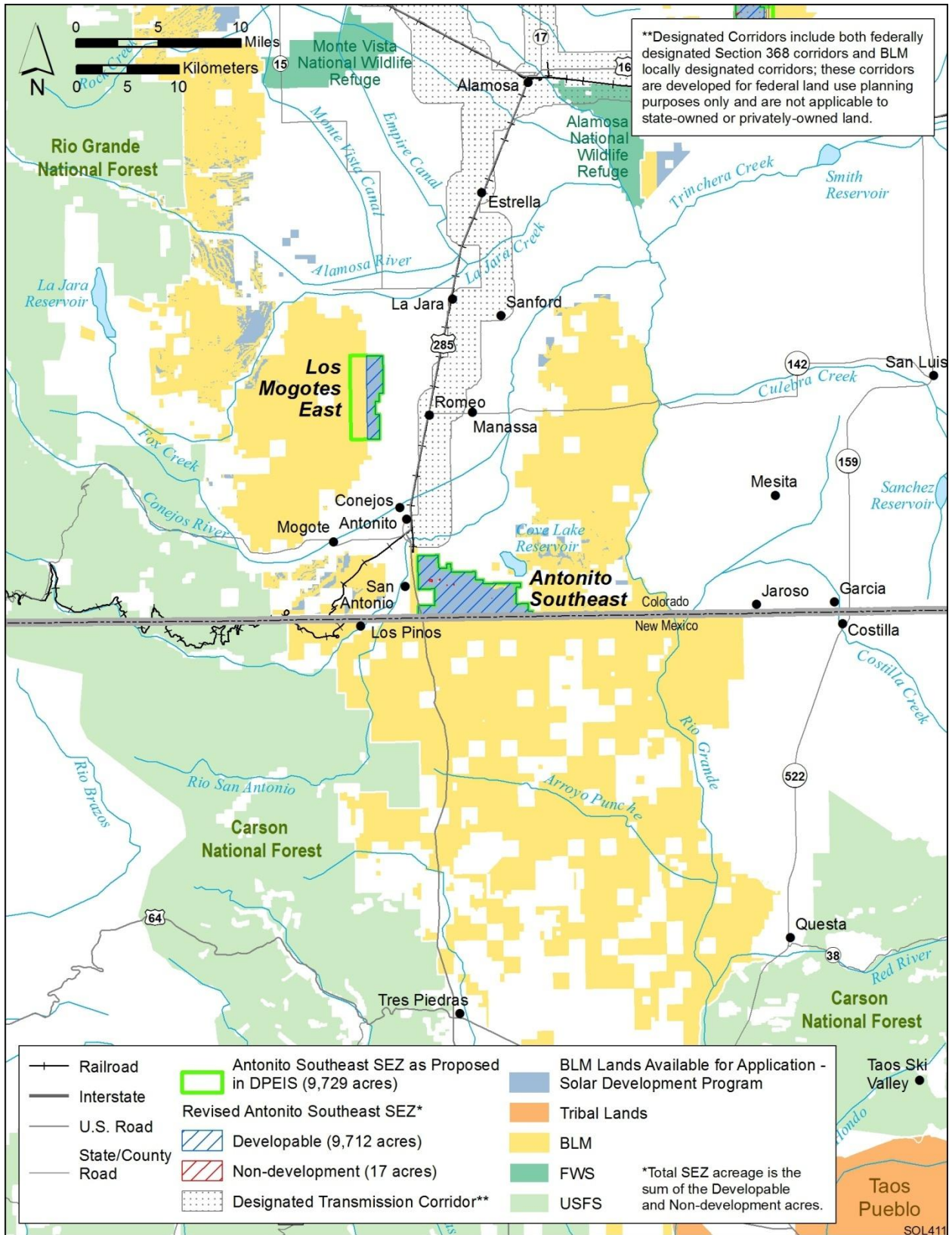
20
21 The proposed Antonito Southeast SEZ is located in southeastern Conejos County, on the
22 southern Colorado state boundary with New Mexico. In 2008, the county population was 8,232,
23 while the surrounding six-county region in Colorado and New Mexico had a population of
24 116,511. The largest nearby town of Alamosa, which had a 2008 population of 8,745, is about
25 34 mi (55 km) to the north. Several small towns lie closer to the SEZ, with Antonito, Colorado,
26 about 2 mi (3 km) to the northwest. The area is served by the San Luis & Rio Grande (SLRG)
27 Railroad. As of October 28, 2011, there were no pending solar project applications within the
28 SEZ.

29
30 As published in the Draft Solar PEIS, the proposed Antonito Southeast SEZ had a total
31 area of 9,729 acres (39.4 km²) (see Figure 10.1.1.1-1). In the Supplement to the Draft Solar PEIS
32 (BLM and DOE 2011), no boundary revisions were identified for the proposed SEZ. However,
33 areas specified for non-development were mapped, where data were available. For the proposed
34 Antonito Southeast SEZ, 17 acres (0.07 km²) of wetland and lake areas were identified as non-
35 development areas (see Figure 10.1.1.1-2). The remaining developable area within the SEZ is
36 9,712 acres (39.3 km²).

37
38 The analyses in the following sections update the affected environment and potential
39 environmental, cultural, and socioeconomic impacts associated with utility-scale solar energy
40 development in the proposed Antonito Southeast SEZ as described in the Draft Solar PEIS.

41 42 43 **10.1.1.2 Development Assumptions for the Impact Analysis**

44
45 Maximum development of the proposed Antonito Southeast SEZ was assumed to be
46 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**

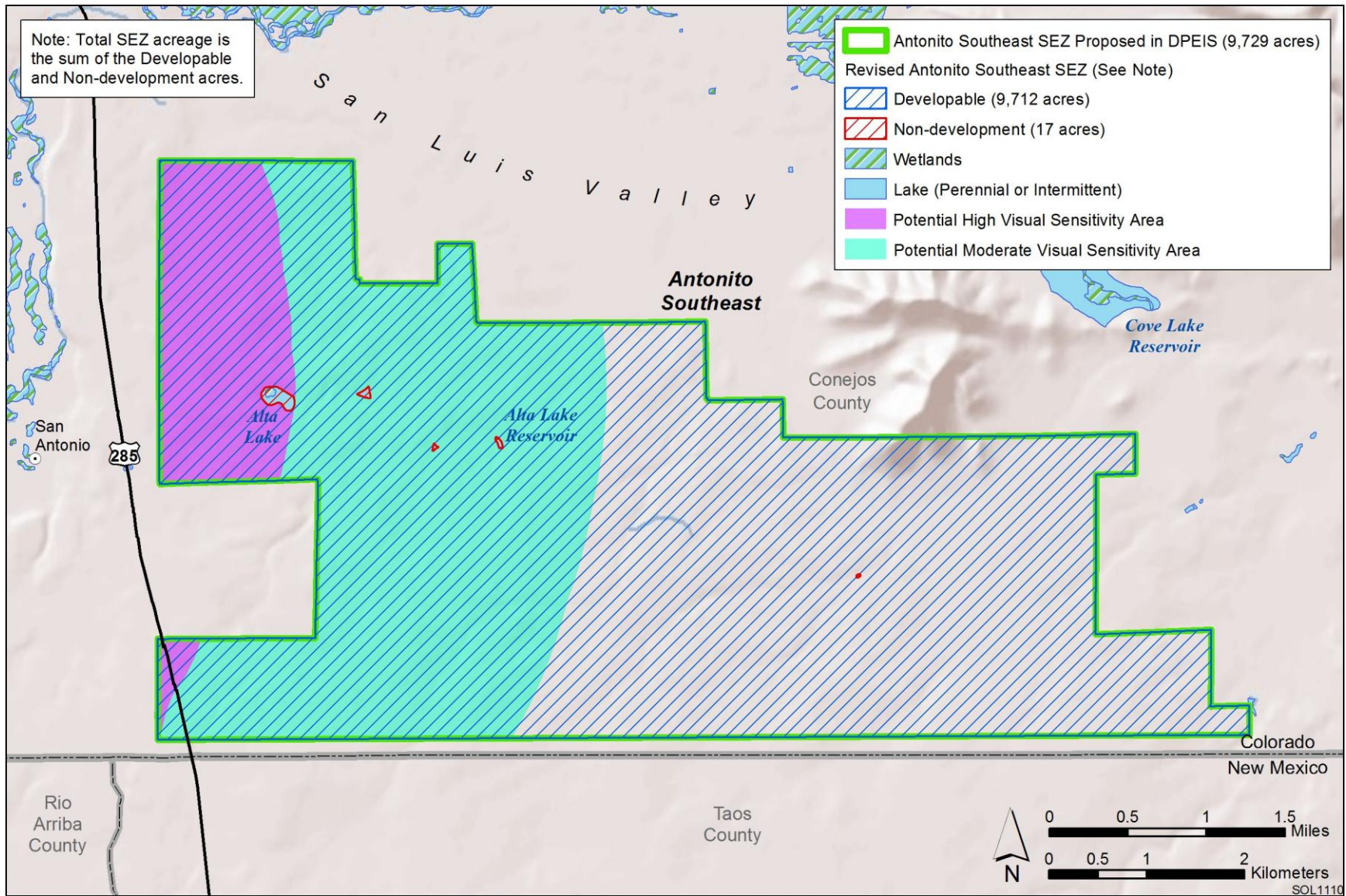


FIGURE 10.1.1.1-2 Developable and Non-development Areas for the Proposed Antonito Southeast SEZ as Revised

(31.4 km²) (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 km²/MW]) and 1,554 MW (solar trough technologies, 5 acres/MW [0.02 km²/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 and 1,554 MW	Adjacent (U.S. 285)	10 mi ^{c,d} and 69 kV	0 acres	NA ^f

^a To convert acres to km², 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 km²/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.

1 The transmission assessment for the Antonito Southwest SEZ has been updated, and
2 the hypothetical transmission corridor assessed in the Draft Solar PEIS is no longer applicable.
3 For this updated assessment, the 121 acres (0.5 km²) of land disturbance for a hypothetical
4 transmission corridor to the existing transmission line is no longer assumed (although the
5 impacts of required new transmission overall are addressed in Section 10.1.23).
6

7 For the proposed Antonito Southeast SEZ, existing road access should be adequate to
8 support construction and operation of solar facilities, because U.S. 285 runs along the western
9 boundary of the SEZ. Thus, no additional road construction outside of the SEZ was assumed to
10 be required to support solar development of the SEZ, as summarized in Table 10.1.1.2-1.
11
12

13 **10.1.1.3 Programmatic and SEZ-Specific Design Features**

14
15 The proposed programmatic design features for each resource area to be required under
16 the BLM Solar Energy Program are presented in Section A.2.2 of Appendix A of this Final Solar
17 PEIS. These programmatic design features are intended to avoid, minimize, and/or mitigate
18 adverse impacts from solar energy development and will be required for development on all
19 BLM-administered lands including SEZ and non-SEZ lands..
20

21 The discussions below addressing potential impacts from solar energy development on
22 specific resource areas (Sections 10.1.2 through 10.1.22) also provide an assessment of the
23 effectiveness of the programmatic design features in mitigating adverse impacts from solar
24 development within the SEZ. SEZ-specific design features to address impacts specific to the
25 proposed Antonito Southeast SEZ may be required in addition to the programmatic design
26 features. The proposed SEZ-specific design features for the Antonito Southeast SEZ have been
27 updated on the basis of revisions to the SEZ since the Draft Solar PEIS (such as boundary
28 changes and the identification of non-development areas), and on the basis of comments
29 received on the Draft and Supplement to the Draft Solar PEIS. All applicable SEZ-specific
30 design features identified to date (including those from the Draft Solar PEIS that are still
31 applicable) are presented in Sections 10.1.2 through 10.1.22.
32
33

34 **10.1.2 Lands and Realty**

35 36 37 **10.1.2.1 Affected Environment**

38
39 The proposed Antonito Southeast SEZ is a well blocked area of BLM-administered
40 public lands that is rural and largely undeveloped. The SEZ is bordered to the north by private
41 lands, and there are 1,280 acres (5.2 km²) of state lands located to the east and west of the area.
42 Land to the south of the SEZ in New Mexico is also public land. Section 10.1.2.1 of the Draft
43 Solar PEIS contained a statement that there was one solar facility operating in the San Luis
44 Valley near Mosca. There actually are several operating facilities in that area. The description in
45 the Draft Solar PEIS of the condition of the SEZ and surrounding area in regard to lands and
46 realty issues remains valid.
47

1 **10.1.2.2 Impacts**
2

3 Solar development in the proposed SEZ would establish a large industrial area that would
4 exclude many existing and potential uses of the land, perhaps in perpetuity. Because the SEZ is
5 undeveloped and rural, utility-scale solar development would introduce a new and discordant
6 land use in the area.
7

8 The description of impacts in the Draft Solar PEIS identified a strip of public lands of
9 about 1,240 acres (5.0 km²) abutting the west end of the proposed SEZ that would be isolated by
10 solar development from the rest of the public lands in the SEZ, and indicated that it would be
11 difficult to manage. While the area may be managed differently from the lands in the SEZ, the
12 presence of the highway and cultural resource values in the area make this unavoidable.
13

14 Access to public lands south and east of the proposed SEZ could be affected by
15 development of solar facilities that could sever existing roads and trails.
16
17

18 **10.1.2.3 SEZ-Specific Design Features and Design Feature Effectiveness**
19

20 Required programmatic design features that would reduce impacts on lands and realty
21 are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the
22 programmatic design features will provide some mitigation for the identified impacts but will not
23 completely mitigate adverse impacts. For example, impacts related to the exclusion of many
24 existing and potential uses of the public land, the visual impact of an industrial-type solar facility
25 within an otherwise rural area, and induced land use changes, if any, on nearby or adjacent state
26 and private lands may not be fully mitigated.
27

28 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of
29 comments received as applicable, the following proposed SEZ-specific design feature for the
30 revised Antonito Southeast SEZ has been identified:
31

- 32 • Management of the 1,240-acre (5.0-km²) area of public land west of the
33 proposed SEZ boundary should be addressed as part of the site-specific
34 analysis of any future development within the SEZ.
35

36 The need for additional SEZ-specific design features will be established for parcels
37 within the proposed Antonito Southeast SEZ through the process of preparing parcels for
38 competitive offer and subsequent project-specific analysis.
39
40

41 **10.1.3 Specially Designated Areas and Lands with Wilderness Characteristics**
42

43 **10.1.3.1 Affected Environment**
44

45 There are nine specially designated areas within 25 mi (40 km) of the proposed Antonito
46 Southeast SEZ. The Draft Solar PEIS accurately describes these areas with one addition. A
47

1 recently maintained inventory of wilderness characteristics determined that public lands within
2 the proposed SEZ do not contain wilderness characteristics.
3
4

5 **10.1.3.2 Impacts**

6

7 As stated in the Draft Solar PEIS, solar energy development within the SEZ will result in
8 the development of a very large industrial site in an area that otherwise is currently rural. Visual
9 impacts on specially designated areas would be affected by the types of solar technologies
10 deployed within the SEZ. Lower height facilities, facilities with less reflectivity, and facilities
11 that do not use wet cooling would be expected to have less potential for adverse visual impact
12 on surrounding areas (see Section 10.1.14 for a more detailed discussion). Elevated viewpoints,
13 such as the slightly elevated portions of the Cumbres & Toltec Scenic Railroad (CTSR) or
14 nearby viewpoints, such as the San Antonio WSA, the West Fork of the North Branch of the
15 Old Spanish Trail, or the Los Caminos Antiguos Scenic Byway, would have significant views
16 of development within the SEZ and would likely be adversely affected. Site-specific analysis,
17 including consideration of the potential for visible glint and glare from solar panels and the
18 visibility of structures, will need to be completed before impacts can be fully assessed and
19 potential mitigation measures considered. Travelers coming south or east on the Los Antiguos
20 Scenic Byway would be looking directly into the SEZ, and development within the SEZ would
21 be very visible, having the potential to detract from the visitor experience. The route of a portion
22 of the West Branch of the North Fork of the Old Spanish Trail passes within 0.25 mi (0.4 km) of
23 the SEZ; thus solar development in the SEZ may have a major impact on the historic and visual
24 integrity of the Trail, depending on the determination of the integrity and historical significance
25 of the portion of the Trail from which solar development could be seen. Finally, development
26 within the SEZ may be inconsistent with the purposes for which the Sangre de Cristo National
27 Heritage Area (NHA) was designated.
28
29

30 **10.1.3.3 SEZ-Specific Design Features and Design Feature Effectiveness**

31

32 Required programmatic design features that would reduce impacts on specially
33 designated areas are described in Section A.2.2 of Appendix A of this Final Solar PEIS (design
34 features for specially designated areas, cultural resources, and visual resources would address
35 impacts). Implementing the programmatic design features will provide some mitigation for the
36 identified impacts but may not mitigate impacts on the CTSR and the San Antonio WSA.
37 Programmatic design features will be applied to address SEZ-specific resources and conditions,
38 for example:
39

- 40 • For projects in the Antonito Southeast SEZ that are located within the
41 viewshed of the West Fork of the North Branch of the Old Spanish Trail, a
42 National Trail inventory will be required to determine the area of possible
43 adverse impact on resources, qualities, values, and associated settings of the
44 Trail; to prevent substantial interference; and to determine any areas
45 unsuitable for development. Residual impacts will be avoided, minimized,
46 and/or mitigated to the extent practicable according to program policy

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

4
5 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of
6 comments received as applicable, the following proposed SEZ-specific design features have been
7 identified:

- 8
9 • The SEZ-specific design features for visual resources specified in
10 Section 10.1.14.3 should be adopted, as they would provide some protection
11 for visual related impacts on the CTSR and the San Antonio WSA.
- 12
13 • Early consultation should be initiated with the entity responsible for
14 developing the management plan for the Sangre de Cristo NHA to understand
15 how development of the SEZ could be consistent with NHA plans/goals.

16
17 The need for additional SEZ-specific design features will be identified through the
18 process of preparing parcels for competitive offer and subsequent project-specific analysis.

19 20 21 **10.1.4 Rangeland Resources**

22 23 24 **10.1.4.1 Livestock Grazing**

25 26 27 ***10.1.4.1.1 Affected Environment***

28
29 The proposed Antonito Southeast SEZ overlaps large portions of three seasonal grazing
30 allotments. These allotments are used by five grazing permittees and provide 669 animal unit
31 months (AUMs) of forage per year

32 33 34 ***10.1.4.1.2 Impacts***

35
36 The general discussion in the Draft Solar PEIS regarding determining the impact on
37 grazing operations remains valid. Should the proposed SEZ be fully developed for solar energy
38 production, it is likely that the BLM grazing permits for all three allotments would be cancelled
39 and the permittees would be displaced. While the specific situation of each of the grazing
40 permittees is not known, it is clear that loss of all or part of their grazing permits would be a
41 significant adverse impact on them. Economic losses would not be limited to the value of the lost
42 grazing opportunity but would extend also to the value of the overall ranch operation including
43 any private lands tied to the grazing operation. While permittees would be reimbursed for their
44 portion of the value of range improvements on their permits, this reimbursement would not cover
45 their economic loss.

1 ***10.1.4.1.3 SEZ-Specific Design Features and Design Feature Effectiveness***
2

3 Required programmatic design features that would reduce impacts on livestock grazing
4 are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the
5 programmatic design features will provide some mitigation for identified impacts should only
6 portions of grazing permits be affected, but they will not mitigate a complete loss of grazing
7 permits, the loss of livestock AUMs, or the loss of value in ranching operations including private
8 land values.
9

10 No SEZ-specific design features to protect livestock grazing have been identified in this
11 Final Solar PEIS. Some SEZ-specific design features may be identified through the process of
12 preparing parcels for competitive offer and subsequent project-specific analysis.
13

14 **10.1.4.2 Wild Horses and Burros**
15

16 ***10.1.4.2.1 Affected Environment***
17

18 The information presented in the Draft Solar PEIS remains valid. There are no wild horse
19 or burro herd management areas (HMAs) within the proposed Antonito Southeast SEZ or in
20 proximity to it; however, there have been occasional reports of feral horses seen in the SEZ.
21
22
23

24 ***10.1.4.2.2 Impacts***
25

26 As presented in the Draft Solar PEIS, solar energy development within the proposed
27 Antonito Southeast SEZ would not affect wild horses and burros.
28
29
30

31 ***10.1.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness***
32

33 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of
34 comments received as applicable, no SEZ-specific design features to address wild horses and
35 burros are required for the proposed Antonito Southeast SEZ.
36
37

38 **10.1.5 Recreation**
39

40 ***10.1.5.1 Affected Environment***
41

42 The area of the proposed Antonito Southeast SEZ has not changed from that presented in
43 the Draft Solar PEIS.
44
45

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

13
14 While the public land within the proposed SEZ is flat and generally unremarkable, it is
15 also large and conspicuous because it is undeveloped and is readily accessible to recreational
16 users. It also adjoins a large block of public lands to the south in New Mexico. As described in
17 the Draft Solar PEIS, the area supports a range of dispersed recreational activities, although it is
18 believed that levels of recreational use are low. The Colorado Division of Wildlife (CDOW)¹ has
19 commented the area is habitat for pronghorn antelope, an important species for hunting in the
20 area. More detailed information on impacts on these species can be found in Section 10.1.11.3.2
21 of the Draft Solar PEIS.

22 23 24 **10.1.5.2 Impacts**

25
26 As stated in the Draft Solar PEIS, solar development of the SEZ will be readily visible
27 to travelers on U.S. 285 and on the Los Caminos Antiguos Scenic Byway. Since the proposed
28 SEZ is large, solar development of the area has the potential to influence the impressions of
29 recreational and tourism visitors entering the San Luis Valley via routes near the SEZ. Whether
30 there would be a potential impact on recreation and tourism in the valley because of the solar
31 development along these access routes is unknown. There may be potential to provide
32 interpretive activities focused on solar energy and development that would be of interest to
33 travelers.

34
35 Because the route of the West Fork of the North Branch of the Old Spanish Trail is so
36 near the SEZ, it is anticipated that the viewshed of the Trail would be adversely affected by solar
37 development within the SEZ and might reduce the potential future recreational attraction of the
38 Trail. However, the integrity and historical significance of the portion of the Trail near to the
39 proposed SEZ remain undetermined.

40
41 Visual impacts on surrounding recreational use areas would be greater with taller solar
42 facilities such as power towers and facilities with wet cooling. Visitors to areas located at higher
43 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.

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

7
8 The CDOW has commented there is a specific concern with the loss of pronghorn
9 antelope habitat in Game Management Unit (GMU) 81, where the SEZ is located. There are
10 limited antelope hunting permits issued in the GMU, and the reduction in habitat that would
11 occur due to solar development within the SEZ could result in a reduction in antelope hunting
12 opportunities. However, the overall impact on pronghorn was estimated to be small in this
13 assessment (see Section 10.1.11.4.2 of the Draft Solar PEIS), because only a small portion of
14 the available habitat in the valley occurs within the proposed SEZ.

15
16 In addition, lands that are outside of the proposed SEZ may be acquired or managed for
17 mitigation of impacts on other resources (e.g., sensitive species). Managing these lands for
18 mitigation could further exclude or restrict recreational use, potentially leading to additional
19 losses in recreational opportunities in the region. The impact of acquisition and management of
20 mitigation lands would be considered as a part of the environmental analysis of specific solar
21 energy projects.

22 23 24 **10.1.5.3 SEZ-Specific Design Features and Design Feature Effectiveness**

25
26 Required programmatic design features that would reduce impacts on recreational
27 resources are described in Section A.2.2 of Appendix A of this Final Solar PEIS (design features
28 for both specially designated areas and visual resources also would address some impacts).
29 Implementing the programmatic design features will provide some mitigation for the identified
30 impacts but will not mitigate the loss of recreational access to public lands developed for solar
31 energy production. Likewise, a loss of wildlife-related hunting recreation will not be mitigated.

32
33 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of
34 comments received as applicable, the following proposed SEZ-specific design feature for the
35 proposed Antonito Southeast SEZ has been identified:

- 36
37
- 38 • Tourism is an important economic growth area for the San Luis Valley,
39 and the Antonito Southeast SEZ is located in a visible location adjacent to
40 principal highway routes into the valley. Because of its location, there is
41 potential to influence visitors' perception of the tourism climate in the valley.
42 As projects are proposed for the SEZ, the potential impacts on tourism should
43 be considered and reviewed with local community leaders.

44 The need for additional SEZ-specific design features will be identified through the
45 process of preparing parcels for competitive offer and subsequent project-specific analysis.
46

1 **10.1.6 Military and Civilian Aviation**
2
3

4 **10.1.6.1 Affected Environment**
5

6 As stated in the Draft Solar PEIS, the proposed Antonito Southeast SEZ is located under
7 two military training routes (MTRs) and is identified by the BLM as an area of required
8 consultation with the U.S. Department of Defense (DoD).
9

10
11 **10.1.6.2 Impacts**
12

13 Through comments on the Draft Solar PEIS, the military has indicated that it has no
14 concerns about potential impacts on its activities associated with solar development. There also
15 are no anticipated impacts on civilian aviation.
16

17
18 **10.1.6.3 SEZ-Specific Design Features and Design Feature Effectiveness**
19

20 Required programmatic design features that would reduce impacts on military and
21 civilian aviation are described in Section A.2.2 of Appendix A of this Final Solar PEIS. The
22 programmatic design features require early coordination with the DoD to identify and avoid,
23 minimize, and/or mitigate, if possible, any potential impacts on the use of military airspace.
24

25 No SEZ-specific design features for military and civilian aviation have been identified in
26 this Final Solar PEIS. Some SEZ-specific design features may be identified through the process
27 of preparing parcels for competitive offer and subsequent project-specific analysis.
28
29

30 **10.1.7 Geologic Setting and Soil Resources**
31

32
33 **10.1.7.1 Affected Environment**
34

35
36 ***10.1.7.1.1 Geologic Setting***
37

38 Data provided in the Draft Solar PEIS remain valid. The boundaries of the proposed
39 Antonito Southeast SEZ remain the same, but about 17 acres (0.069 km²) of wetland and lake
40 areas are now designated as non-development areas.
41

42
43 ***10.1.7.1.2 Soil Resources***
44

45 Data provided in the Draft Solar PEIS remain valid, with the following update:
46

- 1 • Table 10.1.7.1-1 provides revised areas for soil map units taking into account
2 the non-development area within the Antonito Southeast SEZ.
3
4

5 **10.1.7.2 Impacts**

6

7 Impacts on soil resources would occur mainly as a result of ground-disturbing activities
8 (e.g., grading, excavating, and drilling), especially during the construction phase of a solar
9 project. Because the developable area of the SEZ has changed by less than 1%, the assessment
10 of impacts provided in the Draft Solar PEIS remains valid, with the following update:
11

- 12 • Impacts related to wind erodibility are somewhat reduced because the
13 identification of non-development areas eliminates about 5 acres (0.020 km²)
14 of moderately erodible soils from development (the playa areas are not rated
15 for wind erodibility).
16
17

18 **10.1.7.3 SEZ-Specific Design Features and Design Feature Effectiveness**

19

20 Required programmatic design features that would reduce impacts on soils are described
21 in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the programmatic design
22 features will reduce the potential for soil impacts during all project phases.
23

24 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration
25 of comments received as applicable, no SEZ-specific design features for soil resources were
26 identified at the proposed Antonito Southeast SEZ. Some SEZ-specific design features may be
27 identified through the process of preparing parcels for competitive offer and subsequent project-
28 specific analysis.
29
30

31 **10.1.8 Minerals (Fluids, Solids, and Geothermal Resources)**

32

33 A mineral potential assessment for the proposed Antonito Southeast SEZ has been
34 prepared and reviewed by BLM mineral specialists knowledgeable about the region where the
35 SEZ is located (BLM 2012). The BLM is proposing to withdraw the SEZ from settlement, sale,
36 location, or entry under the general land laws, including the mining laws, for a period of 20 years
37 (see Section 2.2.2.2.4 of the Final Solar PEIS). The potential impacts of this withdrawal are
38 discussed in Section 10.1.24.
39
40

41 **10.1.8.1 Affected Environment**

42

43 There are no oil and gas leases, mining claims, or geothermal leases located in the
44 proposed SEZ. The description of the mineral resources in the Draft Solar PEIS remains valid.
45
46

1 **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 km², 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 m²) per year, for each of the wind erodibility groups: WEG 1, 220 tons (200 metric tons) per acre (4,000 m²) per year (average); WEG 2, 134 tons (122 metric tons) per acre (4,000 m²) per year; WEGs 3 and 4 (and 4L), 86 tons (78 metric tons) per acre (4,000 m²) per year; WEG 5, 56 tons (51 metric tons) per acre (4,000 m²) per year; WEG 6, 48 tons (44 metric tons) per acre (4,000 m²) per year; WEG 7, 38 tons (34 metric tons) per acre (4,000 m²) per year; and WEG 8, 0 tons per acre per year.
- ^f A total of 5 acres (0.020 km²) 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 km²) of the Garita cobbly loam (0 to 3% slopes) is currently categorized as a non-development area.
- ^h Less than 1 acre (0.0040 km²) 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 km²) 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 km²) of the playa areas is currently categorized as a non-development area.

Source: NRCS (2009).

1 **10.1.8.2 Impacts**

2
3 There are no anticipated impacts on mineral resources from the development of solar
4 energy facilities in the proposed SEZ. The analysis of impacts on mineral resources in the Draft
5 Solar PEIS remains valid.
6

7
8 **10.1.8.3 SEZ-Specific Design Features and Design Feature Effectiveness**

9
10 Required programmatic design features that will reduce impacts on mineral resources
11 are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the
12 programmatic design features will provide adequate protection of mineral resources.
13

14 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration
15 of comments received as applicable, no SEZ-specific design features for minerals have been
16 identified in this Final Solar PEIS. Some SEZ-specific design features may be identified through
17 the process of preparing parcels for competitive offer and subsequent project-specific analysis.
18

19
20 **10.1.9 Water Resources**

21
22 **10.1.9.1 Affected Environment**

23 The description of the affected environment given in the Draft Solar PEIS relevant to
24 water resources at the proposed Antonito Southeast SEZ remains valid and is summarized in the
25 following paragraphs.
26

27
28 The Antonito Southeast SEZ is within the Rio Grande Headwaters subbasin of the
29 Rio Grande hydrologic region. The SEZ is located in the San Luis Valley bounded by the
30 San Juan Mountains to the west and the Sangre de Cristo Mountains to the east. Precipitation
31 and snowfall in the valley is around 7 in./yr (18 cm/yr) and 25 in./yr (64 cm), respectively, with
32 much greater amounts in the surrounding mountains. Pan evaporation rates are estimated to be
33 on the order of 54 in./yr (137 cm/yr). Surface water features within the SEZ include Alta Lake
34 and several intermittent/ephemeral washes. Alta Lake covers an area of approximately 2 acres
35 (0.0040 km²), and the existing intermittent/ephemeral washes are generally shallow and flow
36 from southwest to northeast. Three palustrine wetlands have been identified within the SEZ,
37 which are temporally flooded throughout the year. Alta Lake and these wetland areas have been
38 identified as non-development areas covering 17 acres (0.07 km²) in total. Flood hazards have
39 not been identified, but intermittent flooding may occur along the intermittent/ephemeral washes
40 and Alta Lake. Groundwater in the San Luis Valley is primarily in basin-fill deposits with an
41 upper unconfined aquifer and a lower confined aquifer, which are separated by a series of
42 confining clay layers and unfractured volcanic rocks. There are no confining clay layers in the
43 vicinity of the Antonito Southeast SEZ; however, a basalt layer that is near the surface acts as a
44 confining unit over the basin-fill aquifer. Groundwater monitoring wells within the SEZ have
45 reported depths to groundwater ranging from 200 to 300 ft (61 to 91 m) below the surface that
46

1 indicate a groundwater flow from west to east toward the Rio Grande. Water quality in the
2 aquifers of the San Luis Valley varies, with good water quality along the edges of the valley and
3 poor water quality in the vicinity of the depression around San Luis Lake.
4

5 The Antonito Southeast SEZ is located in the Colorado Division 3 management zone
6 (Rio Grande Basin) of the Colorado Division of Water Resources (Colorado DWR), where both
7 surface water and groundwater rights are overappropriated. The Rio Grande Compact of 1938
8 obligates Colorado to meet water delivery schedules to New Mexico and governs much of the
9 water management decision making in the San Luis Valley. In order to balance water uses
10 within the San Luis Valley and to meet treaty obligations, several water management
11 mechanisms have been developed that affect existing water rights and water right transfers.
12 The two primary water management considerations affecting solar energy development are
13 the need for an augmentation water plan, and the rules set by the recently formed Special
14 Improvement District Number 1 (Subdistrict #1). Augmentation water plans were described in
15 the Draft Solar PEIS (Section 10.1.9.1.3) and essentially require junior water right holders to
16 have additional water reserves to ensure that more senior water rights are not hindered. The
17 water management plan for Subdistrict #1 was ruled on in June 2010, putting restrictions on
18 groundwater withdrawals in an effort to restore groundwater levels in the unconfined aquifer.
19 None of the Colorado SEZs are located within the boundaries of Subdistrict #1, which primarily
20 includes central portions of the San Luis Valley that are currently used for agriculture. However,
21 given that water rights are overappropriated in the San Luis Valley and largely clustered within
22 Subdistrict #1, it is likely that any new water diversions and water right transfers would involve
23 these new groundwater management considerations.
24

25 In addition to the water resources information provided in the Draft Solar PEIS, this
26 section provides a planning-level inventory of available climate, surface water, and groundwater
27 monitoring stations within the immediate vicinity of the proposed Antonito Southeast SEZ and
28 surrounding basin. Additional data regarding climate, surface water, and groundwater conditions
29 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.
30 Fieldwork and hydrologic analyses needed to determine 100-year floodplains and jurisdictional
31 water bodies would need to be coordinated with appropriate federal, state, and local agencies.
32 Areas within the Antonito Southeast SEZ that are found to be within a 100-year floodplain will
33 be identified as non-development areas. Any water features within the Antonito Southeast SEZ
34 determined to be jurisdictional will be subject to the permitting process described in the Clean
35 Water Act (CWA).
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38 **10.1.9.2 Impacts**

39 ***10.1.9.2.1 Land Disturbance Impacts on Water Resources***

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

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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 km², multiply by 0.004047.

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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).

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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 km²) have been identified as non-development areas, including Alta Lake and several small wetlands.

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

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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		
		Alamosa–Trinchera (ft)	Conejos (ft)	SEZ (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).

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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 ft³ to m³, multiply by 0.0283.

^b To convert mi to km, multiply by 1.6093.

Source: USGS (2012b).

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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).

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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).

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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).

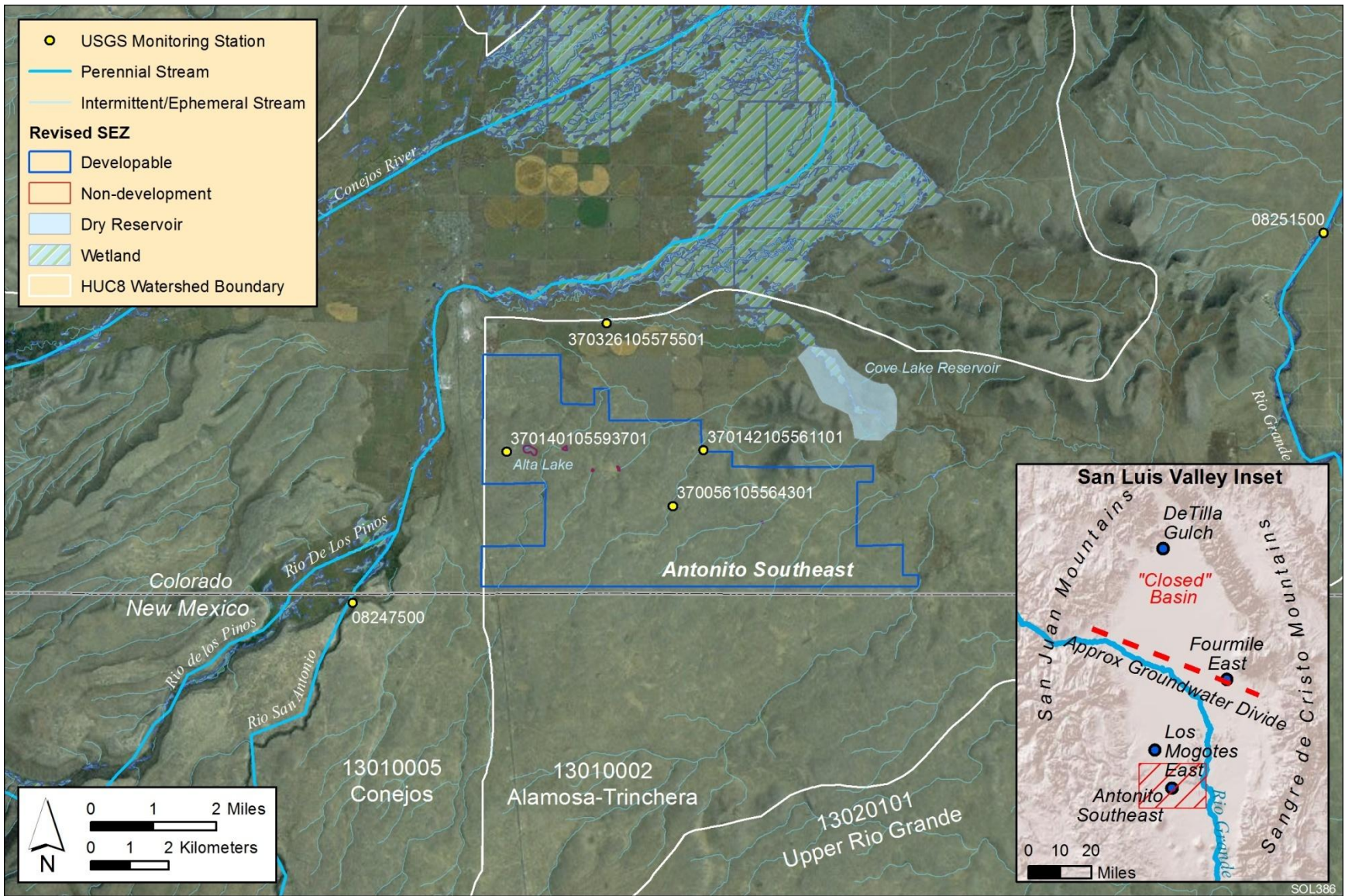


FIGURE 10.1.9.1-1 Water Features near the Proposed Antonito Southeast SEZ as Revised

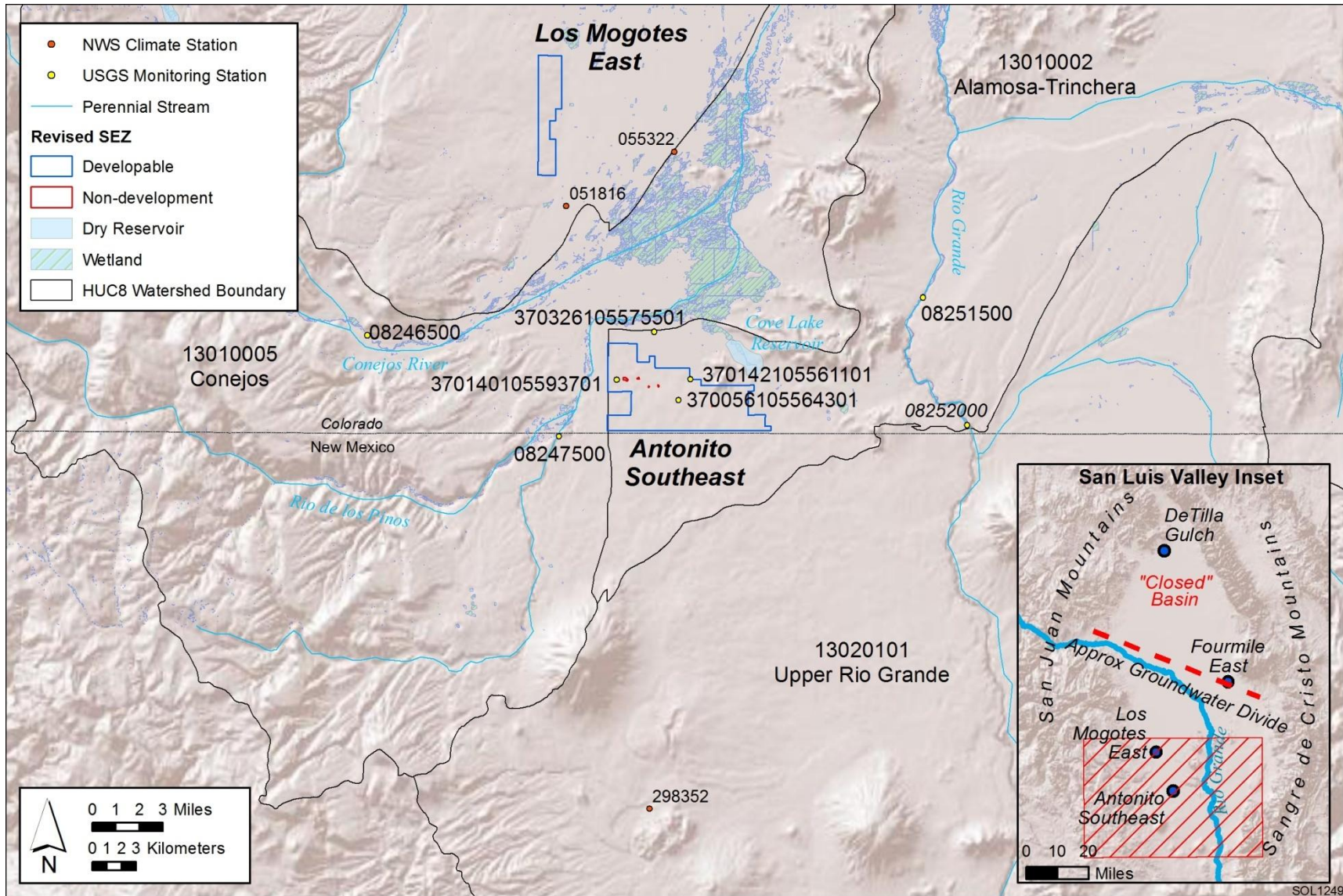


FIGURE 10.1.9.1-2 Water Features within the Alamosa-Trinchera and Conejos Watersheds, Which Include the Proposed Antonito Southeast SEZ as Revised

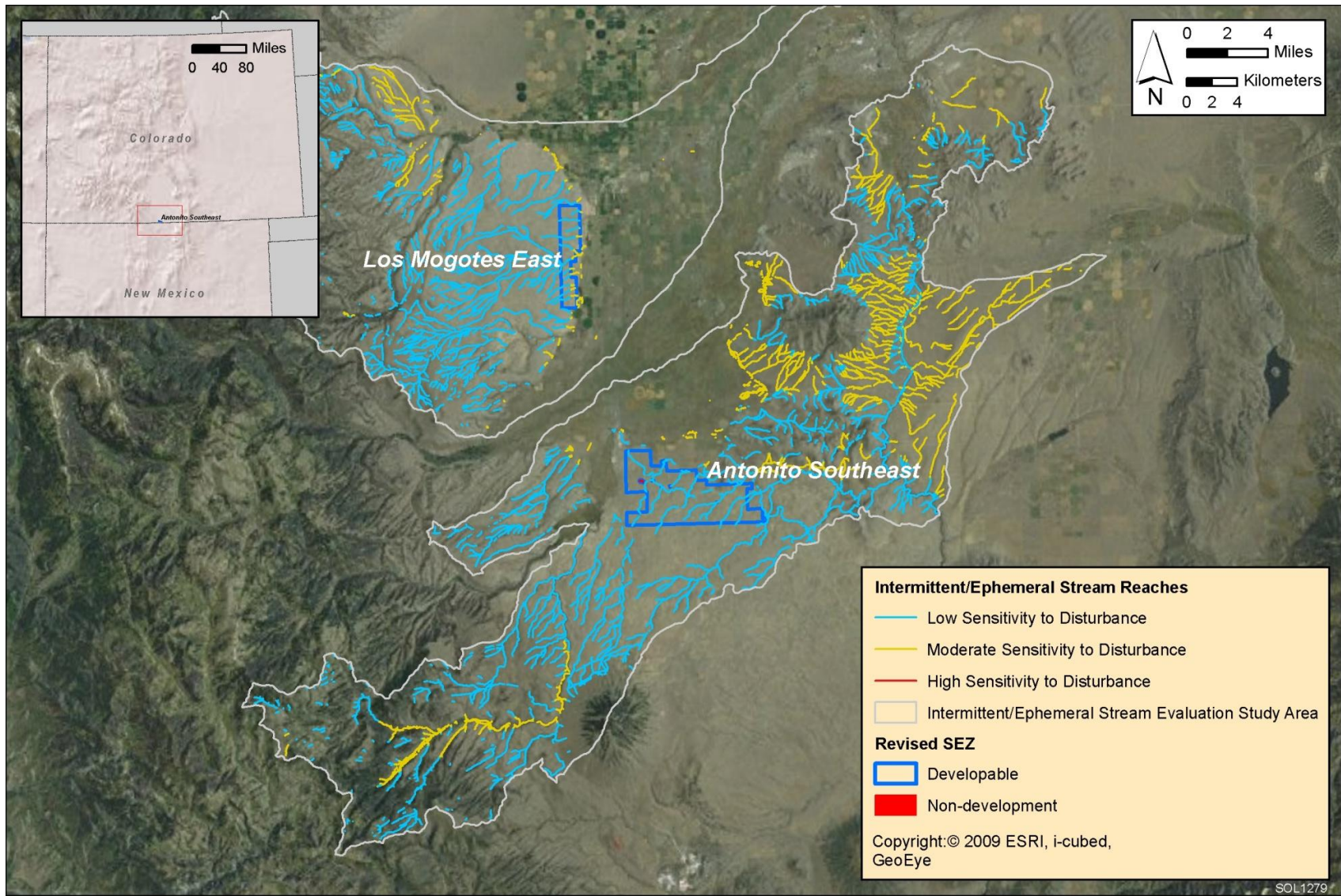
1 The study region considered for the intermittent/ephemeral stream evaluation relevant to
2 the Antonito Southeast SEZ is a subset of the Alamosa–Trinchera and Conejos watersheds
3 (HUC8), for which information regarding stream channels is presented in Tables 10.1.9.1-3 and
4 10.1.9.1-4 of this Final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

10 11 12 ***10.1.9.2.2 Water Use Requirements for Solar Energy Technologies*** 13

14 The water use requirements for full build-out scenarios of the Antonito Southeast SEZ
15 have not changed from the values presented in the Draft Solar PEIS (see Tables 10.1.9.2-1 and
16 10.1.9.2-2 in the Draft Solar PEIS). This section presents additional analyses of groundwater,
17 which includes a basin-scale water budget and a simplified, one-dimensional groundwater model
18 to assess groundwater drawdown for various development scenarios. Only a summary of the
19 results from these groundwater analyses is presented in this section; more information on
20 methods and results is presented in Appendix O.

21
22 The Antonito Southeast SEZ is located in the San Luis Valley, where both surface
23 waters and groundwater are managed conjunctively. Previous studies on water resources in the
24 San Luis Valley typically present a basin-scale water balance, which considers inputs and
25 outputs of water via precipitation, surface water flows, and groundwater (e.g., Mayo et al. 2007).
26 Table 10.1.9.2-1 presents an example water balance for the San Luis Valley that considers all
27 water inputs and outputs from the valley. As noted by Mayo et al. (2007), it is difficult to
28 reconcile some of the historical water budget presented for the San Luis Valley; however, it can
29 be generally stated that the water budget is predominately a balance of precipitation and stream
30 flow inputs with output dominated by evapotranspiration by agricultural lands, riparian areas,
31 and meadows.

32
33 The estimated total water use requirements during the peak construction year are as high
34 as 964 ac-ft/yr (1.2 million m³/yr), which does not constitute a significant amount given the short
35 duration of this water demand relative to water resources within the region. The long duration of
36 groundwater pumping during operations (20 years) poses a greater threat to groundwater
37 resources. This analysis considered low, medium, and high groundwater pumping scenarios that
38 represent full build-out of the SEZ assuming PV, dry-cooled parabolic trough, and wet-cooled
39 parabolic trough, respectively (a 30% operational time was considered for all solar facility
40 types on the basis of operations estimates for proposed utility-scale solar energy facilities).
41 The low, medium, and high pumping scenarios result in groundwater withdrawals that range
42 from 44 to 7,805 ac-ft/yr (54,300 to 9.6 million m³/yr), or 880 to 155,820 ac-ft (1.1 million to
43 192 million m³) over the 20-year operational period. From a groundwater budgeting perspective,
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2 **FIGURE 10.1.9.2-1 Intermittent/Ephemeral Stream Channel Sensitivity to Surface Disturbances in the Vicinity of the Proposed**
3 **Antonito Southeast SEZ as Revised**

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

Process	Amount
<i>Inputs</i>	
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
<i>Outputs</i>	
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
<i>Groundwater storage</i>	
Storage (ac-ft)	2,026,783

^a To convert ac-ft to m³, multiply by 1,234.

^b Colorado DWR (2004).

Source: Mayo et al. (2007).

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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.

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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

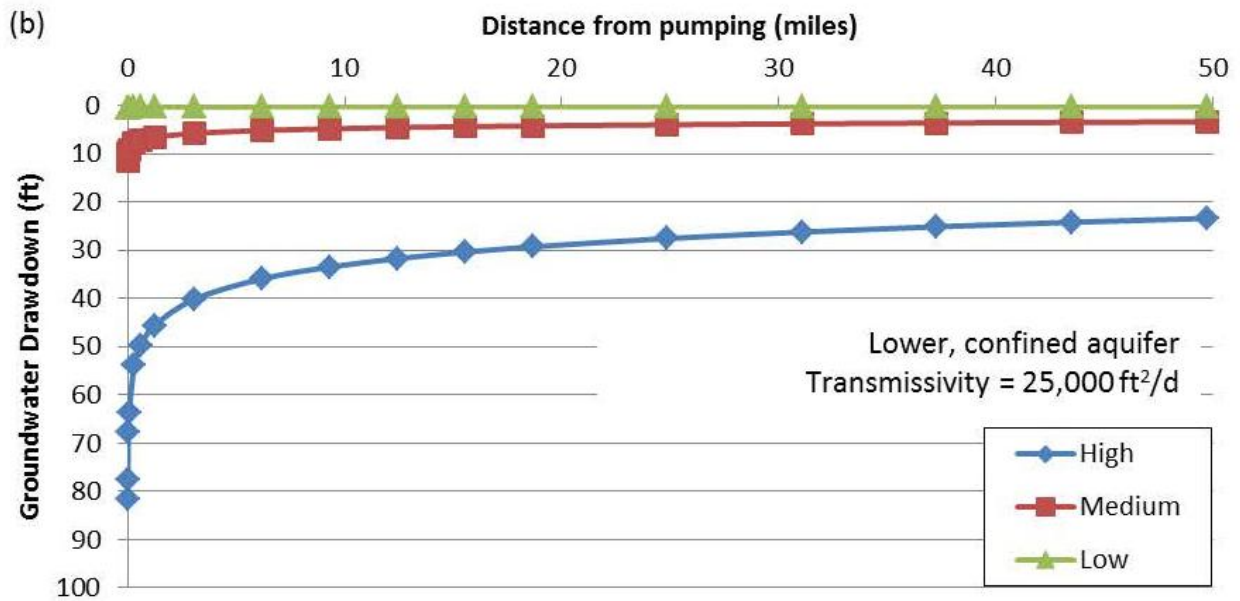
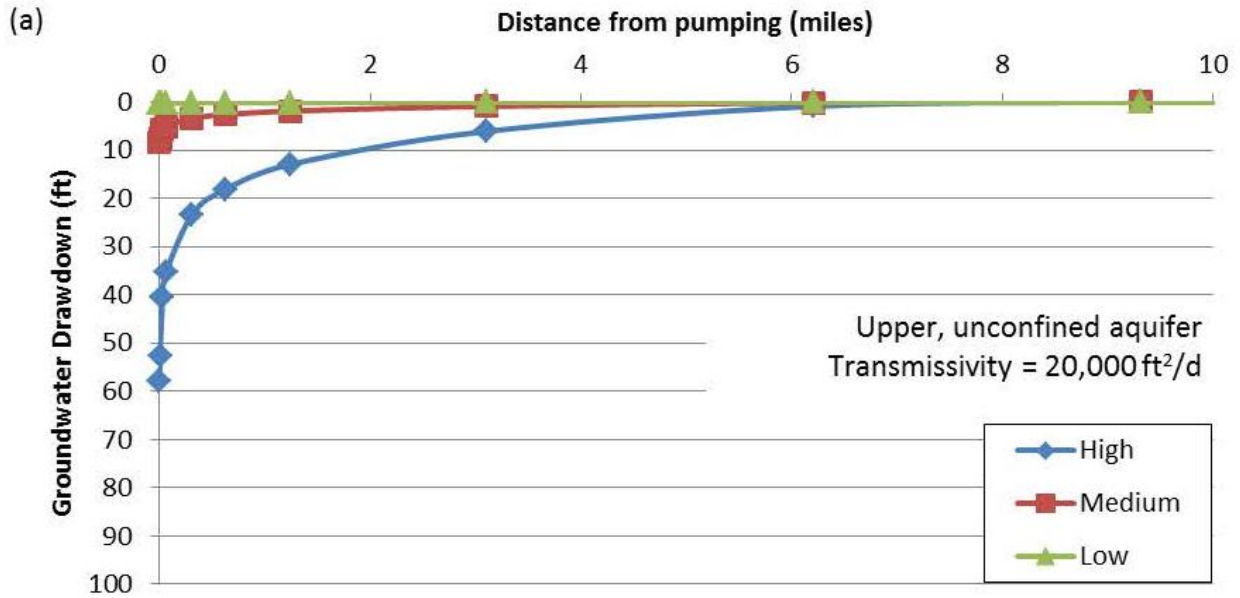
Parameter	Value ^a
<i>Upper, unconfined aquifer</i>	
Aquifer type/conditions	Unconfined/basin fill
Aquifer thickness (ft) ^{b,c}	100
Hydraulic conductivity (ft/day)	200
Transmissivity (ft ² /day)	20,000
Specific yield	0.24
<i>Lower, confined aquifer</i>	
Aquifer type/conditions	Confined/basin fill
Aquifer thickness (ft)	500
Hydraulic conductivity (ft/day)	50
Transmissivity (ft ² /day)	25,000
Storage coefficient	0.0000025
<i>Upper and lower aquifers</i>	
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 m³, multiply by 1,234.

Source: Colorado DWR (2004).

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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).



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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

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

13 14 15 ***10.1.9.2.3 Off-Site Impacts: Roads and Transmission Lines***

16
17 As stated in the Draft Solar PEIS, impacts associated with the construction of roads
18 and transmission lines primarily deal with water use demands for construction, water quality
19 concerns related to potential chemical spills, and land disturbance effects on the natural
20 hydrology. Water needed for transmission line construction activities (e.g., for soil compaction,
21 dust suppression, and potable supply for workers) could be trucked to the construction area from
22 an off-site source. If this occurred, water use impacts at the SEZ would be negligible. The Draft
23 Solar PEIS assessment of impacts on water resources from road and transmission line
24 construction remains valid.

25 26 27 ***10.1.9.2.4 Summary of Impacts on Water Resources***

28
29 The additional information and analyses of water resources presented in this update agree
30 with the information provided in the Draft Solar PEIS, which indicates that the San Luis Valley
31 is a high-elevation basin, with predominately agricultural land use, and is the headwaters of the
32 Rio Grande, where surface water and groundwater processes are coupled and managed jointly.
33 Groundwater in the San Luis Valley is found both in the upper unconfined aquifer and lower
34 confined aquifer, and historical diversions of both surface water and groundwater for irrigation
35 have affected streamflows and groundwater levels. Water management plays a significant role
36 in the San Luis Valley as it pertains to ensuring river flows in the Rio Grande according to the
37 Rio Grande Compact, which is the primary responsibility of the Colorado DWR.

38
39 Disturbance to intermittent/ephemeral stream channels within the Antonito Southeast
40 SEZ should not have a significant impact on the critical functions of groundwater recharge,
41 sediment transport, flood conveyance, and ecological habitat, given the relatively small footprint
42 of the SEZ with respect to the study area, and the low sensitivity to land disturbances of
43 identified intermittent/ephemeral streams. Groundwater withdrawals pose the greatest threat to
44 water resources in the San Luis Valley. The water budgeting and groundwater modeling analyses
45 suggest that significant groundwater drawdown could occur both locally and off-site under the
46 high pumping scenario if groundwater were extracted from either the unconfined or confined

1 aquifer. The low and medium pumping scenarios are preferable, because estimated groundwater
2 drawdown is much less. Ultimately, the process of transferring water rights established by the
3 Colorado DWR will determine how much water can be used by proposed solar facilities. As
4 stated in the Draft Solar PEIS, given the restrictive nature of water rights and the need for
5 augmentation water reserves, it would be difficult for any projects seeking an amount of water
6 more than 1,000 ac-ft/yr (1.2 million m³/yr) to be successful in obtaining the needed water rights
7 (McDermott 2010).
8

9 Predicting impacts associated with groundwater withdrawal is often difficult given the
10 heterogeneity of aquifer characteristics, the long time period between the onset of pumping and
11 its effects, and limited data. Another consideration relevant to the San Luis Valley is that the
12 transfer of water rights will likely come from the purchase of existing irrigation water rights,
13 which will result in a change in the location of the point of diversion and change land use
14 patterns in the basin, both of which can affect groundwater processes. One of the primary
15 mitigation measures to protect water resources is the implementation of long-term monitoring
16 and adaptive management (see Section A.2.4 of Appendix A). For groundwater, this requires a
17 combination of monitoring and modeling to fully identify the temporal and spatial extent of
18 potential impacts. Water management in the San Luis Valley relies on several water monitoring
19 and modeling tools developed by the Colorado DWR and the Colorado Water Conservation
20 Board (CWCB) that are a part of the Colorado's Decision Support Systems (available at
21 <http://cdss.state.co.us/Pages/CDSSHome.aspx>), and these tools should be implemented with
22 respect to long-term monitoring and adaptive management strategies for solar energy
23 development occurring within the San Luis Valley.
24
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26 **10.1.9.3 SEZ-Specific Design Features and Design Feature Effectiveness**

27

28 Required programmatic design features that would reduce impacts on surface water
29 and groundwater are described in Section A.2.2 of Appendix A of this Final Solar PEIS.
30 Implementing the programmatic design features will provide some protection of and reduce
31 impacts on water resources.
32

33 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
34 analyses, and consideration of comments received as applicable, the following SEZ-specific
35 design feature has been identified:
36

- 37 • Groundwater analyses suggest full build-out of wet-cooled technologies is
38 not feasible; for mixed-technology development scenarios, any proposed
39 wet-cooled projects would have to reduce water requirements to less than
40 approximately 1,000 ac-ft/yr (1.2 million m³/yr) in order to secure water
41 rights and comply with water management in the San Luis Valley.
42

43 The need for additional SEZ-specific design features will be identified through the
44 process of preparing parcels for competitive offer and subsequent project-specific analysis.
45
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1 **10.1.10 Vegetation**

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4 **10.1.10.1 Affected Environment**

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6 Several wetlands mapped by the National Wetlands Inventory (NWI) within the
7 proposed Antonito Southeast SEZ, with a total of about 17 acres (0.07 km²), were identified
8 as non-development areas in the Supplement to the Draft Solar PEIS.
9

10 As presented in Section 10.1.10.1 of the Draft Solar PEIS, 7 cover types were identified
11 within the area of the proposed SEZ, while 26 cover types were identified within the area of
12 indirect effects, including the previously assumed transmission line corridor, and within 5 mi
13 (8 km) of the SEZ boundary. For this updated assessment, a specifically located hypothetical
14 transmission line is no longer being assumed (see Section 10.1.23 for an updated transmission
15 assessment for this SEZ). Sensitive habitats on the SEZ include wetlands and ephemeral washes.
16 Figure 10.1.10.1-1 shows the cover types within the affected area of the Antonito Southeast SEZ
17 as revised.
18

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20 **10.1.10.2 Impacts**

21
22 As presented the Draft Solar PEIS, the construction of solar energy facilities within the
23 proposed Antonito Southeast SEZ would result in direct impacts on plant communities because
24 of the removal of vegetation within the facility footprint during land-clearing and land-grading
25 operations. With full development of the SEZ, approximately 80% of the SEZ would be expected
26 to be cleared. Taking the newly identified non-development area into account, approximately
27 7,770 acres (31.4 km²) would be cleared.
28

29 Overall impact magnitude categories were based on professional judgment and include
30 (1) *small*: a relatively small proportion ($\leq 1\%$) of the cover type within the SEZ region would be
31 lost; (2) *moderate*: an intermediate proportion (>1 but $\leq 10\%$) of a cover type would be lost; and
32 (3) *large*: $>10\%$ of a cover type would be lost.
33

34
35 ***10.1.10.2.1 Impacts on Native Species***

36
37 The analysis presented in the Draft Solar PEIS for the original Antonito Southeast SEZ
38 developable area indicated that development would result in a moderate impact on three land
39 cover types and a small impact on all other land cover types occurring within the SEZ
40 (Table 10.1.10.1-1 in the Draft Solar PEIS). Development within the revised Antonito Southeast
41 SEZ could still directly affect all the cover types evaluated in the Draft Solar PEIS; the reduction
42 in the developable area would result in slightly reduced impact levels on some cover types in the
43 affected area, but the impact magnitudes on all land cover types would remain unchanged
44 compared to original estimates in the Draft Solar PEIS.
45
46

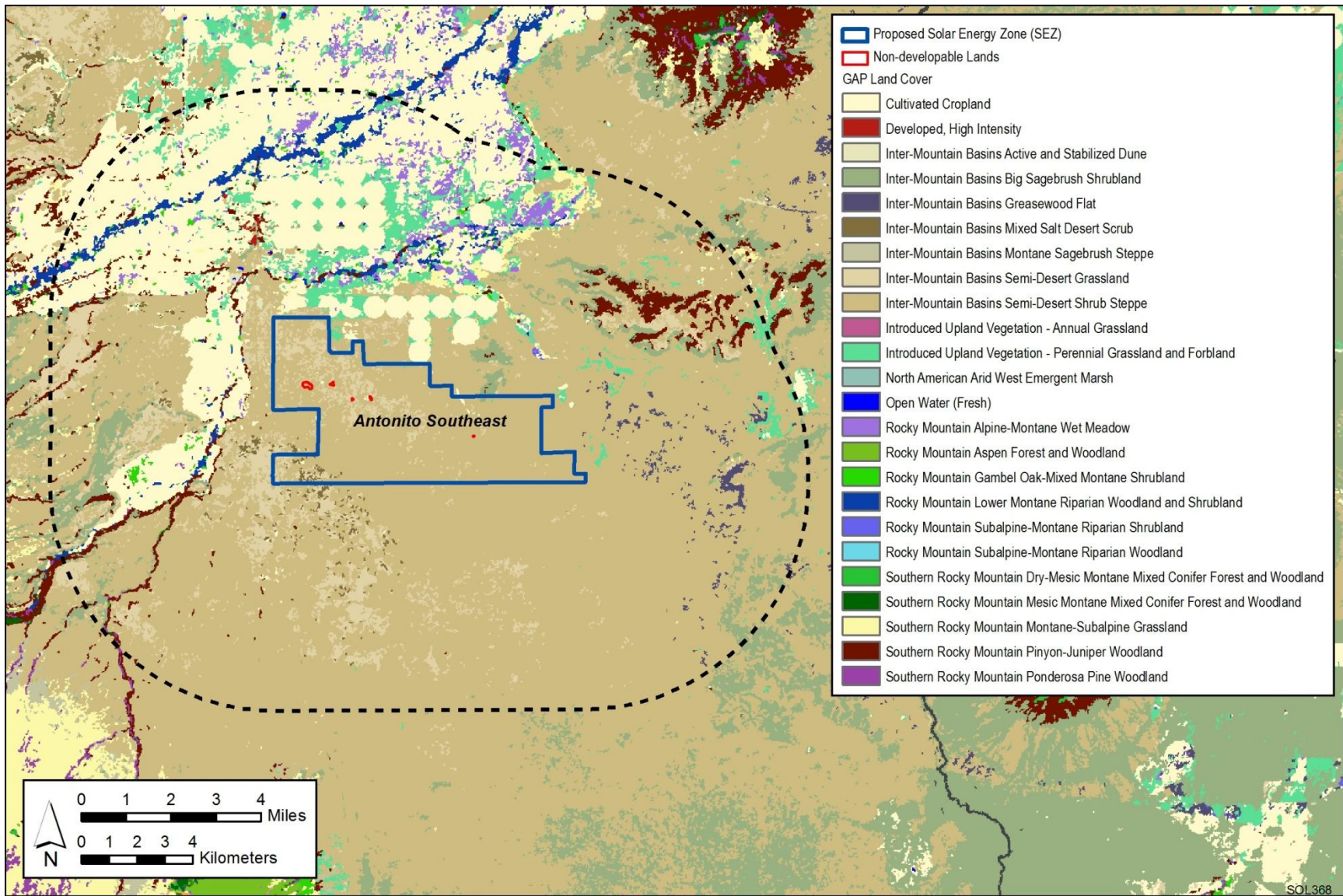


FIGURE 10.1.10.1-1 Land Cover Types within the Proposed Antonito Southeast SEZ as Revised

1 Direct impacts on the NWI-mapped wetlands, such as Alta Lake, that occur within the
2 non-developable portions of the SEZ, or the previously identified transmission corridor, would
3 not occur. However, direct impacts on unmapped wetlands within the remaining developable
4 areas of the SEZ could still occur. In addition, indirect impacts on wetlands within or near the
5 SEZ, as described in the Draft Solar PEIS, could occur.
6
7

8 ***10.1.10.2 Impacts from Noxious Weeds and Invasive Plant Species*** 9

10 As presented the Draft Solar PEIS, land disturbance from project activities and indirect
11 effects of construction and operation within the Antonito Southeast SEZ could potentially result
12 in the establishment or expansion of noxious weeds and invasive species populations, potentially
13 including those species listed in Section 10.1.10.1 in the Draft Solar PEIS. Impacts such as
14 reduced restoration success and possible widespread habitat degradation could still occur.
15
16

17 **10.1.10.3 SEZ-Specific Design Features and Design Feature Effectiveness** 18

19 Required programmatic design features are described in Section A.2.2 of Appendix A
20 of this Final Solar PEIS. SEZ-specific species and habitats will determine how programmatic
21 design features are applied, for example:
22

- 23 • All wetland and dry wash habitats within the SEZ shall be avoided to the
24 extent practicable, and any impacts minimized and/or mitigated in
25 consultation with appropriate agencies. A buffer area shall be maintained
26 around wetlands, dry washes, and riparian areas to reduce the potential for
27 impacts on wetlands on or near the SEZ and on riparian habitats associated
28 with the Rio San Antonio, Rio de los Pinos, Conejos River, and Cove Lake
29 Reservoir.
30
- 31 • Appropriate engineering controls shall be used to minimize impacts on
32 wetland, dry wash, and riparian habitats, including downstream occurrences,
33 resulting from surface water runoff, erosion, sedimentation, altered hydrology,
34 accidental spills, or fugitive dust deposition to these habitats. Appropriate
35 buffers and engineering controls will be determined through agency
36 consultation.
37
- 38 • Groundwater withdrawals shall be limited to reduce the potential for indirect
39 impacts on wetland habitats along the Rio San Antonio or the Conejos River,
40 or on springs associated with groundwater discharge.
41

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

1 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of
2 comments received as applicable, no SEZ-specific design features for vegetation have been
3 identified. Some SEZ-specific design features may be identified through the process of preparing
4 parcels for competitive offer and subsequent project-specific analysis.
5
6

7 **10.1.11 Wildlife and Aquatic Biota**

8

9 For the assessment of potential impacts on wildlife and aquatic biota, overall impact
10 magnitude categories were based on professional judgment and include (1) *small*: a relatively
11 small proportion ($\leq 1\%$) of the species' habitat within the SEZ region would be lost;
12 (2) *moderate*: an intermediate proportion (> 1 but $\leq 10\%$) of the species' habitat would be lost;
13 and (3) *large*: $> 10\%$ of the species' habitat would be lost.
14
15

16 **10.1.11.1 Amphibians and Reptiles**

17
18

19 ***10.1.11.1.1 Affected Environment***

20

21 As presented in the Draft Solar PEIS, amphibian and reptile species expected to occur
22 within the Antonito Southeast SEZ include the Woodhouse's toad (*Bufo woodhousii*), fence
23 lizard (*Sceloporus undulatus*), gopher snake (*Pituophis catenifer*), western rattlesnake (*Crotalus*
24 *viridis*), and western terrestrial garter snake (*Thamnophis elegans*). The potential for these
25 species to occur in the SEZ has not changed, because the boundaries of the Antonito Southeast
26 SEZ have not changed.
27
28

29 ***10.1.11.1.2 Impacts***

30

31 As presented in the Draft Solar PEIS, solar energy development within the Antonito
32 Southeast SEZ could affect potentially suitable habitats for several amphibian and reptile
33 species. The analysis presented in the Draft Solar PEIS indicated that development would result
34 in a small overall impact on representative amphibian and reptile species (Table 10.1.11.1-1 in
35 the Draft Solar PEIS). Development within the Antonito Southeast SEZ could still affect the
36 same species evaluated in the Draft Solar PEIS; however, the reduction in the developable
37 wetland and lake areas would, in particular, minimize potential impacts on amphibians.
38 Non-development in the wetland and lake areas would result in reduced (and still small) impact
39 levels on amphibians and reptiles in the Antonito Southeast SEZ compared to original estimates
40 in the Draft Solar PEIS.
41
42

43 ***10.1.11.1.3 SEZ-Specific Design Features and Design Feature Effectiveness***

44

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

1 implementation of required programmatic design features, impacts on amphibian and reptile
2 species would be small.
3

4 Because of the change in the developable area within the SEZ and the elimination of
5 consideration of a specific route for a new transmission line, the SEZ-specific design features
6 identified in Section 10.1.11.1.3 of the Draft Solar PEIS (i.e., Alta Lake and surrounding
7 wetlands should be avoided; engineering controls should be used to minimize impacts on aquatic
8 habitats) are no longer applicable. On the basis of impact analyses conducted for the Draft Solar
9 PEIS and consideration of comments received as applicable, no SEZ-specific design features
10 for reptiles and amphibians have been identified. Some SEZ-specific design features may be
11 identified through the process of preparing parcels for competitive offer and subsequent project-
12 specific analysis.
13

14 **10.1.11.2 Birds**

15 ***10.1.11.2.1 Affected Environment***

16
17
18 As presented in the Draft Solar PEIS, a large number of bird species could occur or have
19 potentially suitable habitat within the affected area of the proposed Antonito Southeast SEZ.
20 Representative bird species identified in the Draft Solar PEIS included the killdeer (*Charadrius*
21 *vociferus*), Brewer's blackbird (*Euphagus cyanocephalus*), Brewer's sparrow (*Spizella breweri*),
22 common nighthawk (*Chordeiles minor*), horned lark (*Eremophila alpestris*), vesper sparrow
23 (*Pooecetes gramineus*), western meadowlark (*Sturnella neglecta*), the American kestrel (*Falco*
24 *sparverius*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), red-tailed hawk
25 (*Buteo jamaicensis*), short-eared owl (*Asio flammeus*), Swainson's hawk (*Buteo swainsoni*),
26 turkey vulture (*Cathartes aura*), and the mourning dove (*Zenaida macroura*). The potential for
27 these species to occur in the SEZ has not changed because the boundaries of the Antonito
28 Southeast SEZ have not changed.
29
30
31

32 ***10.1.11.2.2 Impacts***

33
34
35 As presented in the Draft Solar PEIS, solar energy development within the Antonito
36 Southeast SEZ could affect potentially suitable habitats of bird species. The analysis presented in
37 the Draft Solar PES for the original Antonito Southeast SEZ indicated that development would
38 result in a small overall impact on the representative bird species. Non-development in the
39 wetland and lake areas would result in reduced (and still small) impact levels on birds in the
40 Antonito Southeast SEZ compared to original estimates in the Draft Solar PEIS. The reduction in
41 the developable wetland and lake areas would, in particular, minimize potential impacts on the
42 killdeer.
43
44

1 **10.1.11.2.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 Required programmatic design features that would reduce impacts on bird species are
4 described in Section A.2.2 of Appendix A of this Final Solar PEIS. With the implementation of
5 required programmatic design features, impacts on bird species would be reduced.
6

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

- 10
- 11 • If present, prairie dog colonies (which could provide habitat or a food source
12 for some raptor species) should be avoided to the extent practicable.
- 13

14 If SEZ-specific design features are implemented in addition to required programmatic
15 design features, it is anticipated that impacts on bird species would be small. The need for
16 additional SEZ-specific design features will be identified through the process of preparing
17 parcels for competitive offer and subsequent project-specific analysis.
18

19

20 **10.1.11.3 Mammals**

21

22

23 **10.1.11.3.1 Affected Environment**

24

25 As presented in the Draft Solar PEIS, a large number of mammal species were identified
26 that could occur or have potentially suitable habitat within the affected area of the proposed
27 Antonito Southeast SEZ. Representative mammal species identified in the Draft Solar PEIS
28 included (1) big game species: the American black bear (*Ursus americanus*), bighorn sheep
29 (*Ovis canadensis*), cougar (*Puma concolor*), elk (*Cervus canadensis*), mule deer (*Odocoileus*
30 *hemionus*), and pronghorn (*Antilocapra americana*); (2) furbearers and small game species:
31 the American badger (*Taxidea taxus*), coyote (*Canis latrans*), desert cottontail (*Sylvilagus*
32 *audubonii*), red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*), and white-tailed
33 jackrabbit (*Lepus townsendii*); and (3) small nongame species: the big brown bat (*Eptesicus*
34 *fuscus*), deer mouse (*Peromyscus maniculatus*), least chipmunk (*Tamias minimus*), little brown
35 myotis (*Myotis lucifugus*), northern pocket gopher (*Thomomys talpoides*), Ord's kangaroo rat
36 (*Dipodomys ordii*), thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*), and western
37 small-footed myotis (*Myotis ciliolabrum*). The potential for these species to occur in the SEZ has
38 not changed because the boundaries of the Antonito Southeast SEZ have not changed.
39

40

41 **10.1.11.3.2 Impacts**

42

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

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

13 ***10.1.11.3.3 SEZ-Specific Design Features and Design Feature Effectiveness***

14
15 Required programmatic design features that would reduce impacts on mammal species
16 are described in Section A.2.2 of Appendix A of this Final Solar PEIS. SEZ-specific resources
17 and conditions will determine how programmatic design features are applied, for example:

- 18
19 • Prairie dog colonies shall be avoided to the extent practicable to reduce
20 impacts on species such as desert cottontail and thirteen-lined ground squirrel.

21
22 If the programmatic design features are implemented, impacts on mammal species will
23 be reduced. On the basis of impact analyses conducted for the Draft Solar PEIS, updates to the
24 analyses due to changes to the SEZ boundaries, and consideration of comments received as
25 applicable, the following SEZ-specific design features for mammals have been identified:

- 26
27 • Construction should be curtailed during winter when big game species are
28 present, particularly within elk severe winter range.
- 29
30 • Disturbance near the elk and mule deer resident population areas should be
31 avoided.
- 32
33 • Where big game winter ranges intersect or are within close proximity to the
34 SEZ, use of motorized vehicles and other human disturbances should be
35 controlled (e.g., through road closures).
- 36
37 • Development in the 253-acre (1-km²) portion of the SEZ that overlaps the
38 pronghorn summer concentration area should be avoided.

39
40 If these SEZ-specific design features are implemented in addition to required
41 programmatic design features, impacts on mammal species would be small. The need for
42 additional SEZ-specific design features will be identified through the process of preparing
43 parcels for competitive offer and subsequent project-specific analysis.

1 **10.1.11.4 Aquatic Biota**
2
3

4 ***10.1.11.4.1 Affected Environment***
5

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

- 11
- 12 • The wetlands in the SEZ (including Alta Lake) have now been identified as
13 non-development areas.
 - 14 • A specific route for a new transmission line corridor is no longer assumed.
15

16

17 Aquatic biota present in the surface water features of the Antonito Southeast SEZ have
18 not been characterized. As stated in Appendix C of the Supplement to the Draft Solar PEIS, site
19 surveys can be conducted at the project-specific level to characterize aquatic biota, if present.
20

21

22 ***10.1.11.4.2 Impacts***
23

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

- 31
- 32 • Because Alta Lake and other wetlands in the SEZ have been identified as non-
33 development areas, direct impacts on them would not occur. However, as
34 described in the Draft Solar PEIS, the wetlands could be affected indirectly by
35 solar development activities within the SEZ.
36

37

38 ***10.1.11.4.3 SEZ-Specific Design Features and Design Feature Effectiveness***
39

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

- 43
- 44 • Undisturbed buffer areas and sediment and erosion controls shall be
45 maintained around Alta Lake and associated wetlands in the western portion
46 of the SEZ.

- 1 • The use of heavy machinery and pesticides shall be avoided within the
2 immediate catchment basins for Alta Lake and its associated wetlands.
3
- 4 • Development shall avoid any additional wetlands identified during future site-
5 specific fieldwork.
6

7 It is anticipated that implementation of the programmatic design features will reduce
8 impacts on aquatic biota, and if the utilization of water from groundwater or surface water
9 sources is adequately controlled to maintain sufficient water levels in nearby aquatic habitats,
10 the potential impacts on aquatic biota from solar energy development at the Antonito Southeast
11 SEZ would be small.
12

13 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of
14 comments received as applicable, no SEZ-specific design features for aquatic biota have been
15 identified. Some SEZ-specific design features may be identified through the process of preparing
16 parcels for competitive offer and subsequent project-specific analysis.
17
18

19 **10.1.12 Special Status Species**

22 **10.1.12.1 Affected Environment**

23
24 Thirty-eight special status species that could occur or have potentially suitable habitat
25 within the affected area of the proposed Antonito Southeast SEZ were identified in the Draft
26 Solar PEIS. Since publication of the Draft Solar PEIS, there have been no revisions to the
27 boundaries of the proposed SEZ; however, approximately 17 acres (0.07 km²) of wetland and
28 playa habitat within the SEZ have been identified as non-development areas. Exclusion of these
29 wetland areas from development does not reduce the number of species that could be affected by
30 development on the Antonito Southeast SEZ.
31

32 Since publication of the Draft Solar PEIS, three additional special status species
33 (Mexican spotted owl [*Strix occidentalis lucida*], western yellow-billed cuckoo [*Coccyzus*
34 *americanus occidentalis*], and fringed myotis [*Myotis thysanodes*]) have been identified that
35 could occur in the affected area based on known occurrences and the presence of potentially
36 suitable habitat. These three additional species are discussed in the remainder of this section.
37

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

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

3
4 Field surveys for Gunnison prairie dog and western burrowing owl were conducted
5 between June 6, 2011, and September 9, 2011 (Garcia and Harvey 2011). Gunnison prairie dog
6 activity was noted in five distinct areas in the western and northern portions of the SEZ within a
7 total approximate area of 592.4 acres (2.4 km²). Burrowing owls were not recorded on the SEZ
8 during the field survey. However, burrowing owls may be associated with prairie dog colonies
9 on private land west of the SEZ and may utilize the SEZ (particularly the western portion of the
10 SEZ) for nesting and/or foraging. A single burrowing owl was seen on the ground approximately
11 5 mi (8 km) east of the SEZ on June 21, 2011 (Garcia and Harvey 2011).

12
13
14 **Mexican Spotted Owl.** The Mexican spotted owl was listed as a threatened species under
15 the ESA on March 16, 1993 (USFWS 1993). Critical habitat for this species was designated on
16 June 6, 1995 (USFWS 1995), but several court rulings resulted in the U.S. Fish and Wildlife
17 Service (USFWS) removing the critical habitat designation on March 25, 1998 (USFWS 1998).
18 In March 2000, the USFWS was ordered by the courts to propose critical habitat; this resulted
19 in the current designation that includes 4.6 million acres (0.02 km²) in Arizona, Colorado,
20 New Mexico, and Utah on federal lands (USFWS 2004). A recovery plan for the Mexican
21 spotted owl was published in December 1995 and later revised in June 2011 (USFWS 2011).
22 At the time of federal listing in 1993, the total population of Mexican spotted owls was
23 estimated at 2,100.

24
25 The Mexican spotted owl occurs from southern British Columbia, Canada, to central
26 Mexico. The primary habitat of the spotted owl is steep rocky canyons, although mature
27 coniferous forests are also important habitat. The spotted owl occupies closed canopy forests in
28 steep canyons with uneven-aged tree stands with a high basal area, and an abundance of snags
29 and downed logs (NatureServe 2010; USFWS 2011).

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

37
38 The Mexican spotted owl is known to occur in Conejos County, Colorado, and
39 potentially suitable habitat for this species may occur in the affected area of the Antonito
40 Southeast SEZ. Potentially suitable habitat for this species does not occur on the SEZ. However,
41 the SWReGAP habitat suitability model for the spotted owl identified approximately 4,900 acres
42 (20 km²) of potentially suitable habitat within the area of indirect effects (Figure 10.1.12.1-1;
43 Table 10.1.12.1-1). Designated critical habitat for the Mexican spotted owl does not occur in the
44 affected area.

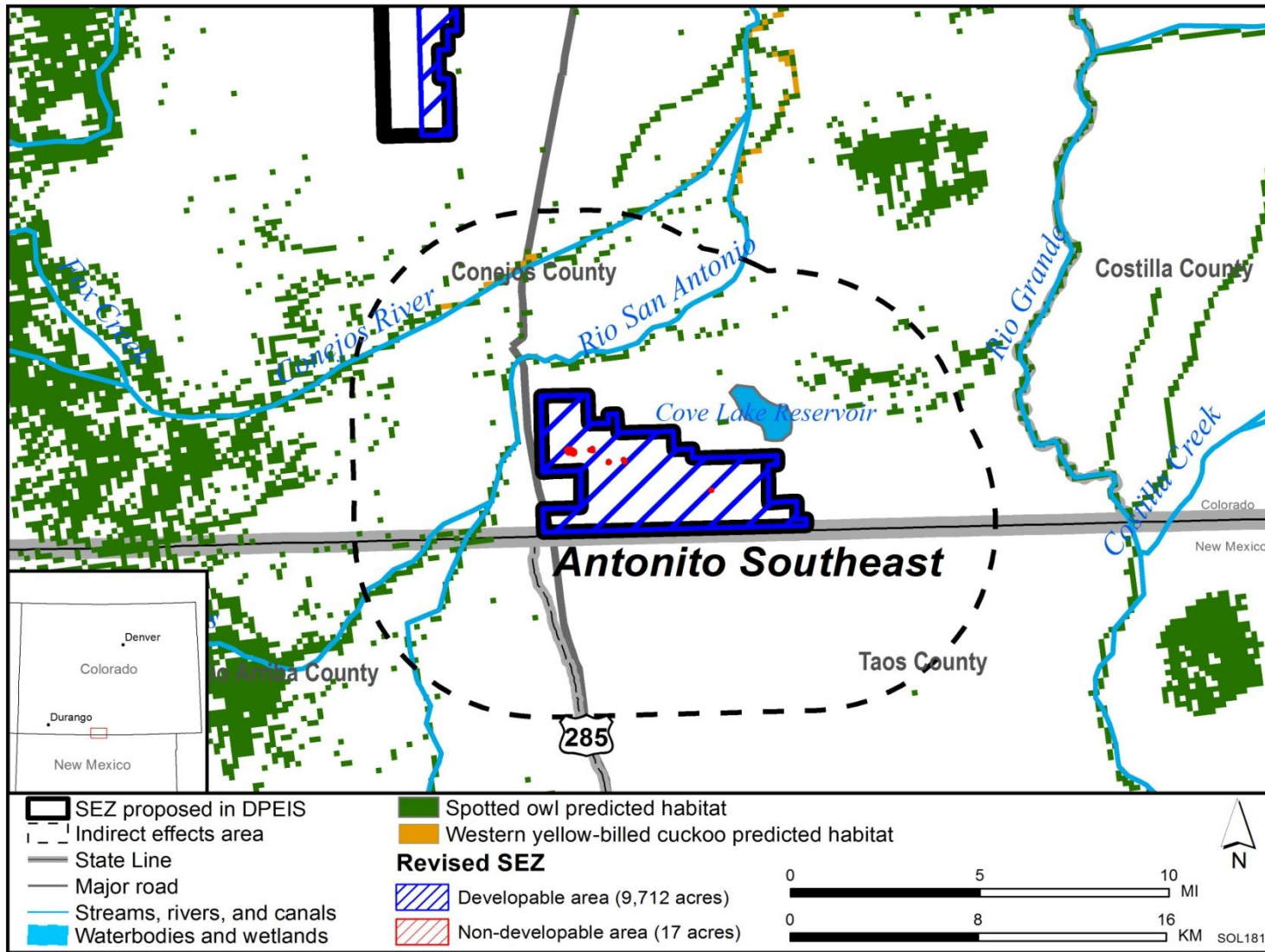


FIGURE 10.1.12.1-1 Developable Area for the Proposed Antonito Southeast SEZ as Revised and Distribution of Potentially Suitable Habitat for the Mexican Spotted Owl and Western Yellow-Billed Cuckoo

1 **TABLE 10.1.12.1-1 Habitats, Potential Impacts, and Potential Mitigation for Additional Special Status Species That Could Be Affected**
 2 **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	<i>Strix occidentalis lucida</i>	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	<i>Coccyzus americanus occidentalis</i>	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	<i>Myotis thysanodes</i>	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*: $\leq 1\%$ of the population or its habitat would be lost and the activity would not result in a measurable change in carrying capacity or population size in the affected area; (2) *moderate*: >1 but $\leq 10\%$ of the population or its habitat would be lost and the activity would result in a measurable but moderate (not destabilizing) change in carrying capacity or population size in the affected area; 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.

1 **Western Yellow-Billed Cuckoo.** The western yellow-billed cuckoo is a candidate for
2 listing under the ESA and has the potential to occur in the affected area. The western yellow-
3 billed cuckoo is a neotropical migrant bird that inhabits large riparian woodlands in the western
4 United States. This species is not known to occur in Conejos County, Colorado, but it has been
5 documented in nearby counties, such as La Plata and Rio Grande Counties, Colorado. Although
6 the SWReGAP habitat suitability model for the western yellow-billed cuckoo does not identify
7 any suitable habitat for this species within the SEZ, approximately 250 acres (1 km²) of
8 potentially suitable riparian habitat occurs within the area of indirect effects along the Conejos
9 River (Figure 10.1.12.1-1; Table 10.1.12.1-1). Potentially suitable habitat may also occur in the
10 area of indirect effects along the Rio San Antonio and Cove Lake Reservoir. Additional basic
11 information on life history, habitat needs, and threats to populations of this species is provided in
12 Appendix J.

13
14
15 **Fringed Myotis.** The fringed myotis is a year-round resident in western Colorado,
16 where it forages in a variety of habitats including ponderosa pine woodlands, greasewood flats,
17 oakbrush, and shrublands. This species was not evaluated for the Antonito Southeast SEZ in the
18 Draft Solar PEIS. The species roosts in caves, rock crevices, or buildings. The fringed myotis
19 was not recorded on the Antonito Southeast SEZ during field surveys conducted in 2011
20 (Rodriguez 2011). However, fringed myotis was recorded on the DeTilla Gulch SEZ, suggesting
21 that the species could occur elsewhere in the San Luis Valley and potentially within the Antonito
22 Southeast SEZ. According to the SWReGAP habitat suitability model, potentially suitable
23 foraging habitat for the fringed myotis could occur on the SEZ and throughout portions of the
24 area of indirect effects (Table 10.1.12.1-1). There is no potentially suitable roosting habitat
25 (rocky cliffs and outcrops) in the area of direct effects.

26 27 28 **10.1.12.2 Impacts**

29
30 Overall impact magnitude categories were based on professional judgment and include
31 (1) *small*: a relatively small proportion ($\leq 1\%$) of the special status species' habitat within the
32 SEZ region would be lost; (2) *moderate*: an intermediate proportion (> 1 but $\leq 10\%$) of the special
33 status species' habitat would be lost; and (3) *large*: $> 10\%$ of the special status species' habitat
34 would be lost.

35
36 As presented in the Draft Solar PEIS, solar energy development within the Antonito
37 Southeast SEZ could affect potentially suitable habitats of special status species. The analysis
38 presented in the Draft Solar PEIS for the original Antonito Southeast SEZ developable area
39 indicated that development would result in no impact or a small overall impact on all special
40 status species (Table 10.1.12.1-1 in the Draft Solar PEIS). Because the boundaries of the
41 Antonito Southeast SEZ have not changed, development within the SEZ could still affect the
42 same 38 species evaluated in the Draft Solar PEIS; however, the reduction in the developable
43 area would result in reduced (but still small) impact levels compared to original estimates in the
44 Draft Solar PEIS.

1 Field surveys were conducted for the BLM following the publication of the Draft Solar
2 PEIS to determine the potential occurrence of Gunnison prairie dog, western burrowing owl, and
3 special status bat species in the Colorado SEZs (Garcia and Harvey 2011; Rodriguez 2011).
4 Results of these surveys have documented the presence of the Gunnison prairie dog in the
5 western and northern portions of the Antonito Southeast SEZ within an area of approximately
6 592.4 acres (2.4 km²) (Garcia and Harvey 2011). In the Draft Solar PEIS, it was determined that
7 as much as 8,293 acres (34 km²) of potentially suitable habitat for the Gunnison prairie dog
8 could be directly affected by solar energy development within the Antonito Southeast SEZ,
9 resulting in a small overall impact magnitude compared to available habitat in the SEZ region.
10 Development within the revised developable area of the Antonito Southeast SEZ will not affect
11 any more potentially suitable habitat than what was presented in the Draft Solar PEIS; therefore,
12 the overall impact magnitude for the Gunnison prairie dog remains small.
13

14 The western burrowing owl was not observed on the Antonito Southeast SEZ during field
15 surveys in 2011 (Garcia and Harvey 2011). However, this species may be associated with prairie
16 dog colonies in close proximity to the SEZ and may utilize the SEZ for nesting and/or foraging.
17 In the Draft Solar PEIS, it was determined that as much as 9,700 acres (39 km²) of potentially
18 suitable habitat for the western burrowing owl could be directly affected by solar energy
19 development within the Antonito Southeast SEZ, resulting in a small overall impact magnitude
20 compared to available habitat in the SEZ region. Development within the revised developable
21 area of the Antonito Southeast SEZ will not affect any more potentially suitable habitat than
22 what was presented in the Draft Solar PEIS; therefore, the overall impact magnitude for the
23 western burrowing owl remains small.
24

25 On the basis of field surveys for special status bat species and comments received on the
26 Draft Solar PEIS, there are three additional special status species that may occur in the affected
27 area of the Antonito Southeast SEZ—Mexican spotted owl, western yellow-billed cuckoo, and
28 fringed myotis. Impacts on these species are discussed below and in Table 10.1.12.1-1. The
29 impact assessment for these additional species was carried out in the same way as for those
30 species analyzed in the Draft Solar PEIS (Section 10.1.12.2 of the Draft Solar PEIS).
31
32

33 **Mexican Spotted Owl.** The Mexican spotted owl is known to occur in Conejos County,
34 Colorado, and, according to the SWReGAP habitat suitability model for the spotted owl, suitable
35 habitat for the species does not occur anywhere within the Antonito Southeast SEZ. However,
36 approximately 4,900 acres (20 km²) of potentially suitable year-round habitat occurs within the
37 area of indirect effects (Figure 10.1.12.1-1). The amount of potentially suitable habitat within the
38 indirect effects area represents about 0.7% of the available suitable habitat in the region
39 (Table 10.1.12.1-1).
40

41 The overall impact on the Mexican spotted owl from construction, operation, and
42 decommissioning of utility-scale solar energy facilities within the Antonito Southeast SEZ is
43 considered small, because suitable habitat for this species does not occur in the SEZ and only
44 indirect effects are possible. The implementation of design features is expected to be sufficient to
45 reduce indirect impacts to negligible levels.
46

1 **Western Yellow-Billed Cuckoo.** The western yellow-billed cuckoo is known to occur in
2 Conejos County, Colorado, and potentially suitable habitat occurs in the affected area of the
3 Antonito Southeast SEZ. According to the SWReGAP habitat suitability model, suitable habitat
4 for this species does not occur on the SEZ. However, the SWReGAP habitat suitability model
5 indicates approximately 250 acres (1 km²) of potentially suitable habitat occurs in the area of
6 indirect effects, primarily along the Conejos River (Figure 10.1.12.1-1). This indirect effects area
7 represents about 9% of the available suitable habitat in the region (Table 10.1.12.1-1).
8

9 The overall impact on the western yellow-billed cuckoo from construction, operation, and
10 decommissioning of utility-scale solar energy facilities within the Antonito Southeast SEZ is
11 considered small, because no potentially suitable habitat for this species occurs in the area of
12 direct effects and only indirect effects are possible. The implementation of design features is
13 expected to be sufficient to reduce indirect impacts to negligible levels.
14
15

16 **Fringed Myotis.** The fringed myotis is a year-round resident in southwestern Colorado
17 and is known to occur within the San Luis Valley. Although this species is not known to occur
18 in the Antonito Southeast SEZ, field surveys conducted in 2011 documented the presence of
19 this species in the DeTilla Gulch SEZ (Rodriguez 2011). According to the SWReGAP
20 habitat suitability model, approximately 9,700 acres (39 km²) of suitable foraging habitat
21 on the Antonito Southeast SEZ may be directly affected by construction and operations
22 (Table 10.1.12.1-1). This direct effects area represents 0.3% of potentially suitable habitat in the
23 SEZ region. About 122,500 acres (496 km²) of potentially suitable habitat occurs in the area of
24 indirect effects; this area represents about 3.5% of the available suitable habitat in the region
25 (Table 10.1.12.1-1). Most of the potentially suitable habitat in the affected area is foraging
26 habitat represented by desert shrubland. There is no potentially suitable roosting habitat (rocky
27 cliffs and outcrops) in the area of direct effects; however, it is possible for individuals to roost in
28 nearby habitats within the area of indirect effects (Rodriguez 2011).
29

30 The overall impact on the fringed myotis from construction, operation, and
31 decommissioning of utility-scale solar energy facilities within the Antonito Southeast SEZ is
32 considered small, because the amount of potentially suitable foraging habitat for this species in
33 the area of direct effects represents less than 1% of potentially suitable foraging habitat in the
34 SEZ region. The implementation of design features is expected to be sufficient to reduce indirect
35 impacts on this species to negligible levels. Avoidance of all potentially suitable foraging
36 habitats is not feasible because potentially suitable habitat is widespread throughout the area of
37 direct effects and readily available in other portions of the SEZ region.
38
39

40 **10.1.12.3 SEZ-Specific Design Features and Design Feature Effectiveness**

41

42 Required programmatic design features are described in Section A.2.2 of Appendix A of
43 this Final Solar PEIS. SEZ-specific resources conditions will guide how programmatic design
44 features are applied, for example:
45

- 1 • Pre-disturbance surveys shall be conducted within the SEZ (i.e., area of direct
2 effects) to determine the presence and abundance of special status species
3 including those identified in Table 10.1.12.1-1 of the Draft Solar PEIS as well
4 as those identified in Table 10.1.12.1-1 in this Final Solar PEIS. Disturbance
5 to occupied habitats for these species shall be avoided or minimized to the
6 extent practicable. If avoiding or minimizing impacts on occupied habitats is
7 not possible, translocation of individuals from areas of direct effects or
8 compensatory mitigation of direct effects on occupied habitats may be used to
9 reduce impacts. A comprehensive mitigation strategy for special status species
10 that uses one or more of these options to offset the impacts of projects shall be
11 developed in coordination with the appropriate federal and state agencies.
12
- 13 • Disturbance of wetland and riparian habitat within the SEZ shall be avoided or
14 minimized to the extent practicable. Alta Lake and other identified wetlands
15 have been identified as non-developable areas. Pre-disturbance surveys shall
16 be conducted to determine the presence of additional wetland and riparian
17 habitat in the developable area; development of these habitats shall be avoided
18 or minimized. Adverse impacts on the following special status species could
19 be reduced with the avoidance of wetland and riparian habitats: halfmoon
20 milkvetch (*Astragalus allochrous* var. *playanus*), least moonwort (*Botrychium*
21 *simplex*), Rocky Mountain blazing-star (*Liatris ligulistylis*), Rio Grande chub
22 (*Gila Pandora*), Rio Grande sucker (*Catostomus plebeius*), milk snake
23 (*Lampropeltis triangulum*), bald eagle (*Haliaeetus leucocephalu*), Barrow's
24 goldeneye (*Bucephala islandica*), ferruginous hawk (*Buteo regalis*), and
25 southwestern willow flycatcher (*Empidonax traillii extimus*).
26
- 27 • Avoiding or limiting groundwater withdrawals for solar energy development
28 on the SEZ shall be employed to reduce impacts on groundwater-dependent
29 special status species, including those species that may occur in riparian or
30 aquatic habitats supported by groundwater. These species include the
31 southwestern willow flycatcher and the western yellow-billed cuckoo.
32
- 33 • Consultations with the USFWS and CDOW shall be conducted to address the
34 potential for impacts on the southwestern willow flycatcher, a species listed as
35 endangered under the Endangered Species Act (ESA). Consultation would
36 identify an appropriate survey protocol, avoidance measures, and, if
37 appropriate, reasonable and prudent alternatives, reasonable and prudent
38 measures, and terms and conditions for incidental take statements.
39
- 40 • Coordination with the USFWS and CDOW shall be conducted to address the
41 potential for impacts on the Gunnison's prairie dog and northern leopard frog
42 (*Rana pipiens*)—species that are either candidates or under review for listing
43 under the ESA. Coordination would identify an appropriate survey protocol,
44 avoidance measures, and, potentially, translocation or compensatory
45 mitigation.
46

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

4
5 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of
6 comments received as applicable, no SEZ-specific design features for special status species have
7 been identified. Some SEZ-specific design features may be identified through the process of
8 preparing parcels for competitive offer and subsequent project-specific analysis. Projects will
9 comply with terms and conditions set forth by the USFWS Biological Opinion resulting from the
10 programmatic consultation and any necessary project-specific ESA Section 7 consultations.

11 12 13 **10.1.13 Air Quality and Climate**

14 15 16 **10.1.13.1 Affected Environment**

17
18 Except as noted below, the information for air quality and climate presented for the
19 affected environment of the Draft Solar PEIS remains essentially unchanged.

20 21 22 **10.1.13.1.1 Existing Air Emissions**

23
24 The Draft Solar PEIS presented Conejos County emissions data for 2002. More recent
25 data for 2008 (CDPHE 2011) were reviewed for this Final Solar PEIS. The two emissions
26 inventories used different sources and assumptions. All emissions in the 2008 data were lower
27 than those in the 2002 data, and all criteria air pollutants were much lower, but volatile organic
28 compounds (VOCs) were about half of those in the 2002 data. These changes would not affect
29 the modeled air quality impacts presented in this update.

30 31 32 **10.1.13.1.2 Air Quality**

33
34 The calendar quarterly average National Ambient Air Quality Standard (NAAQS) of
35 1.5 µg/m³ for lead (Pb) presented in Table 10.1.13.1-2 of the Draft Solar PEIS has been replaced
36 by the rolling 3-month standard (0.15 µg/m³). The federal 24-hour and annual sulfur dioxide
37 (SO₂), 1-hour ozone (O₃), and annual PM₁₀ (particulate matter with a diameter of 10 µm or less)
38 standards have been revoked as well (EPA 2011). All Colorado State Ambient Air Quality
39 Standards (SAAQS), except the 3-hour SO₂ standard of 700 µg/m³, have been revoked since the
40 publication of the Draft Solar PEIS. These changes would not affect the modeled air quality
41 impacts presented in this update.

42
43 The developable area of the proposed Antonito Southeast SEZ was reduced by about
44 0.2%, from 9,729 acres (39.4 km²) to 9,712 acres (39.3 km²). This reduction was effected by
45 removing interior portions of the proposed SEZ from potentially developable areas. The

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

3 4 5 **10.1.13.2 Impacts**

6 7 8 **10.1.13.2.1 Construction**

9 10 11 **Methods and Assumptions**

12
13 The methods and modeling assumptions have not changed from those presented in the
14 Draft Solar PEIS. The reduction in the developable area of the proposed Antonito Southeast SEZ
15 by less than 1% would cause only a negligible impact on modeled air quality impacts; thus air
16 quality impacts were not remodeled.

17 18 19 **Results**

20
21 Since the annual PM₁₀ standard has been rescinded, the discussion of annual PM₁₀
22 impacts in the Draft Solar PEIS is no longer applicable, and Table 10.1.13.2-1 has been updated
23 for this Final Solar PEIS.

24
25 Since the air quality impacts remain the same as those presented in the Draft Solar PEIS,
26 the discussion and conclusions in the Draft Solar PEIS remain valid.² Predicted 24-hour PM₁₀
27 and 24-hour PM_{2.5} (particulate matter with a diameter of 2.5 μm or less) concentration levels
28 could exceed the standard level used for comparison at the SEZ boundaries and in the immediate
29 surrounding areas during the construction of a solar facility. However, these high particulate
30 concentrations would be limited to the immediate vicinity of the proposed SEZ boundary and
31 would decrease quickly with distance. At the nearest residence located about 0.5 mi (0.8 km)
32 north of the SEZ, the 24-hour PM₁₀ standard level used for comparison would be exceeded, but
33 the 24-hour and annual PM_{2.5} standard levels would not be exceeded at any nearby residences or
34 communities.

35
36 The conclusions in the Draft Solar PEIS concerning impacts in nearby Prevention of
37 Significant Deterioration (PSD) Class I areas remain valid. Predicted 24-hour PM₁₀
38 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 km²) 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.

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

Pollutant ^a	Averaging Time	Rank ^b	Concentration (µg/m ³)				Percentage of NAAQS	
			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; PM₁₀ = 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.

3
4
5
6
7
8
9

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.

10 Overall, the conclusions of the Draft Solar PEIS remain valid. Predicted 24-hour PM₁₀
 11 and 24-hour PM_{2.5} concentration levels could exceed the standard level used for comparison at
 12 the SEZ boundaries and in immediate surrounding areas during the construction of a solar
 13 facility. To reduce potential impacts on ambient air quality and in compliance with required
 14 programmatic design features, aggressive dust control measures would be used. Predicted total
 15 concentrations for annual PM_{2.5} would be below the standard level used for comparison at the
 16 site boundary. Potential air quality impacts on neighboring communities would be much lower.
 17 Modeling indicates that construction activities are anticipated to exceed Class I PSD PM₁₀
 18 increments at the nearest federal Class I areas (Wheeler Peak WA, New Mexico, and Great Sand
 19 Dunes WA). Construction activities are not subject to the PSD program, and the comparison
 20 provides only a screen to gauge the size of the impact. Accordingly, it is anticipated that impacts
 21 of construction activities on ambient air quality would be moderate and temporary.

22
23
24
25

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

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

3 4 5 **10.1.13.2.2 Operations** 6

7 The reduction in developable area of the proposed Antonito Southeast SEZ by less
8 than 1% reduces the generating capacity and annual power generation by a similar percentage
9 and thus reduces the potentially avoided emissions presented in the Draft Solar PEIS.

10 Updated estimates for emissions potentially avoided by a solar facility can be obtained from
11 Table 10.1.13.2-2 in the Draft Solar PEIS by reducing the tabulated emissions by about 0.18%.
12 Maximum emissions avoided would be up to 3,600 tons/yr for SO₂, 4,151 tons/yr for NO_x, and
13 2,690,000 tons/yr for carbon dioxide (CO₂); other reductions are too small to show. These small
14 reductions would not affect the analysis presented in the Draft Solar PEIS, and the conclusion
15 presented therein that solar facilities built in the proposed Antonito Southeast SEZ could avoid
16 relatively more fuel emissions in Colorado than those built in other states with less reliance on
17 fossil fuel-generated power remains valid.

18 19 20 **10.1.13.2.3 Decommissioning and Reclamation** 21

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

25 26 27 **10.1.13.3 SEZ-Specific Design Features and Design Feature Effectiveness** 28

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

34
35 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of
36 comments received as applicable, no SEZ-specific design features for air quality have been
37 identified. Some SEZ-specific design features may be identified through the process of preparing
38 parcels for competitive offer and subsequent project-specific analysis.

39 40 41 **10.1.14 Visual Resources** 42

43 44 **10.1.14.1 Affected Environment** 45

46 No boundary revisions were identified for the proposed Antonito Southeast SEZ;
47 however, 17 acres (0.07 km²) of non-development wetland and lake areas were identified. The
48 remaining developable area within the SEZ is 9,712 acres (39.3 km²).

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

11
12 Within the La Jara Field Office, lands within the 25-mi (40-km), 650-ft (198-m)
13 viewshed of the SEZ contain 31,253 acres (126.5 km²) of VRI Class II lands, 36,225 acres
14 (146.6 km²) of VRI Class III lands, and 25,345 acres (102.6 km²) of VRI Class IV lands.

15 16 17 **10.1.14.2 Impacts**

18
19 The summary of impacts provided in the Draft Solar PEIS remains valid. In general, the
20 Antonito Southeast SEZ is located in an area of low scenic quality. Visitors to the area, workers,
21 and residents of nearby areas may experience visual impacts from solar energy facilities located
22 within the SEZ (as well as any associated access roads and transmission lines) as they travel area
23 roads.

24
25 Utility-scale solar energy development within the proposed Antonito Southeast SEZ is
26 likely to result in strong visual contrasts for some viewpoints in the San Antonio WSA, along
27 some portions of the Los Caminos Antiguos Scenic Byway, along portions of the West Fork of
28 the North Branch of the Old Spanish Trail, and where there are clear views to the SEZ for
29 residents of and visitors to the community of Antonito. Moderate visual contrast levels would be
30 expected for high-elevation viewpoints in the San Luis Hills WSA and ACEC and for portions of
31 the CTSR Corridor and CTSR Corridor ACEC. Residents and visitors to Conejos likely would
32 observe lower levels of contrasts; minimal to weak visual contrasts would be expected for some
33 viewpoints within other sensitive visual resource areas within the 25-mi (40-km) viewshed of
34 the SEZ.

35
36 Solar development on lands in the SEZ visible from and in close proximity to the West
37 Fork of the North Branch of the Old Spanish Trail has a higher potential to have visual impacts
38 on the Trail. The BLM has identified areas in the SEZ visible from and within 1 mi (1.6 km) of
39 the West Fork as potential high visual sensitivity areas, where solar development would be
40 subject to specific, additional design features that would be identified when project-specific
41 environmental analyses are conducted. In addition, the BLM has identified areas in the SEZ
42 visible from 1 to 3 mi (1.6 to 4.8 km) from the Trail as potential moderate visual sensitivity
43 areas. Solar development within these areas also would be subject to specific, additional design
44 features identified as part of a project specific analysis.

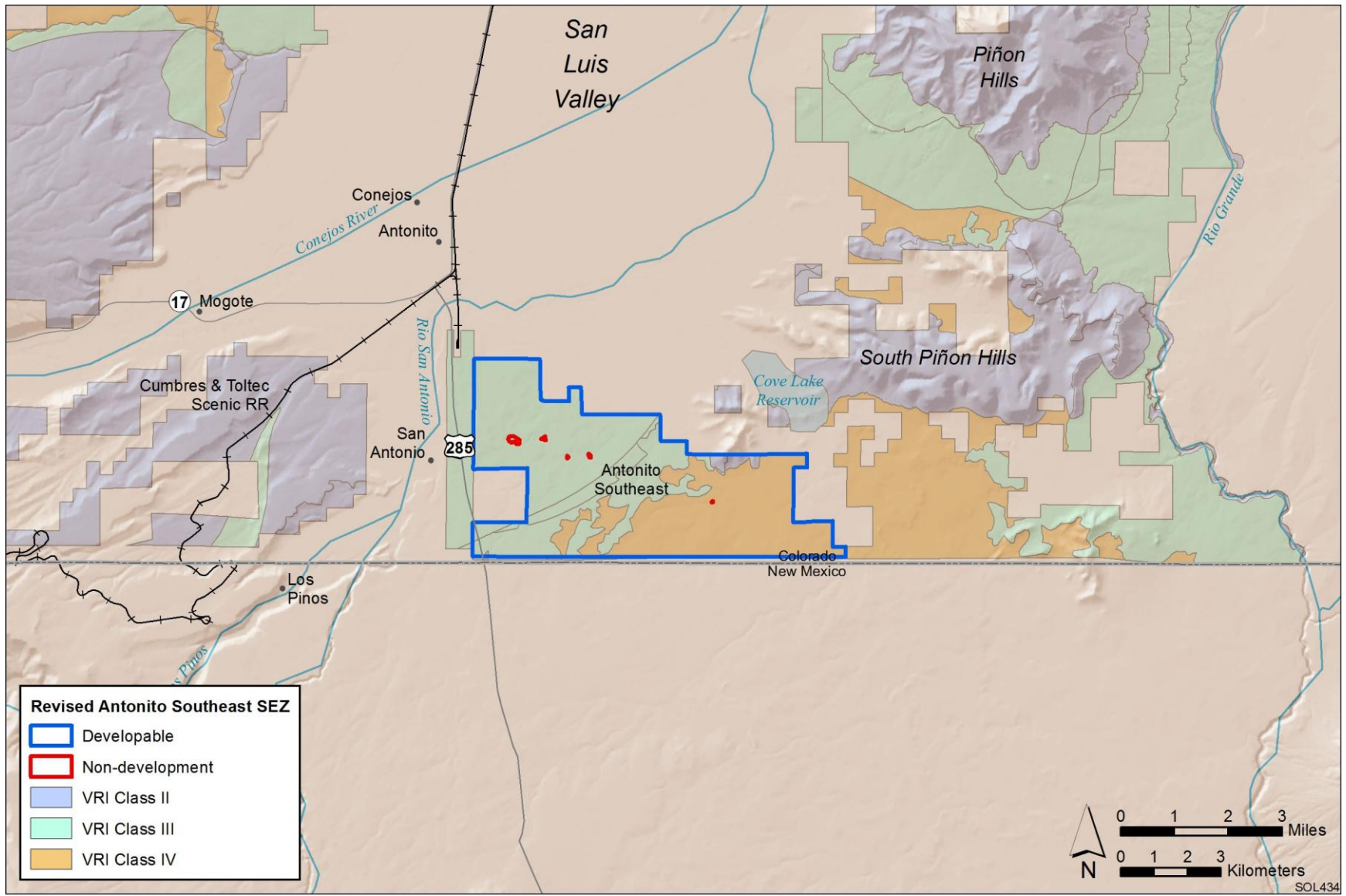


FIGURE 10.1.14.1-1 Visual Resource Inventory Values for the Proposed Antonito Southeast SEZ as Revised

1 In addition, the BLM has identified areas in the SEZ visible from and within 3 mi
2 (4.8 km) of the CTSR ACEC and San Antonio WSA as potential moderate visual sensitivity
3 areas. In these areas, solar development also would be subject to specific, additional design
4 features to be identified in conjunction with project-specific analyses.
5
6

7 **10.1.14.3 SEZ-Specific Design Features and Design Feature Effectiveness** 8

9 Required programmatic design features that would reduce impacts on visual resources are
10 described in Section A.2.2 of Appendix A of this Final Solar PEIS. While application of the
11 programmatic design features would reduce potential visual impacts somewhat, the degree of
12 effectiveness of these design features could be assessed only at the site- and project-specific
13 level. Given the large scale, reflective surfaces, and strong regular geometry of utility-scale solar
14 energy facilities and the lack of screening vegetation and landforms within the SEZ viewshed,
15 siting the facilities away from sensitive visual resource areas and other sensitive viewing areas
16 would be the primary means of mitigating visual impacts. The effectiveness of other visual
17 impact mitigation measures generally would be limited. Utility-scale solar energy development
18 using any of the solar technologies analyzed in this Solar PEIS and at the scale analyzed would
19 be expected to result in large adverse visual impacts that could not be mitigated.
20

21 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of
22 comments received as applicable, the following proposed SEZ-specific design features for visual
23 resources have been identified:
24

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

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

- 4
- 5 • Special visual impact mitigation shall be considered for solar development on
6 lands in the SEZ visible from and within 3 mi (5 km) of the centerline of the
7 West Fork of the North Branch of the Old Spanish Trail. Solar development
8 on lands in the SEZ visible from and in close proximity to the West Fork of
9 the North Branch of the Old Spanish Trail has a higher potential to cause
10 visual impacts on the Trail. Therefore, the BLM has identified areas in the
11 SEZ visible from and within 1 mi (1.6 km) of the West Fork of the North
12 Branch of the Old Spanish Trail as potential high visual sensitivity areas,
13 where solar development would be subject to specific additional design
14 features that will be identified when project-specific environmental analyses
15 are conducted. In addition, the BLM has identified areas in the SEZ visible
16 from and within 3 mi (5 km) of the West Fork of the North Branch of the Old
17 Spanish Trail as potential moderate visual sensitivity areas, where solar
18 development would also be subject to specific additional design features that
19 will be identified when project-specific environmental analyses are conducted.
20
- 21 • Special visual impact mitigation shall be considered for solar development on
22 lands in the SEZ visible from and within 3 mi (5 km) of the CTSR ACEC and
23 San Antonio WSA. Solar development on lands in the SEZ visible from and in
24 close proximity to the CTSR ACEC and San Antonio WSA has a higher
25 potential to cause visual impacts on the ACEC and the WSA. Therefore, the
26 BLM has identified areas in the SEZ visible from and within 3 mi (5 km) of
27 the CTSR ACEC and San Antonio WSA as potential moderate visual
28 sensitivity areas, where solar development would be subject to specific
29 additional design features that will be identified when project-specific
30 environmental analyses are conducted.

31

32 The need for additional SEZ-specific design features will be identified through the
33 process of preparing parcels for competitive offer and subsequent project-specific analysis.
34

35

36 **10.1.15 Acoustic Environment**

37

38

39 **10.1.15.1 Affected Environment**

40

41 The developable area of the proposed Antonito Southeast SEZ was reduced by less than
42 1%, from 9,729 acres (39.4 km²) to 9,712 acres (39.3 km²). The boundaries of the SEZ were not
43 changed, and thus the information for acoustic environment remains the same as presented in the
44 Draft Solar PEIS.

1 **10.1.15.2 Impacts**
2

3 Given the small reduction in the developable area of the Antonito Southeast SEZ and the
4 lack of change in the boundaries, the conclusions presented in the Draft Solar PEIS remain valid
5 except for construction and operations impacts on specially designated areas and impacts from
6 operating dish engine facilities.
7

8
9 **10.1.15.2.1 Construction**

10
11 Except as noted below, for impacts in specially designated areas, the assessment in the
12 Draft Solar PEIS remains valid.
13

14 On the basis of comments received and recent references as applicable, this Final Solar
15 PEIS used an updated approximate significance threshold of 55 dBA corresponding to the onset
16 of adverse physiological impacts (Barber et al. 2010) to update the analysis of potential noise
17 impacts on terrestrial wildlife in areas of special concern. As a result of this updated analysis,
18 the conclusion in the Draft Solar PEIS that wildlife would not be adversely affected has been
19 updated for this Final Solar PEIS as follows. For construction activities occurring near the
20 southwestern SEZ boundary, the estimated noise level at the boundary of the San Antonio WSA
21 in New Mexico (about 1.6 mi [2.6 km] to the southwest) would be about 37 dBA. This estimated
22 level is below the significance threshold; thus noise from construction in the proposed Antonito
23 Southeast SEZ is not anticipated to adversely affect wildlife in the nearby specially designated
24 areas. However, as discussed in Section 5.10.2 of this Final Solar PEIS, there is the potential for
25 other effects to occur at lower noise levels (Barber et al. 2011). Because of the potential for
26 impacts at lower noise levels, impacts on terrestrial wildlife from construction noise would have
27 to be considered on a project-specific basis, including site-specific background levels and
28 hearing sensitivity for site-specific terrestrial wildlife of concern. However, even with potential
29 impacts at these lower noise levels, construction noise at the SEZ would not be anticipated to
30 affect wildlife in nearby specially designated areas.
31

32 For construction activities occurring near the western SEZ boundary, the estimated noise
33 level at the West Fork of the North Branch of the Old Spanish Trail (as close as 660 ft [200 m]
34 to the west) would be about 66 dBA, which is well above the typical daytime mean rural
35 background level of 40 dBA. Accordingly, construction occurring near the western SEZ
36 boundary could result in adverse noise impacts on the Old Spanish Trail, but these impacts
37 would be temporary.
38

39 Construction within the proposed Antonito Southeast SEZ would cause some
40 unavoidable but localized short-term noise impacts on neighboring communities, particularly
41 activities occurring near the northern or western proposed SEZ boundaries, close to the nearby
42 residences. No adverse vibration impacts are anticipated from construction activities, including
43 pile driving for dish engines.
44
45

1 **10.1.15.2.2 Operations**
2

3 Given the small reduction in the developable area of the proposed Antonito Southeast
4 SEZ, the assessment presented in the Draft Solar PEIS remains valid, except as noted below
5 for impacts from thermal energy storage (TES) and dish engine facilities near residence or in
6 specially designated areas.
7

8
9 **Parabolic Trough and Power Tower**
10

11 As stated above under construction impacts, for this Final Solar PEIS an updated
12 approximate significance threshold of 55 dBA was used to evaluate potential noise impacts on
13 terrestrial wildlife in areas of special concern. With TES operating near the southwestern SEZ
14 boundary, estimated daytime and nighttime noise levels at the boundary of the San Antonio
15 WSA in New Mexico would be about 37 and 47 dBA, respectively. These estimated levels are
16 below the significance threshold; thus noise from operations in the proposed Antonito Southeast
17 SEZ is not anticipated to considerably affect wildlife in the nearby specially designated areas.
18 However, as discussed in Section 5.10.2 of this Final Solar PEIS, there is the potential for other
19 effects to occur at lower noise levels (Barber et al. 2011). Because of these impacts and the
20 potential for impacts at lower noise levels, noise impacts on terrestrial wildlife from a parabolic
21 trough or power tower facility equipped with TES would have to be considered on a project-
22 specific basis, including site-specific background levels and hearing sensitivity for site-specific
23 terrestrial wildlife of concern.
24

25 For operations of a parabolic trough or power tower facility equipped with TES near the
26 western SEZ boundary, the estimated daytime and nighttime noise levels at the West Fork of the
27 North Branch of the Old Spanish Trail (as close as 660 ft [200 m] to the west) would be about
28 49 and 59 dBA, respectively, which are significantly above the typical daytime and nighttime
29 mean rural background levels of 40 and 30 dBA. Accordingly, a solar facility with TES located
30 near the western SEZ boundary could result in adverse noise impacts on the North Branch of the
31 Old Spanish Trail.
32

33
34 **Dish Engines**
35

36 As stated above under construction impacts, for this Final Solar PEIS an updated
37 approximate significance threshold of 55 dBA was used to evaluate potential noise impacts on
38 terrestrial wildlife in areas of special concern. Estimated noise level from operation of a dish
39 engine solar facility at the boundary of the San Antonio WSA in New Mexico would be about
40 43 dBA. This estimated level is below the significance threshold; thus noise from operations in
41 the proposed Antonito Southeast SEZ is not anticipated to adversely affect wildlife in the nearby
42 specially designated area. However, as discussed in Section 5.10.2 of this Final Solar PEIS, there
43 is the potential for other effects to occur at lower noise levels (Barber et al. 2011). With these
44 impacts and the potential for impacts at lower noise levels, noise impacts on terrestrial wildlife
45 from a dish engine facility would have to be considered on a project-specific basis, including

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

3
4 On the basis of a full build-out of the SEZ with dish engine facilities, the estimated noise
5 level at the West Fork of the North Branch of the Old Spanish Trail (as close as 660 ft [200 m]
6 to the west) would be about 55 dBA, which is well above the typical daytime mean rural
7 background level of 40 dBA. Therefore, dish engine noise from the SEZ could result in adverse
8 noise impacts on the West Fork of the North Branch of the Old Spanish Trail.

9
10 With no changes in the boundaries of the proposed Antonito Southeast SEZ, the
11 discussions of vibration, transformer and switchyard noise, and transmission line corona
12 discharge presented in the Draft Solar PEIS remain valid. Noise impacts from these sources
13 would be minimal to negligible.

14 15 16 ***10.1.15.2.3 Decommissioning and Reclamation***

17
18 The conclusions on decommissioning and reclamation in the proposed Antonito
19 Southeast SEZ as presented in the Draft Solar PEIS remain valid. Decommissioning and
20 reclamation activities would be of short duration, and their potential noise impacts would be
21 minor and temporary. Potential noise and vibration impacts on surrounding communities would
22 be minimal.

23 24 25 **10.1.15.3 SEZ-Specific Design Features and Design Feature Effectiveness**

26
27 Required programmatic design features that would reduce noise impacts are described in
28 Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the programmatic design
29 features will provide some protection from noise impacts.

30
31 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of
32 comments received as applicable, no SEZ-specific design features for noise were identified.
33 Some SEZ-specific design features may be identified through the process of preparing parcels
34 for competitive offer and subsequent project-specific analysis.

35 36 37 **10.1.16 Paleontological Resources**

38 39 40 **10.1.16.1 Affected Environment**

41
42 Data provided in the Draft Solar PEIS remain valid, with the following update:

- 43
44 • The BLM Regional Paleontologist may have additional information regarding
45 the paleontological potential of the SEZ and be able to verify the potential

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

3 4 5 **10.1.16.2 Impacts**

6
7 The assessment provided in the Draft Solar PEIS remains valid. Impacts on significant
8 paleontological resources are possible in those areas where the Alamosa Formation is determined
9 to be at a depth that could be affected by solar energy development. However, a more detailed
10 look at the geological deposits is necessary to determine whether a paleontological survey is
11 warranted.

12 13 14 **10.1.16.3 SEZ-Specific Design Features and Design Feature Effectiveness**

15
16 Required programmatic design features are described in Appendix A of this Final Solar
17 PEIS. Impacts would be minimized through the implementation of required programmatic design
18 features, including a stop-work stipulation in the event that paleontological resources are
19 encountered during construction, as described in Section A.2.2 of Appendix A.

20
21 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of
22 comments received as applicable, the following SEZ-specific design feature has been identified:

- 23
24 • Avoidance of PFYC Class 4 or 5 areas is recommended for development
25 within the proposed Antonito Southeast SEZ (i.e., the 4-acre [0.016-km²]
26 parcel in the north part of the SEZ). Where avoidance of Class 4 or 5 deposits
27 is not possible, a paleontological survey or monitoring would be required by
28 the BLM.

29
30 The need for and nature of additional SEZ-specific design features will depend on the
31 findings of future paleontological investigations and may be identified through the process of
32 preparing parcels for competitive offer and subsequent project-specific analysis.

33
34 As additional information on paleontological resources (e.g., from regional
35 paleontologists or from new surveys) becomes available, the BLM will post the data to the
36 project Web site (<http://solareis.anl.gov>) for use by applicants, the BLM, and other stakeholders.

37 38 39 **10.1.17 Cultural Resources**

40 41 42 **10.1.17.1 Affected Environment**

43
44 Data provided in the Draft Solar PEIS remain valid, with the following updates:
45

- 1 • A study by the National Park Service (NPS) was recently conducted to
2 identify “opportunities to preserve and interpret nationally significant
3 American Latino heritage sites within the San Luis Valley and central Sangre
4 de Cristo Mountains, as well as opportunities for conservation of the area’s
5 landscape, environment, and natural resources” (NPS 2011). This area,
6 including the Sangre de Cristo National Heritage Area, has been recognized
7 and celebrated for its rich natural and cultural resources, much of it associated
8 with America’s Latino heritage. The findings of the reconnaissance survey
9 indicated that the “resources and traditions existing within the survey area
10 meet National Park Service criteria for national significance and possess
11 exceptional value in illustrating and interpreting the theme of American
12 Latino heritage” (NPS 2011).
13
- 14 • The San Luis Valley and central Sangre de Cristo Mountains were initially
15 part of Mexico’s northern frontier, and settlement of the area was facilitated
16 by the approval of land grants from the Mexican government. The three land
17 grants from the Mexican government in the San Luis Valley were the Conejos
18 Grant, the Luis Maria Baca No. 4 Land Grant, and the Sangre de Cristo Grant.
19 The Conejos Grant (2.5 million acres [10,117 km²]) was one of the oldest in
20 Colorado, having been established in 1833. The portion of the grant near the
21 Colorado–New Mexico border, in the western part of the San Luis Valley, was
22 initially settled by Hispanic immigrants from the lower Chama Valley in
23 New Mexico, and their settlements included Conejos, Mogote, Las Mesitas,
24 and Rincones. The U.S. government decided not to honor the land grant and
25 dissolved it, settling the northern portion under U.S. laws. The Luis Maria
26 Baca Land Grant (100,000 acres[405 km²]) was originally granted in 1821,
27 but because of conflicting claims in the early 1860s, the Baca heirs agreed to
28 accept five parcels in three different states, one of which is this land grant
29 (No. 4). This land grant is notable for having been owned by two different
30 Colorado governors and then by mining investors who extracted more than
31 \$50 million in gold. The Sangre de Cristo Grant (1 million acres [4,047 km²])
32 was established in 1843 and was settled in the eastern San Luis Valley in
33 Costilla County by Hispanic settlers from Taos after the Mexican–American
34 War. This land grant is notable for being the focus of an 1876 Supreme Court
35 decision, *Tameling v. United States Freehold & Emigration Co.*, in which its
36 large acreage was upheld, changing the way that Mexican land grant claims
37 were processed (NPS 2011).
38
- 39 • An ethnographic study of Hispanic heritage in association with the Old
40 Spanish Trail was published in 2008 (Stoffle et al. [2008]). The North Branch
41 of the Old Spanish Trail running through the San Luis Valley (including both
42 East and West Forks) was one of five segments of the Old Spanish Trail that
43 were investigated; others included segments of the Old Spanish Trail in
44 New Mexico and California. The study identified important heritage sites and
45 resources in the San Luis Valley associated with the northern Old Spanish
46 Trail route from Taos to California on the basis of interviews conducted in the

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

- 20
21 • Trujillo Homestead was designated a National Historic Landmark in
22 January 2012. It encompasses approximately 35 acres (0.14 km²) of land
23 about 15 mi (24 km) north of the Fourmile East SEZ and consists of two
24 nineteenth-century Hispanic ranch properties: the Teofilo and Adrellita
25 Homestead dating to 1865 and the Pedro and Sofia Trujillo Homestead dating
26 to 1879. The homesteads consist of two discontinuous pieces of land with
27 two standing buildings, one structure, and concentrations of historic debris
28 associated with the homesteads. The sites were designated a landmark because
29 they are representative of the movement of Hispanic Americans into the
30 northern frontier and offer important information on early livestock economy,
31 ethnic and racial conflicts, and settlement and subsistence patterns, as well
32 as assimilation efforts of early Hispanic Americans (DOI 2012; Simmons and
33 Simmons 2003).
- 34
35 • Additional information may be available to characterize the SEZ and its
36 surrounding area in the future (after the Final Solar PEIS is completed), as
37 follows:
 - 38 – Results of an ethnographic study currently being conducted by TRC
39 Solutions, which focuses on Native American use of lands being analyzed
40 for solar development within the San Luis Valley. The study will discuss
41 sensitive and traditional use areas. Interviews with tribal members and
42 field visits will facilitate the identification of resources and sites of
43 traditional and religious importance to tribes.
 - 44 – Results of a Class II sample survey of the SEZ designed to obtain a
45 statistically valid sample of archeological properties and their distribution
46 within the SEZ. Results from the ethnographic study and the sample

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

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

13 14 15 **10.1.17.2 Impacts**

16
17 Impacts on significant cultural resources are possible in the proposed Antonito Southeast
18 SEZ. The potential significance of the Taos Valley Canal, the stagecoach route, and other
19 possible historic or indigenous trail segments should be investigated further to determine whether
20 solar energy development would adversely affect these resources. Impacts on the West Fork of
21 the North Branch of the Old Spanish Trail are possible; however, further investigation is needed
22 to determine the location and integrity of portions of the Trail from which future potential
23 development in the SEZ could be viewed. Visual impacts are likely on the CTSR ACEC;
24 however, the general area is not pristine and significant development is already present in the
25 area. The assessment provided in the Draft Solar PEIS remains valid with the following update:

- 26
27 • Impacts on significant cultural resources and cultural landscapes associated
28 with American Latino heritage are possible throughout the San Luis Valley.

29 30 31 **10.1.17.3 SEZ-Specific Design Features and Design Feature Effectiveness**

32
33 Required programmatic design features that would reduce impacts on cultural resources
34 are described in Section A.2.2. of Appendix A of this Final Solar PEIS. Programmatic design
35 features will be applied to address SEZ-specific resources and conditions, for example:

- 36
37 • For projects in the Antonito Southeast SEZ that are located within the
38 viewshed of the West Fork of the North Branch of the Old Spanish Trail, a
39 National Trail inventory will be required to determine the area of possible
40 adverse impact on resources, qualities, values, and associated settings of
41 the Trail; to prevent substantial interference; and to determine any areas
42 unsuitable for development. Residual impacts will be avoided, minimized,
43 and/or mitigated to the extent practicable according to program policy
44 standards. Programmatic design features have been included in BLM's
45 Solar Energy Program to address impacts in National Historic Trails (see
46 Section A.2.2.23 of Appendix A).

1 Programmatic design features also assume that the necessary surveys, evaluations, and
2 consultations will occur. Ongoing consultation with the Colorado State Historic Preservation
3 Office (SHPO) and the appropriate Native American governments would be conducted during
4 the development of the proposed Antonito Southeast SEZ. It is likely that adverse effects on
5 significant resources in the valley could be mitigated to some degree through such efforts,
6 although not enough to eliminate the adverse effects unless a significant resource is avoided
7 entirely.
8

9 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of
10 comments received as applicable, the following SEZ-specific design features have been
11 identified:
12

- 13 • Development of a Memorandum of Agreement (MOA) may be needed among
14 the BLM, Colorado SHPO, and other parties, such as the Advisory Council on
15 Historic Preservation (ACHP) to address the adverse effects of solar energy
16 development on historic properties. The agreement may specify avoidance,
17 minimization, and/or mitigation measures. Should an MOA be developed to
18 resolve adverse effects on the Old Spanish National Historic Trail or the West
19 Fork of the North Branch of the Old Spanish Trail, the Trail Administration
20 for the Old Spanish Trail (BLM-NMSO and NPS Intermountain Trails Office,
21 Santa Fe) should be included in the development of that MOA.
22
- 23 • Additional coordination with the CTSR Commission is recommended to
24 address possible mitigation measures for reducing visual impacts on the
25 railroad.
26

27 The need for and nature of additional SEZ-specific design features will be identified
28 through the process of preparing parcels for competitive offer and subsequent project-specific
29 analysis.
30

31 32 **10.1.18 Native American Concerns**

33 34 35 **10.1.18.1 Affected Environment**

36
37 Data provided in the Draft Solar PEIS remain valid but will be supplemented in the
38 future by the results of the ethnographic study being completed in the San Luis Valley (see
39 Section 10.1.17.1).
40

41 42 **10.1.18.2 Impacts**

43
44 The description of potential concerns provided in the Draft Solar PEIS remains valid.
45 No direct impacts from solar energy development are likely to occur to known culturally
46 significant areas (i.e., San Luis Lakes, the Great Sand Dunes, and Blanca Peak); however,

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

6 **10.1.18.3 SEZ-Specific Design Features and Design Feature Effectiveness**

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

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

27 **10.1.19 Socioeconomics**

30 **10.1.19.1 Affected Environment**

32 The developable area of the proposed Antonito Southeast SEZ has changed by less than
33 1%. The socioeconomic region of influence (ROI), the area in which site employees would live
34 and spend their wages and salaries, and into which any in-migration would occur, includes the
35 same counties and communities as described in the Draft Solar PEIS, meaning that no updates
36 to the affected environment information given in the Draft Solar PEIS are required.

39 **10.1.19.2 Impacts**

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

1 than 1%), the impacts for full build-out of the SEZ estimated in the Draft Solar PEIS remain
2 essentially unchanged. During construction, between 218 and 2,885 jobs and between
3 \$11.6 million and \$154 million in income could be associated with solar development in the
4 SEZ. During operations at full build-out, between 24 and 529 jobs and between \$0.7 million and
5 \$16.6 million in income could be produced. In-migration of workers and their families would
6 mean between 48 and 631 rental housing units would be needed during construction, and
7 between 7 and 134 owner-occupied units during operations.
8
9

10 **10.1.19.3 SEZ-Specific Design Features and Design Feature Effectiveness**

11
12 Required programmatic design features that would reduce socioeconomic impacts
13 are described in Section A.2.2. of Appendix A of this Final Solar PEIS. Implementing the
14 programmatic design features will reduce the potential for socioeconomic impacts during all
15 project phases.
16

17 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of
18 comments received as applicable, no SEZ-specific design features to address socioeconomic
19 impacts have been identified. Some SEZ-specific design features may be identified through the
20 process of preparing parcels for competitive offer and subsequent project-specific analysis.
21
22

23 **10.1.20 Environmental Justice**

24 25 26 **10.1.20.1 Affected Environment**

27
28 The data presented in the Draft Solar PEIS for the proposed Antonito Southeast SEZ have
29 not changed substantially. While there are minority populations in the Colorado or New Mexico
30 portions of the 50-mi (80-km) radius of the SEZ taken as a whole, there are no low-income
31 populations in this area (as a whole).
32

33 In the Colorado portion of the 50-mi (80-km) radius, more than 50% of the population
34 in all but one of the block groups in Conejos County consists of minority population groups,
35 together with all the block groups in adjacent Costilla County. Block groups in the cities of
36 Alamosa (Alamosa County), Monte Vista, and Del Norte (both in Rio Grande County) are also
37 more than 50% minority. In the New Mexico portion of the radius, Rio Arriba County has three
38 block groups in which the minority population is more than 20 percentage points higher than the
39 state average and one block group that is more than 50% minority. Taos County has six block
40 groups with more than 50% minority, and five block groups in the vicinity of the City of Taos
41 (Taos County) have minority populations that are 20 percentage points higher than the state
42 average.
43

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

1 average. Figure 10.1.20.1-1 shows the locations of the low-income population groups within the
2 50-mi (80-km) radius of the SEZ.

3 4 5 **10.1.20.2 Impacts**

6
7 Potential impacts (e.g., from noise and dust during construction and operations, visual
8 impacts, cultural impacts, and effects on property values) on low-income and minority
9 populations could be incurred as a result of the construction and operation of solar facilities
10 involving each of the four technologies. Although impacts are likely to be small, there are
11 minority populations defined by Council on Environmental Quality (CEQ) guidelines
12 (CEQ 1997) (see Section 10.1.20.1 of the Draft Solar PEIS) within the 50-mi (80-km) radius
13 around the boundary of the SEZ. This means that any adverse impacts of solar projects could
14 disproportionately affect minority populations. Further analysis of these impacts would be
15 included in subsequent National Environmental Policy Act of 1969 (NEPA) reviews of
16 individual solar projects. Because there are no low-income populations within the 50-mi
17 (80-km) radius as a whole, there would not be impacts on low-income populations.

18 19 20 **10.1.20.3 SEZ-Specific Design Features and Design Feature Effectiveness**

21
22 Required programmatic design features that would reduce potential environmental justice
23 impacts are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the
24 programmatic design features will reduce the potential for environmental justice impacts.

25
26 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of
27 comments received as applicable, no SEZ-specific design features for environmental justice have
28 been identified. Some SEZ-specific design features may be identified through the process of
29 preparing parcels for competitive offer and subsequent project-specific analysis.

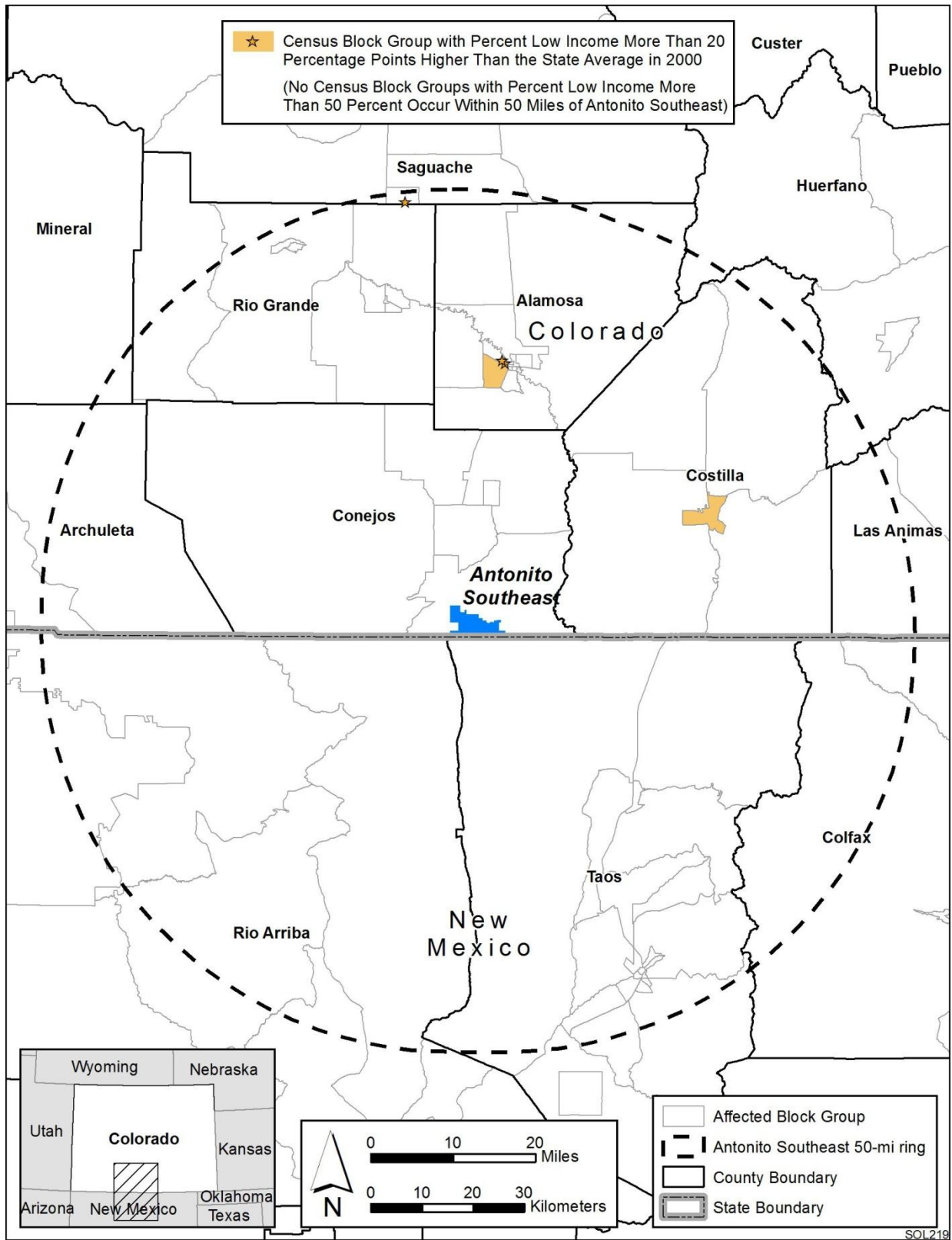
30 31 32 **10.1.21 Transportation**

33 34 35 **10.1.21.1 Affected Environment**

36
37 The reduction in developable area of the proposed Antonito Southeast SEZ of less than
38 1% does not change the information on affected environment for transportation provided in the
39 Draft Solar PEIS.

40 41 42 **10.1.21.2 Impacts**

43
44 As stated in the Draft Solar PEIS, the primary transportation impacts are anticipated
45 to be from commuting worker traffic. U.S. 285 provides a regional traffic corridor that could



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

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

6
7 Solar development within the SEZ would affect public access along off-highway vehicle
8 (OHV) routes that are designated open and available for public use. Although open routes
9 crossing areas granted rights-of-way (ROWs) for solar facilities could be redesignated as closed
10 (see Section 5.5.1 of the Draft Solar PEIS), a programmatic design feature has been included
11 under Recreation (Section A.2.2.6.1 of Appendix A) that requires consideration of replacement
12 of lost OHV route acreage and of access across and to public lands.

13 14 15 **10.1.21.3 SEZ-Specific Design Features and Design Feature Effectiveness**

16
17 Required programmatic design features that would reduce transportation impacts are
18 described in Section A.2.2. of Appendix A of this Final Solar PEIS. The programmatic design
19 features, including local road improvements, multiple site access locations, staggered work
20 schedules, and ride-sharing, will all provide some relief to traffic congestion on local roads
21 leading to the SEZ. Depending on the location of solar facilities within the SEZ, more specific
22 access locations and local road improvements could be implemented.

23
24 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of
25 comments received as applicable, no SEZ-specific design features to address transportation have
26 been identified. Some SEZ-specific design features may be identified through the process of
27 preparing parcels for competitive offer and subsequent project-specific analysis.

28 29 30 **10.1.22 Cumulative Impacts**

31
32 The analysis of potential impacts in the vicinity of the proposed Antonito Southeast SEZ
33 presented in the Draft Solar PEIS is still generally applicable for this Final Solar PEIS. The
34 following sections include an update to the information presented in the Draft Solar PEIS
35 regarding cumulative effects for the proposed Antonito Southeast SEZ.

36 37 38 **10.1.22.1 Geographic Extent of the Cumulative Impact Analysis**

39
40 The geographic extent of the cumulative impact analysis has not changed. The extent
41 varies on the basis of the nature of the resource being evaluated and the distance at which an
42 impact may occur (thus, e.g., air quality impacts may have a greater regional extent than visual
43 resource impacts). Lands around the SEZ are privately owned, administered by the U.S. Forest
44 Service (USFS), or administered by the BLM. The BLM administers approximately 11% of the
45 lands within a 50-mi (80-km) radius of the SEZ.

1 **10.1.22.2 Overview of Ongoing and Reasonably Foreseeable Future Actions**
2

3 The Draft Solar PEIS included three other proposed SEZs in Colorado: Fourmile East,
4 DeTilla Gulch, and Los Mogotes East. All of these proposed SEZs are being carried forward to
5 the Final Solar PEIS; the areas of the De Tilla Gulch, Fourmile East, and Los Mogotes East
6 SEZs have been decreased.
7

8 The ongoing and reasonably foreseeable future actions described below are grouped into
9 two categories: (1) actions that relate to energy production and distribution and (2) other ongoing
10 and reasonably foreseeable actions, including those related to mining and mineral processing,
11 grazing management, transportation, recreation, water management, and conservation
12 (Section 10.1.22.2.2). Together, these actions and trends have the potential to affect human and
13 environmental receptors within the geographic range of potential impacts over the next 20 years.
14

15
16 ***10.1.22.2.1 Energy Production and Distribution***
17

18 The list of reasonably foreseeable future actions near the proposed Antonito Southeast
19 SEZ has been updated and is presented in Table 10.1.22.2-1. Projects listed in the table are
20 shown in Figure 10.1.22.2-1.
21

22 Xcel Energy (Public Service Company of Colorado) has submitted a transmission
23 planning report to the Colorado Public Utility Commission stating that it intends to end its
24 involvement in the proposed San Luis Valley–Calumet-Comanche Transmission Project
25 (Heide 2011). The project itself has not been cancelled.
26

27
28 ***10.1.22.2.2 Other Actions***
29

30 None of the major ongoing and foreseeable actions within 50 mi (80 km) of the proposed
31 Antonito Southeast SEZ that were listed in Table 10.1.22.2-3 of the Draft Solar PEIS have had a
32 change in their status. An additional mining and mineral processing activity is the Taos Gravel
33 Products Torres Pit, a subsurface sand and gravel products mining activity in Taos County,
34 New Mexico, approximately 35 mi (56 km) south of the SEZ. The existing Torres Pit occupies
35 51 acres (0.21 km²), and it is proposed to extend the mining operation on 84 acres (0.34 km²), all
36 privately owned land. Water is used only for fugitive dust control and is provided by an on-site
37 well (BLM 2011c).
38

39
40 **10.1.22.3 General Trends**
41

42 The information on general trends presented in the Draft Solar PEIS remains valid.
43
44

1 **TABLE 10.1.22.2-1 Ongoing and Reasonably Foreseeable Future Actions Related to Energy**
 2 **Development and Distribution near the Proposed Antonito Southeast SEZ and in the San Luis**
 3 **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.

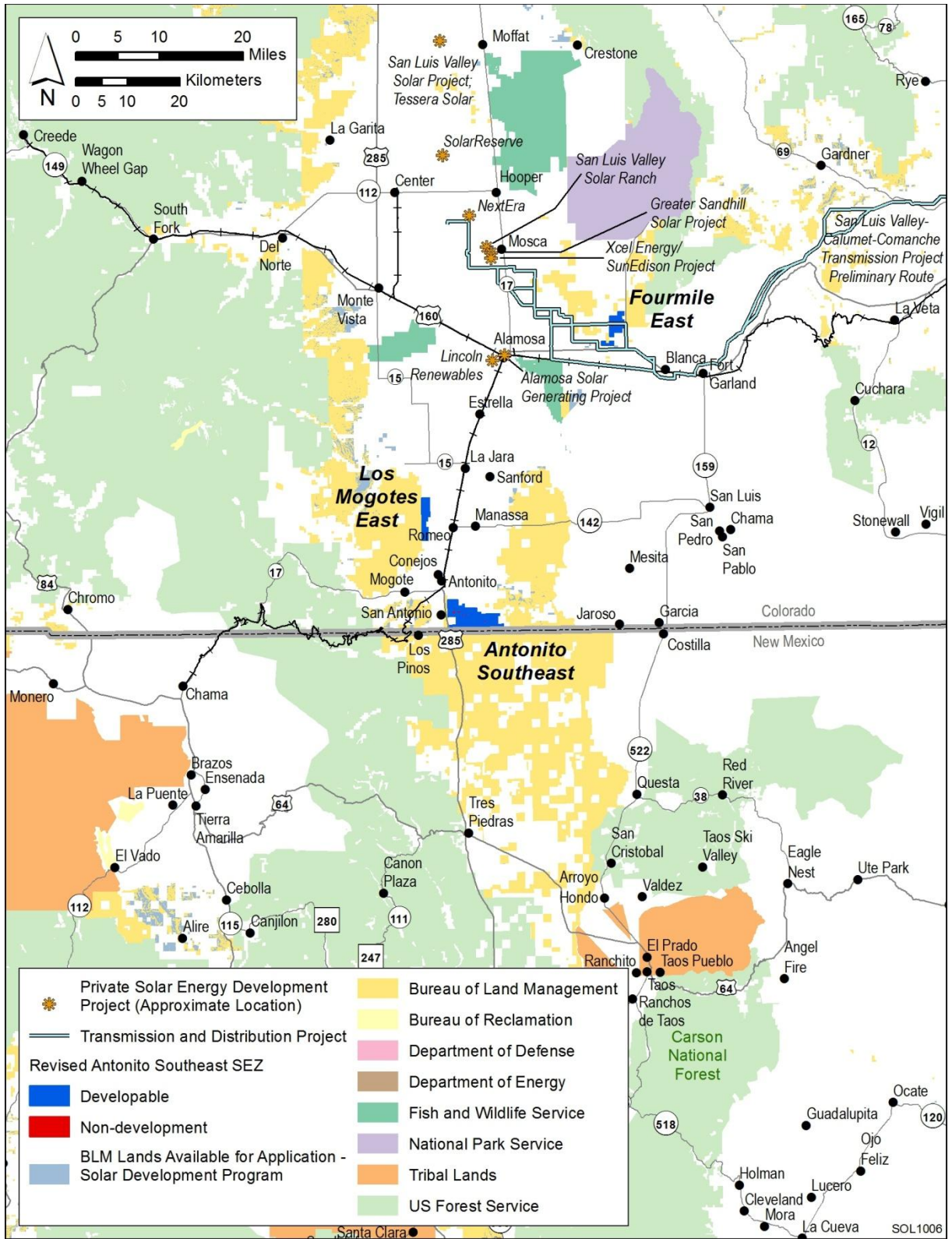
^c To convert acres to km², multiply by 0.004047.

^d See Solar Feeds (2012) for details.

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

^f See Heide (2011) for details.

4



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

1 **10.1.22.4 Cumulative Impacts on Resources**
2

3 Total disturbance over 20 years in the proposed Antonito Southeast SEZ is assumed to be
4 about 7,700 acres (31.2 km²), or 80% of the entire proposed SEZ. This development would
5 contribute incrementally to the impacts from other past, present, and reasonably foreseeable
6 future actions in the region as described in the Draft Solar PEIS. Primary impacts from
7 development in the Antonito Southeast SEZ may include impacts on water quantity and quality,
8 air quality, ecological resources such as habitat and species, cultural and visual resources, and
9 specially designated lands.

10
11 One additional project, the expansion of the Torres Gravel Pit, has been identified within
12 50 mi (80 km) of the SEZ. As a result of the reduction in the developable areas of the nearby
13 Los Mogotes East and Fourmile East SEZs, the incremental cumulative impacts associated with
14 development in the proposed Antonito Southeast SEZ during construction, operation, and
15 decommissioning are expected to be the same or less than those projected in the Draft Solar
16 PEIS.

17
18 On the basis of comments received on the Draft Solar PEIS, cumulative impacts on
19 recreation in the San Luis Valley have been reconsidered. While it is unlikely that the Antonito
20 Southeast SEZ individually would have a large impact on recreation and tourism throughout the
21 valley, cumulative impacts on the overall tourism and recreation environment of the area could
22 be significant, because it is one of four proposed SEZs totaling about 16,300 acres (66 km²) on
23 public lands and there is additional solar energy development on private lands. Because most of
24 the land on the valley floor of the San Luis Valley is private and heavily developed for
25 agricultural use, undeveloped public lands around the valley provide accessible areas for public
26 recreation. Although it is believed the recreational use of the proposed SEZ is low, the loss of
27 public access to such areas cumulatively leads to an overall reduction in the availability of
28 recreation that can become significant.

29
30
31 **10.1.23 Transmission Analysis**
32

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

42
43 On the basis of its size, the assumption of a minimum of 5 acres (0.02 km²) of land
44 required per MW, and the assumption of a maximum of 80% of the land area developed, the
45 Antonito Southeast SEZ is estimated to have the potential to generate 1,554 MW of marketable
46 solar power at full build-out.

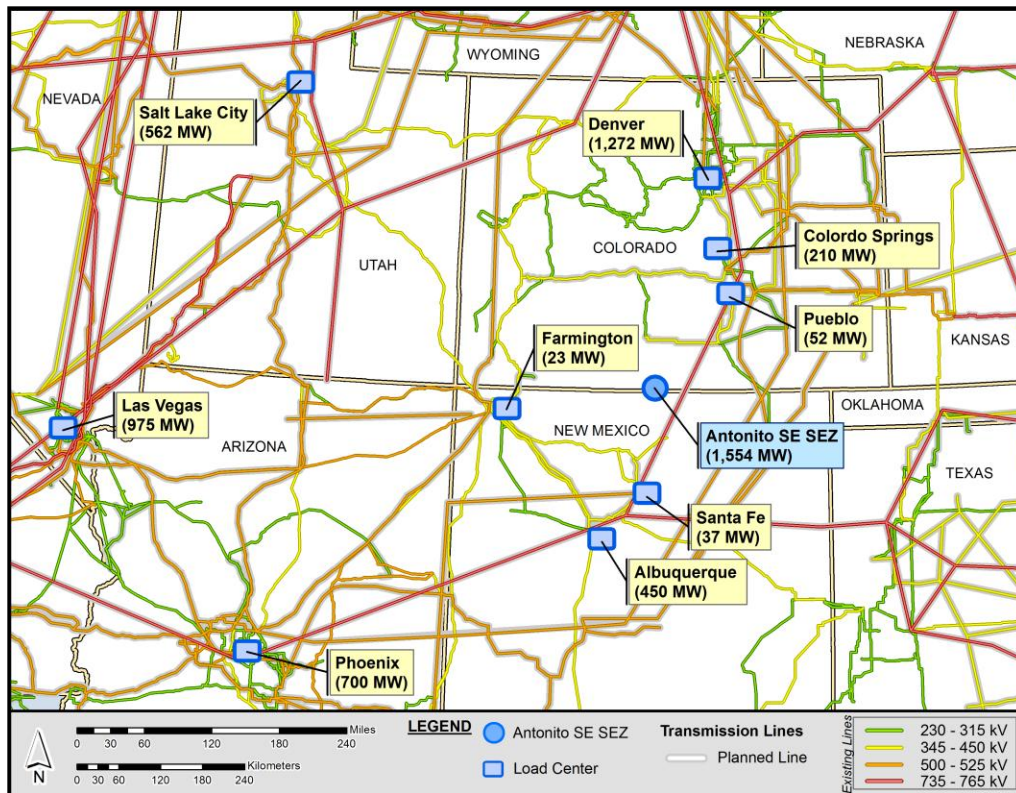
1 **10.1.23.1 Identification and Characterization of Load Areas**

2
3 The primary candidates for Antonito Southeast SEZ load areas are the major surrounding
4 cities. Figure 10.1.23.1-1 shows the possible load areas for the Antonito Southeast SEZ and the
5 estimated portion of their market that could be served by solar generation. Possible load areas
6 for the Antonito Southeast SEZ include Pueblo, Colorado Springs, and Denver, Colorado;
7 Farmington, Albuquerque, and Santa Fe, New Mexico; Salt Lake City, Utah; Phoenix, Arizona;
8 and Las Vegas, Nevada.

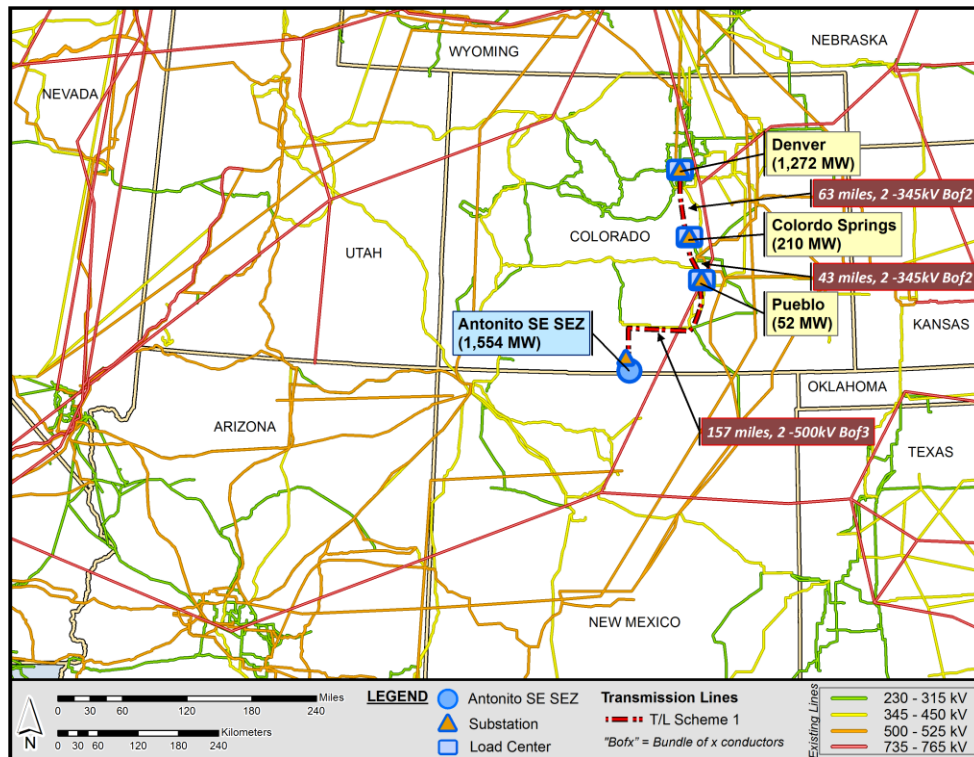
9
10 The two load area groups examined for the Antonito Southeast SEZ are as follows:

- 11
12 1. Pueblo, Colorado Springs, and Denver, Colorado; and
13
14 2. Farmington and Albuquerque, New Mexico; Salt Lake City, Utah; and
15 Phoenix, Arizona.

16
17 Figure 10.1.23.1-2 shows the most economically viable transmission scheme for the
18 Antonito Southeast SEZ (transmission scheme 1), and Figure 10.1.23.1-3 shows an alternative
19 transmission scheme (transmission scheme 2) that represents a logical choice should
20 transmission scheme 1 be infeasible. As described in Appendix G, the alternative shown in
21



22
23 **FIGURE 10.1.23.1-1 Location of the Proposed Antonito Southeast SEZ and**
24 **Possible Load Areas (Source for background map: Platts 2011)**
25



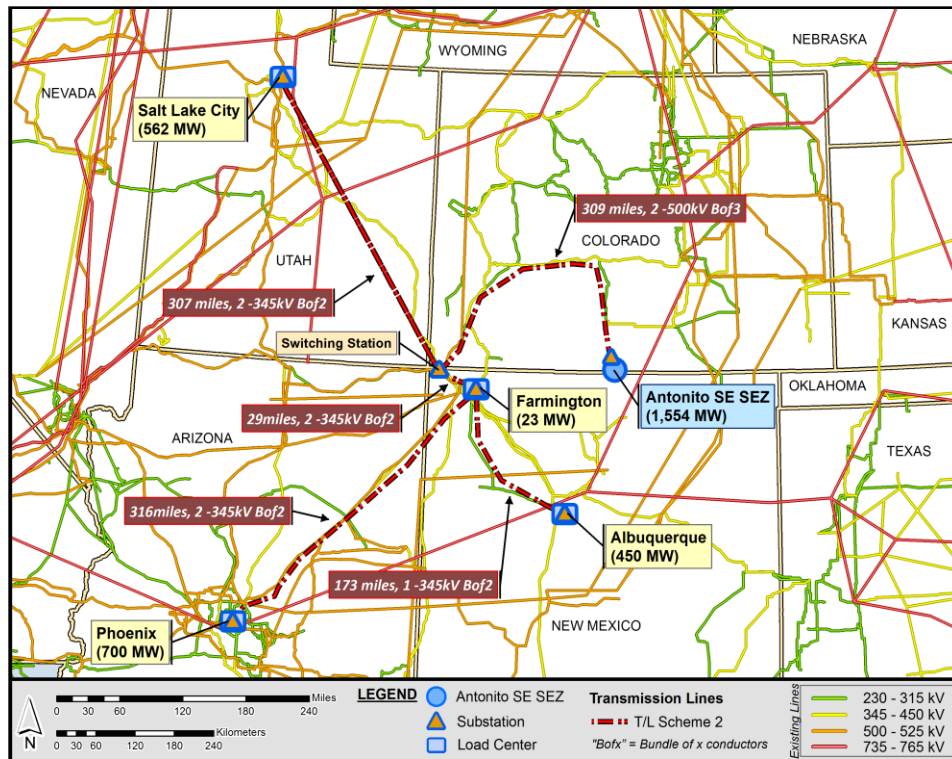
1
2 **FIGURE 10.1.23.1-2 Transmission Scheme 1 for the Proposed Antonito**
3 **Southeast SEZ (Source for background map: Platts 2011)**

4
5
6 transmission scheme 2 represents the optimum choice if one or more of the primary linkages in
7 transmission scheme 1 are excluded from consideration. The groups provide for linking loads
8 along alternative routes so that the SEZ's output of 1,554 MW could be fully allocated.
9

10 Table 10.1.23.1-1 summarizes and groups the load areas according to their associated
11 transmission scheme and provides details on how the megawatt load for each area was estimated.
12

13 10.1.23.2 Findings for the DLT Analysis

14
15
16 The DLT analysis approach assumes that the Antonito Southeast SEZ will require all new
17 construction for transmission lines (i.e., dedicated lines) and substations. The new transmission
18 lines(s) would be designed to be able to directly convey the 1,554-MW output of the Antonito
19 Southeast SEZ to the prospective load areas for each possible transmission scheme. Note that the
20 combined solar market for the Pueblo, Colorado Springs, and Denver region during the initial
21 year is only about 1,534 MW (or about 20 MW short of the SEZ's maximum output). However,
22 the total load of the region is projected to grow to 1,559 MW by the second year of the study
23 period, assuming a population load growth of 2% a year. Thus by the second year, the Denver
24 region should be able to absorb all of the SEZ's maximum power output. The approach also
25 assumes that all existing transmission lines in the Western Electricity Coordinating Council
26



1
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6
7

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).

8

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

3
4 Figures 10.1.23.1-2 and 10.1.23.1-3 display the pathways that new dedicated lines might
5 follow to distribute solar power generated at the Antonio Southeast SEZ via the two identified
6 transmission schemes described in Table 10.1.23.1-1. These pathways parallel existing 500-,
7 345-, 230-kV, and/or lower voltage lines. The intent of following existing lines is to avoid
8 pathways that may be infeasible due to topographical limitations or other concerns.

9
10 For transmission scheme 1, serving load centers to the north, a new line would be
11 constructed to connect with Pueblo (52 MW), Colorado Springs (210 MW), and Denver
12 (1,272 MW), so that the 1,554-MW output of the Antonio Southeast SEZ could be fully utilized
13 by the second year of the study based on nominal anticipated load growth as noted above. This
14 particular scheme has three segments. The first segment extends about 157 mi (253 km)
15 northeast to Pueblo. To efficiently convey the full SEZ output of 1,554 MW over this segment, a
16 double-circuit 500-kV line (2–500 kV) bundle of three conductors (Bof3) would be required. The
17 second segment, from Pueblo to Colorado Springs, is about 43 mi (69 km) long. The third and
18 last segment, from Colorado Springs to Denver, is about 63 mi (101 km) long. In general, the
19 transmission configuration options for each leg, or segment, may vary and were determined by
20 using the line “loadability” curve provided in American Electric Power’s *Transmission Facts*
21 (AEP 2010). Appendix G documents the line options used for this analysis and describes how the
22 load area groupings were determined.

23
24 For transmission scheme 2, primarily serving load centers to the southwest and
25 northwest, new lines would be constructed to connect with Farmington (23 MW), Albuquerque
26 (450 MW), Phoenix (700 MW), and Salt Lake City (562 MW). The scheme assumes that
27 marketing power to nearby Denver, Pueblo, and Colorado Springs is no longer feasible. The
28 alternate scheme has five segments. The length and transmission line configurations associated
29 with each segment are shown in Figure 10.1.23.1-3.

30
31 Table 10.1.23.2-1 summarizes the distances to the various load areas over which new
32 transmission lines would need to be constructed, as well as the assumed number of substations
33 that would be required. One substation is assumed to be installed at each load area and an
34 additional one at the SEZ. Thus, in general, the total number of substations per scheme is simply
35 equal to the number of load areas associated with the scheme plus one. Substations at the load
36 areas would consist of one or more step-down transformers, while the originating substation at
37 the SEZ would consist of several step-up transformers. For schemes that require the branching of
38 the lines, a switching substation is assumed to be constructed at the appropriate junction. In
39 general, switching stations carry no local load but are assumed to be equipped with switching
40 gears (e.g., circuit breakers and connecting switches) to reroute power as well as, in some cases,
41 with additional equipment to regulate voltage. The originating substation would have a combined
42 substation rating of at least 1,554 MW (to match the plant’s output), while the combined load
43 substations would have a similar total rating of 1,554 MW.

44
45 Table 10.1.23.2-2 provides an estimate of the total land area disturbed for construction
46 of new transmission facilities under each of the schemes evaluated. The most favorable

1 **TABLE 10.1.23.2-1 Potential Transmission Schemes, Estimated Solar Markets, and Distances to**
 2 **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.

3
4
5
6

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	263	4	6,054.5	37.3	6,091.8
	Colorado Springs, Colorado ^a					
	Denver, Colorado ^b					
2	Switching Station	1,134	6	24,990.9	74.6	25,065.5
	Farmington, New Mexico ^a					
	Albuquerque, New Mexico ^b					
	Salt Lake City, Utah ^b					
	Phoenix, Arizona ^a					

^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 km², multiply by 0.004047.

7
8

1 transmission scheme with respect to minimizing the costs and area disturbed would be scheme 1,
 2 which would serve the Pueblo, Colorado Springs, and Denver markets and for which the
 3 construction of new transmission lines and substations is estimated to disturb about 6,092 acres
 4 (24.7 km²) of land. The less favorable transmission scheme with respect to minimizing the costs
 5 and area disturbed would be scheme 2. For scheme 2, the construction of new transmission lines
 6 and substations is estimated to disturb a land area on the order of 25,066 acres (101.4 km²).

7
 8 Table 10.1.23.2-3 shows the estimated net present value (NPV) of both transmission
 9 schemes and takes into account the cost of constructing the lines, the substations, and the
 10 projected revenue stream over the 10-year horizon. A positive NPV indicates that revenues more
 11 than offset investments. This calculation does not include the cost of producing electricity.

12
 13 The most economically attractive configuration (transmission scheme 1) has the highest
 14 positive NPV and serves the Colorado cities of Pueblo, Colorado Springs, and Denver. The
 15 secondary case (transmission scheme 2), which excludes one or more of the primary pathways
 16 used in scheme 1, is less economically attractive and focuses on delivering power to the cities of
 17 Farmington, Albuquerque, Phoenix, and Salt Lake City.

18
 19 Table 10.1.23.2-4 shows the effect of varying the value of the utilization factor on the
 20 NPV of the transmission schemes. The table shows that at about 40% utilization, the NPVs for
 21 both schemes are positive. It also shows that as the utilization factor is increased, the economic
 22 viability of the lines also increases. Utilization factors can be raised by allowing the new
 23 dedicated lines to market other power generation outputs in the region in addition to that of its
 24 associated SEZ.

25
 26
 27 **TABLE 10.1.23.2-3 Comparison of Potential Transmission Lines with Respect to NPV (Base Case)**
 28 **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).

1 **TABLE 10.1.23.2-4 Effect of Varying the Utilization Factor on the NPV of the Transmission**
 2 **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).

3
4
5 The findings of the DLT analysis for the proposed Antonito Southeast SEZ are as
6 follows:

- 7
- 8 • Transmission scheme 1, which identifies the cities of Pueblo, Colorado
9 Springs, and Denver (in that specific sequence) as the primary markets,
10 represents the most favorable option based on NPV and land use
11 requirements. This scheme would result in new land disturbance of about
12 6,092 acres (24.7 km²).
- 13
- 14 • Transmission scheme 2 represents an alternative configuration in which
15 electricity would be marketed to the geographically dispersed load areas of
16 Farmington, Albuquerque, Salt Lake City, and Phoenix, but would result in a
17 considerably lower NPV and greater amounts of new land disturbance, on the
18 order of 25,066 acres (101.4 km²).
- 19
- 20 • Other load area configurations are possible but would be less favorable than
21 scheme 1 in terms of NPV and, in most cases, also in terms of land use
22 requirements. If new electricity generation at the proposed Antonito Southeast
23 SEZ is not sent to either of the two markets identified above, the potential
24 upper-bound impacts in terms of cost would be greater.
- 25
- 26 • The analysis of transmission requirements for the proposed Antonito
27 Southeast SEZ would be expected to show lower costs and less land
28 disturbance if solar-eligible load assumptions were increased, although the
29 magnitude of those changes would vary due to a number of factors. In general,
30 for cases such as the Antonito Southeast SEZ that show multiple load areas

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

10 11 12 **10.1.24 Impacts of the Withdrawal**

13
14 The BLM is proposing to withdraw 9,729 acres (39 km²) of public land comprising the
15 proposed Antonito Southeast SEZ from settlement, sale, location, or entry under the general land
16 laws, including the mining laws, for a period of 20 years (see Section 2.2.2.2.4 of the Final Solar
17 PEIS). The public lands would be withdrawn, subject to valid existing rights, from settlement,
18 sale, location, or entry under the general land laws, including the mining laws. This means that
19 the lands could not be appropriated, sold, or exchanged during the term of the withdrawal, and
20 new mining claims could not be filed on the withdrawn lands. Mining claims filed prior to the
21 segregation or withdrawal of the identified lands would take precedence over future solar energy
22 development. The withdrawn lands would remain open to the mineral leasing, geothermal
23 leasing, and mineral material laws, and the BLM could elect to lease the oil, gas, coal, or
24 geothermal steam resources, or to sell common-variety mineral materials, such as sand and
25 gravel, contained in the withdrawn lands. In addition, the BLM would retain the discretion to
26 authorize linear and renewable energy ROWs on the withdrawn lands.

27
28 The purpose of the proposed land withdrawal is to minimize the potential for conflicts
29 between mineral development and solar energy development for the proposed 20-year
30 withdrawal period. Under the land withdrawal, there would be no mining-related surface
31 development, such as the establishment of open pit mining, construction of roads for hauling
32 materials, extraction of ores from tunnels or adits, or construction of facilities to process the
33 material mined, that could preclude use of the SEZ for solar energy development. For the
34 Antonito Southeast SEZ, the impacts of the proposed withdrawal on mineral resources and
35 related economic activity and employment are expected to be negligible because the mineral
36 potential of the lands within the SEZ is low (BLM 2012). There has been no documented mining
37 within the SEZ, and there are no known locatable mineral deposits within the land withdrawal
38 area. According to the Legacy Rehost 2000 System (LR2000) (accessed in January 2012), there
39 are no recorded mining claims within the land withdrawal area.

40
41 Although the mineral potential of the lands within the Antonito Southeast SEZ is low, the
42 proposed withdrawal of lands within the SEZ would preclude many types of mining activity over
43 a 20-year period, resulting in the avoidance of potential mining-related adverse impacts. Impacts
44 commonly related to mining development include increased soil erosion and sedimentation,
45 water use, generation of contaminated water in need of treatment, creation of lagoons and ponds
46 (hazardous to wildlife), toxic runoff, air pollution, establishment of noxious weeds and invasive

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

7 **10.1.25 References**

8
9 *Note to Reader:* This list of references identifies Web pages and associated URLs where
10 reference data were obtained for the analyses presented in this Final Solar PEIS. It is likely that
11 at the time of publication of this Final Solar PEIS, some of these Web pages may no longer be
12 available or the URL addresses may have changed. The original information has been retained
13 and is available through the Public Information Docket for this Final Solar PEIS.

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1 **10.1.26 Errata for the Proposed Antonito Southeast SEZ**

2

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

10

11

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.”

1 **10.2 DE TILLA GULCH**

2
3
4 **10.2.1 Background and Summary of Impacts**

5
6
7 **10.2.1.1 General Information**

8
9 The proposed De Tilla Gulch SEZ is located in Saguache County in south-central
10 Colorado. In 2008, the county population was 6,903, while the four-county region surrounding
11 the SEZ—Alamosa, Chafee, Saguache, and Rio Grande Counties—had a total population of
12 51,974. The largest nearby town, which is located about 50 mi (80 km) to the south, is Alamosa,
13 with a 2008 population of 8,745.

14
15 U.S. 285, a two-lane highway, passes along the northwestern border of the proposed
16 De Tilla Gulch SEZ. The SLRG Railroad also serves the area. As of October 28, 2011, there
17 were no pending solar project applications within the SEZ.

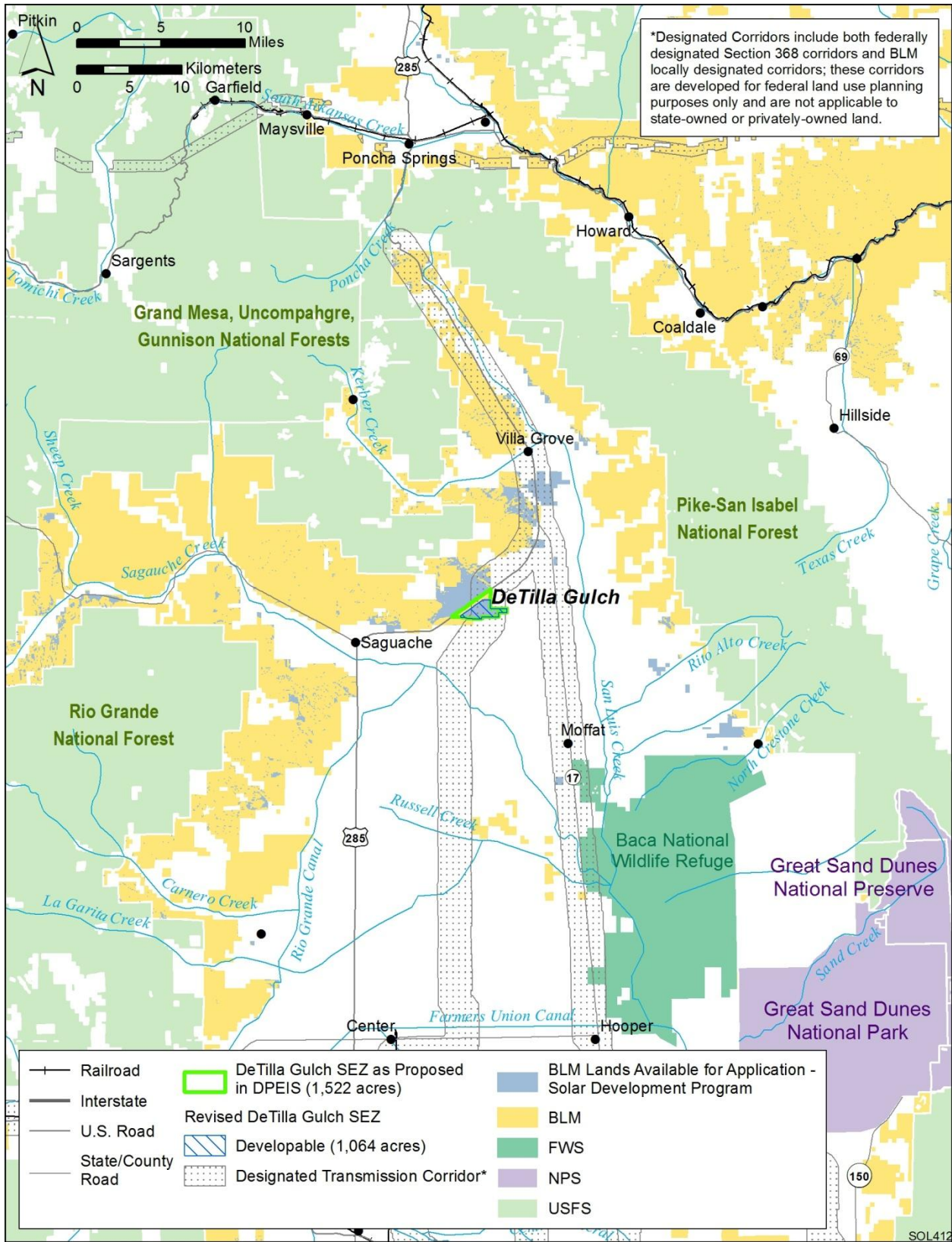
18
19 As published in the Draft Solar PEIS (BLM and DOE 2010), the proposed De Tilla
20 Gulch SEZ had a total area of 1,522 acres (6.2 km²) (see Figure 10.2.1.1-1). In the Supplement
21 to the Draft Solar PEIS (BLM and DOE 2011), the size of the SEZ was reduced, eliminating
22 458 acres (1.9 km²) along the northwest edge of the SEZ (i.e., the area that had bordered
23 U.S. 285) (see Figure 10.2.1.1-2). Eliminating this area is primarily intended to avoid impacts on
24 an active Gunnison prairie dog colony, on pronghorn winter range and winter concentration area,
25 and on the proposed Cochetopa Scenic Byway. No additional areas for non-development were
26 identified within the SEZ. The remaining developable area within the SEZ is 1,064 acres
27 (4.3 km²).

28
29 Because of the extensive potential impacts from solar development in the portion of the
30 De Tilla Gulch SEZ that has been eliminated, those lands are proposed as solar ROW exclusion
31 areas; that is, applications for solar development on those lands will not be accepted by the BLM.

32
33 The analyses in the following sections update the affected environment and potential
34 environmental, cultural, and socioeconomic impacts associated with utility-scale solar energy
35 development in the De Tilla Gulch SEZ as described in the Draft Solar PEIS.

36
37
38 **10.2.1.2 Development Assumptions for the Impact Analysis**

39
40 Maximum development of the proposed De Tilla Gulch SEZ was assumed to be 80% of
41 the developable SEZ area over a period of 20 years, a maximum of 851 acres (3.4 km²)
42 (Table 10.2.1.2-1). Full development of the De Tilla Gulch SEZ would allow development of
43 facilities with an estimated total of between 95 MW (dish engine or PV technologies,
44 9 acres/MW [0.04 km²/MW]) and 170 MW (solar trough technologies, 5 acres/MW
45 [0.09 km²/MW]) of electrical power capacity.



1

2 **FIGURE 10.2.1.1-1 Proposed De Tilla Gulch SEZ as Revised**

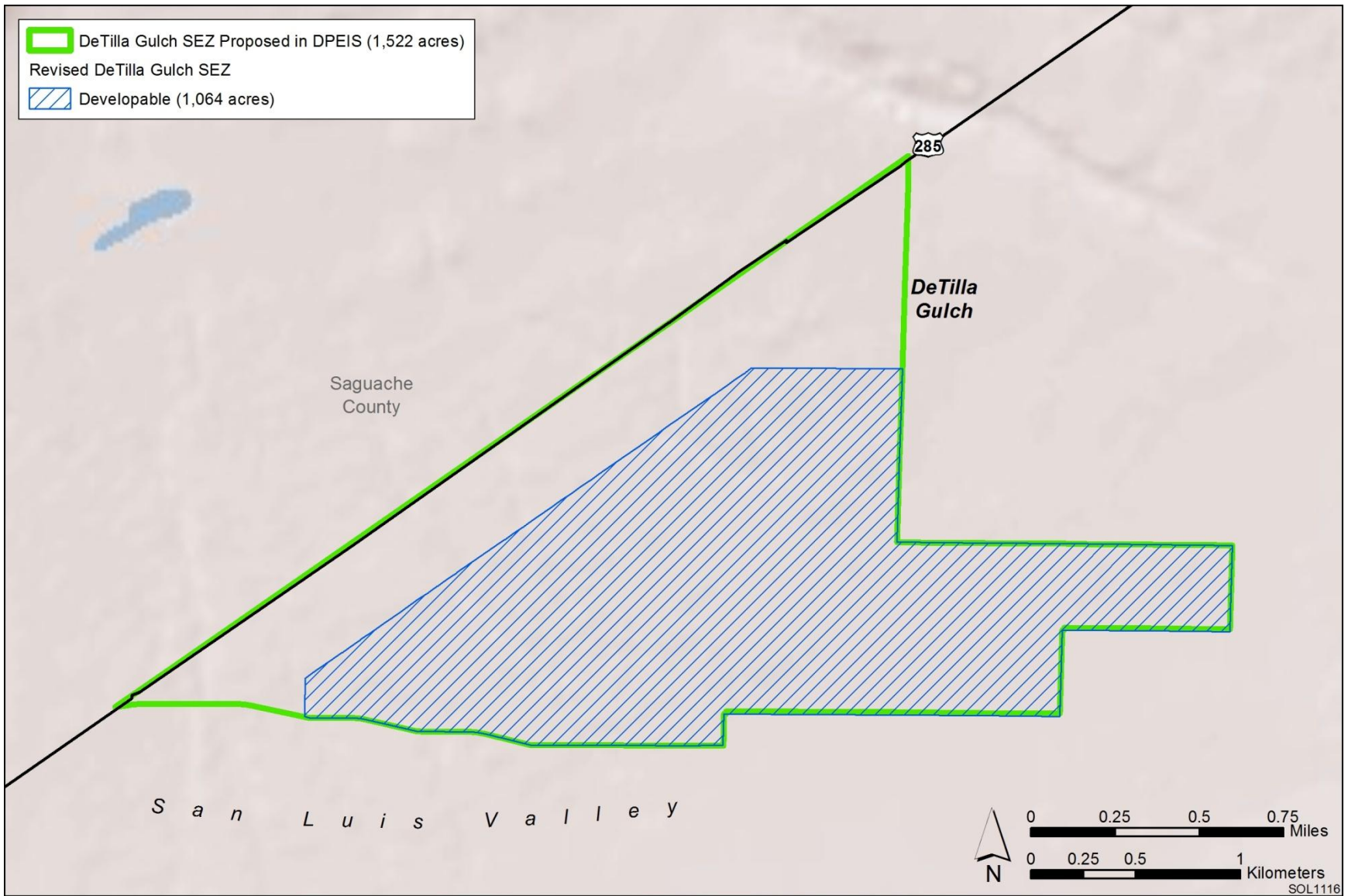


FIGURE 10.2.1.1-2 Developable Area for the Proposed De Tilla Gulch SEZ as Revised

1 **TABLE 10.2.1.2-1 Assumed Development Acreages, Solar MW Output, and Nearest Access**
 2 **Road and Transmission Line for the Proposed De Tilla Gulch SEZ as Revised**

Total Developable Acreage and Assumed Development 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 Corridor ^d
1,064 acres ^a and 851 acres	95 MW ^b 170 MW ^c	Adjacent (U.S. 285)	Adjacent and 115-kV	0 acres	Adjacent/through ^e

- a To convert acres to km², 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 km²/MW) of land required.
- c Maximum power output if the SEZ were fully developed using solar trough technologies, assuming 5 acres/MW (0.02 km²/MW) of land required.
- d BLM-designated corridors are developed for federal land use planning purposes only and are not applicable to state-owned or privately owned land.
- e A BLM locally designated corridor covers about two-thirds of the proposed De Tilla Gulch SEZ.

3
 4
 5 Availability of transmission from SEZs to load centers will be an important consideration
 6 for future development in SEZs. For the proposed De Tilla Gulch SEZ, the nearest existing
 7 transmission line as identified in the Draft Solar PEIS is a 115-kV transmission line that crosses
 8 the SEZ. It is possible that this existing line could be used to provide access from the SEZ to the
 9 transmission grid, but the 115-kV capacity of the existing line may not be adequate for 95 to
 10 170 MW of new capacity. Therefore, at full build-out capacity, new transmission lines and
 11 upgrades of existing transmission lines may be required to bring electricity from the proposed
 12 De Tilla Gulch SEZ to load centers. An assessment of the most likely load center destinations for
 13 power generated at the De Tilla Gulch SEZ and a general assessment of the impacts of
 14 constructing and operating new transmission facilities to those load centers is provided in
 15 Section 10.2.23. In addition, the generic impacts of transmission and associated infrastructure
 16 construction and of line upgrades for various resources are discussed in Chapter 5 of this Final
 17 Solar PEIS. Project-specific analyses would also be required to identify the specific impacts of
 18 new transmission construction and line upgrades for any projects proposed within the SEZ.

19
 20 Most of the De Tilla Gulch SEZ overlaps a locally designated transmission corridor. For
 21 this impact assessment, it is assumed that up to 80% of the proposed SEZ could be developed.
 22 This does not take into account the potential limitations to solar development that may result
 23 from siting constraints associated with this corridor. The development of solar facilities and the
 24 existing corridor will be dealt with by the BLM on a case-by-case basis; see Section 10.2.2.2 on
 25 impacts on lands and realty for further discussion.
 26

1 For the proposed De Tilla Gulch SEZ, U.S. 285 runs along the northwestern boundary of
2 the SEZ. Thus existing road access to the proposed De Tilla Gulch SEZ should be adequate
3 to support construction and operation of solar facilities, and no additional road construction
4 outside the SEZ is assumed to be required to support solar development of the SEZ, as
5 summarized in Table 10.2.1.2-1.
6
7

8 **10.2.1.3 Programmatic and SEZ-Specific Design Features**

9

10 The proposed programmatic design features for each resource area to be required under
11 the BLM Solar Energy Program are presented in Section A.2.2 of Appendix A of this Final Solar
12 PEIS. These programmatic design features are intended to avoid, minimize, and/or mitigate
13 adverse impacts from solar energy development and will be required for development on all
14 BLM-administered lands, including SEZ and non-SEZ lands.
15

16 The discussions below addressing potential impacts from solar energy development on
17 specific resource areas (Sections 10.2.2 through 10.2.22) also provide an assessment of the
18 effectiveness of the programmatic design features in mitigating adverse impacts from solar
19 development within the SEZ. SEZ-specific design features to address impacts specific to the
20 proposed De Tilla Gulch SEZ may be required in addition to the programmatic design features.
21 The proposed SEZ-specific design features for the De Tilla Gulch SEZ have been updated on the
22 basis of revisions to the SEZ since the Draft Solar PEIS (such as boundary changes and the
23 identification of non-development areas) and on the basis of comments received on the Draft and
24 Supplement to the Draft Solar PEIS. All applicable SEZ-specific design features identified to
25 date (including those from the Draft Solar PEIS that are still applicable) are presented in
26 Sections 10.2.2 through 10.2.22.
27
28

29 **10.2.2 Lands and Realty**

30
31

32 **10.2.2.1 Affected Environment**

33

34 The size of the proposed De Tilla Gulch SEZ has been reduced to 1,064 acres (4.3 km²)
35 with an assumed developable area (80%) of 851 acres (3.4 km²). The description of the condition
36 of the SEZ in the Draft Solar PEIS remains accurate, except that because of the boundary change
37 U.S. 285 no longer is immediately adjacent to the area. A BLM-designated transmission corridor
38 covers almost all the SEZ. The lands south and east of the SEZ are private or state-owned.
39
40

41 **10.2.2.2 Impacts**

42

43 Although the proposed SEZ has been reduced in size, solar development on the proposed
44 SEZ would still introduce a new and discordant land use into an otherwise rural area and would
45 exclude many current and future uses of the land. Because of the SEZ's location close to
46 U.S. 285, solar development within the SEZ will be highly visible to visitors as they enter the

1 northern end of the San Luis Valley. The boundary changes will isolate an area of about
2 458 acres (1.9 km²) between the proposed SEZ and the highway, fragmenting the public land in
3 the area and making the isolated public land parcel more difficult to manage.

4
5 Most of the proposed De Tilla Gulch SEZ overlaps a locally-designated transmission
6 corridor. This existing corridor will be used primarily for the siting of transmission lines and
7 other infrastructure such as pipelines. The existing corridor will be the preferred location for any
8 transmission development that is required to support solar development and future transmission
9 grid improvements related to the build-out of the De Tilla Gulch SEZ. Any use of the corridor
10 lands within the De Tilla Gulch SEZ for solar energy facilities, such as solar panels or heliostats,
11 must be compatible with the future use of the existing corridor. The BLM will assess solar
12 projects in the vicinity of existing corridor on a case-by-case basis. The BLM will review and
13 approve individual project plans of development to ensure compatible development that
14 maintains the use of the corridor.

15
16 The remaining analysis in the Draft Solar PEIS is still valid.

17 18 19 **10.2.2.3 SEZ-Specific Design Features and Design Feature Effectiveness**

20
21 Required programmatic design features that would reduce impacts on lands and realty
22 are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the
23 programmatic design features will provide some mitigation for the identified impacts but will not
24 mitigate all adverse impacts. For example, impacts related to the exclusion of many existing and
25 potential uses of the public land, the visual impact of an industrial-type solar facility within an
26 otherwise rural area, and induced land use changes on state and private lands may not be fully
27 mitigated.

28
29 No SEZ-specific design features for lands and realty have been identified through this
30 Final Solar PEIS. Some SEZ-specific design features may be established for parcels within the
31 De Tilla Gulch SEZ through the process of preparing parcels for competitive offer and
32 subsequent project-specific analysis.

33 34 35 **10.2.3 Specially Designated Areas and Lands with Wilderness Characteristics**

36 37 38 **10.2.3.1 Affected Environment**

39
40 The route of the Old Spanish National Historic Trail parallels the southern border of the
41 SEZ about 0.25 mi (0.4 km) south of the proposed SEZ, and there is one USFS roadless area
42 located within 5 mi (8 km) of the SEZ. Several additional specially designated areas are within
43 the viewshed of the SEZ. A recently maintained inventory of wilderness characteristics of public
44 lands within the SEZ found that these lands do not contain wilderness characteristics. The
45 description of specially designated lands in the Draft Solar PEIS remains accurate.

1 **10.2.3.2 Impacts**
2

3 Because the Old Spanish National Historic Trail is within 0.25 mi (0.4 km) of the SEZ, it
4 is anticipated that solar development on the SEZ would have a major impact on the historic and
5 visual integrity of the Trail and on future management of the Trail. The magnitude of these
6 impacts would depend on the integrity and historical significance of the segment of the Trail
7 from which solar development could be seen.
8

9 There are no additional significant impacts on specially designated areas anticipated from
10 solar energy development of the SEZ. The description of impacts in the Draft Solar PEIS
11 remains valid.
12

13
14 **10.2.3.3 SEZ-Specific Design Features and Design Feature Effectiveness**
15

16 Required programmatic design features that would reduce impacts on specially
17 designated areas are described in Section A.2.2 of Appendix A of this Final Solar PEIS (design
18 features for specially designated areas, cultural resources, and visual resources would address
19 impacts).
20

21 Programmatic design features will be applied to address SEZ-specific resources and
22 conditions, for example:
23

- 24 • For projects in the De Tilla Gulch SEZ that are located within the viewshed of
25 the Old Spanish National Historic Trail, a National Trail inventory will be
26 required to determine the area of possible adverse impact to resources,
27 qualities, values, and associated settings of the Trail; to prevent substantial
28 interference; and to determine any areas unsuitable for development. Residual
29 impacts will be avoided, minimized, and/or mitigated to the extent practicable
30 according to program policy standards. Programmatic design features have
31 been included in BLM’s Solar Energy Program to address impacts on
32 National Historic Trails (see Section A.2.2.23 of Appendix A).
33

34 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
35 analyses due to changes to the SEZ boundaries, and consideration of comments received as
36 applicable, the no SEZ-specific design features have been identified. The need for SEZ-specific
37 design features will be identified through the process of preparing parcels for competitive offer
38 and subsequent project-specific analysis.
39
40

1 **10.2.4 Rangeland Resources**

2
3
4 **10.2.4.1 Livestock Grazing**

5
6
7 ***10.2.4.1.1 Affected Environment***

8
9 One BLM grazing allotment overlaps the proposed De Tilla Gulch SEZ. The reduction in
10 the size of the proposed SEZ results in a change in the percentage of the Crow grazing allotment
11 that is within the SEZ from 55% to 38%. The allotment has not been grazed for many years.
12

13
14 ***10.2.4.1.2 Impacts***

15
16 Although there has been a reduction in the size of the SEZ, it is still anticipated that,
17 should solar development occur in the SEZ, the Crow Allotment grazing permit would be
18 cancelled. Even though there is a reduction in the percentage of the allotment that is physically in
19 the SEZ, the lands that are no longer in the SEZ are located in the strip between the SEZ and the
20 highway and would not be easily accessible to livestock. The current water source for the
21 allotment remains within the revised SEZ boundary and would become unavailable. However,
22 the fact that the allotment has not been grazed for many years because of the lack of adequate
23 fencing is still relevant, and it is not likely that the allotment would be used again even without
24 solar development in the proposed SEZ.
25

26
27 ***10.2.4.1.3 SEZ-Specific Design Features and Design Feature Effectiveness***

28
29 Required programmatic design features that would reduce impacts on livestock grazing
30 are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the
31 programmatic design features will provide some mitigation for identified impacts should only a
32 portion of the grazing permit be affected, but they would not mitigate a complete loss of the
33 grazing permit, the loss of livestock AUMs, or the loss of value in ranching operations including
34 private land values.
35

36 No SEZ-specific design features to protect livestock grazing have been identified in this
37 Final Solar PEIS. Some SEZ-specific design features may be established when specific projects
38 within the SEZ are being considered.
39
40

1 **10.2.4.2 Wild Horses and Burros**

2
3
4 ***10.2.4.2.1 Affected Environment***

5
6 As presented in the Draft Solar PEIS, no wild horse or burro HMAs occur within the
7 proposed De Tilla Gulch SEZ or in proximity to it. The reduction in size of the SEZ does not
8 alter these data.

9
10
11 ***10.2.4.2.2 Impacts***

12
13 As presented in the Draft Solar PEIS, solar energy development within the proposed
14 De Tilla Gulch SEZ would not affect wild horses and burros. The reduction in size of the SEZ
15 does not affect this conclusion.

16
17
18 ***10.2.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness***

19
20 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
21 analyses due to changes to the SEZ boundaries, and consideration of comments received as
22 applicable, no SEZ-specific design features to address wild horses and burros are required for the
23 proposed De Tilla Gulch SEZ.

24
25
26 **10.2.5 Recreation**

27
28
29 ***10.2.5.1 Affected Environment***

30
31 The area of the proposed De Tilla Gulch SEZ has been reduced by about 30%, to
32 1,064 acres (4.3 km²), by removing the area along the northwest edge of the SEZ.

33
34 Comments pointed out that most of the recreation discussion in the Draft Solar PEIS
35 focused internally within the SEZ and did not address the larger part that public and other
36 federal lands play in the landscape and tourism economy of the San Luis Valley. The better-
37 known attractions within the valley include Great Sand Dunes National Park and Preserve, the
38 Old Spanish National Historic Trail, two scenic railroads, the Los Caminos Antiguos Scenic
39 Byway, the Sangre de Cristo Mountains, three national wildlife refuges, and numerous
40 designated wilderness areas, and these are among the highlights of the recreational and tourism
41 opportunities of the area. While the land within the De Tilla Gulch SEZ is flat, plain, and not an
42 important recreational use area, it is adjacent to U.S. 285 and is highly visible to travelers
43 entering the San Luis Valley from the north. Tourism is an important part of the valley economy
44 and an important focus for future economic growth.

1 The public lands within the proposed SEZ are identified by the CDOW as habitat for both
2 deer and pronghorn antelope, and animals that use these lands likely support hunting recreational
3 opportunities in other areas of the valley. More detailed information on impacts on these species
4 can be found in Section 10.2.11.3.2 of the Draft Solar PEIS.
5
6

7 **10.2.5.2 Impacts** 8

9 Solar development of the SEZ would exclude recreational users from the public lands
10 within the SEZ, but the anticipated level of this impact is small. Visual impacts on surrounding
11 recreational areas potentially would be greater with taller solar facilities, such as power towers
12 and facilities that utilize wet-cooling technology, but the overall impacts of solar development of
13 this site are anticipated to be low. The only exception would likely be recreational visitors
14 interested in the Old Spanish National Historic Trail (described in Section 10.2.3.2 above), for
15 whom impacts might be higher.
16

17 Solar development in the SEZ will be readily visible to travelers on U.S. 285 and to
18 travelers headed to tourist attractions elsewhere in the San Luis Valley, and solar development at
19 the northern entrance to the valley may affect the overall impression of recreational visitors to
20 the area. Recreational visitors to areas at elevations higher than that of the SEZ (e.g., Sangre de
21 Cristo wilderness areas and USFS roadless areas) will see the solar development within the SEZ,
22 but the impact on these areas is anticipated to be minimal. The types of solar technologies
23 employed and the possibility of significant glint or glare from reflective surfaces of solar
24 facilities would play a large role in the extent of visibility of solar development. Because of the
25 location of the SEZ along a main highway, there may be some potential to provide interpretive
26 activities focused on solar energy and development that would be of interest to travelers.
27

28 The CDOW has identified the potential for an impact on the availability of hunting
29 opportunities for pronghorn antelope associated with development of the De Tilla Gulch SEZ.
30 While it is unlikely that hunting occurs directly within the proposed SEZ, animals that use the
31 land likely support hunting recreation elsewhere. However, the overall impact on pronghorn was
32 estimated to be small in this assessment (see Section 10.2.11.4.2 of the Draft Solar PEIS),
33 because only a small portion of the available habitat in the valley occurs within the proposed
34 SEZ.
35

36 In addition, lands that are outside of the proposed SEZ may be acquired or managed for
37 mitigation of impacts on other resources (e.g., sensitive species). Managing these lands for
38 mitigation could further exclude or restrict recreational use, potentially leading to additional
39 losses in recreational opportunities in the region. The impact of acquisition and management of
40 mitigation lands would be considered as a part of the environmental analysis of specific solar
41 energy projects.
42
43

1 **10.2.5.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 Required programmatic design features that would reduce impacts on recreational
4 resources are described in Section A.2.2 of Appendix A of this Final Solar PEIS (design features
5 for both specially designated areas and visual resources also would address some impacts).
6 Implementing the programmatic design features for visual impacts would help minimize impacts
7 of individual solar projects, but would not address the larger question of what level of solar
8 energy development might cause adverse impacts on tourism and recreational segments of the
9 local economy. In addition, implementing the programmatic design features for recreation would
10 not mitigate the loss of recreational access to public lands developed for solar energy production
11 or the loss of wildlife-related hunting recreation.
12

13 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
14 analyses due to changes to the SEZ boundaries, and consideration of comments received as
15 applicable, the following SEZ-specific design feature has been identified:
16

- 17 • Tourism is an important economic growth area for the San Luis Valley, and
18 the De Tilla Gulch SEZ is located in a visible location adjacent to a principal
19 highway route into the valley. Because of its location, there is potential to
20 influence visitors’ perception of the tourism climate in the valley. As projects
21 are proposed for the SEZ, the potential impacts on tourism should be
22 considered and reviewed with local community leaders.
23

24 The need for additional SEZ-specific design features will be identified through the
25 process of preparing parcels for competitive offer and subsequent project-specific analysis.
26

27
28 **10.2.6 Military and Civilian Aviation**
29

30
31 **10.2.6.1 Affected Environment**
32

33 Although the size of the SEZ has been reduced, the remaining proposed SEZ is still
34 located under special use airspace (SUA) and is identified by the BLM as an area of required
35 consultation with DoD.
36

37
38 **10.2.6.2 Impacts**
39

40 Through comments on the Draft Solar PEIS, the military has indicated that it has no
41 concerns about potential impacts on its activities associated with solar development. There are no
42 anticipated impacts on civilian aviation.
43
44

1 **10.2.6.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 Required programmatic design features that would reduce impacts on military and
4 civilian aviation are described in Section A.2.2 of Appendix A of this Final Solar PEIS. The
5 programmatic design features require early coordination with the DoD to identify and avoid,
6 minimize, and/or mitigate, if possible, any potential impacts on the use of military airspace.
7

8 No SEZ-specific design features for military and civilian aviation have been identified
9 in this Final Solar PEIS. Some SEZ-specific design features may be identified through the
10 process of preparing parcels for competitive offer and subsequent project-specific analysis.
11

12
13 **10.2.7 Geologic Setting and Soil Resources**
14

15
16 **10.2.7.1 Affected Environment**
17

18
19 ***10.2.7.1.1 Geologic Setting***
20

21 Data provided in the Draft Solar PEIS remain valid, with the following update:
22

- 23 • The terrain of the proposed De Tilla Gulch SEZ is relatively flat with a very
24 gentle dip to the southeast (Figure 10.2.7.1-1). The boundaries of the De Tilla
25 Gulch SEZ have been changed to eliminate 458 acres (1.9 km²) along the
26 northwest edge of the site. Based on these changes, the elevations range from
27 7,790 ft (2,374 m) along the northwest corner of the SEZ to about 7,660 ft
28 (2,335 m) at the southeastern-most corner.
29

30
31 ***10.2.7.1.2 Soil Resources***
32

33 Data provided in the Draft Solar PEIS remain valid, with the following updates:
34

- 35 • Soils within the proposed De Tilla Gulch SEZ as revised are predominantly
36 the gravelly to gravelly sandy loams of the Rock River and Graypoint Series,
37 which now make up about 73% of the soil coverage at the site.
38
- 39 • Soil unit coverage at the proposed De Tilla Gulch SEZ as revised is shown in
40 Figure 10.2.7.1-2. The new SEZ boundaries eliminate 254 acres (1.03 km²) of
41 the Rock River gravelly loam (3 to 15% slopes), 107 acres (0.43 km²) of the
42 Graypoint gravelly sandy loam (0 to 3% slopes), 25 acres (0.10 km²) of the
43 Shawa loam (0 to 4% slopes), 70 acres (0.28 km²) of the Platoro loam (0 to
44 3% slopes), and eight acres (0.032 km²; all) of the Jodero-Lolo complex (0 to
45 6% slopes) (Table 10.2.7.1-1).
46

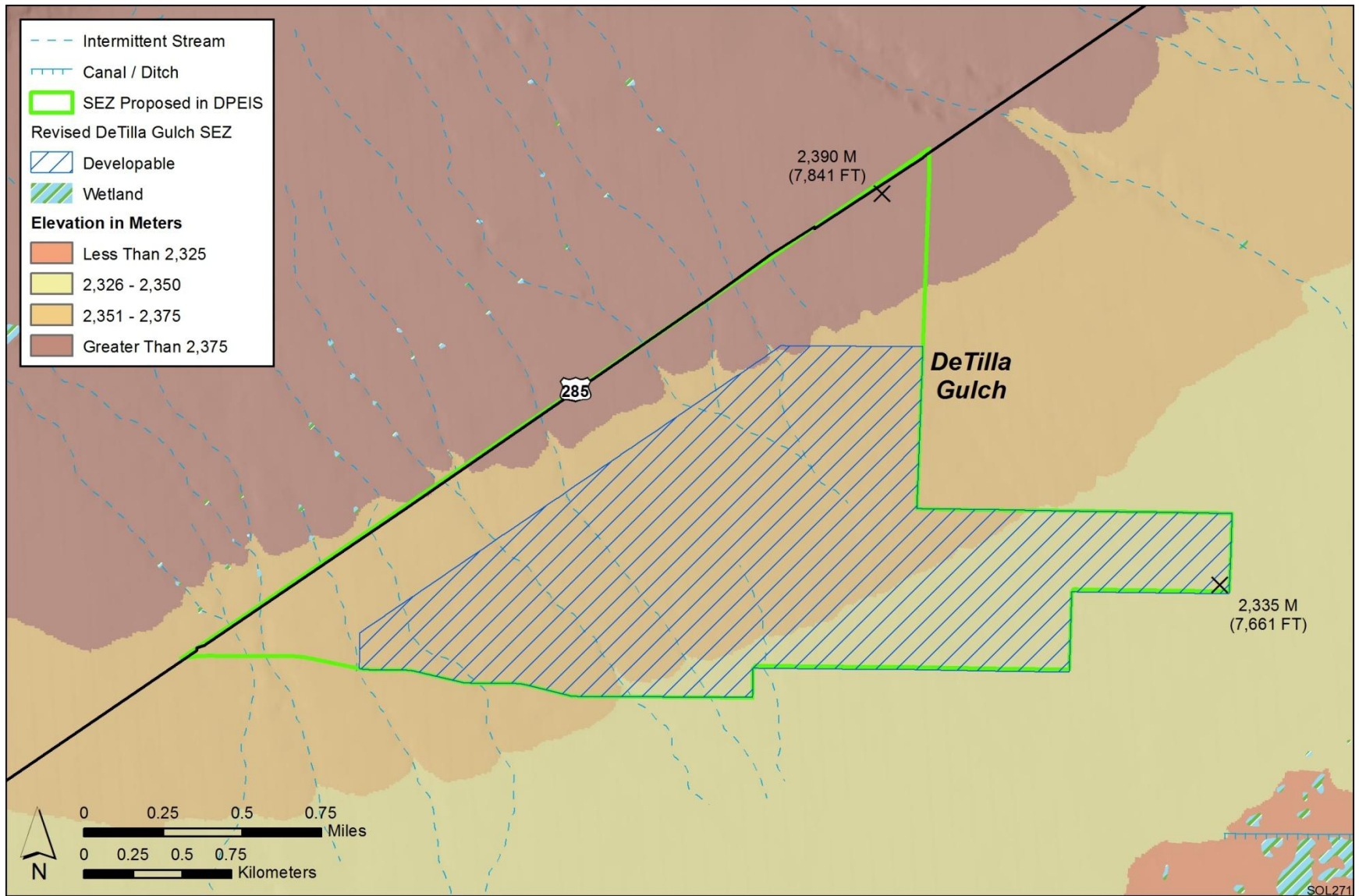


FIGURE 10.2.7.1-1 General Terrain of the Proposed De Tilla Gulch SEZ as Revised

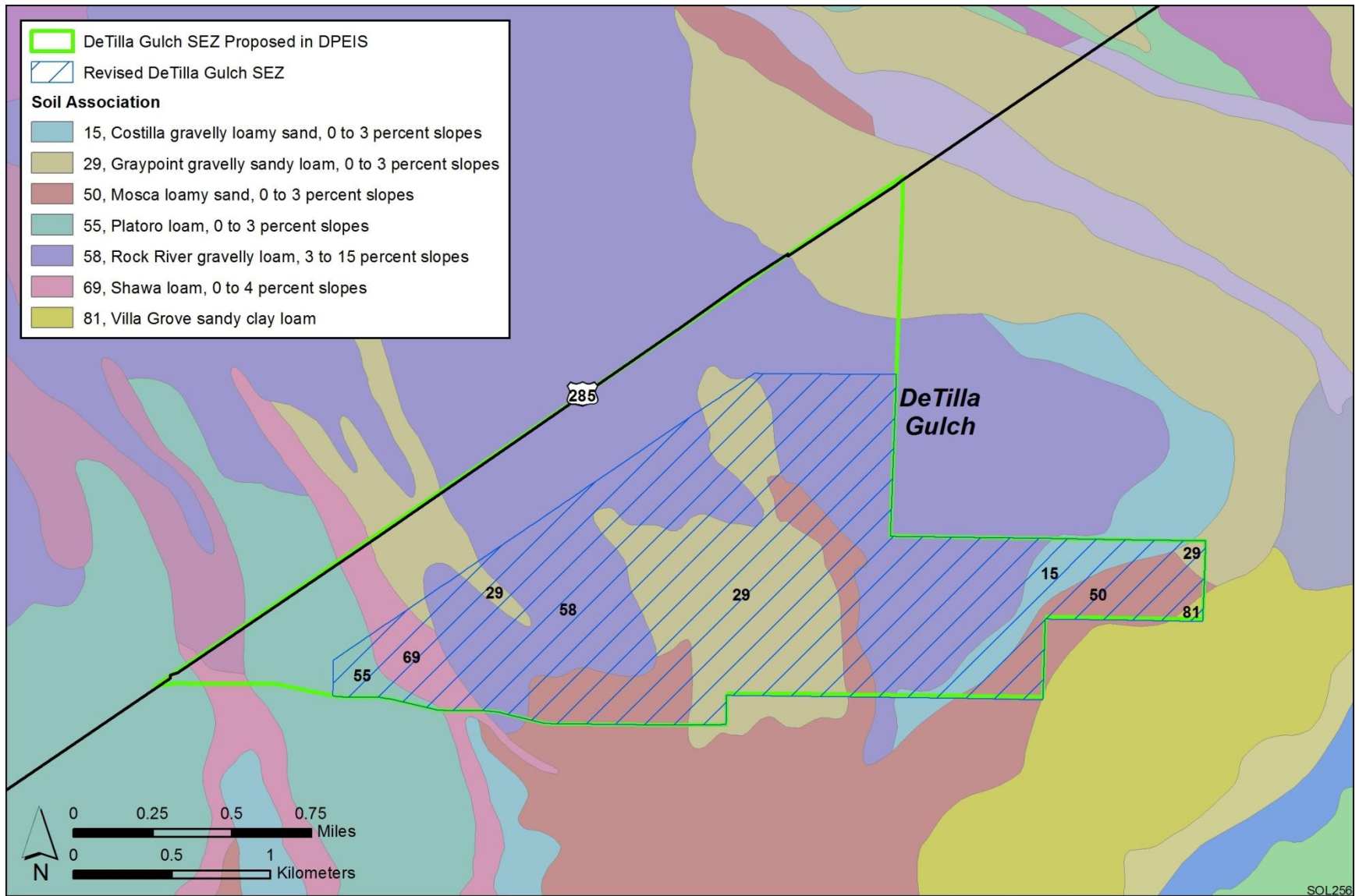


FIGURE 10.2.7.1-2 Soil Map for the Proposed De Tilla Gulch SEZ as Revised (NRCS 2008)

1 **TABLE 10.2.7.1-1 Summary of Soil Map Units within the Proposed De Tilla Gulch SEZ as Revised**

Map Unit Symbol	Map Unit Name	Erosion Potential		Description	Area in Acres ^c (Percentage of SEZ)
		Water ^a	Wind ^b		
58	Rock River gravelly loam (3 to 15% slope)	Slight	Moderate (WEG 4) ^d	Nearly level to gently sloping soils on valley side slopes and fans. Parent material consists of calcareous alluvium. Deep and well drained, with moderate surface-runoff potential and moderate permeability. Shrink-swell potential is low. Available water capacity is moderate. Used mainly as rangeland. Moderate rutting hazard.	506 (47.5)
29	Graypoint gravelly sandy loam (0 to 3% slope)	Slight	Moderate (WEG 3)	Level to nearly level soils on broad fans and terraces. Parent material consists of alluvium derived from basalt. Deep and well drained, with moderate surface-runoff potential and moderate permeability. Shrink-swell potential is low to moderate. Available water capacity is low. Caving hazard exists. Used mainly as rangeland and irrigated cropland, pasture, and hayland. Farmland of unique importance. ^e Moderate rutting hazard.	274 (25.8)
50	Mosca loamy sand (0 to 3% slope)	Slight	High (WEG 2)	Level to nearly level soils on fans and floodplains. Parent material consists of alluvium derived from basalt. Soils are deep and well drained, with moderate surface-runoff potential and moderate permeability. Shrink-swell potential is low. Available water capacity is low. Used mainly as rangeland and irrigated cropland. Farmland of unique importance. Moderate rutting hazard.	169 (15.9)
15	Costilla gravelly loamy sand (0 to 3% slope)	Slight	High (WEG 2)	Level to nearly level soils on fans and terraces. Parent material consists of sandy alluvium. Deep and somewhat excessively drained, with a low surface-runoff potential (high infiltration rate) and moderately rapid permeability. Shrink-swell potential is low. Available water capacity is low. Caving hazard exists. Used mainly as rangeland and wildlife habitat, and locally for irrigated crops. Moderate rutting hazard.	56 (5.2)

TABLE 10.2.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Erosion Potential		Description	Area in Acres ^c (Percentage of SEZ)
		Water ^a	Wind ^b		
69	Shawa loam (0 to 4% slope)	Slight	Moderate (WEG 6)	Level to nearly level soils on fans and low terraces adjacent to streams. Parent material consists of alluvium. Deep and moderately well drained, with moderate surface-runoff potential and moderate permeability. Shrink-swell potential is low to moderate. Available water capacity is high. Used mainly as irrigated pastureland, irrigated cropland, and rangeland. Prime farmland, if irrigated. Severe rutting hazard.	37 (3.5)
55	Platoro loam (0 to 3% slope)	Slight	Moderate (WEG 6)	Level to nearly level soils on fans and terraces. Parent material consists of alluvium derived mainly from basalt. Deep and well drained, with moderate surface-runoff potential and moderately slow permeability. Shrink-swell potential is low to moderate. Available water capacity is moderate. Used mainly as irrigated cropland, irrigated pastureland, and rangeland. Prime farmland, if irrigated. Severe rutting hazard.	19 (1.8)
81	Villa Grove sandy clay loam	Slight	Moderate (WEG 5)	Level soils on floodplains. Parent material consists of alluvium. Deep and poorly drained, with moderate surface-runoff potential and moderate permeability. Shrink-swell potential is low to moderate. Available water capacity is low. Flooding hazard during snowmelt season. Used mainly as rangeland and locally as irrigated pastureland. Prime farmland, if irrigated. Severe rutting hazard.	3 (<1)

^a 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.

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

^c To convert acres to km², multiply by 0.004047.

Footnotes continued on next page.

TABLE 10.2.7.1-1 (Cont.)

- ^d 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 m²) per year, for each of the wind erodibility groups: WEG 1, 220 tons (200 metric tons) per acre (4,000 m²) per year (average); WEG 2, 134 tons (122 metric tons) per acre per year; WEGs 3 and 4 (and 4L), 86 tons (78 metric tons) per acre (4,000 m²) per year; WEG 5, 56 tons (51 metric tons) per acre (4,000 m²) per year; WEG 6, 48 tons (44 metric tons) per acre (4,000 m²) per year; WEG 7, 38 tons (34 metric tons) per acre (4,000 m²) per year; and WEG 8, 0 tons (0 metric tons) per acre (4,000 m²) per year.
- ^e Farmland is of unique importance for the production of food, feed, fiber, forage, or oilseed crops. 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.

Sources: NRCS (2009); USDA (1984).

- 1 • Re-evaluation of the soil coverage indicates an increase of 4 acres (0.016 km²)
2 for the Mosca loamy sand, and a 1-acre (0.0040-km²) increase for both the
3 Costilla gravelly loamy sand and the Villa Grove sandy clay loam relative to
4 what was reported in the Draft Solar PEIS (Table 10.2.7.1-1).
5
6

7 **10.2.7.2 Impacts**

8
9 Impacts on soil resources would occur mainly as a result of ground-disturbing activities
10 (e.g., grading, excavating, and drilling), especially during the construction phase of a solar
11 project. The assessment provided in the Draft Solar PEIS remains valid, with the following
12 update:
13

- 14 • Impacts related to wind erodibility are reduced because the new SEZ
15 boundaries eliminate 464 acres (1.9 km²) of moderately erodible soils from
16 development.
17
18

19 **10.2.7.3 SEZ-Specific Design Features and Design Feature Effectiveness**

20
21 Required programmatic design features that would reduce impacts on soils are described
22 in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the programmatic design
23 features will reduce the potential for soil impacts during all project phases.
24

25 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
26 analyses due to changes to the SEZ boundaries, and consideration of comments received as
27 applicable, no SEZ-specific design features were identified for soil resources at the proposed
28 De Tilla Gulch SEZ. Some SEZ-specific design features may be identified through the process of
29 preparing parcels for competitive offer and subsequent project-specific analysis.
30
31

32 **10.2.8 Minerals (Fluids, Solids, and Geothermal Resources)**

33
34 A mineral potential assessment for the proposed De Tilla Gulch SEZ has been prepared
35 and reviewed by BLM mineral specialists knowledgeable about the region where the SEZ is
36 located (BLM 2012). The BLM is proposing to withdraw the SEZ from settlement, sale, location,
37 or entry under the general land laws, including the mining laws, for a period of 20 years (see
38 Section 2.2.2.2.4 of the Final Solar PEIS). The potential impacts of this withdrawal are discussed
39 in Section 10.2.24.
40
41

42 **10.2.8.1 Affected Environment**

43
44 There are no oil and gas leases, mining claims, or geothermal leases located in the
45 proposed SEZ. The description in the Draft Solar PEIS remains valid.
46

1 **10.2.8.2 Impacts**

2
3 There are no anticipated impacts on mineral resources from the development of solar
4 energy facilities in the proposed SEZ. The analysis of impacts on mineral resources in the Draft
5 Solar PEIS remains valid.
6

7
8 **10.2.8.3 SEZ-Specific Design Features and Design Feature Effectiveness**

9
10 Required programmatic design features that would reduce impacts on mineral resources
11 are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the
12 programmatic design features will provide adequate protection of mineral resources.
13

14 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
15 analyses due to changes to the SEZ boundaries, and consideration of comments received as
16 applicable, no SEZ-specific design features for mineral resources have been identified. Some
17 SEZ-specific design features may be identified through the process of preparing parcels for
18 competitive offer and subsequent project-specific analysis.
19

20
21 **10.2.9 Water Resources**

22
23 **10.2.9.1 Affected Environment**

24
25
26 The overall size of the De Tilla Gulch SEZ has been reduced by 31% from the area
27 described in the Draft Solar PEIS, resulting in a total area of 1,064 acres (4.3 km²). The
28 description of the affected environment given in the Draft Solar PEIS relevant to water resources
29 at the De Tilla Gulch SEZ remains valid and is summarized in the following paragraphs.
30

31 The De Tilla Gulch SEZ is within the Rio Grande Headwaters subbasin of the
32 Rio Grande hydrologic region. The SEZ is located in the northern part of the San Luis Valley
33 bounded by the San Juan Mountains to the west and the Sangre de Cristo Mountains to the east.
34 Precipitation and snowfall in the valley is around 8 in./yr (20 cm/yr) and 24 in./yr (61 cm),
35 respectively, with much greater amounts in the surrounding mountains. Pan evaporation rates are
36 estimated to be on the order of 54 in./yr (137 cm/yr). No permanent surface water bodies, flood
37 hazards, or wetlands have been identified within the SEZ. Several intermittent/ephemeral
38 drainages cross the area from the northwest to the southeast and may be subject to intermittent
39 flooding. Groundwater in the San Luis Valley is primarily in basin-fill deposits with an upper
40 unconfined aquifer and a lower confined aquifer, which are separated by a series of confining
41 clay layers and unfractured volcanic rocks. The SEZ sits on an alluvial fan deposit at the base of
42 the San Juan Mountains over unconfined groundwater. A groundwater monitoring well within
43 the site has reported a depth to groundwater of 136 ft (41 m) and indicates a groundwater flow
44 from north to south. Water quality in the northern San Luis Valley varies, with small areas of
45 TDS values of up to 1,000 mg/L near the SEZ; much smaller concentrations (250 to 500 mg/L)
46 generally surround the area.

1 The De Tilla Gulch SEZ is located in the Colorado Division 3 management zone
2 (Rio Grande Basin) of the Colorado DWR, where both surface water and groundwater rights are
3 overappropriated. The Rio Grande Compact of 1938 obligates Colorado to meet water delivery
4 schedules to New Mexico and governs much of the water management decision making in the
5 San Luis Valley. In order to balance water uses within the San Luis Valley and to meet treaty
6 obligations, several water management mechanisms have been developed that affect existing
7 water rights and water right transfers. The two primary water management considerations
8 affecting solar energy development are the need for an augmentation water plan, and the rules set
9 by the recently formed Special Improvement District Number 1 (Subdistrict #1). Augmentation
10 water plans were described in the Draft Solar PEIS (Section 10.2.9.1.3) and essentially require
11 junior water right holders to have additional water reserves to ensure that more senior water
12 rights are not hindered. The water management plan for Subdistrict #1 was ruled on in June of
13 2010, putting restrictions on groundwater withdrawals in an effort to restore groundwater levels
14 in the unconfined aquifer. None of the Colorado SEZs are located within the boundaries of
15 Subdistrict #1, which primarily includes central portions of the San Luis Valley that are currently
16 used for agriculture. However, given that water rights are overappropriated in the San Luis
17 Valley and largely clustered within Subdistrict #1, it is likely that any new water diversions and
18 water right transfers would involve these new groundwater management considerations.
19

20 In addition to the water resources information provided in the Draft Solar PEIS, this
21 section provides a planning-level inventory of available climate, surface water, and groundwater
22 monitoring stations within the immediate vicinity of the De Tilla Gulch SEZ and surrounding
23 basin. Additional data regarding climate, surface water, and groundwater conditions are
24 presented in Tables 10.2.9.1-1 through 10.2.9.1-7 and in Figures 10.2.9.1-1 and 10.2.9.1-2.
25 Fieldwork and hydrologic analyses needed to determine 100-year floodplains and jurisdictional
26 water bodies would need to be coordinated with appropriate federal, state, and local agencies.
27 Areas within the De Tilla Gulch SEZ that are found to be within a 100-year floodplain will be
28 identified as non-development areas. Any water features within the De Tilla Gulch SEZ
29 determined to be jurisdictional will be subject to the permitting process described in the CWA.
30

31 **10.2.9.2 Impacts**

32 ***10.2.9.2.1 Land Disturbance Impacts on Water Resources***

33
34
35
36
37 The discussion of land disturbance effects on water resources in the Draft Solar PEIS
38 remains valid. As stated in the Draft Solar PEIS, land disturbance impacts in the vicinity of the
39 proposed De Tilla Gulch SEZ could potentially affect drainage patterns and groundwater
40 recharge. The alteration of natural drainage pathways during construction can lead to impacts
41 related to flooding, loss of water delivery to downstream regions, and alterations to riparian
42 vegetation and habitats. The alteration of the SEZ boundaries removes several
43 intermittent/ephemeral stream reaches, which reduces the potential for adverse impacts
44 associated with land disturbance activities.
45
46

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TABLE 10.2.9.1-1 Watershed and Water Management Basin Information Relevant to the Proposed De Tilla Gulch SEZ as Revised

Basin	Name	Area (acres) ^b
Subregion (HUC4) ^a	Rio Grande Headwaters (1301)	4,871,764
Cataloging unit (HUC8)	Sagauche (13010004)	864,210
Groundwater basin	San Luis Valley	2,000,000
SEZ	De Tilla Gulch	1,064

^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 km², multiply by 0.004047.

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TABLE 10.2.9.1-2 Climate Station Information Relevant to the Proposed De Tilla Gulch 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.)
Center 4 SSW, Colorado (051458)	7,673	30	1941–2011	7.00	25.00
Crestone 1 SE, Colorado (051964)	8,004	19	1982–2011	13.00	62.40
Sagauche, Colorado (057337)	7,701	8	1894–2009	8.27	23.50
Sargents, Colorado (057460)	8,470	30	1899–2011	14.17	105.60

^a National Weather Service’s Cooperative Station Network station identification code.

^b Surface elevations for the proposed De Tilla Gulch SEZ range from 7,670 to 7,835 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).

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TABLE 10.2.9.1-3 Total Lengths of Selected Streams at the Subregion, Cataloging Unit, and SEZ Scale Relevant to the Proposed De Tilla Gulch SEZ as Revised

Water Feature	Subregion, HUC4 (ft) ^a	Cataloging Unit, HUC8 (ft)	SEZ (ft)
Unclassified streams	19,502	0	0
Perennial streams	14,694,407	2,430,527	0
Intermittent/ephemeral streams	94,288,163	18,660,065	17,354
Canals	12,151,458	1,770,862	0

^a To convert ft to m, multiply by 0.3048.

Source: USGS (2012a).

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TABLE 10.2.9.1-4 Stream Discharge Information Relevant to the Proposed De Tilla Gulch SEZ as Revised

Parameter	Station (USGS ID)
	Saguache Creek near Saguache, Colorado (08227000)
Period of record	1911–2007
No. of observations	88
Discharge, median (ft ³ /s) ^a	293
Discharge, range (ft ³ /s)	67–1220
Discharge, most recent observation (ft ³ /s)	250
Distance to SEZ (mi) ^b	16

^a To convert ft³ to m³, multiply by 0.0283.

^b To convert mi to km, multiply by 1.6093.

Source: USGS (2012b).

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TABLE 10.2.9.1-5 Surface Water Quality Data Relevant to the Proposed De Tilla Gulch SEZ as Revised

Parameter	Station (USGS ID) ^a	
	08227000	381004105552000
Period of record	1967–2004	1975–1976
No. of records	126	4
Temperature (°C) ^b	8.4 (0–22.5)	60 (59–60)
Total dissolved solids (mg/L)	107.5 (82–124)	661 (648–690)
Dissolved oxygen (mg/L)	9.1 (7.1–11.3)	NA ^c
pH	7.5 (7.1–8.9)	6.5 (6.5–7.3)
Total nitrogen (mg/L)	NA	NA
Phosphorus (mg/L as P)	0.0815 (0.061–0.088)	NA
Organic carbon (mg/L)	NA	NA
Calcium (mg/L)	17 (12.1–21)	57 (55–59)
Magnesium (mg/L)	2.7 (1.84–5.1)	13
Sodium (mg/L)	5.9 (4.04–9.5)	140 (140–150)
Chloride (mg/L)	1.505 (0.64–3.6)	39.5 (38–40)
Sulfate (mg/L)	5.17 (2.68–12)	170 (160–190)
Arsenic (µg/L)	NA	31 (26–36)
Cadmium (µg/L)	NA	<2 (–)
Copper (µg/L)	NA	<2 (–)

^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).

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

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The study region considered for the intermittent/ephemeral stream evaluation relevant to the De Tilla Gulch SEZ is a subset of the Sagauche watershed (HUC8), for which information regarding stream channels is presented in Tables 10.2.9.1-3 and 10.2.9.1-4 of this Final Solar PEIS. The results of the intermittent/ephemeral stream evaluation are shown in Figure 10.2.9.2-1, 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, 28% of the intermittent/ephemeral stream channels had low sensitivity and 72% had

1
2

TABLE 10.2.9.1-6 Water Quality Data from Groundwater Samples Relevant to the Proposed De Tilla Gulch SEZ as Revised

Parameter	Station (USGS ID) ^a		
	380515106080501	380605106002501	380955105550301
Period of record	1968	1968	1968
No. of records	1	1	1
Temperature (°C) ^b	11.7	14	12
Total dissolved solids (mg/L)	NA ^c	172	NA
Dissolved oxygen (mg/L)	NA	NA	NA
pH	NA	7.2	NA
Nitrate + nitrite (mg/L as N)	NA	NA	NA
Phosphate (mg/L)	NA	0.01	NA
Organic carbon (mg/L)	NA	NA	NA
Calcium (mg/L)	NA	29	NA
Magnesium (mg/L)	NA	3.9	NA
Sodium (mg/L)	NA	20	NA
Chloride (mg/L)	NA	5.1	NA
Sulfate (mg/L)	NA	26	NA
Arsenic (µg/L)	NA	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).

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TABLE 10.2.9.1-7 Groundwater Surface Elevations Relevant to the Proposed De Tilla Gulch SEZ as Revised

Parameter	Station (USGS ID)		
	380651106004501	380421106033001	380512106004901
Period of record	1989–2011	1979–2011	1979–2011
No. of observations	18	384	375
Surface elevation (ft) ^a	7,748	7,625	7,628
Well depth (ft)	194	63.3	86
Depth to water, median (ft)	130.16	6.2	23.38
Depth to water, range (ft)	127.35–144.83	2.02–11.95	21.41–27.96
Depth to water, most recent observation (ft)	144.83	9.48	27.75
Distance to SEZ (mi) ^b	1	4	2

^a To convert ft to m, multiply by 0.3048.

^b To convert mi to km, multiply by 1.6093.

Source: USGS (2012b).

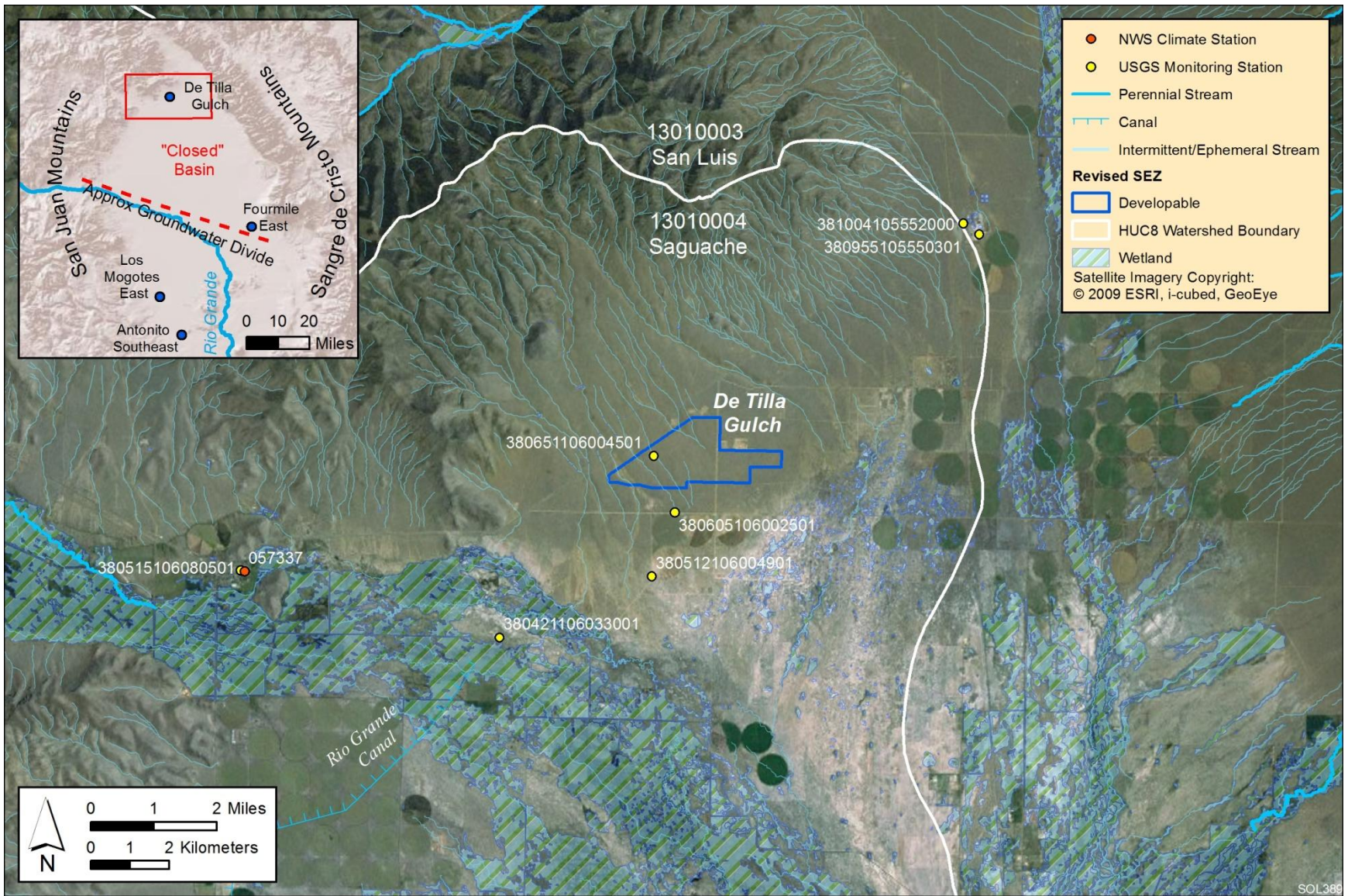


FIGURE 10.2.9.1-1 Water Features near the Proposed De Tilla Gulch SEZ as Revised

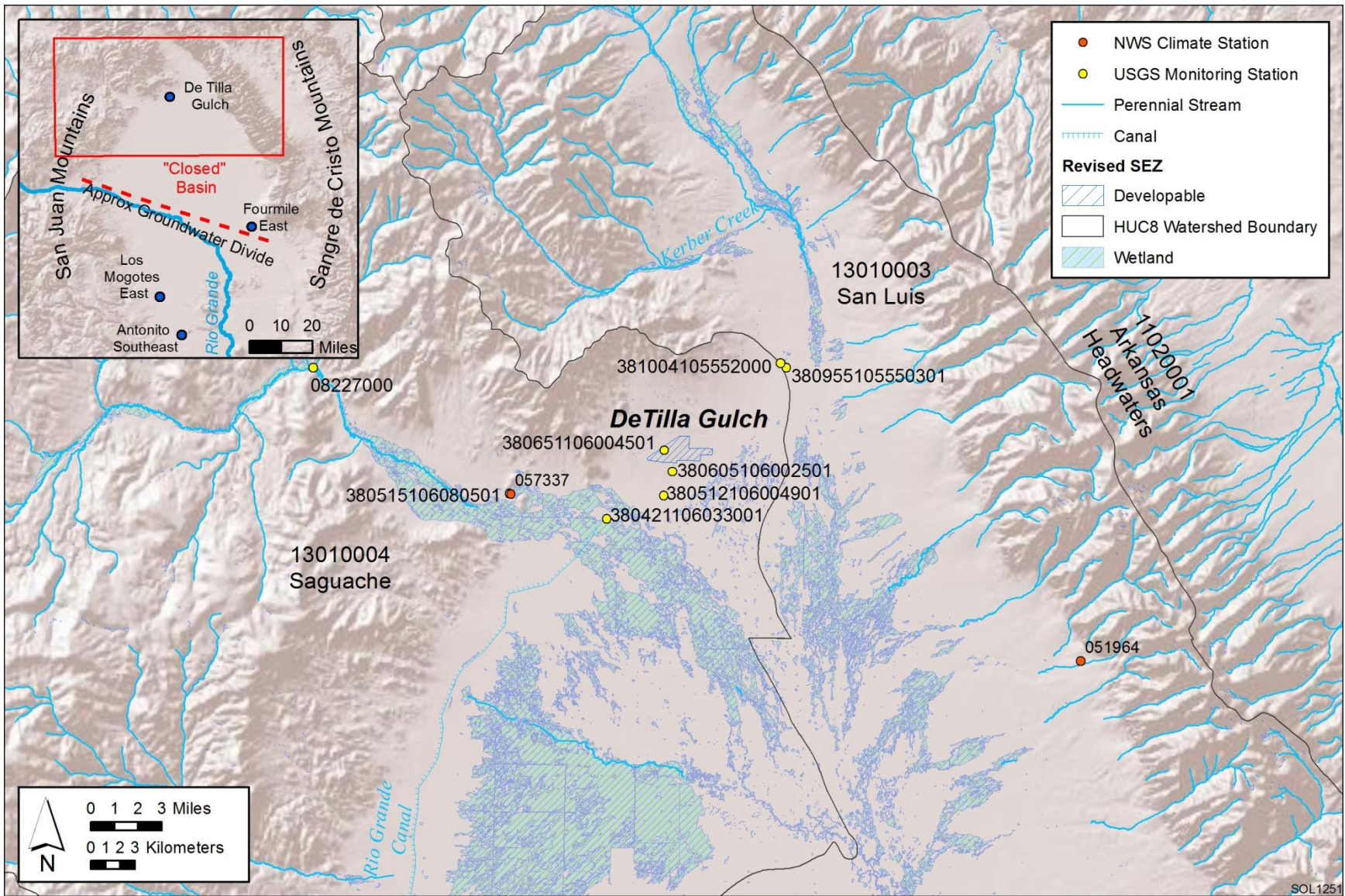


FIGURE 10.2.9.1-2 Water Features within the Sagauche Watershed, Which Includes the Proposed De Tilla Gulch SEZ as Revised

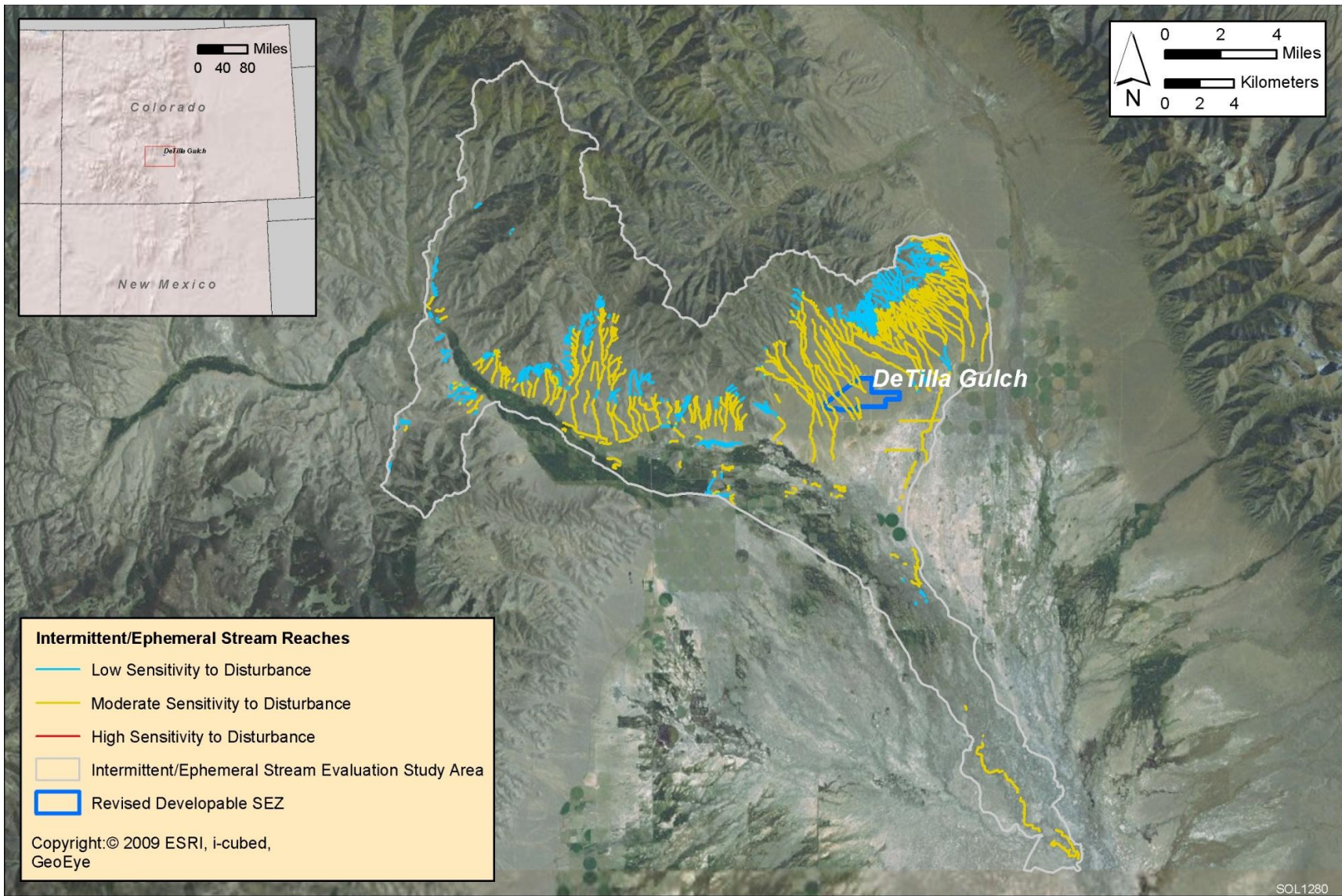


FIGURE 10.2.9.2-1 Intermittent/Ephemeral Stream Channel Sensitivity to Surface Disturbances in the Vicinity of the Proposed De Tilla Gulch SEZ as Revised

1 **TABLE 10.2.9.2-1 Estimated Water Requirements for the Proposed De Tilla Gulch SEZ as**
 2 **Revised^a**

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Construction—Peak Year				
<i>Water use requirements</i>				
Fugitive dust control (ac-ft) ^b	261	261	261	261
Potable supply for workforce (ac-ft)	31	13	5	3
Total water use requirements (ac-ft)	292	274	266	264
<i>Wastewater generated</i>				
Sanitary wastewater (ac-ft)	31	13	5	3
Operations				
<i>Water use requirements</i>				
Mirror/panel washing (ac-ft/yr)	85	47	47	5
Potable supply for workforce (ac-ft/yr)	2	1	1	<1
Dry cooling (ac-ft/yr)	34–170	19–95	NA ^c	NA
Wet cooling (ac-ft/yr)	766–2,468	426–1,371	NA	NA
<i>Total water use requirements</i>				
Non-cooled technologies (ac-ft/yr)	NA	NA	48	5
Dry-cooled technologies (ac-ft/yr)	121–257	67–143	NA	NA
Wet-cooled technologies (ac-ft/yr)	853–2,555	474–1,419	NA	NA
<i>Wastewater generated</i>				
Blowdown (ac-ft/yr)	48	27	NA	NA
Sanitary wastewater (ac-ft/yr)	2	1	1	<1

^a See Section M.9.2 of Appendix M of the Draft Solar PEIS for methods used in estimating water use requirements.

^b To convert ac-ft to m³, multiply by 1,234.

^c NA = not applicable.

3
 4
 5 moderate sensitivity to land disturbance. All the intermittent/ephemeral channel reaches within
 6 the De Tilla Gulch SEZ were classified as having moderate sensitivity to land disturbance.

7
 8
 9 **10.2.9.2.2 Water Use Requirements for Solar Energy Technologies**

10
 11 Changes in the De Tilla Gulch SEZ boundaries resulted in changes to the estimated water
 12 use requirements and a reduction in the land affected by surface disturbances. This section
 13 presents changes in water use estimates for the reduced SEZ area and additional analyses
 14 pertaining to groundwater. The additional analyses of groundwater include a basin-scale water
 15 budget and a simplified, one-dimensional groundwater model of potential groundwater
 16 drawdown. Only a summary of the results from these groundwater analyses is presented in this

1 section; more information on methods and results is presented in Appendix O. Table 10.2.9.2-1
2 presents the revised estimates of water requirements for both construction and operation of solar
3 facilities at the De Tilla Gulch SEZ assuming full build-out of the SEZ and accounting for its
4 decreased size.

5
6 The De Tilla Gulch SEZ is located in the San Luis Valley, where both surface waters
7 and groundwater are managed conjunctively. Previous studies on water resources in the
8 San Luis Valley typically present a basin-scale water balance, which considers inputs and
9 outputs of water via precipitation, surface water flows, and groundwater (e.g., Mayo et al. 2007).
10 Table 10.1.9.2-2 presents an example water balance for the San Luis Valley that considers all
11 water inputs and outputs from the valley. As noted by Mayo et al. (2007), it is difficult to
12 reconcile some of the historical water budget presented for the San Luis Valley; however, it can
13 be generally stated that the water budget is predominately a balance of precipitation and
14 streamflow inputs, with output dominated by evapotranspiration by agricultural lands, riparian
15 areas, and meadows.

16
17 The estimated total water use requirements during the peak construction year are as high
18 as 292 ac-ft/yr (360,200 m³/yr), which does not constitute a significant amount given the short
19 duration of this water demand relative to water resources within the region. The long duration of
20 groundwater pumping during operations (20 years) poses a greater threat to groundwater
21 resources. This analysis considered low, medium, and high groundwater pumping scenarios that
22 represent full build-out of the SEZ, assuming PV, dry-cooled parabolic trough, and wet-cooled
23 parabolic trough, respectively (a 30% operational time was considered for all solar facility types
24 on the basis of operations estimates for proposed utility-scale solar energy facilities). The low,
25 medium, and high pumping scenarios result in groundwater withdrawals that range from 5 to
26 854 ac-ft/yr (6,200 to 1.1 million m³/yr) or 100 to 17,080 ac-ft (123,400 to 21.1 million m³) over
27 the 20-year operational period. From a groundwater budgeting perspective, all pumping
28 scenarios over the 20-year operational period represent less than 1% of the groundwater storage.

29
30 Examining groundwater withdrawals with respect to a basin-scale water budget allows
31 for an assessment of potential impacts only to an order of magnitude approximation of basin-
32 scale estimates of complex groundwater processes. In addition, a water budget approach ignores
33 the temporal and spatial components of how groundwater withdrawals affect groundwater
34 surface elevations, groundwater flow rates, and connectivity to surface water features such as
35 streams, wetlands, playas, and riparian vegetation. A one-dimensional groundwater modeling
36 analysis was performed to present a simplified depiction of the spatial and temporal effects of
37 groundwater withdrawals by examining groundwater drawdown in a radial direction around the
38 center of the SEZ for the low, medium, and high pumping scenarios considering pumping from
39 the upper unconfined aquifer only. As stated in the Draft Solar PEIS, the De Tilla Gulch SEZ is
40 located in a region of the San Luis Valley where confining clay and volcanic rock layers are
41 absent. A detailed discussion of the groundwater modeling analysis is presented in Appendix O.
42 It should be noted, however, that the aquifer parameters used for the one-dimensional
43 groundwater model (Table 10.2.9.2-3) represent available literature data, and that the model
44 aggregates these value ranges into a simplistic representation of the aquifers.

1
2
3

TABLE 10.2.9.2-2 Water Budget for the San Luis Valley, Which Includes the Proposed De Tilla Gulch SEZ as Revised

Process	Amount
<i>Inputs</i>	
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
<i>Outputs</i>	
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
<i>Groundwater storage</i>	
Storage (ac-ft)	2,026,783

^a To convert ac-ft to m³, multiply by 1,234.

^b Colorado DWR (2004).

Source: Mayo et al. (2007).

4
5
6
7
8
9

TABLE 10.2.9.2-3 Aquifer Characteristics and Assumptions Used in the One-Dimensional Groundwater Model for the Proposed De Tilla Gulch SEZ as Revised

Parameter	Value
Aquifer type/conditions	Unconfined/basin fill
Aquifer thickness (ft) ^{a,b}	100
Hydraulic conductivity (ft/day)	10
Transmissivity (ft ² /day)	1,000
Specific yield	0.24
Analysis period (yr)	20
High pumping scenario (ac-ft/yr) ^c	854
Medium pumping scenario (ac-ft/yr)	122
Low pumping scenario (ac-ft/yr)	5

^a Mayo et al. (2007).

^b To convert ft to m, multiply by 0.3048.

^c To convert ac-ft to m³, multiply by 1,234.

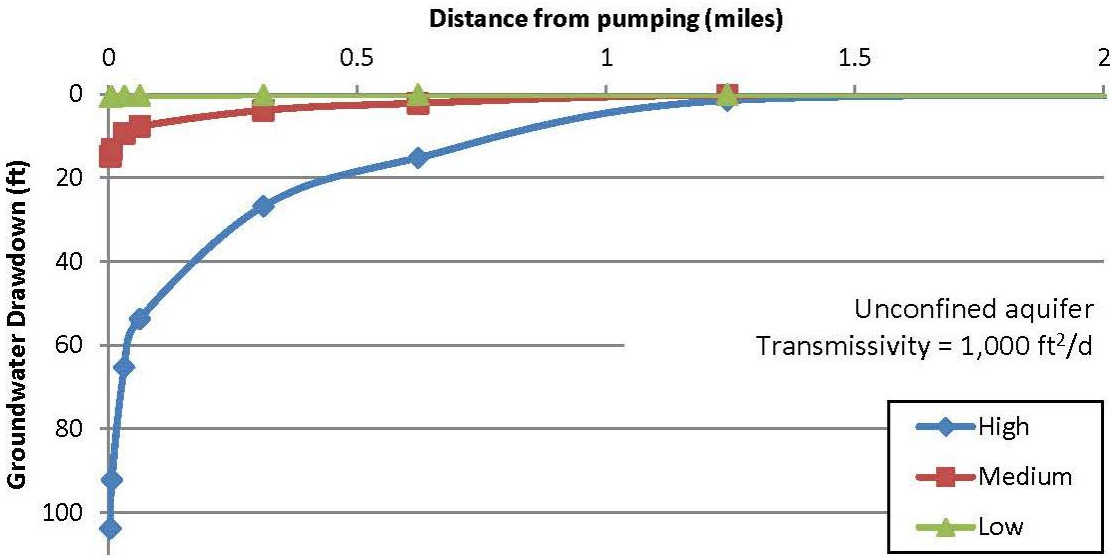
Source: Colorado DWR (2004).

10

1 Depth to groundwater is typically 100 to 200 ft (30 to 61 m) below the surface in the
 2 vicinity of the De Tilla Gulch SEZ. The one-dimensional groundwater modeling results for
 3 the unconfined aquifer suggest that groundwater drawdown in the vicinity of the SEZ
 4 (approximately a 1-mi [1.6-km] radius) ranges from up to 110 ft (34 m) for the high pumping
 5 scenario, up to 15 ft (5 m) for the medium pumping scenario, and less than 1 ft (0.3 m) for the
 6 low pumping scenario (Figure 10.2.9.2-2). The groundwater drawdown associated with the high
 7 pumping scenario is on the order of the saturated thickness of the aquifer assumed for the model
 8 (Table 10.2.9.2-3) at the center of pumping, which represents a significant, but localized,
 9 groundwater impact. The extent of groundwater drawdown is primarily restricted to the vicinity
 10 of the SEZ for all pumping scenarios.

11
 12 The comparison of water use requirements to the basin-scale water budget and the
 13 one dimensional groundwater modeling suggests that groundwater withdrawal would only have a
 14 local impact on groundwater resources. From a groundwater budgeting perspective, the three
 15 pumping scenarios considered are not significant relative to the amounts of water moved
 16 through the San Luis Valley. Groundwater modeling results suggest that the high pumping
 17 scenario would have a localized groundwater drawdown effect in the unconfined aquifer.
 18 As stated in Section 10.2.9.1, water management of the San Luis Valley is restrictive given
 19 its overappropriated water rights and its obligations to maintain flows in the Rio Grande.
 20 Ultimately, any proposed groundwater withdrawals for solar energy facilities would be reviewed
 21 for impacts by the Colorado DWR and would be subject to the rules and court decisions outlined
 22 in Case Numbers 06CV64 and 07CW52 (Colorado District Court 2010).

23
 24



25

26 **FIGURE 10.2.9.2-2 Estimated One-Dimensional Groundwater Drawdown Resulting from**
 27 **High, Medium, and Low Groundwater Pumping Scenarios over the 20-Year Operational**
 28 **Period at the Proposed De Tilla Gulch SEZ as Revised**

29
 30

1 **10.2.9.2.3 Off- Site Impacts: Roads and Transmission Lines**
2

3 As stated in the Draft Solar PEIS, impacts associated with the construction of roads and
4 transmission lines primarily deal with water use demands for construction, water quality
5 concerns relating to potential chemical spills, and land disturbance effects on the natural
6 hydrology. Water needed for transmission line construction activities (e.g., for soil compaction,
7 dust suppression, and potable supply for workers) could be trucked to the construction area from
8 an off-site source. If this occurred, water use impacts at the SEZ would be negligible. The Draft
9 Solar PEIS assessment of impacts on water resources from road and transmission line
10 construction remains valid.
11

12
13 **10.2.9.2.4 Summary of Impacts on Water Resources**
14

15 The additional information and analyses of water resources presented in this update agree
16 with the information provided in the Draft Solar PEIS, which indicates that the San Luis Valley
17 is a high-elevation basin, with predominately agricultural land use, and is the headwaters of the
18 Rio Grande, where surface water and groundwater processes are coupled and managed jointly.
19 Groundwater in the San Luis Valley is found both in the upper unconfined aquifer and lower
20 confined aquifer, and historical diversions of both surface water and groundwater for irrigation
21 have affected streamflows and groundwater levels. Water management plays a significant role
22 in the San Luis Valley because it pertains to ensuring river flows in the Rio Grande according to
23 the Rio Grande Compact, which is the primary responsibility of the Colorado DWR.
24

25 Disturbance to intermittent/ephemeral stream channels within the De Tilla Gulch SEZ
26 could potentially affect groundwater recharge, as this portion of the San Luis Valley is an
27 important recharge area (see Figure O.1-3 in Appendix O). The intermittent/ephemeral stream
28 evaluation suggests that all the intermittent/ephemeral streams crossing the SEZ have a moderate
29 sensitivity to land disturbances. Several design features described in Section A.2.2 of
30 Appendix A of this Final Solar PEIS specify measures to reduce impacts regarding
31 intermittent/ephemeral water features, and drainage alterations associated with stormwater
32 management should focus on maintaining groundwater recharge functionality.
33

34 Groundwater withdrawals associated with solar energy facilities typically pose the
35 greatest threat to water resources in arid and semiarid regions; however, water budgeting and
36 groundwater modeling analyses suggest that only localized groundwater drawdown occurs in the
37 unconfined aquifer for all pumping scenarios at the De Tilla Gulch SEZ. The high pumping
38 scenario has the potential for a significant groundwater drawdown within the SEZ, but not the
39 surrounding area. Ultimately, the process of transferring water rights established by the Colorado
40 DWR will determine how much water can be used by proposed solar facilities. As stated in the
41 Draft Solar PEIS, given the restrictive nature of water rights and the need for augmentation
42 water reserves, it would be difficult for any projects seeking an amount of water more than
43 1,000 ac-ft/yr (1.2 million m³/yr) to be successful in obtaining the needed water rights
44 (McDermott 2010). The only scenario where this level of groundwater withdrawals is exceeded
45 is for a full build-out scenario of wet-cooled facilities that have an operating period of greater
46 than 30%, which is highly unlikely.

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

16 17 18 **10.2.9.3 SEZ-Specific Design Features and Design Feature Effectiveness**

19
20 Required programmatic design features that would reduce impacts on surface water
21 and groundwater are described in Section A.2.2 of Appendix A of this Final Solar PEIS.
22 Implementing the programmatic design features would provide some protection of and reduce
23 impacts on water resources.

24
25 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
26 analyses due to changes to the SEZ boundaries, and consideration of comments received as
27 applicable, the following SEZ-specific design feature has been identified:

- 28
29 • Application of the design features regarding intermittent/ephemeral water
30 bodies and storm water management should emphasize the need to maintain
31 groundwater recharge for disturbed surface water features within the De Tilla
32 Gulch SEZ.

33
34 The need for additional SEZ-specific design features will be identified through the process
35 of preparing parcels for competitive offer and subsequent project specific analysis.

36 37 38 **10.2.10 Vegetation**

39 40 41 **10.2.10.1 Affected Environment**

42
43 As presented in the Draft Solar PEIS, 4 cover types were identified within the area of the
44 proposed De Tilla Gulch SEZ, while 34 cover types were identified within 5 mi (8 km) of the
45 SEZ boundary (the indirect effects area). Sensitive habitats on the SEZ include ephemeral dry
46 washes. Because of the changes to the SEZ boundaries that exclude lands along the northwest

1 margin, Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland Complex and
2 Recently Logged Areas cover types no longer occur within 5 mi (8 km) of the SEZ boundary.
3 Figure 10.2.10-1 shows the cover types within the affected area of the De Tilla Gulch SEZ as
4 revised.

7 **10.2.10.2 Impacts**

8
9 As presented the Draft Solar PEIS, the construction of solar energy facilities within the
10 proposed De Tilla Gulch SEZ would result in direct impacts on plant communities because of
11 the removal of vegetation within the facility footprint during land-clearing and land-grading
12 operations. Approximately 80% of the SEZ would be expected to be cleared with full
13 development of the SEZ. Considering the reduced size of the SEZ, approximately 851 acres
14 (3.4 km²) would be cleared.

15
16 Overall impact magnitude categories were based on professional judgment and include
17 (1) *small*: a relatively small proportion ($\leq 1\%$) of the cover type within the SEZ region would be
18 lost; (2) *moderate*: an intermediate proportion (> 1 but $\leq 10\%$) of a cover type would be lost; and
19 (3) *large*: $> 10\%$ of a cover type would be lost.

21 **10.2.10.2.1 Impacts on Native Species**

22
23
24 The analysis presented in the Draft Solar PEIS for the original De Tilla Gulch SEZ
25 developable area indicated that development would result in a small impact on all land cover
26 types occurring within the SEZ (Table 10.2.11.1-1 in the Draft Solar PEIS). Development within
27 the De Tilla Gulch SEZ could still directly affect all the cover types evaluated in the Draft Solar
28 PEIS; indirect impacts on the Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland
29 Complex and Recently Logged Areas cover types would not occur. The reduction in the
30 developable area would result in reduced (and still small) impact levels on all cover types in the
31 affected area, compared to original estimates in the Draft Solar PEIS.

32
33 Direct impacts could still occur on unmapped wetlands within the remaining areas of the
34 SEZ. In addition, indirect impacts on wetlands within or near the SEZ, as described in the Draft
35 Solar PEIS, could occur.

37 **10.2.10.2.2 Impacts from Noxious Weeds and Invasive Plant Species**

38
39
40 As presented the Draft Solar PEIS, land disturbance from project activities and indirect
41 effects of construction and operation within the De Tilla Gulch SEZ could potentially result in
42 the establishment or expansion of noxious weeds and invasive species populations, potentially
43 including those species listed in Section 10.2.10.1 of the Draft Solar PEIS. Impacts such as
44 reduced restoration success and possible widespread habitat degradation could still occur;
45 however, a small reduction in the potential for such impacts would result from the reduced
46 developable area of the SEZ.

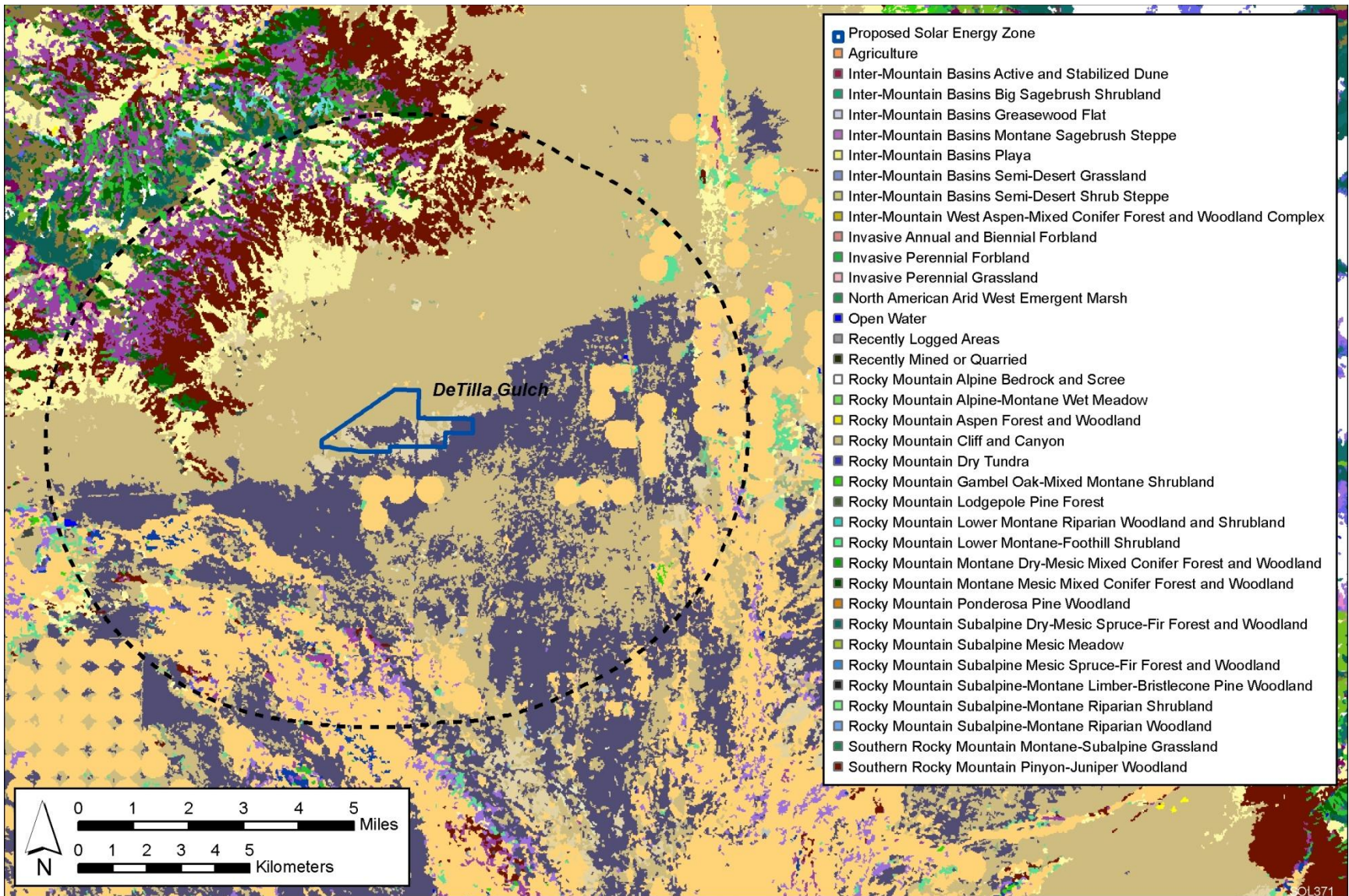


FIGURE 10.2.10.1-1 Land Cover Types within the Proposed De Tilla Gulch SEZ as Revised

1 **10.2.10.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 Required programmatic design features that would reduce impacts on vegetation are
4 described in Section A.2.2 of Appendix A of this Final Solar PEIS. SEZ-specific species and
5 habitats will determine how programmatic design features are applied, for example:
6

- 7 • All ephemeral dry wash habitats within the SEZ shall be avoided to the extent
8 practicable, and any impacts minimized and mitigated in consultation with
9 appropriate agencies. A buffer area shall be maintained around dry washes to
10 reduce the potential for impacts on these habitats on or near the SEZ.
11
- 12 • Appropriate engineering controls shall be used to minimize impacts on
13 wetland, dry wash, and riparian habitats, including downstream occurrences,
14 such as those associated with Saguache Creek or San Luis Creek, resulting
15 from surface water runoff, erosion, sedimentation, altered hydrology,
16 accidental spills, or fugitive dust deposition to these habitats. Appropriate
17 buffers and engineering controls will be determined through agency
18 consultation.
19
- 20 • Groundwater withdrawals shall be limited to reduce the potential for indirect
21 impacts on wetland habitats, such as many of those south, southwest, or
22 southeast of the De Tilla Gulch SEZ, including the wetland complexes
23 associated with Saguache and San Luis Creeks, which are associated with
24 groundwater discharge.
25

26 It is anticipated that implementation of the programmatic design features will reduce a
27 high potential for impacts from invasive species and impacts on wetlands, dry washes, and
28 riparian habitats to a minimal potential for impact. Residual impacts on wetlands could result
29 from remaining groundwater withdrawal and so forth; however, it is anticipated that these
30 impacts would be avoided in the majority of instances.
31

32 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
33 analyses due to changes to the SEZ boundaries, and consideration of comments received as
34 applicable, no SEZ-specific design features have been identified. Some SEZ-specific design
35 features may be identified through the process of preparing parcels for competitive offer and
36 subsequent project-specific analysis.
37
38

39 **10.2.11 Wildlife and Aquatic Biota**
40

41 For the assessment of potential impacts on wildlife and aquatic biota, overall impact
42 magnitude categories were based on professional judgment and include (1) *small*: a relatively
43 small proportion ($\leq 1\%$) of the species' habitat within the SEZ region would be lost;
44 (2) *moderate*: an intermediate proportion (> 1 but $\leq 10\%$) of the species' habitat would be lost;
45 and (3) *large*: $> 10\%$ of the species' habitat would be lost.
46

1 **10.2.11.1 Amphibians and Reptiles**
2
3

4 ***10.2.11.1.1 Affected Environment***
5

6 As presented in the Draft Solar PEIS, representative amphibian and reptile species
7 expected to occur within the SEZ include the Great Plains toad (*Bufo cognatus*), Woodhouse’s
8 toad (*Bufo woodhousii*), fence lizard (*Sceloporus undulatus*), gopher snake (*Pituophis catenifer*),
9 many-lined skink (*Eumeces multivirgatus*), western rattlesnake (*Crotalus viridis*), short-horned
10 lizard (*Phrynosoma hernandesi*), and western terrestrial garter snake (*Thamnophis elegans*). The
11 reduction in the size of the De Tilla Gulch SEZ does not alter the potential for these species to
12 occur in the affected area.
13

14
15 ***10.2.11.1.2 Impacts***
16

17 As presented the Draft Solar PEIS, solar energy development within the proposed
18 De Tilla Gulch SEZ could affect potentially suitable habitats for amphibian and reptile species.
19 The analysis presented in the Draft Solar PEIS for the original De Tilla Gulch SEZ indicated that
20 development would result in a small overall impact on representative amphibian and reptile
21 species (Table 10.2.11.1-1 in the Draft Solar PEIS). Development within the revised De Tilla
22 Gulch SEZ could still affect the same species evaluated in the Draft Solar PEIS; however, the
23 changes to the SEZ boundaries would result in reduced (and still small) impact levels compared
24 to original estimates in the Draft Solar PEIS.
25
26

27 ***10.2.11.1.3 SEZ-Specific Design Features and Design Feature Effectiveness***
28

29 Required programmatic design features that will reduce impacts on amphibian and reptile
30 species are described in Section A.2.2 of Appendix A of this Final Solar PEIS. SEZ-specific
31 conditions will be considered when programmatic design features are applied, for example:
32

- 33 • Ephemeral drainages within the SEZ shall be avoided to the extent
34 practicable.
- 35
36 • Appropriate engineering controls shall be used to minimize impacts resulting
37 from surface water runoff, erosion, sedimentation, accidental spills, or fugitive
38 dust deposition on aquatic, riparian, and wetland habitats associated with
39 Saguache Creek, San Luis Creek, Rio Grande Canal, and wetland areas
40 located within the area of indirect effects.
41

42 With the implementation of required programmatic design features, impacts on
43 amphibian and reptile species would be small.
44

45 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
46 analyses due to changes to the SEZ boundaries, and consideration of comments received as

1 applicable, no SEZ-specific design features for amphibian and reptile species have been
2 identified. Some SEZ-specific design features may be identified through the process of preparing
3 parcels for competitive offer and subsequent project-specific analysis.
4
5

6 **10.2.11.2 Birds**

7
8

9 **10.2.11.2.1 Affected Environment**

10

11 As presented in the Draft Solar PEIS, a large number of bird species could occur or
12 have potentially suitable habitat within the affected area of the proposed De Tilla Gulch SEZ.
13 Representative bird species identified in the Draft Solar PEIS included Brewer’s blackbird
14 (*Euphagus cyanocephalus*), Brewer’s sparrow (*Spizella breweri*), common nighthawk
15 (*Chordeiles minor*), horned lark (*Eremophila alpestris*), northern rough-winged swallow
16 (*Stelgidopteryx serripennis*), vesper sparrow (*Pooecetes gramineus*), western meadowlark
17 (*Sturnella neglecta*), American kestrel (*Falco sparverius*), ferruginous hawk (*Buteo regalis*),
18 golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), short-eared owl (*Asio*
19 *flammeus*), Swainson’s hawk (*Buteo swainsoni*), turkey vulture (*Cathartes aura*), and the
20 mourning dove (*Zenaida macroura*). The reduction in the size of the De Tilla Gulch SEZ does
21 not alter the potential for these species or other bird species to occur in the affected area.
22
23

24 **10.2.11.2.2 Impacts**

25

26 As presented in the Draft Solar PEIS, solar energy development within the De Tilla
27 Gulch SEZ could affect potentially suitable habitats of bird species. The analysis presented in the
28 Draft Solar PEIS for the original De Tilla Gulch SEZ indicated that development would result in
29 a small overall impact on the representative bird species (Table 10.2.11.2-1 in the Draft Solar
30 PEIS). Development within the revised De Tilla Gulch SEZ could still affect the same species
31 evaluated in the Draft Solar PEIS; however, the reduction in the size of the SEZ would result in
32 reduced (and still small) impact levels compared to original estimates in the Draft Solar PEIS.
33
34

35 **10.2.11.2.3 SEZ-Specific Design Features and Design Feature Effectiveness**

36

37 Required programmatic design features that will reduce impacts on bird species are
38 described in Section A.2.2 of Appendix A of this Final Solar PEIS. SEZ-specific species and
39 habitats will determine how programmatic design features are applied, for example:
40

- 41 • Appropriate engineering controls shall be used to minimize impacts resulting
42 from surface water runoff, erosion, sedimentation, accidental spills, or fugitive
43 dust deposition on aquatic, riparian, and wetland habitats associated with
44 Saguache Creek, San Luis Creek, Rio Grande Canal, and wetland areas.
45

1 With the implementation of required programmatic design features, impacts on bird
2 species will be reduced.

3
4 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
5 analyses due to changes to the SEZ boundaries, and consideration of comments received as
6 applicable, the following SEZ-specific design feature has been identified:

- 7
8 • Prairie dog colonies (which could provide habitat or food resources for
9 some bird species) should be avoided to the extent practicable. An active
10 Gunnison's prairie dog colony has been eliminated from potential
11 development because of the reduction in size of the SEZ (see Section 10.2.12
12 for more discussion of the prairie dog).

13
14 If SEZ-specific design features are implemented in addition to required programmatic
15 design features, it is anticipated that impacts on bird species would be small. The need for
16 additional SEZ-specific design features will be identified through the process of preparing
17 parcels for competitive offer and subsequent project-specific analysis.

18 19 20 **10.2.11.3 Mammals**

21 22 ***10.2.11.3.1 Affected Environment***

23
24
25 As presented in the Draft Solar PEIS, a large number of mammal species were identified
26 that could occur or have potentially suitable habitat within the affected area of the proposed
27 De Tilla Gulch SEZ. Representative mammal species identified in the Draft Solar PEIS included
28 (1) big game species: the American black bear (*Ursus americanus*), bighorn sheep (*Ovis*
29 *canadensis*), cougar (*Puma concolor*), elk (*Cervus canadensis*), mule deer (*Odocoileus*
30 *hemionus*), and pronghorn (*Antilocapra americana*); (2) furbearers and small game species: the
31 American badger (*Taxidea taxus*), coyote (*Canis latrans*), desert cottontail (*Sylvilagus*
32 *audubonii*), red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*), and white-tailed
33 jackrabbit (*Lepus townsendii*); and (3) small nongame species: the big brown bat (*Eptesicus*
34 *fuscus*), deer mouse (*Peromyscus maniculatus*), least chipmunk (*Tamias minimus*), little brown
35 myotis (*Myotis lucifugus*), northern pocket gopher (*Thomomys talpoides*), Ord's kangaroo rat
36 (*Dipodomys ordii*), thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*), and western
37 small-footed myotis (*Myotis ciliolabrum*). The reduction in the size of the De Tilla Gulch SEZ
38 does not alter the potential for these species or any additional mammal species to occur in the
39 affected area.

40 41 42 ***10.2.11.3.2 Impacts***

43
44 As presented in the Draft Solar PEIS, solar energy development within the De Tilla
45 Gulch SEZ could affect potentially suitable habitats of mammal species. The analysis presented
46 in the Draft Solar PEIS for the original De Tilla Gulch SEZ indicated that development would

1 result in no impacts on elk and a small overall impact on all other representative mammal species
2 analyzed (Table 10.2.11.3-1 in the Draft Solar PEIS). Development within the revised De Tilla
3 Gulch SEZ could still affect the same representative mammal species evaluated in the Draft
4 Solar PEIS; however, the reduction in the size of the SEZ would result in reduced (and still
5 small) impact levels compared to original estimates in the Draft Solar PEIS. The 213-acre
6 (0.9-km²) portion of the SEZ that overlapped elk summer range for the original De Tilla Gulch
7 SEZ is largely excluded from the revised SEZ.
8

9 Overall range for elk, overall range and winter range for mule deer, and overall range and
10 winter range for pronghorn would be reduced from 1,217 acres (4.9 km²) to 851 acres (3.4 km²)
11 or less for the De Tilla Gulch SEZ as revised. Impact levels for these activity areas would still be
12 small. The 497 acres (2.0 km²) of elk winter range and severe winter range would be largely
13 excluded from direct impacts because these ranges fall within the 458 acres (1.9 km²) excluded
14 from the revised SEZ. Most of the 609 acres (2.5 km²) of pronghorn winter concentration area
15 could still be directly affected by solar energy development within the revised De Tilla Gulch
16 SEZ. The overall impact level would still be small.
17
18

19 ***10.2.11.3.3 SEZ-Specific Design Features and Design Feature Effectiveness***

20
21 Required programmatic design features are described in Section A.2.2 of Appendix A of
22 this Final Solar PEIS. SEZ-specific conditions will be considered when programmatic design
23 features are applied, for example:
24

- 25 • Prairie dog colonies shall be avoided to the extent practicable to reduce
26 impacts on species such as desert cottontail and thirteen-lined ground squirrel.
27 An active Gunnison's prairie dog colony has been eliminated from potential
28 development because of the changed in the boundaries of the SEZ
29 (see Section 10.2.12 for more discussion of the prairie dog).
30

31 If the programmatic design features are implemented, impacts on mammal species will be
32 reduced. On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
33 analyses due to changes to the SEZ boundaries, and consideration of comments received as
34 applicable, the following SEZ-specific design features have been identified:
35

- 36 • The extent of habitat disturbance should be minimized within the elk severe
37 winter range and pronghorn winter concentration area. Most of the elk severe
38 winter range occurs within the area removed from the SEZ.
39
- 40 • Construction should be curtailed during winter when big game species are
41 present.
42
- 43 • Where big game winter ranges intersect or are within close proximity to the
44 SEZ, motorized vehicles and other human disturbances should be controlled
45 (e.g., through road closures).
46

1 If these SEZ-specific design features are implemented in addition to the required
2 programmatic design features, it is anticipated that impacts on mammal species would be small.
3 The need for additional SEZ-specific design features will be identified through the process of
4 preparing parcels for competitive offer and subsequent project-specific analysis.
5
6

7 **10.2.11.4 Aquatic Biota**

8
9

10 ***10.2.11.4.1 Affected Environment***

11

12 No perennial surface water bodies, seeps, or springs are present on the proposed De Tilla
13 Gulch SEZ. Several intermittent drainages do cross the site, but they are not known to support
14 aquatic communities. The boundaries of the De Tilla Gulch SEZ have been reduced compared to
15 the boundaries given in the Draft Solar PEIS. Based on these changes, an update to the Draft
16 Solar PEIS is as follows:
17

- 18 • Approximately 5 mi (8 km) of the perennial Saguache Creek and 4 mi (6 km)
19 of the San Luis Creek are located within the area of indirect effects within
20 5 mi (8 km) of the SEZ. In addition, 1 mi (2 km) of the Rio Grande canal is
21 located within the area of potential indirect effects.
22

23 Aquatic biota present in the surface water features in the De Tilla Gulch SEZ have not
24 been characterized. As stated in Appendix C of the Supplement to the Draft Solar PEIS, site
25 surveys can be conducted at the project-specific level to characterize the aquatic biota, if present,
26 within the De Tilla Gulch SEZ.
27

28 ***10.2.11.4.2 Impacts***

29
30

31 The types of impacts on aquatic habitats and biota that could occur from development of
32 utility-scale solar energy facilities are identified in Section 5.10.3 of the Draft Final PEIS and
33 this Final Solar PEIS. Aquatic habitats present on or near the De Tilla Gulch SEZ could be
34 affected by solar energy development in a number of ways, including (1) direct disturbance,
35 (2) deposition of sediments, (3) changes in water quantity, and (4) degradation of water quality.
36 The impact assessment provided in the Draft Solar PEIS remains valid, with the following
37 update:
38

- 39 • The amount of surface water features within the SEZ and in the area of
40 indirect effects that could potentially be affected by solar energy development
41 is less because the size of the SEZ has been reduced.
42
43

1 **10.2.11.4.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 Required programmatic design features applicable to aquatic biota are described in
4 Section A.2.2 of Appendix A of this Final Solar PEIS. SEZ-specific resources and conditions
5 will determine how programmatic design features are applied, for example:
6

- 7 • Sediment and erosion controls shall be implemented along intermittent
8 drainages that drain toward Saguache or San Luis Creeks and the wetlands in
9 the vicinity of the SEZ.
10

11 It is anticipated that implementation of the programmatic design features will reduce
12 impacts on aquatic biota, and if the utilization of water from groundwater or surface water
13 sources is adequately controlled to maintain sufficient water levels in nearby aquatic habitats, the
14 potential impacts on aquatic biota from solar energy development at the De Tilla Gulch SEZ
15 would be small.
16

17 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
18 analyses due to changes to the SEZ boundaries, and consideration of comments received as
19 applicable, no SEZ-specific design features for aquatic biota have been identified. Some SEZ-
20 specific design features may be identified through the process of preparing parcels for
21 competitive offer and subsequent project-specific analysis.
22
23

24 **10.2.12 Special Status Species**
25
26

27 **10.2.12.1 Affected Environment**
28

29 Thirty-three special status species that could occur or have potentially suitable habitat
30 within the affected area of the proposed De Tilla Gulch SEZ were identified in the Draft Solar
31 PEIS. The reduction in the size of the De Tilla Gulch SEZ does not alter the potential for these
32 special status species to occur in the affected area. However, field surveys conducted for the
33 BLM following the publication of the Draft Solar PEIS have indicated that two additional
34 special status bat species are known to occur in the SEZ affected area—the big free-tailed bat
35 (*Nyctinomops macrotis*) and the fringed myotis (*Myotis thysanodes*). Figure 10.2.12.1-1 shows
36 the known or potential occurrences of species in the affected area of the revised De Tilla Gulch
37 SEZ that are listed, proposed, or candidates for listing under the ESA.
38

39 Following the publication of the Draft Solar PEIS, the BLM conducted field surveys for
40 special status bat species, as well as Gunnison prairie dog (*Cynomys gunnisoni*) and western
41 burrowing owl (*Athene cunicularia*), in the De Tilla Gulch SEZ. Surveys for bat species were
42 conducted in the SEZ using passive and active acoustic monitoring techniques at various times
43 between June 16, 2011, and October 15, 2011 (Rodriguez 2011). Survey results indicated high
44 bat activity during night hours within the SEZ. The big free-tailed bat and the fringed myotis
45 were the only special status bat species recorded on the SEZ. No roosting habitat for these

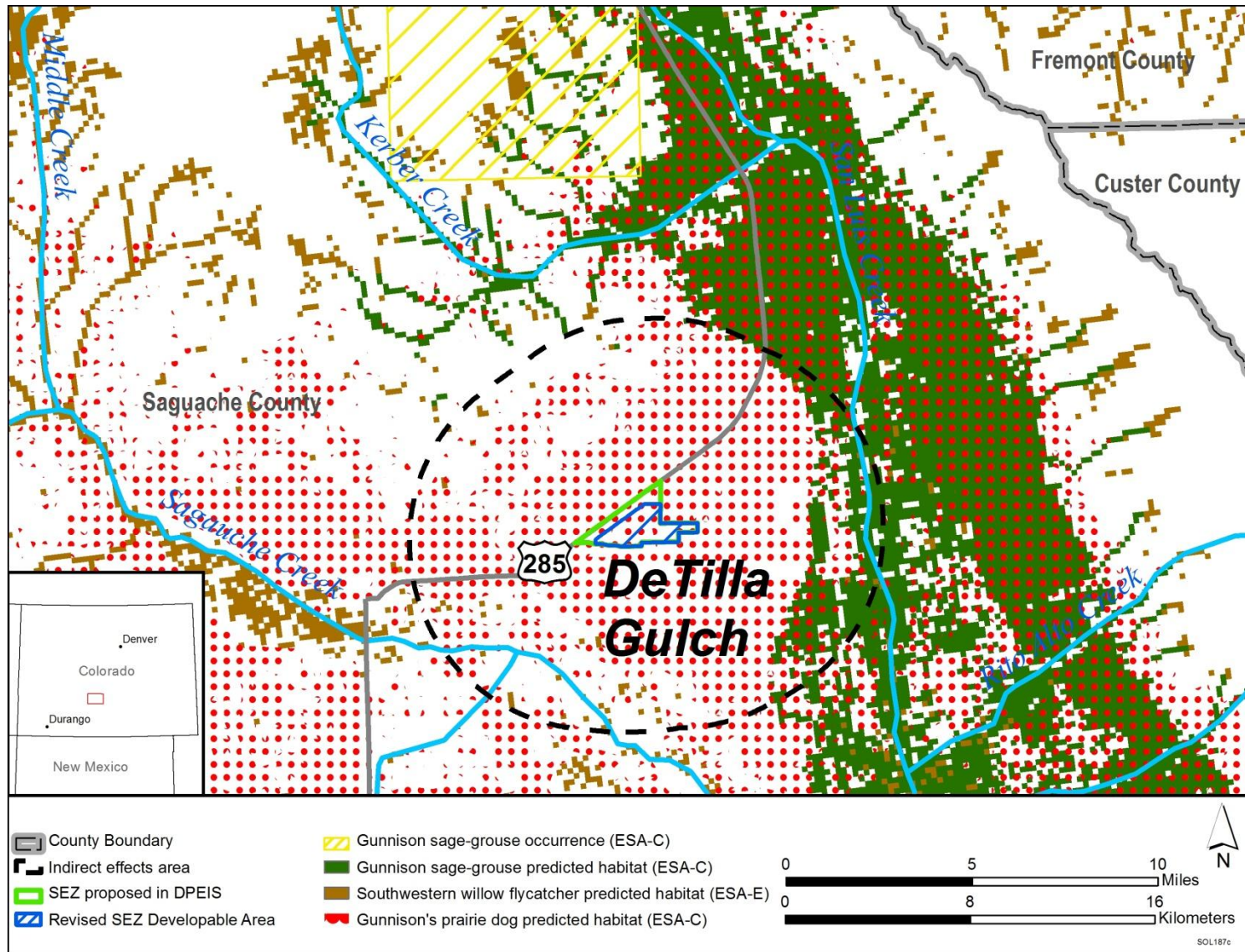


FIGURE 10.2.12.1-1 Developable Area for the Proposed De Tilla Gulch SEZ as Revised and Known or Potential Occurrences of Species Listed as Threatened or Endangered, Proposed, or Candidates for Listing under the ESA

1 species was observed on the SEZ (Rodriguez 2011). Additional life ecological and natural
2 history information for these two species is provided below.
3

4 Field surveys for Gunnison prairie dog and western burrowing owl were conducted
5 June 6, July 18, and September 22, 2011 (Garcia and Harvey 2011). Gunnison prairie dog
6 activity was noted in five distinct areas in the western portion of the De Tilla Gulch SEZ within a
7 total approximate area of 104.3 acres (0.4 km²). Although the size of the De Tilla Gulch SEZ has
8 been reduced since the field surveys were conducted, some Gunnison prairie dog colonies are
9 likely to occur in the revised area of the De Tilla Gulch SEZ. Burrowing owls were not recorded
10 on the SEZ during the field surveys. However, burrowing owls may be associated with prairie
11 dog colonies west and north of the SEZ and may utilize the SEZ for nesting and/or foraging
12 (Garcia and Harvey 2011).
13
14

15 **Big Free-Tailed Bat.** The big free-tailed bat is a year-round resident in western Colorado
16 where it forages in a variety of habitats including coniferous forests and desert shrublands. This
17 species was not evaluated for the De Tilla Gulch SEZ in the Draft Solar PEIS. The species roosts
18 in rock crevices or in buildings. The species is known to occur in the San Luis Valley of southern
19 Colorado, and field surveys conducted in 2011 documented the presence of this species on the
20 De Tilla Gulch SEZ. According to the SWReGAP habitat suitability model, potentially suitable
21 foraging habitat for the big free-tailed bat occurs on the SEZ and in portions of the area of
22 indirect effects (Table 10.2.12.1-1). On the basis of an evaluation of SWReGAP land cover
23 types, there is no potentially suitable roosting habitat (rocky cliffs and outcrops) in the area of
24 direct effects. Results of the field survey conducted in 2011 concluded that although roost habitat
25 does not occur on the SEZ, individual big free-tailed bats may roost in nearby habitats within the
26 area of indirect effects (Rodriguez 2011).
27
28

29 **Fringed Myotis.** The fringed myotis is a year-round resident in western Colorado where
30 it forages in a variety of habitats including ponderosa pine woodlands, greasewood flats,
31 oakbrush, and shrublands. This species was not evaluated for the De Tilla Gulch SEZ in the
32 Draft Solar PEIS. The species roosts in caves, rock crevices, or in buildings. Field surveys
33 conducted in 2011 documented the presence of this species on the De Tilla Gulch SEZ.
34 According to the SWReGAP habitat suitability model, potentially suitable foraging habitat for
35 the fringed myotis does not occur on the SEZ. However, the species may use portions of the SEZ
36 as foraging habitat. Foraging and roosting may also occur outside the SEZ in the area of indirect
37 effects (Table 10.2.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is
38 no potentially suitable roosting habitat (rocky cliffs and outcrops) in the area of direct effects.
39 Results of the field survey conducted in 2011 concluded that although roost habitat does not
40 occur on the SEZ, individuals may roost in nearby habitats within the area of indirect effects
41 (Rodriguez 2011).
42
43

1 **TABLE 10.2.12.1-1 Habitats, Potential Impacts, and Potential Mitigation for Special Status Species That Could Be Affected by Solar**
 2 **Energy Development on the Proposed De Tilla Gulch SEZ as Revised^a**

Common Name	Scientific Name	Listing Status ^b	Habitat ^c	Maximum Area of Potential Habitat Affected ^d		Overall Impact Magnitude ^e and Species-Specific Mitigation ^h
				Within SEZ (Direct Effects) ^e	Outside SEZ (Indirect Effects) ^f	
<i>Mammals</i>						
Big free-tailed bat	<i>Nyctinomops macrotis</i>	BLM-S; CO-S1; FWS-SC	Roosts in rock crevices on cliff faces or in buildings. Forages primarily in coniferous forests and arid shrublands. Known to occur in within the SEZ. About 1,258,000 acres ⁱ of potentially suitable habitat occurs in the affected area.	0 acres; however, potentially suitable foraging habitat may occur throughout the SEZ.	9,700 acres of potentially suitable habitat (0.7% 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.
Fringed myotis	<i>Myotis thysanodes</i>	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. Known to occur in within the SEZ. About 3,166,000 acres of potentially suitable habitat occurs within the SEZ region.	1,000 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	68,600 acres of potentially suitable habitat (2.2% 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.

^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 10.2.12.1-1 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; FWS-SC = USFWS species of concern.

^c Potentially suitable habitat was determined by using SWReGAP habitat suitability models (USGS 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.

Footnotes continued on next page.

TABLE 10.2.12.1-1 (Cont.)

-
- ^d Maximum area of potential habitat that could be affected relative to availability within the analysis area. Habitat availability for each species within the analysis area was determined by using SWReGAP habitat suitability models (USGS 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 and within 5 mi (8 km) of the SEZ boundary. Indirect effects include effects from surface runoff or dust from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ.
- ^g Overall impact magnitude categories were based on professional judgment and include (1) *small*: $\leq 1\%$ of the population or its habitat would be lost, and the activity would not result in a measurable change in carrying capacity or population size in the affected area; (2) *moderate*: >1 but $\leq 10\%$ of the population or its habitat, would be lost and the activity would result in a measurable but moderate (not destabilizing) change in carrying capacity or population size in the affected area; 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.

1 **10.2.12.2 Impacts**
2

3 Overall impact magnitude categories were based on professional judgment and include
4 (1) *small*: a relatively small proportion ($\leq 1\%$) of the special status species' habitat within the
5 SEZ region would be lost; (2) *moderate*: an intermediate proportion (>1 but $\leq 10\%$) of the special
6 status species' habitat would be lost; and (3) *large*: $>10\%$ of the special status species' habitat
7 would be lost.
8

9 As presented in the Draft Solar PEIS, solar energy development within the De Tilla
10 Gulch SEZ could affect potentially suitable habitats of special status species. The analysis
11 presented in the Draft Solar PEIS for the original area of the De Tilla Gulch SEZ indicated that
12 development would result in no impact or a small overall impact on all special status species
13 (Table 10.2.12.1-1 in the Draft Solar PEIS). Development within the revised De Tilla Gulch SEZ
14 could still affect the same 33 species evaluated in the Draft Solar PEIS; however, the reduction
15 in the developable area would result in reduced (and still small) impact levels compared to
16 original estimates in the Draft Solar PEIS.
17

18 Field surveys were conducted for the BLM following the publication of the Draft Solar
19 PEIS to determine the potential occurrence of Gunnison prairie dog, western burrowing owl, and
20 special status bat species in the Colorado SEZs (Garcia and Harvey 2011; Rodriguez 2011).
21 Results of these surveys have documented the presence of the Gunnison prairie dog in the
22 western portion of the De Tilla Gulch SEZ within an area of approximately 104.3 acres
23 (0.4 km^2) (Garcia and Harvey 2011). It is likely that some of these prairie dog colonies occur in
24 the revised area of the De Tilla Gulch SEZ. In the Draft Solar PEIS, it was determined that as
25 much as 1,289 acres (5 km^2) of potentially suitable habitat for the Gunnison prairie dog could be
26 directly affected by solar energy development within the original De Tilla Gulch SEZ, resulting
27 in a small overall impact magnitude compared to available habitat in the SEZ region.
28 Development within the revised area of the De Tilla Gulch SEZ will affect less potentially
29 suitable habitat than that presented in the Draft Solar PEIS; therefore, the overall impact
30 magnitude for the Gunnison prairie dog remains small.
31

32 The western burrowing owl was not observed on the De Tilla Gulch SEZ during field
33 surveys in 2011 (Garcia and Harvey 2011). However, this species may be associated with prairie
34 dog colonies in close proximity to the SEZ and may utilize the SEZ for nesting and/or foraging.
35 In the Draft Solar PEIS, it was determined that as much as 1,200 acres (5 km^2) of potentially
36 suitable habitat for the western burrowing owl could be directly affected by solar energy
37 development within the original De Tilla Gulch SEZ, resulting in a small overall impact
38 magnitude compared to available habitat in the SEZ region. Development within the revised area
39 of the De Tilla Gulch SEZ will not affect any more potentially suitable habitat than that
40 presented in the Draft Solar PEIS; therefore, the overall impact magnitude for the western
41 burrowing owl remains small.
42

43 Field surveys for special status bat species indicated that two additional special status bat
44 species are known to occur in the SEZ affected area—the big free-tailed bat and the fringed
45 myotis (Rodriguez 2011). Impacts on these two species are provided below.
46

1 **Big Free-Tailed Bat.** The big free-tailed bat is a year-round resident in southwestern
2 Colorado and is known to occur within the De Tilla Gulch SEZ. According to the SWReGAP
3 habitat suitability model, suitable foraging habitat for this species does not occur on the SEZ.
4 However, it is possible for this species to forage throughout the entire revised area of the
5 De Tilla Gulch SEZ (1,064 acres [4.3 km²]) (Table 10.2.12.1-1). This direct effects area
6 represents less than 0.1% of potentially suitable habitat in the SEZ region. About 9,700 acres
7 (39 km²) of potentially suitable habitat occurs in the area of indirect effects; this area represents
8 about 0.7% of the available suitable habitat in the region (Table 10.2.12.1-1). Most of the
9 potentially suitable habitat in the affected area is foraging habitat represented by desert
10 shrubland. On the basis of an evaluation of SWReGAP land cover types, there is no potentially
11 suitable roosting habitat (rocky cliffs and outcrops) in the area of direct effects. Results of the
12 field survey conducted in 2011 concluded that although roost habitat does not occur on the SEZ,
13 individual big free-tailed bats may roost in nearby habitats within the area of indirect effects
14 (Rodriguez 2011).

15
16 The overall impact on the big free-tailed bat from construction, operation, and
17 decommissioning of utility-scale solar energy facilities within the revised area of the De Tilla
18 Gulch SEZ is considered small, because the amount of potentially suitable foraging habitat for
19 this species in the area of direct effects represents less than 1% of potentially suitable foraging
20 habitat in the SEZ region. The implementation of design features is expected to be sufficient to
21 reduce indirect impacts on this species to negligible levels. Avoidance of all potentially suitable
22 foraging habitats is not feasible, because potentially suitable habitat is widespread throughout the
23 area of direct effect and readily available in other portions of the SEZ region.

24
25
26 **Fringed Myotis.** The fringed myotis is a year-round resident in southwestern Colorado
27 and is known to occur within the De Tilla Gulch SEZ. According to the SWReGAP habitat
28 suitability model, approximately 1,000 acres (4 km²) of suitable foraging habitat on the revised
29 area of the De Tilla Gulch SEZ may be directly affected by construction and operations
30 (Table 10.2.12.1-1). This direct effects area represents less than 0.1% of potentially suitable
31 habitat in the SEZ region. About 68,600 acres (278 km²) of potentially suitable habitat occurs in
32 the area of indirect effects; this area represents about 2.2% of the available suitable habitat in the
33 region (Table 10.2.12.1-1). Most of the potentially suitable habitat in the affected area is foraging
34 habitat represented by desert shrubland. On the basis of an evaluation of SWReGAP land cover
35 types, there is no potentially suitable roosting habitat (rocky cliffs and outcrops) in the area of
36 direct effects. Results of the field survey conducted in 2011 concluded that although roost habitat
37 does not occur on the SEZ, individuals may roost in nearby habitats within the area of indirect
38 effects (Rodriguez 2011).

39
40 The overall impact on the fringed myotis from construction, operation, and
41 decommissioning of utility-scale solar energy facilities within the revised area of the De Tilla
42 Gulch SEZ is considered small, because the amount of potentially suitable foraging habitat for
43 this species in the area of direct effects represents less than 1% of potentially suitable foraging
44 habitat in the SEZ region. The implementation of design features is expected to be sufficient to
45 reduce indirect impacts on this species to negligible levels. Avoidance of all potentially suitable

1 foraging habitats is not feasible, because potentially suitable habitat is widespread throughout the
2 area of direct effects and readily available in other portions of the SEZ region.
3

4 5 **10.2.12.3 SEZ-Specific Design Features and Design Feature Effectiveness** 6

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

- 10
11 • Pre-disturbance surveys shall be conducted within the SEZ to determine the
12 presence and abundance of special status species, including those identified in
13 Table 10.2.12.1-1 of the Draft Solar PEIS, as well as those mentioned in
14 Table 10.2.12.1-1 of this Final Solar PEIS. Disturbance to occupied habitats
15 for these species shall be avoided or minimized to the extent practicable. If
16 avoiding or minimizing impacts on occupied habitats is not possible,
17 translocation of individuals from areas of direct effects or compensatory
18 mitigation of direct effects on occupied habitats may be used to reduce
19 impacts. A comprehensive mitigation strategy for special status species that
20 uses one or more of these options to offset the impacts of development shall
21 be developed in coordination with the appropriate federal and state agencies.
22
- 23 • Avoiding or limiting groundwater withdrawals for solar energy development
24 on the SEZ shall be employed to reduce impacts on groundwater-dependent
25 special status species, including those species that may occur in riparian or
26 aquatic habitats supported by groundwater. These species include the
27 southwestern willow flycatcher.
28
- 29 • Coordination with the USFWS and CDOW shall be conducted to address the
30 potential for impacts on the Gunnison's prairie dog, a candidate for listing
31 under the ESA. Coordination would identify an appropriate survey protocol,
32 avoidance measures, and, potentially, translocation or compensatory
33 mitigation.
34

35 If the programmatic design features are implemented, it is anticipated that the majority of
36 impacts on the special status species from habitat disturbance and groundwater use will be
37 reduced.
38

39 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
40 analyses due to changes to the SEZ boundaries, and consideration of comments received as
41 applicable, no SEZ-specific design features for special status species have been identified. Some
42 SEZ-specific design features may be identified through the process of preparing parcels for
43 competitive offer and subsequent project-specific analysis. Projects will comply with terms and
44 conditions set forth by the USFWS Biological Opinion resulting from the programmatic
45 consultation and any necessary project-specific ESA Section 7 consultations.
46

1 **10.2.13 Air Quality and Climate**

2
3
4 **10.2.13.1 Affected Environment**

5
6 Except as noted below, the information for air quality and climate presented in the
7 affected environment section of the Draft Solar PEIS remains essentially unchanged.

8
9
10 **10.2.13.1.1 Existing Air Emissions**

11
12 The Draft Solar PEIS presented Saguache County emissions data for 2002. More recent
13 data for 2008 (CDPHE 2011) were reviewed. The two emissions inventories are from different
14 sources and make different assumptions. Emissions of SO₂ were the same in both inventories.
15 Emissions of NO_x, CO, and VOCs were lower in the more recent data, while PM₁₀ and PM_{2.5}
16 emissions were lower in the 2002 data. These changes would not affect modeled air quality
17 impacts presented in this Final Solar PEIS.

18
19
20 **10.2.13.1.2 Air Quality**

21
22 The calendar quarterly average NAAQS of 1.5 µg/m³ for lead (Pb) presented in
23 Table 10.2.13.1-2 of the Draft Solar PEIS has been replaced by the rolling 3-month standard
24 (0.15 µg/m³). The federal 24-hour and annual SO₂, 1-hour O₃, and annual PM₁₀ standards have
25 been revoked as well (EPA 2011). All Colorado SAAQS, except the 3-hour SO₂ standard of
26 700 µg/m³, have been revoked since the Draft Solar PEIS. These changes will not affect the
27 modeled air quality impacts presented in this Final Solar PEIS.

28
29 The size of the proposed De Tilla Gulch SEZ was reduced by about 30% from
30 1,522 acres (6.2 km²) to 1,064 acres (4.3 km²) by removing a strip along U.S. 285. With this
31 change in boundaries, the distance to Great Sand Dunes WA remains the same as in the Draft
32 Solar PEIS, the distance to Weminuche WA increases by about 0.5 mi (0.8 km), and the distance
33 to La Garita WA increases by about 1 mi (1.6 km).

34
35
36 **10.2.13.2 Impacts**

37
38
39 **10.2.13.2.1 Construction**

40
41
42 **Methods and Assumptions**

43
44 Except for the area disturbed at any one time during construction, the methods and
45 modeling assumptions have not changed from those presented in the Draft Solar PEIS. Based on
46 the reduction in the area of the proposed De Tilla Gulch SEZ, air quality for this Final Solar

1 PEIS was remodeled assuming that 851 acres (3.4 km²), 80% of the updated developable area,
2 would be disturbed at any one time. The Draft Solar PEIS assumed disturbance of an area of
3 1,218 acres (4.9 km²).
4
5

6 **Results**

7

8 Since the annual PM₁₀ standard has been rescinded, the discussion of annual PM₁₀
9 impacts in the Draft Solar PEIS is no longer applicable, and Table 10.2.13.2-1 has been updated
10 for this Final Solar PEIS. The concentration values in the table are based on updated air quality
11 modeling reflecting the revised boundaries of the proposed SEZ.
12

13 Given the reduced area of the proposed SEZ, the concentrations predicted for this Final
14 Solar PEIS are less than or equal to those predicted in the Draft Solar PEIS, but the conclusions
15 presented in the Draft remain valid.¹ Predicted 24-hour PM₁₀ and 24-hour PM_{2.5} concentration
16 levels could exceed NAAQS levels used for comparison at the SEZ boundaries and in the
17 immediately surrounding area during the construction phase of a solar development. These high
18 particulate levels would be limited to the immediate area surrounding the SEZ boundary and
19 would decrease quickly with distance. Predicted total concentrations for annual PM_{2.5} would be
20 below the standard level used for comparison.
21

22 At the two nearest residences about 0.3 mi (0.5 km) east of the proposed SEZ and 0.45 mi
23 (0.7 km) to the south and at the nearby communities of Saguache, Moffat, and Crestone, the
24 conclusion of the Draft Solar PEIS that total particulate levels (background plus the increment
25 due to construction activities) would not exceed standard levels remains valid.
26

27 Consistent with the conclusions in the Draft Solar PEIS, the updated 24-hour and annual
28 PM₁₀ concentration increments at the nearest Class I area—the Great Sand Dunes WA—would
29 be about 112% and 6%, respectively, of the PSD increment levels for Class I areas. Given the
30 distances and prevailing winds, concentration increments at the other two Class I areas
31 (La Garita WA and Weminuche WA) would be much lower than those at the Great Sand
32 Dunes WA.
33

34 The conclusion of the Draft Solar PEIS that construction emissions from the proposed
35 De Tilla Gulch SEZ would contribute minimally to PM₁₀ concentrations in the Canon City PM₁₀
36 maintenance area about 45 mi (72 km) east-northeast of the proposed SEZ and thus would not
37 affect its attainment status remains valid.
38

¹ 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 so on, is not known; thus air quality modeling cannot be conducted. It has been assumed that 80% of the developable area of 1,064 acres (3.4 km²) 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.

1 **TABLE 10.2.13.2-1 Maximum Air Quality Impacts from Emissions Associated with**
 2 **Construction Activities for the Proposed De Tilla Gulch SEZ as Revised**

Pollutant ^a	Averaging Time	Rank ^b	Concentration ($\mu\text{g}/\text{m}^3$)				Percentage of NAAQS	
			Maximum Increment ^b	Background	Total	NAAQS	Increment	Total
PM ₁₀	24 hours	H3H	430	27.0	457	150	287	305
PM _{2.5}	24 hours	H8H	26.3	16.0	42.3	35	75	121
	Annual	- ^c	6.5	4.0	10.5	15	43	70

^a PM_{2.5} = particulate matter with a diameter of $\leq 2.5 \mu\text{m}$; PM₁₀ = particulate matter with a diameter of $\leq 10 \mu\text{m}$.

^b Concentrations for attainment demonstration are presented. H3H = highest of the third-highest concentrations at each receptor over the 2-year period. H8H = highest of the multiyear average of the eighth-highest concentrations at each receptor over the 2-year period. For the annual average, multiyear averages of annual means over the 2-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.

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Overall, predicted 24-hour PM₁₀ and 24-hour PM_{2.5} concentration levels could exceed standard levels used for comparison at the SEZ boundaries and in the immediately surrounding areas during the construction phase of a solar development project. To reduce potential impacts on ambient air quality and in compliance with required programmatic design features, aggressive dust control measures would be used. Potential impacts on the air quality of neighboring communities would be much lower. Predicted total concentrations for annual PM_{2.5} would be below the standard level. Construction activities could result in concentrations above Class I PSD PM₁₀ increment levels at the nearest federal Class I area, the Great Sand Dunes WA. However, construction activities are not subject to the PSD program; the comparison is made as an indicator of possible dust levels in the WA during the limited construction period and as a screen to gauge the size of the potential impact. Therefore, it is anticipated that the potential impacts of construction activities on ambient air quality would be moderate and temporary.

With the reduced size of the SEZ, emissions from construction equipment and vehicles would be less than those discussed in the Draft Solar PEIS. Any potential impacts on AQRVs at nearby federal Class I areas would be less. The conclusions in the Draft Solar PEIS remain valid. Emissions from construction-related equipment and vehicles are temporary and could cause some unavoidable but short-term impacts.

1 **10.2.13.2.2 Operations**

2
3 The reduction in the size of the proposed De Tilla Gulch SEZ by about 30%, from
4 1,522 acres (6.2 km²) to 1,064 acres (4.3 km²), reduces the generating capacity and annual
5 power generation and thus reduces the potentially avoided emissions presented in the Draft Solar
6 PEIS. Total revised power generation capacity ranging from 95 to 170 MW is estimated for the
7 De Tilla Gulch SEZ for various solar technologies. Updated estimates for emissions potentially
8 avoided by a solar facility can be obtained from the table in the Draft Solar PEIS by reducing the
9 tabulated estimates by about 30%, as shown in the revised Table 10.2.13.2-2. For example, for
10 power tower, dish engine, and PV technologies, up to 253 tons per year (= 69.92% × [the low-
11 end value of 361 tons per year tabulated in the Draft Solar PEIS]) of NO_x could be avoided by
12 full solar development of the proposed De Tilla Gulch SEZ as revised for this Final Solar PEIS.
13 Although the total emissions avoided by full solar development of the proposed SEZ are
14 considerably reduced from those presented in the Draft Solar PEIS, the conclusions of the Draft
15 remain valid. Solar facilities built in the De Tilla Gulch SEZ could avoid relatively more fossil
16 fuel emissions than those built in other states that rely less on fossil fuel-generated power.
17
18

19 **10.2.13.2.3 Decommissioning and Reclamation**

20
21 The discussion in the Draft Solar PEIS remains valid. Decommissioning and reclamation
22 activities would be of short duration, and their potential air impacts would be moderate and
23 temporary.
24
25

26 **10.2.13.3 SEZ-Specific Design Features and Design Feature Effectiveness**

27
28 Required programmatic design features that would reduce air quality impacts are
29 described in Section A.2.2 of Appendix A of this Final Solar PEIS. Limiting dust generation
30 during construction and operations is a required programmatic design feature under the BLM
31 Solar Energy Program. These extensive fugitive dust control measures will keep off-site PM
32 levels as low as possible during construction.
33

34 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
35 analyses due to changes to the SEZ boundaries, and consideration of comments received as
36 applicable, no SEZ-specific design features for air quality have been identified for the proposed
37 De Tilla Gulch SEZ. Some SEZ-specific design features may be identified through the process of
38 preparing parcels for competitive offer and subsequent project-specific analysis.
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1 **TABLE 10.2.13.2-2 Annual Emissions from Combustion-Related Power Generation Avoided by**
 2 **Full Solar Development of the Proposed De Tilla Gulch SEZ as Revised**

Area Size (acres) ^a	Capacity (MW) ^b	Power Generation (GWh/yr) ^c	Emissions Avoided (tons/yr; 10 ³ tons/yr for CO ₂) ^d			
			SO ₂	NO _x	Hg	CO ₂
1,064	95–170	166–298	219–394	253–455	0.001–0.003	164–295
Percentage of total emissions from electric power systems in the state of Colorado ^e			0.35–0.63%	0.35–0.63%	0.35–0.63%	0.35–0.63%
Percentage of total emissions from all source categories in the state of Colorado ^f			0.19–0.33%	0.06–0.11%	– ^g	0.16–0.28%
Percentage of total emissions from electric power systems in the six-state study area ^e			0.09–0.16%	0.07–0.12%	0.05–0.09%	0.06–0.11%
Percentage of total emissions from all source categories in the six-state study area ^f			0.05–0.08%	0.01–0.02%	–	0.02–0.04%

a To convert acres to km², multiply by 0.004047.

b It is assumed that the SEZ would eventually have development on 80% of the lands and that a range of 5 acres (0.020 km²) per MW (for parabolic trough technology) to 9 acres (0.036 km²) per MW (power tower, dish engine, and PV technologies) would be required.

c Assumed a capacity factor of 20%.

d Composite combustion-related emission factors for SO₂, NO_x, Hg, and CO₂ of 2.64, 3.05, 1.7 × 10⁻⁵, and 1,976 lb/MWh, respectively, were used for the state of Colorado.

e Emission data for all air pollutants are for 2005.

f Emission data for SO₂ and NO_x are for 2002, while those for CO₂ are for 2005.

g A dash indicates not estimated.

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

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10.2.14 Visual Resources

10.2.14.1 Affected Environment

10 The proposed De Tilla Gulch SEZ, as revised, extends approximately 1.0 mi (1.6 km)
 11 north to south (at its greatest extent) and 2.2 mi (3.5 km) east to west (at its greatest extent). The
 12 SEZ has been revised to eliminate 458 acres (1.9 km²) along the northwest edge of the SEZ. The
 13 proposed SEZ now occupies an area of 1,064 acres (4.3 km²). Because of the reduction in size of
 14 the De Tilla Gulch SEZ, the total acreage of the lands visible within the 25-mi (40-km) viewshed
 15 of the SEZ also has decreased.

1 U.S. 285 no longer is the northwestern boundary of the SEZ. A portion of this highway
2 is locally referred to as the Cochetopa Scenic Byway, which runs south from Poncha Pass on
3 U.S. 285 to Saguache, along Highway 114 to Highway 50, and back east to Poncha Springs.
4 The road has been nominated for an official scenic byway designation by a citizen proposal
5 (BLM 2011a; Gunnison County Board of Commissioners 2011).
6

7 An updated VRI map for the SEZ and surrounding lands is shown in Figure 10.2.14.1-1;
8 it provides information from the BLM's 2009 VRI, which was finalized in October 2011
9 (BLM 2011b). As shown, the VRI value for the SEZ still is VRI Class III, indicating moderate
10 relative visual values.
11

12 Lands in the Saguache Field Office within the 25-mi (40-km), 650-ft (198-m) viewshed
13 of the revised SEZ include 22,633 acres (91.6 km²) of VRI Class II areas; 22,996 acres
14 (93.1 km²) of VRI Class III areas; and 12,757 acres (51.6 km²) of VRI Class IV areas.
15

16 **10.2.14.2 Impacts**

17 The reduction in size of the SEZ would reduce the total visual impacts associated with
18 solar energy development in the SEZ. It would limit the total amount of solar facility
19 infrastructure that would be visible and reduce the geographic extent of the visible infrastructure.
20
21

22 The reduction in size of the SEZ proposed in the Supplement to the Draft Solar PEIS
23 eliminated approximately 30% of the original SEZ. The resulting visual contrast reduction for
24 any given point within view of the SEZ would vary greatly depending on the viewpoint's
25 distance and direction from the SEZ. In general, contrast reduction would be greatest for
26 viewpoints closest to the portions of the SEZ that were eliminated and especially for those that
27 had broad wide-angle views of these areas. Contrast reductions also would be larger for elevated
28 viewpoints relative to non-elevated viewpoints, because the reduction in area of the solar
29 facilities would be more apparent when looking down at the SEZ than when looking across it.
30
31

32 ***10.2.14.2.1 Impacts on the Proposed De Tilla Gulch SEZ***

33 Although the reduction in size of the SEZ would reduce visual contrasts associated with
34 solar development, solar development within the SEZ still would involve major modification of
35 the existing character of the landscape and would likely dominate the views from most locations
36 within the SEZ. Additional impacts would occur as a result of the construction, operation, and
37 decommissioning of related facilities, such as access roads and electric transmission lines. In
38 general, strong visual contrasts from solar development still would be expected for viewing
39 locations within the SEZ.
40
41

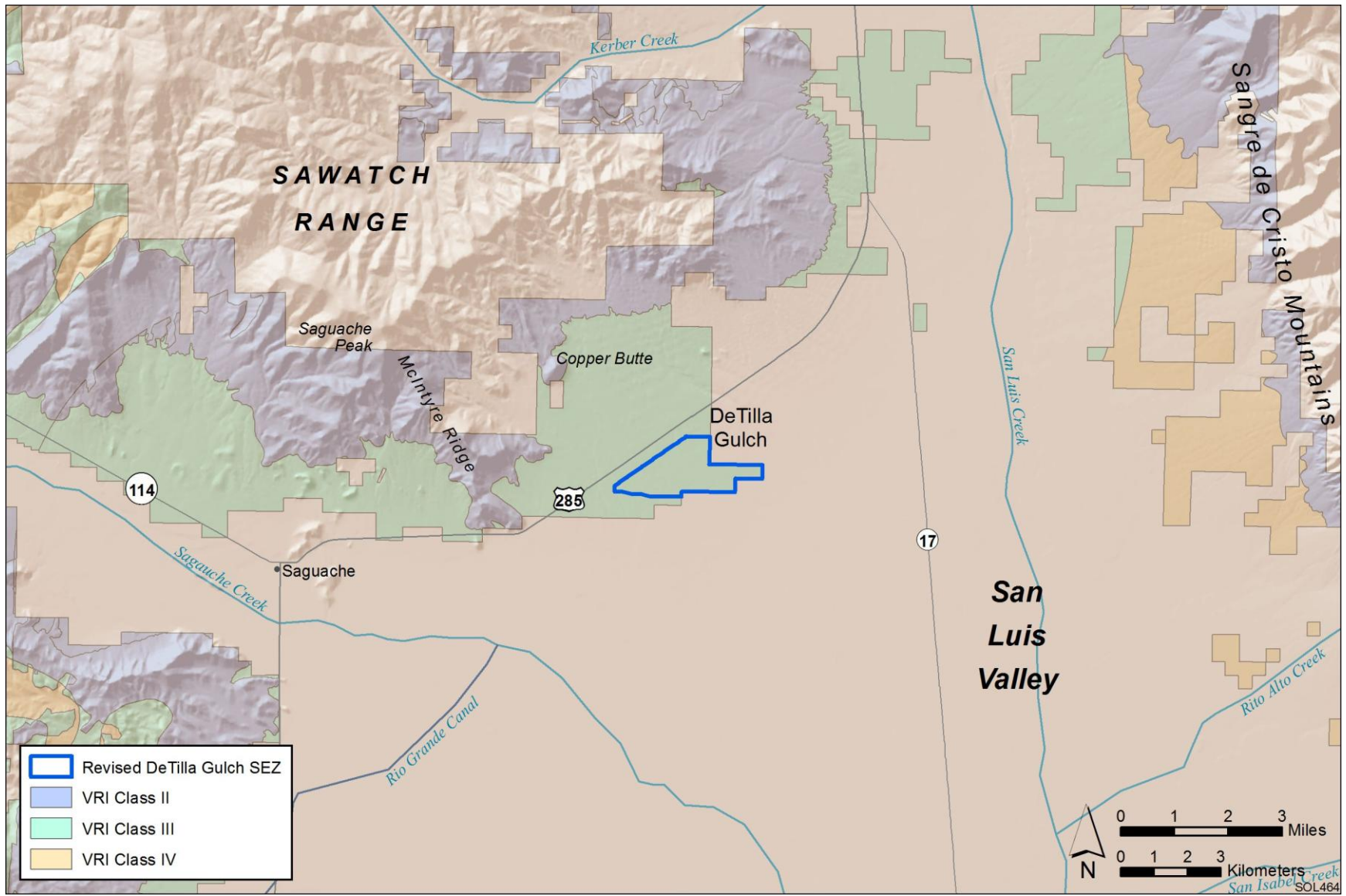


FIGURE 10.2.14.1-1 Visual Resource Inventory Values for the Proposed De Tilla Gulch SEZ as Revised

1 **10.2.14.2.2 Impacts on Lands Surrounding the Proposed De Tilla Gulch SEZ**
2

3 For the Draft Solar PEIS, preliminary viewshed analyses were conducted to identify
4 which lands surrounding the proposed SEZ could have views of solar facilities in at least some
5 portion of the SEZ (see Appendixes M and N of the Draft Solar PEIS for important information
6 on assumptions and limitations of the methods used). Four viewshed analyses were conducted,
7 assuming four different heights representative of project elements associated with potential solar
8 energy technologies: PV and parabolic trough arrays, 24.6 ft (7.5 m); solar dishes and power
9 blocks for CSP technologies, 38 ft (11.6 m); transmission towers and short solar power towers,
10 150 ft (45.7 m); and tall solar power towers, 650 ft (198.1 m).
11

12 These same viewsheds were recalculated in order to account for the boundary changes
13 described in the Supplement to the Draft Solar PEIS. Figure 10.2.14.2-1 shows the combined
14 results of the viewshed analyses for all four solar technologies. The colored segments indicate
15 areas with clear lines of sight to one or more areas within the SEZ and from which solar facilities
16 within these areas of the SEZ would be expected to be visible, assuming the absence of screening
17 vegetation or structures and adequate lighting and other atmospheric conditions. The light brown
18 areas are locations from which PV and parabolic trough arrays located in the SEZ could be
19 visible. Solar dishes and power blocks for CSP technologies would be visible from the areas
20 shaded in light brown and the additional areas shaded in light purple. Transmission towers and
21 short solar power towers would be visible from the areas shaded light brown, light purple, and
22 the additional areas shaded in dark purple. Power tower facilities located in the SEZ could be
23 visible from areas shaded light brown, light purple, and dark purple, and at least the upper
24 portions of power tower receivers could be visible from the additional areas shaded in medium
25 brown.
26

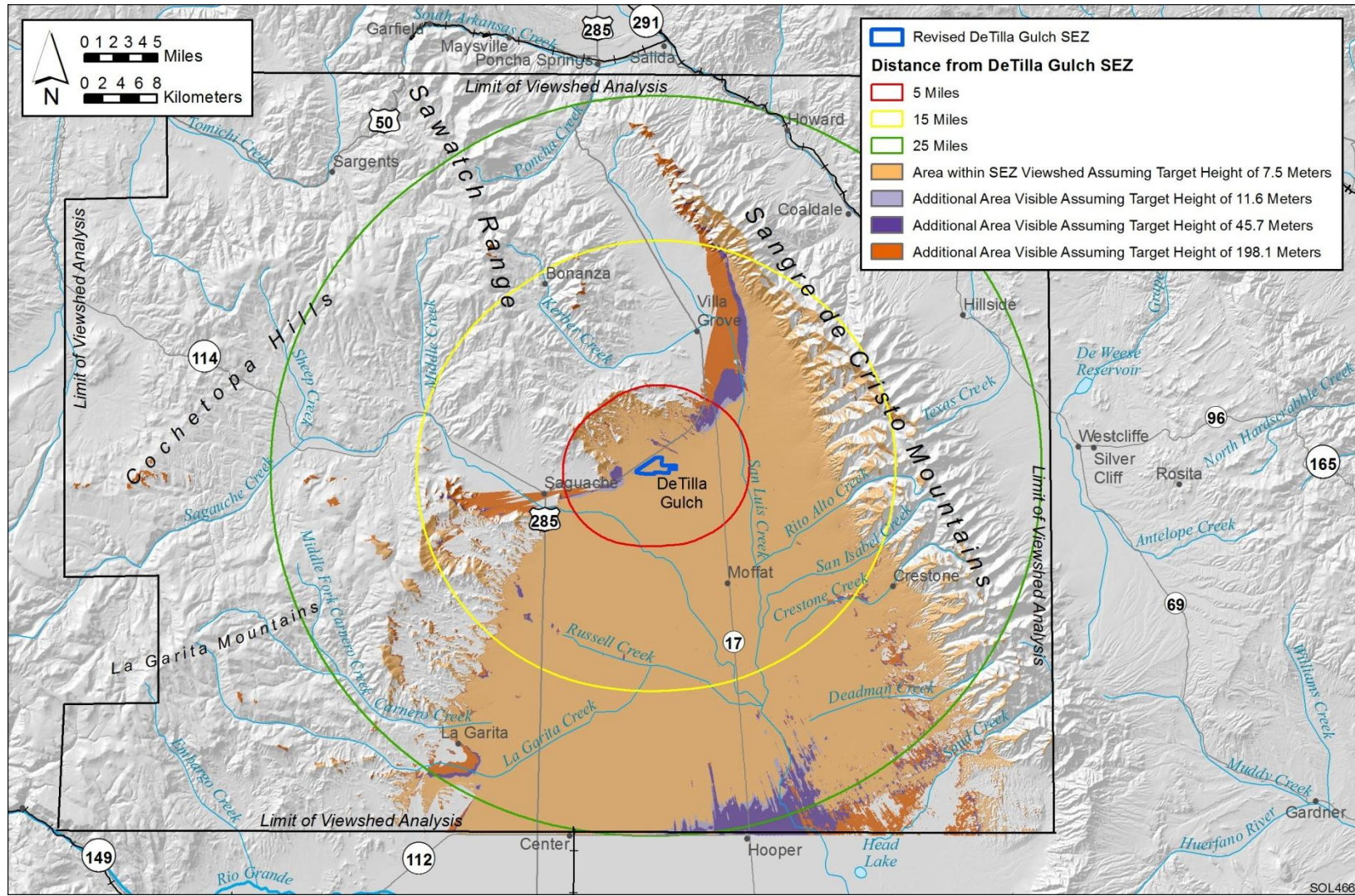
27
28 **10.2.14.2.3 Impacts on Selected Federal-, State-, and BLM-Designated Sensitive**
29 **Visual Resource Areas and Other Lands and Resources**
30

31 Figure 10.2.14.2-2 shows the results of a geographic information system (GIS) analysis
32 that overlays selected federal-, state-, and BLM-designated sensitive visual resource areas onto
33 the combined tall solar power tower (650 ft [198.1 m]) and PV and parabolic trough array
34 (24.6 ft [7.5 m]) viewsheds, in order to illustrate which of these sensitive visual resource areas
35 would have views of solar facilities within the SEZ and therefore potentially would be subject to
36 visual impacts from those facilities. Distance zones that correspond with BLM's VRM system-
37 specified foreground-middleground distance (5 mi [8 km]), background distance (15 mi
38 [24.1 km]), and a 25-mi (40.2-km) distance zone are shown as well, in order to indicate the effect
39 of distance from the SEZ on impact levels, which are highly dependent on distance. A similar
40 analysis was conducted for the Draft Solar PEIS.
41

42 The scenic resources included in the analysis were as follows:
43

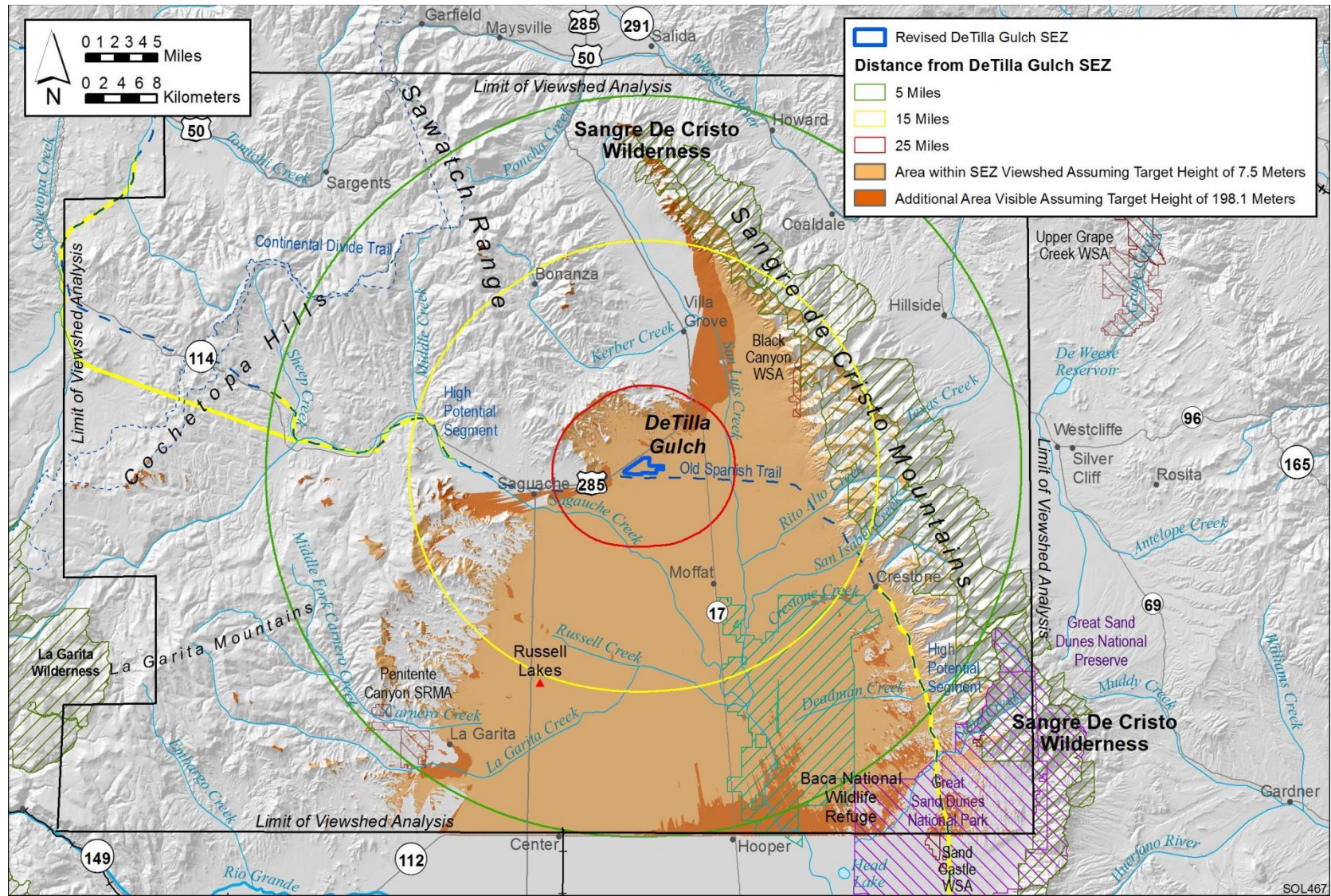
- 44 • National Parks, National Monuments, National Recreation Areas, National
45 Preserves, National Wildlife Refuges, National Reserves, National
46 Conservation Areas, National Historic Sites;

1



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FIGURE 10.2.14.2-1 Viewshed Analyses for the Proposed De Tilla Gulch SEZ as Revised and Surrounding Lands, Assuming Viewshed Heights of 24.6 ft (7.5 m), 38 ft (11.6 m), 150 ft (45.7 m), and 650 ft (198.1 m) (shaded areas indicate lands from which solar development and/or associated structures within the SEZ could be visible)



2 **FIGURE 10.2.14.2-2** Overlay of Selected Sensitive Visual Resource Areas onto Combined 650-ft (198.1-m) and 24.6-ft (7.5-m)
3 Viewsheds for the Proposed De Tilla Gulch SEZ as Revised

- 1 • Congressionally authorized Wilderness Areas;
- 2
- 3 • Wilderness Study Areas;
- 4
- 5 • National Wild and Scenic Rivers;
- 6
- 7 • Congressionally authorized Wild and Scenic Study Rivers;
- 8
- 9 • National Scenic Trails and National Historic Trails;
- 10
- 11 • National Historic Landmarks and National Natural Landmarks;
- 12
- 13 • All-American Roads, National Scenic Byways, State Scenic Highways, and
- 14 BLM- and USFS-designated scenic highways/byways;
- 15
- 16 • BLM-designated Special Recreation Management Areas; and
- 17
- 18 • ACECs designated because of outstanding scenic qualities.
- 19

20 The results of the GIS analyses are summarized in Table 10.2.14.2-1. The change in size
21 of the SEZ alters the viewshed of the SEZ, such that the visibility of the SEZ and solar facilities
22 within the SEZ from the surrounding lands would be reduced. With the reduction in size of the
23 SEZ, solar energy development within the SEZ would be expected to create minimal or weak
24 visual contrasts for viewers within most of the surrounding scenic resource areas listed in
25 Table 10.2.14.2-1. An exception is the Old Spanish National Historic Trail; in this resource area,
26 strong visual contrasts still would be expected.

27
28 In addition to these areas, impacts on other lands and resource areas also were evaluated.
29 These areas include the surrounding communities of Saguache and Moffat and U.S. 285, a
30 portion of which coincides with the proposed Cochetopa Scenic Byway, as described in
31 Section 10.2.14.1.

32 33 34 ***10.2.14.2.4 Summary of Visual Resource Impacts for the Proposed De Tilla Gulch*** 35 ***SEZ*** 36

37 The visual contrast analysis in the Draft Solar PEIS determined that because there could
38 be multiple solar facilities within the De Tilla Gulch SEZ, a variety of technologies employed,
39 and a range of supporting facilities required, solar development would make the SEZ essentially
40 industrial in appearance and would contrast strongly with the surrounding mostly natural-
41 appearing landscape.

42
43 The elimination of acreage within the SEZ would reduce the visual contrast associated
44 with solar facilities as seen both within the SEZ and from surrounding lands in both daytime and
45 nighttime views. The reductions in visual contrast can be summarized as follows:
46

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TABLE 10.2.14.2-1 Selected Potentially Affected Sensitive Visual Resources within a 25-mi (40-km) Viewshed of the Proposed De Tilla Gulch SEZ as Revised, Assuming a Target Height of 650 ft (198.1 m)

Feature Type	Feature Name (Total Acreage) ^a	Feature Area or Linear Distance ^{b,c}		
		Visible within 5 mi	Visible Between	
			5 and 15 mi	15 and 25 mi
National Historic Trail	Old Spanish (2,700 mi) ^d	12.6 mi (0%)	10.7 mi (0%)	10.7 mi (0%)
WA	Sangre de Cristo (217,695 acres)	0 acres	10,607 acres (5%)	7,459 acres (3%)
WSA	Black Canyon (16,699 acres)	0 acres	1,032 acres (6%)	0 acres
NNL	Russell Lakes (3,860 acres)	0 acres	0 acres	3,860 acres (100%)
NWR	Baca (92,596 acres)	0 acres	13,755 acres (15%)	61,964 acres (67%)
SRMA	Penitente Canyon (4,173 acres)	0 acres	0 acres	297 acres (7%)

- ^a To convert acres to km², multiply by 0.004047.
- ^b To convert mi to km, multiply by 1.609.
- ^c Percentage of total feature acreage or road length viewable.
- ^d Source: BLM (2011c).

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- Within the De Tilla Gulch SEZ: Contrasts experienced by viewers along the northwest edge of the SEZ would be reduced due to the elimination of 458 acres (1.9 km²) along U.S. 285. However, strong contrasts still would be expected in the remaining developable area.
- Old Spanish National Historic Trail: A very slight reduction in contrasts would be anticipated due to the elimination of acreage within the western portion of the SEZ; however, with the proximity of the Trail to the southern boundary of the SEZ, solar development within the SEZ still would cause strong contrasts for those portions of the Trail in close proximity to the SEZ, with lower contrasts for more distant portions of the Trail.

- 1 • Sangre De Cristo WA: A very slight reduction in contrasts would be
2 anticipated; however, solar development within the SEZ still would cause
3 weak visual contrasts.
- 4
- 5 • Black Canyon WSA: A very slight reduction in contrasts would be
6 anticipated; however, solar development within the SEZ still would cause
7 weak visual contrasts.
- 8
- 9 • Russell Lakes NNL: No reduction in contrasts would be anticipated; solar
10 development within the SEZ still would cause weak visual contrasts.
- 11
- 12 • Baca NWR: A reduction in contrasts would be anticipated; however, solar
13 development within the SEZ still would cause minimal to weak visual
14 contrasts.
- 15
- 16 • Penitente Canyon SRMA: A very slight reduction in contrasts would be
17 anticipated; solar development within the SEZ would cause minimal visual
18 contrasts.
- 19
- 20 • Saguache: A very slight reduction in contrasts would be anticipated; solar
21 development within the SEZ still would cause minimal contrasts.
- 22
- 23 • Moffat: No reduction in contrasts would be anticipated; solar development
24 within the SEZ still would cause weak visual contrasts.
- 25
- 26 • U.S. 285: U.S. 285 was the border of the SEZ as it was originally proposed in
27 the Draft Solar PEIS. Approximately 458 acres (1.9 km²) of the SEZ were
28 eliminated along this roadway. A substantial reduction in contrasts would be
29 anticipated, since solar development would no longer be adjacent to U.S. 285.
30 However, solar development still would cause strong contrasts, especially for
31 viewers travelling along portions of the roadway located within 0.25 mi
32 (0.40 km) of the boundary of the SEZ and immediately to the east of the SEZ.
33 Contrasts would be lower for viewpoints on U.S. 285 farther from the SEZ.
- 34
- 35 • Cochetopa Scenic Byway (proposed): Portions of this roadway that are
36 located within the 650-ft (198.1-m), 25-mi (40-km) viewshed coincide with
37 U.S. 285 between Saguache and just north of the intersection of U.S. 285 and
38 State Route 17. Contrasts resulting from solar development within the SEZ
39 would be similar to that described for U.S. 285.
- 40
- 41

42 **10.2.14.3 SEZ-Specific Design Features and Design Feature Effectiveness**

43
44 Required programmatic design features that would reduce impacts on visual resources are
45 described in Section A.2.2 of Appendix A of this Final Solar PEIS. While application of the
46 programmatic design features will reduce potential visual impacts somewhat, the degree of

1 effectiveness of these design features could be assessed only at the site- and project-specific
2 level. Given the large scale, reflective surfaces, and strong regular geometry of utility-scale solar
3 energy facilities and the lack of screening vegetation and landforms within the SEZ viewshed,
4 siting the facilities away from sensitive visual resource areas and other sensitive viewing areas
5 would be the primary means of mitigating visual impacts. The effectiveness of other visual
6 impact mitigation measures generally would be limited. Utility-scale solar energy development
7 using any of the solar technologies analyzed in this Final Solar PEIS and at the scale analyzed
8 would be expected to result in large adverse visual impacts that could not be mitigated.
9

10 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
11 analyses due to changes to the SEZ boundaries, and consideration of comments received as
12 applicable, a proposed SEZ-specific design feature for the SEZ is as follows:
13

- 14 • The development of power tower facilities should be prohibited within the
15 SEZ. The San Luis Valley is a regionally important tourist destination and is
16 an area with many small communities and numerous important historic,
17 cultural, and recreational resources. The valley contains numerous historic
18 sites, two scenic railways, two scenic highways, several wildlife refuges,
19 Great Sand Dunes NP and Preserve, the Rio Grande WSR, congressionally
20 designated WAs, the Sangre de Cristo NHA, and various other attractions that
21 draw tourists to the region. A number of these areas overlook the San Luis
22 Valley from the surrounding mountains and include elevated viewpoints that
23 would have clear views of power tower facilities in the Valley. The height of
24 solar power tower receiver structures, combined with the intense light
25 generated by the receivers atop the towers, would be expected to create strong
26 visual contrasts that could not be effectively screened from view for most
27 areas surrounding the SEZ. The effective area of impact from power tower
28 structures is much larger than that for comparably rated lower height facilities,
29 which makes it more likely that they would conflict with the growing tourism
30 focus of the Valley. In addition, for power towers exceeding 200 ft (61 m) in
31 height, hazard navigation lighting that could be visible for very long distances
32 would likely be required. Prohibiting the development of power tower
33 facilities would remove this source of impacts, thus substantially reducing
34 potential visual impacts on the Old Spanish National Historic Trail, the
35 community of Saguache, and other residents of and visitors to the San Luis
36 Valley, a regionally important tourist destination.
37

38 The need for additional SEZ-specific design features may be identified through the
39 process of preparing parcels for competitive offer and subsequent project-specific analysis.
40
41

1 **10.2.15 Acoustic Environment**

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4 **10.2.15.1 Affected Environment**

5
6 The size of the proposed De Tilla Gulch SEZ was reduced by about 30%, from
7 1,522 acres (6.2 km²) to 1,064 acres (4.3 km²) by removing a strip along U.S. 285. However,
8 this reduction in the size of the SEZ did not substantially change the distances to some of the
9 sensitive receptors at which noise was modeled for the Draft Solar PEIS. The affected
10 environment presented in the Draft Solar PEIS remains valid.

11
12
13 **10.2.15.2 Impacts**

14
15 On the basis of the boundary changes and reduced size of the proposed De Tilla Gulch
16 SEZ, noise impacts were remodeled for this Final Solar PEIS. The distance to the nearest
17 residence remained the same as in the Draft Solar PEIS.

18
19
20 **10.2.15.2.1 Construction**

21
22 Estimated noise levels from construction activities in the proposed SEZ at the nearest
23 residence about 0.3 mi (0.5 km) away would be about 56 dBA, which is higher than a typical
24 daytime mean rural background level of 40 dBA. Estimated day-night average noise levels at this
25 residence would be 52 dBA L_{dn}, which is below the EPA guideline of 55 dBA L_{dn} for residential
26 areas.

27
28 Noise levels from construction activities occurring near the southern SEZ boundary, at
29 the Old Spanish National Historic Trail (as close as 0.25 mi [0.4 km] to the south), would be
30 about 58 dBA, which is well above the typical daytime mean rural background level of 40 dBA.
31 The conclusion in the Draft Solar PEIS that construction occurring near the southern SEZ
32 boundary could result in noise impacts on the Old Spanish Historic Trail remains valid, but these
33 impacts would be temporary.

34
35 Overall, construction would cause some unavoidable but localized short-term impacts on
36 neighboring communities, particularly for activities occurring near the eastern proposed SEZ
37 boundary, close to nearby residences.

38
39 No adverse vibration impacts are anticipated from construction activities, including pile
40 driving for dish engines.

41
42
43 **10.2.15.2.2 Operations**

44
45 The conclusions presented in the Draft Solar PEIS remain valid, except as noted below
46 for impacts from TES and dish engine facilities near residences or in specially designated areas.

1 **Parabolic Trough and Power Tower**

2
3 If TES were not used for parabolic trough and power tower technologies (12 hours of
4 daytime operations only), estimated noise levels at the nearest residence about 0.3 mi (0.5 km)
5 away from the SEZ boundary would be about 47 dBA, which exceeds the typical daytime mean
6 rural background of 40 dBA. The day-night average noise level of 45 dBA L_{dn} would be below
7 the EPA guideline of 55 dBA L_{dn} for residential areas. If TES were used, the estimated nighttime
8 noise level at the nearest residence would be about 57 dBA, which is higher than the typical
9 nighttime mean rural background level of 30 dBA. The day-night average noise level is
10 estimated to be about 58 dBA L_{dn} , which is a little higher than the EPA guideline of 55 dBA L_{dn}
11 for residential areas. The assumptions are conservative in terms of operating hours, and no credit
12 was given to other attenuation mechanisms. Thus it is likely that noise levels would be lower
13 than 58 dBA L_{dn} at the nearest residence, even if TES were used at a solar facility. Nonetheless,
14 operating parabolic trough or power tower facilities using TES and located near the eastern SEZ
15 boundary could result in potential noise impacts on the nearest residence, depending on
16 background noise levels and meteorological conditions.

17
18 For operations of a parabolic trough or power tower facility equipped with TES occurring
19 near the southern SEZ boundary, the estimated daytime and nighttime noise levels at the Old
20 Spanish National Historic Trail would be about 48 and 58 dBA, respectively, which are higher
21 than the typical daytime and nighttime mean rural background levels of 40 and 30 dBA. The
22 conclusion in the Draft Solar PEIS that operation of a solar facility near the southern SEZ
23 boundary could result in noise impacts on the Old Spanish National Historic Trail remains valid.

24
25
26 **Dish Engines**

27
28 The reduced size of the proposed SEZ would reduce the maximum potential number of
29 25-kW dish engines to 3,800 covering 851 acres (3.4 km²); the Draft Solar PEIS modeled
30 5,400 dish engines covering 1,217 acres (4.9 km²). The estimated noise level at the nearest
31 residence about 0.3 mi (0.5 km) from the SEZ boundary would be about 50 dBA, which is higher
32 than the typical daytime mean rural background level of 40 dBA. The estimated day-night
33 average noise level of 48 dBA L_{dn} at this residence is below the EPA guideline of 55 dBA L_{dn}
34 for residential areas. The conclusion of the Draft Solar PEIS that noise from dish engines could
35 cause adverse noise impacts on the nearest residences, depending on background noise levels and
36 meteorological conditions, remains valid.

37
38 The estimated noise level from an operating dish engine facility would be about 51 dBA
39 at the Old Spanish National Historic Trail (about 0.25 mi [0.4 km] to the south), which is higher
40 than the typical daytime mean rural background level of 40 dBA. Thus, the conclusion in the
41 Draft Solar PEIS that noise from an operating dish engine facility in the De Tilla Gulch SEZ
42 could result in adverse impacts on the Old Spanish National Historic Trail remains valid.

43
44 The discussions of vibration, transformer and switchyard noise, and transmission line
45 corona discharge presented in the Draft Solar PEIS remain valid. Noise impacts from vibration

1 and transformer and switchyard noise would be minimal. Noise impacts from transmission line
2 corona discharge would be negligible.

3 4 5 **10.2.15.2.3 Decommissioning and Reclamation**

6
7 The conclusions on decommissioning and reclamation in the proposed De Tilla Gulch
8 SEZ as presented in the Draft Solar PEIS remain valid. Decommissioning and reclamation
9 activities would be of short duration, and their potential noise impacts would be minor and
10 temporary. Potential noise and vibration impacts on surrounding communities would be minimal.

11 12 13 **10.2.15.3 SEZ-Specific Design Features and Design Feature Effectiveness**

14
15 Required programmatic design features that would reduce noise impacts are described in
16 Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the programmatic design
17 features will provide some protection from noise impacts.

18
19 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
20 analyses due to changes to the SEZ boundaries, and consideration of comments received as
21 applicable, no SEZ-specific design features for the proposed De Tilla Gulch SEZ have been
22 identified. Some SEZ-specific design features may be identified through the process of preparing
23 parcels for competitive offer and subsequent project-specific analysis.

24 25 26 **10.2.16 Paleontological Resources**

27 28 29 **10.2.16.1 Affected Environment**

30
31 Data provided in the Draft Solar PEIS remain valid, with the following update:

- 32
33 • The BLM Regional Paleontologist may have additional information regarding
34 the paleontological potential of the SEZ and be able to verify the PFYC of the
35 SEZ as Class 3b as used in the Draft Solar PEIS.

36 37 38 **10.2.16.2 Impacts**

39
40 The assessment provided in the Draft Solar PEIS remains valid. Impacts on significant
41 paleontological resources are unknown, and a more detailed look at the geological deposits and
42 their depth is needed to determine whether a paleontological survey is warranted.

1 **10.2.16.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 Required programmatic design features are described in Section A.2.2 of Appendix A of
4 this Final Solar PEIS. Impacts would be minimized through the implementation of the required
5 programmatic design features, including a stop-work stipulation in the event that paleontological
6 resources are encountered during construction, as described in Section A.2.2 of Appendix A.
7

8 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
9 analyses due to changes in the SEZ boundaries, and consideration of comments received as
10 applicable, no SEZ-specific design features for paleontological resources have been identified for
11 the proposed De Tilla Gulch SEZ. Because the PFYC of the proposed SEZ is Class 3b (unknown
12 potential), paleontological surveys would be needed to identify those areas that may have
13 significant paleontological resources; therefore, the need for and nature of any SEZ-specific
14 design features would depend on the findings of future paleontological investigations. Some
15 SEZ-specific design features may be identified through the process of preparing parcels for
16 competitive offer and subsequent project-specific analysis.
17

18 As additional information on paleontological resources (e.g., from regional
19 paleontologists or from new surveys) becomes available, the BLM will post the data to a public
20 Web site for use by applicants, the BLM, and other stakeholders.
21

22
23 **10.2.17 Cultural Resources**
24

25
26 **10.2.17.1 Affected Environment**
27

28 Data provided in the Draft Solar PEIS remain valid, with the following updates:
29

- 30 • Because the footprint of the proposed De Tilla Gulch SEZ has changed, the
31 amount of the SEZ that has been surveyed has been reduced from two surveys
32 of 51 acres (0.2 km²) covering 3.8% of the SEZ, to one survey of about
33 17 acres (0.06 km²), covering approximately 1.6% of the proposed De Tilla
34 Gulch SEZ.
35
- 36 • Additional information may be available to characterize the SEZ and its
37 surrounding area in the future (after the Final Solar PEIS has been completed),
38 as follows:
 - 39 – A Class III inventory of linear features in close proximity to the SEZ that
40 were previously identified using light detection and ranging (LiDAR);
 - 41 – Results of an ethnographic study currently being conducted by TRC
42 Solutions, which focuses on Native American use of lands being analyzed
43 for solar development within the San Luis Valley. The study will discuss
44 sensitive and traditional use areas. Interviews with tribal members and
45 field visits will facilitate the identification of resources and sites of
46 traditional and religious importance to tribes. Results of a Class II sample

1 survey of the SEZ designed to obtain a statistically valid sample of
2 archeological properties and their distribution within the SEZ. Results
3 from the ethnographic study and the sample inventory can be combined to
4 project cultural sensitivity zones as an aid in planning future solar
5 developments.

- 6 – Identification of the location of the Old Spanish National Historic Trail in
7 the vicinity of the SEZ and viewshed analyses from key points along the
8 Trail. High-potential segments of the Trail have been identified to the east
9 between Crestone, Colorado, and the Fourmile East SEZ and to the west
10 of Saguache, Colorado. The Trail segment to the east would be within the
11 viewshed at about 16 mi (26 km) regardless of solar technology type. Also
12 within the viewshed at about 6 mi (10 km) would be the West Fork of the
13 North Branch of the Old Spanish Trail, not currently part of the National
14 Historic Trail system, but still an important trail and significant cultural
15 resource that would be visually affected along an approximately 20-mi
16 (32-km) stretch of the Trail.
- 17 – Continuation of government-to-government consultation as described in
18 Section 2.4.3 of the Supplement to the Draft Solar PEIS and IM 2012-032
19 (BLM 2011d), including follow-up to recent ethnographic studies
20 covering some SEZs in Nevada and Utah with tribes not included in the
21 original studies to determine whether those tribes have similar concerns.

22 23 24 **10.2.17.2 Impacts**

25
26 The assessment provided in the Draft Solar PEIS remains valid. Impacts on significant
27 cultural resources are possible; however, a cultural resource survey of the area of potential affect
28 would be needed to determine whether any resources are present. An inventory of the location,
29 integrity, and significance of portions of the Old Spanish Trail from which future development in
30 the SEZ could be viewed would need to occur to determine whether adverse impacts on the Trail
31 would occur with solar energy development. The assessment provided in the Draft Solar PEIS
32 remains valid with the following update:

- 33
34 • Impacts on significant cultural resources and cultural landscapes associated
35 with American Latino heritage are possible throughout the San Luis Valley.

36 37 38 **10.2.17.3 SEZ-Specific Design Features and Design Feature Effectiveness**

39
40 Required programmatic design features that would reduce impacts on cultural resources
41 are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Programmatic design
42 features will be applied to address SEZ-specific resources and conditions, for example:

- 43
44 • For projects in the De Tilla Gulch SEZ that are located within the viewshed of
45 the Old Spanish National Historic Trail and/or the West Fork of the North
46 Branch of the Old Spanish Trail, a National Trail inventory will be required to

1 determine the area of possible adverse effect on resources, qualities, values,
2 and associated settings of the trail; to prevent substantial interference; and to
3 determine any areas unsuitable for development. Residual impacts will be
4 avoided, minimized, and/or mitigated to the extent practicable according to
5 program policy standards. Programmatic design features have been included
6 in BLM's Solar Energy Program to address impacts on National Historic
7 Trails (see Section A.2.2.23 of Appendix A).
8

9 Programmatic design features also assume that the necessary surveys, evaluations, and
10 consultations will occur. Ongoing consultations with the Colorado SHPO and the appropriate
11 Native American governments would be conducted during the development of the De Tilla
12 Gulch SEZ. It is likely that most adverse effects on significant resources in the valley could be
13 mitigated to some degree through such efforts, although not enough to eliminate the adverse
14 effects unless a significant resource is avoided entirely.
15

16 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
17 analyses due to changes to the SEZ boundaries, and consideration of comments received as
18 applicable, the following SEZ-specific design feature has been identified:
19

- 20 • Development of an MOA may be needed among the BLM, Colorado SHPO,
21 and other parties, such as the ACHP, to address the adverse effects of solar
22 energy development on historic properties. The agreement may specify
23 avoidance, minimization, or mitigation measures. Should an MOA be
24 developed to resolve adverse effects on the Old Spanish National Historic
25 Trail and/or the West Fork of the North Branch of the Old Spanish Trail, the
26 Trail Administration for the Old Spanish Trail (BLM-NMSO and NPS
27 Intermountain Trails Office, Santa Fe) should be included in the development
28 of that MOA.
29

30 The need for and nature of additional SEZ-specific design features will depend on the
31 results of future investigations. Some additional SEZ-specific design features may be established
32 through the process of preparing parcels for competitive offer and subsequent project-specific
33 analysis.
34
35

36 **10.2.18 Native American Concerns**

37
38

39 **10.2.18.1 Affected Environment**

40

41 Data provided in the Draft Solar PEIS remain valid but will be supplemented in the
42 future by the results of the ethnographic study being completed in the San Luis Valley
43 (see Section 10.1.17.1).
44
45

1 **10.2.18.2 Impacts**
2

3 The description of potential concerns provided in the Draft Solar PEIS remains valid. No
4 direct impacts from solar energy development are likely to occur on culturally significant areas
5 (i.e., San Luis Lakes, the Great Sand Dunes, and Blanca Peak); however, indirect visual and
6 auditory impacts are possible. It is likely that traditional plant resources and animal habitats
7 would be directly affected by solar energy development in the proposed De Tilla Gulch SEZ.
8

9
10 **10.2.18.3 SEZ-Specific Design Features and Design Feature Effectiveness**
11

12 Required programmatic design features that would reduce impacts on Native American
13 concerns are described in Section A.2.2 of Appendix A of this Final Solar PEIS. For example,
14 impacts would be minimized through the avoidance of sacred sites, water sources, and tribally
15 important plant and animal species. Programmatic design features require that the necessary
16 surveys, evaluations, and consultations would occur. The tribes would be notified regarding the
17 results of archaeological surveys, and they would be contacted immediately upon any discovery
18 of Native American human remains and associated cultural items.
19

20 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
21 analyses due to changes in the SEZ boundaries, and consideration of comments received as
22 applicable, no SEZ-specific design features to address Native American concerns have been
23 identified for the proposed De Tilla Gulch SEZ. The need for and nature of SEZ-specific design
24 features would be determined during government-to-government consultation with affected
25 tribes as part of the process of preparing parcels for competitive offer and subsequent project-
26 specific analysis. Potentially significant sites and landscapes in the vicinity of the SEZ associated
27 with Blanca Peak, Great Sand Dunes, and San Luis Lakes, as well as trail systems, mountain
28 springs, mineral resources, burial sites, ceremonial areas, water resources, and plant and animal
29 resources, should be considered and discussed during consultation.
30

31
32 **10.2.19 Socioeconomics**
33

34 **10.2.19.1 Affected Environment**
35

36
37 Although the boundaries of the De Tilla Gulch SEZ have been reduced compared to the
38 boundaries given in the Draft Solar PEIS, the socioeconomic ROI, the area in which site
39 employees would live and spend their wages and salaries, and into which any in-migration would
40 occur, includes the same counties and communities as described in the Draft Solar PEIS; that is,
41 no updates to the affected environment information given in the Draft Solar PEIS are required.
42
43

1 **10.2.19.2 Impacts**
2

3 Socioeconomic resources in the ROI around the SEZ could be affected by solar energy
4 development through the creation of direct and indirect employment and income, the generation
5 of direct sales and income taxes, SEZ acreage rental and capacity payments to BLM, the in-
6 migration of solar facility workers and their families, impacts on local housing markets, and on
7 local community service employment. The impact assessment provided in the Draft Solar PEIS
8 remains valid, with the following updates:
9

10 **10.2.19.2.1 Solar Trough**
11

12 **Construction**
13

14 Total construction employment impacts in the ROI (including direct and indirect impacts)
15 from the use of solar trough technologies would be 789 jobs (Table 10.2.19.2-1). Construction
16 activities would constitute 2.4% of total ROI employment. A solar development would also
17 produce \$43.2 million in income. Direct sales taxes would be less than \$0.1 million;
18 direct income taxes, \$1.7 million.
19

20 Given the scale of construction activities and the low likelihood that the entire
21 construction workforce in the required occupational categories would be available within the
22 ROI, construction of a solar facility would mean that some in-migration of workers and their
23 families from outside the ROI would be required, with up to 518 persons in-migrating to the
24 ROI. Although in-migration may potentially affect local housing markets, the relatively small
25 number of in-migrants and the availability of temporary accommodations (hotels, motels, and
26 mobile home parks) would mean that the impact of solar facility construction on the number of
27 vacant rental housing units is not expected to be large, with up to 179 rental units expected to be
28 occupied in the ROI. This occupancy rate would represent 8.5% of the vacant rental units
29 expected to be available in the ROI.
30

31 In addition to the potential impact on housing markets, in-migration would affect
32 community service (education, health, and public safety) employment. An increase in such
33 employment would be required to meet existing levels of service in the ROI. Accordingly, up to
34 six new teachers, one physician, and one public safety employee (career firefighters and
35 uniformed police officers) would be required in the ROI. These increases would represent 0.8%
36 of total ROI employment expected in these occupations.
37

38 **Operations**
39

40 Total operations employment impacts in the ROI (including direct and indirect impacts)
41 of a full build-out of the SEZ using solar trough technologies would be 55 jobs
42 (Table 10.2.19.2-1). Such a solar development would also produce \$1.8 million in income.
43 Direct sales taxes would be less than \$0.1 million; direct income taxes, \$0.1 million. On the basis
44
45
46

1
2
3

TABLE 10.2.19.2-1 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed De Tilla Gulch SEZ as Revised with Trough Facilities

Parameter	Maximum Annual Construction Impacts ^a	Annual Operations Impacts ^b
Employment (no.)		
Direct	466	37
Total	789	55
Income ^c		
Total	43.2	1.8
Direct state taxes ^c		
Sales	<0.1	<0.1
Income	1.7	0.1
BLM payments ^c		
Rental	NA ^d	0.1
Capacity ^e	NA	1.1
In-migrants (no.)	518	24
Vacant housing ^f (no.)	179	15
Local community service employment		
Teachers (no.)	6	0
Physicians (no.)	1	0
Public safety (no.)	1	0

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 170 MW (corresponding to 851 acres [3 km²] of land disturbance) could be built.

^b Operations impacts were based on full build-out of the site, producing a total output of 170 MW.

^c Values are reported in \$ million 2008.

^d NA = not applicable.

^e The BLM annual capacity payment was based on a fee of \$6,570/MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010), assuming a solar facility with no storage capability, and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884/MW.

^f Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

1 of fees established by the BLM (BLM 2010), acreage rental payments would be \$0.1 million,
2 and solar generating capacity payments, at least \$1.1 million.

3
4 As for the construction workforce, operation of a solar facility likely would require some
5 in-migration of workers and their families from outside the ROI, with up to 24 persons in-
6 migrating into the ROI. Although in-migration may potentially affect local housing markets, the
7 relatively small number of in-migrants and the availability of temporary accommodations
8 (hotels, motels, and mobile home parks) would mean that the impact of solar facility operation
9 on the number of vacant owner-occupied housing units is not expected to be large, with up to
10 15 owner-occupied units expected to be occupied in the ROI.

11
12 No new community service employment would be required to meet existing levels of
13 service in the ROI.

14 15 16 ***10.2.19.2.2 Power Tower***

17 18 19 **Construction**

20
21 Total construction employment impacts in the ROI (including direct and indirect impacts)
22 from the use of power tower technologies would be 314 jobs (Table 10.2.19.2-2). Construction
23 activities would constitute 1.0 % of total ROI employment. Such a solar development would
24 also produce \$17.2 million in income. Direct sales taxes would be less than \$0.1 million; direct
25 income taxes of \$0.7 million.

26
27 Given the scale of construction activities and the low likelihood that the entire
28 construction workforce in the required occupational categories would be available within the
29 ROI, construction of a solar facility would mean that some in-migration of workers and their
30 families from outside the ROI would be required, with up to 206 persons in-migrating to the
31 ROI. Although in-migration may potentially affect local housing markets, the relatively small
32 number of in-migrants and the availability of temporary accommodations (hotels, motels, and
33 mobile home parks) would mean that the impact of solar facility construction on the number of
34 vacant rental housing units is not expected to be large, with up to 71 rental units expected to be
35 occupied in the ROI. This occupancy rate would represent 3.4% of the vacant rental units
36 expected to be available in the ROI.

37
38 In addition to the potential impact on housing markets, in-migration would affect
39 community service (education, health, and public safety) employment. An increase in such
40 employment would be required to meet existing levels of service in the ROI. Accordingly, up to
41 two new teachers and one physician would be required in the ROI. These increases would
42 represent 0.3% of total ROI employment expected in these occupations.

1
2
3

TABLE 10.2.19.2-2 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed De Tilla Gulch SEZ as Revised with Power Tower Facilities

Parameter	Maximum Annual Construction Impacts ^a	Annual Operations Impacts ^b
Employment (no.)		
Direct	185	19
Total	314	26
Income ^c		
Total	17.2	0.8
Direct state taxes ^c		
Sales	<0.1	<0.1
Income	0.7	<0.1
BLM payments ^c		
Rental	NA ^d	0.1
Capacity ^e	NA	0.6
In-migrants (no.)	206	12
Vacant housing ^f (no.)	71	8
Local community service employment		
Teachers (no.)	2	0
Physicians (no.)	1	0
Public safety (no.)	0	0

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 95 MW (corresponding to 851 acres [3 km²] of land disturbance) could be built.

^b Operations impacts were based on full build-out of the site, producing a total output of 95 MW.

^c Values are reported in \$ million 2008.

^d NA = not applicable.

^e The BLM annual capacity payment was based on a fee of \$6,570/MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010), assuming a solar facility with no storage capability, and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884/MW.

^f Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

1 **Operation**

2
3 Total operations employment impacts in the ROI (including direct and indirect
4 impacts) of a full build-out of the SEZ using power tower technologies would be 26 jobs
5 (Table 10.2.19.2-2). Such a solar development would also produce \$0.8 million in income.
6 Direct sales taxes would be less than \$0.1 million; direct income taxes, less than \$0.1 million.
7 On the basis of fees established by the BLM (BLM 2010), acreage rental payments would be
8 \$0.1 million, and solar generating capacity payments, at least \$0.6 million.
9

10 As for the construction workforce, operation of a solar facility likely would require some
11 in-migration of workers and their families from outside the ROI, with up to 12 persons in-
12 migrating to the ROI. Although in-migration may potentially affect local housing markets, the
13 relatively small number of in-migrants and the availability of temporary accommodations
14 (hotels, motels, and mobile home parks) would mean that the impact of solar facility operation
15 on the number of vacant owner-occupied housing units is not expected to be large, with up to
16 8 owner-occupied units expected to be required in the ROI.
17

18 No new community service employment would be required to meet existing levels of
19 service in the ROI.
20

21
22 ***10.2.19.2.3 Dish Engine***

23
24
25 **Construction**

26
27 Total construction employment impacts in the ROI (including direct and indirect impacts)
28 from the use of dish engine technologies would be 128 jobs (Table 10.2.19.2-3). Construction
29 activities would constitute 0.4% of total ROI employment. Such a solar development would
30 also produce \$7.0 million in income. Direct sales taxes would be less than \$0.1 million; direct
31 income taxes, \$0.3 million.
32

33 Given the scale of construction activities and the low likelihood that the entire
34 construction workforce in the required occupational categories would be available within the
35 ROI, construction of a solar facility would mean that some in-migration of workers and their
36 families from outside the ROI would be required, with up to 84 persons in-migrating into the
37 ROI. Although in-migration may potentially affect local housing markets, the relatively small
38 number of in-migrants and the availability of temporary accommodations (hotels, motels, and
39 mobile home parks) would mean that the impact of solar facility construction on the number of
40 vacant rental housing units is not expected to be large, with up to 29 rental units expected to be
41 occupied in the ROI. This occupancy rate would represent 1.4% of the vacant rental units
42 expected to be available in the ROI.
43

44 In addition to the potential impact on housing markets, in-migration would affect
45 community service (education, health, and public safety) employment. An increase in such
46 employment would be required to meet existing levels of service in the ROI. Accordingly,

1
2
3

TABLE 10.2.19.2-3 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed De Tilla Gulch SEZ as Revised with Dish Engine Facilities

Parameter	Maximum Annual Construction Impacts ^a	Annual Operations Impacts ^b
Employment (no.)		
Direct	75	19
Total	128	26
Income ^c		
Total	7.0	0.8
Direct state taxes ^c		
Sales	<0.1	<0.1
Income	0.3	<0.1
BLM payments ^c		
Rental	NA ^d	0.1
Capacity ^e	NA	0.6
In-migrants (no.)	84	12
Vacant housing ^f (no.)	29	7
Local community service employment		
Teachers (no.)	1	0
Physicians (no.)	0	0
Public safety (no.)	0	0

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 95 MW (corresponding to 851 acres [3 km²] of land disturbance) could be built.

^a Operations impacts were based on full build-out of the site, producing a total output of 1,557 MW.

^c Values are reported in \$ million 2008.

^d NA = not applicable.

^e The BLM annual capacity payment was based on a fee of \$6,570/MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010), assuming a solar facility with no storage capability, and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884/MW.

^f Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

1 one new teacher would be required in the ROI. This increase would represent 0.1% of total
2 ROI employment expected in this occupation.

3 4 5 **Operations**

6
7 Total operations employment impacts in the ROI (including direct and indirect impacts)
8 of a full build-out of the SEZ using dish engine technologies would be 26 jobs
9 (Table 10.2.19.2-3). Such a solar development would also produce \$0.8 million in income.
10 Direct sales taxes would be less than \$0.1 million; direct income taxes, less than \$0.1 million. On
11 the basis of fees established by the BLM (BLM 2010), acreage rental payments would be
12 \$0.1 million, and solar generating capacity payments, at least \$0.6 million.

13
14 As for the construction workforce, operation of a solar facility likely would require some
15 in-migration of workers and their families from outside the ROI, with up to 12 persons in-
16 migrating to the ROI. Although in-migration may potentially affect local housing markets, the
17 relatively small number of in-migrants and the availability of temporary accommodations
18 (hotels, motels, and mobile home parks) would mean that the impact of solar facility operation
19 on the number of vacant owner-occupied housing units is not expected to be large, with up to
20 seven owner-occupied units expected to be required in the ROI.

21
22 No new community service employment would be required to meet existing levels of
23 service in the ROI.

24 25 26 **10.2.19.2.4 Photovoltaic**

27 28 29 **Construction**

30
31 Total construction employment impacts in the ROI (including direct and indirect impacts)
32 from the use of PV technologies would be 60 jobs (Table 10.2.19.2-4). Construction activities
33 would constitute 0.2% of total ROI employment. Such a solar development would also produce
34 \$3.3 million in income. Direct sales taxes would be less than \$0.1 million; direct income taxes,
35 \$0.1 million.

36
37 Given the scale of construction activities and the low likelihood that the entire
38 construction workforce in the required occupational categories would be available within the
39 ROI, construction of a solar facility would mean that some in-migration of workers and their
40 families from outside the ROI would be required, with up to 39 persons in-migrating to the ROI.
41 Although in-migration may potentially affect local housing markets, the relatively small number
42 of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile
43 home parks) would mean that the impact of solar facility construction on the number of vacant
44 rental housing units is not expected to be large, with up to 14 rental units expected to be
45 occupied in the ROI. This occupancy rate would represent 0.6% of the vacant rental units
46 expected to be available in the ROI.

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2
3

TABLE 10.2.19.2-4 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed De Tilla Gulch SEZ as Revised with PV Facilities^a

Parameter	Maximum Annual Construction Impacts ^a	Annual Operations Impacts ^b
Employment (no.)		
Direct	35	2
Total	60	3
Income ^c		
Total	3.3	0.1
Direct state taxes ^c		
Sales	<0.1	<0.1
Income	0.1	<0.1
BLM payments ^c		
Rental	NA ^d	0.1
Capacity ^e	NA	0.5
In-migrants (no.)	39	1
Vacant housing ^f (no.)	14	1
Local community service employment		
Teachers (no.)	0	0
Physicians (no.)	0	0
Public safety (no.)	0	0

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 95 MW (corresponding to 851 acres [12 km²] of land disturbance) could be built.

^b Operations impacts were based on full build-out of the site, producing a total output of 95 MW.

^c Values are reported in \$ million 2008.

^d NA = not applicable.

^e The BLM annual capacity payment was based on a fee of \$5,256/MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010), assuming full build-out of the site.

^f Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

4
5

1 No new community service employment would be required to meet existing levels of
2 service in the ROI.

3 4 5 **Operations**

6
7 Total operations employment impacts in the ROI (including direct and indirect impacts)
8 of a full build-out of the SEZ using PV technologies would be three jobs (Table 10.2.19.2-4).
9 Such a solar development would also produce \$0.1 million in income. Direct sales taxes would
10 be less than \$0.1 million; direct income taxes, less than \$0.1 million. Based on fees established
11 by the BLM (BLM 2010), acreage rental payments would be \$0.1 million, and solar generating
12 capacity payments, at least \$0.5 million.

13
14 As for the construction workforce, operation of a solar facility likely would require some
15 in-migration of workers and their families from outside the ROI, with one person in-migrating to
16 the ROI. Although in-migration may potentially affect local housing markets, the relatively small
17 number of in-migrants and the availability of temporary accommodations (hotels, motels, and
18 mobile home parks) would mean that the impact of solar facility operation on the number of
19 vacant owner-occupied housing units is not expected to be large, with one owner-occupied unit
20 expected to be required in the ROI.

21
22 No new community service employment would be required to meet existing levels of
23 service in the ROI.

24 25 26 **10.2.19.3 SEZ-Specific Design Features and Design Feature Effectiveness**

27
28 Required programmatic design features that would reduce socioeconomic impacts are
29 described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the
30 programmatic design features will reduce the potential for socioeconomic impacts during all
31 project phases.

32
33 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
34 analyses due to changes to the SEZ boundaries, and consideration of comments received as
35 applicable, no SEZ-specific design features to address socioeconomic impacts have been
36 identified. Some SEZ-specific design features may be identified through the process of preparing
37 parcels for competitive offer and subsequent project-specific analysis.

38 39 40 **10.2.20 Environmental Justice**

41 42 43 **10.2.20.1 Affected Environment**

44
45 The data presented in the Draft Solar PEIS have changed due to the change in boundaries
46 of the proposed De Tilla Gulch SEZ. The affected environment information for environmental

1 justice presented in the Draft Solar PEIS has also changed, as reflected in the following
2 discussion.

3
4 The data in Table 10.2.20.1-1 show the minority and low-income composition of the total
5 population located within a 50-mi (80-km) radius of the proposed SEZ based on 2000 Census
6 data and CEQ guidelines (CEQ 1997) (see Section 10.2.20.1 of the Draft Solar PEIS).
7 Individuals identifying themselves as Hispanic or Latino are included in the table as a separate
8 entry. However, because Hispanics can be of any race, this number also includes individuals also
9 identifying themselves as being part of one or more of the population groups listed in the table.

10
11 A large number of minority and low-income individuals are located in the 50-mi (80-km)
12 area around the boundary of the SEZ. Within the 50-mi (80-km) radius, 27.9% of the population
13 is classified as minority, while 14.6% is classified as low-income. However, the number of
14 minority or low-income individuals does not exceed the state average by 20 percentage points
15 or more, and does not exceed 50% of the total population in the area; that is, there are no
16 minority or low-income populations in the 50-mi (80-km) radius of the SEZ based on
17 2000 Census data and CEQ guidelines.

18
19 A small number of block groups in the 50-mi (80-km) radius have minority populations
20 that make up more than 50% of the total population. These are located in Conejos and Costilla
21 Counties and in the cities of Alamosa (Alamosa County), Monte Vista and Del Norte (both in
22 Rio Grande County), and Center (Saguache County) and in the vicinity of Canon City (Freemont
23 County).

24
25 Low-income populations in the 50-mi (80-km) radius are limited to one block group, in
26 the City of Alamosa, which has a low-income population share that is more than 20 percentage
27 points higher than the state average.

28
29 Figures 10.2.20.1-1 and 10.2.20.1-2 show the locations of the minority and low-income
30 population groups in the 50-mi (80-km) radius around the boundary of the SEZ.

31 32 33 **10.2.20.2 Impacts**

34
35 Environmental justice concerns common to all utility-scale solar energy development are
36 described in detail in Section 5.18 of the Draft Solar PEIS. The potentially relevant
37 environmental impacts associated with solar development within the proposed SEZ include noise
38 and dust generation during the construction of solar facilities; noise and EMF effects associated
39 with solar project operations; the visual impacts of solar generation and auxiliary facilities,
40 including transmission lines; access to land used for economic, cultural, or religious purposes;
41 and effects on property values as areas of concern that might potentially affect minority and low-
42 income populations.

43
44 Potential impacts on low-income and minority populations could be incurred as a result
45 of the construction and operation of solar facilities involving each of the four technologies.
46 Although impacts are likely to be small, there are no minority populations, as defined by CEQ

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TABLE 10.2.20.1-1 Minority and Low-Income Populations within the 50-mi (80-km) Radius Surrounding the Proposed De Tilla Gulch SEZ as Revised

Parameter	Colorado
Total population	100,258
White, non-Hispanic	72,336
Hispanic or Latino	22,009
Non-Hispanic or Latino minorities	5,913
One race	4,630
Black or African American	2,838
American Indian or Alaskan Native	1,147
Asian	493
Native Hawaiian or other Pacific Islander	35
Some other race	117
Two or more races	1,283
Total minority	27,922
Low-income	12,905
Percentage minority	27.9
State percent minority	25.5
Percentage low-income	14.6
State percent low-income	9.3

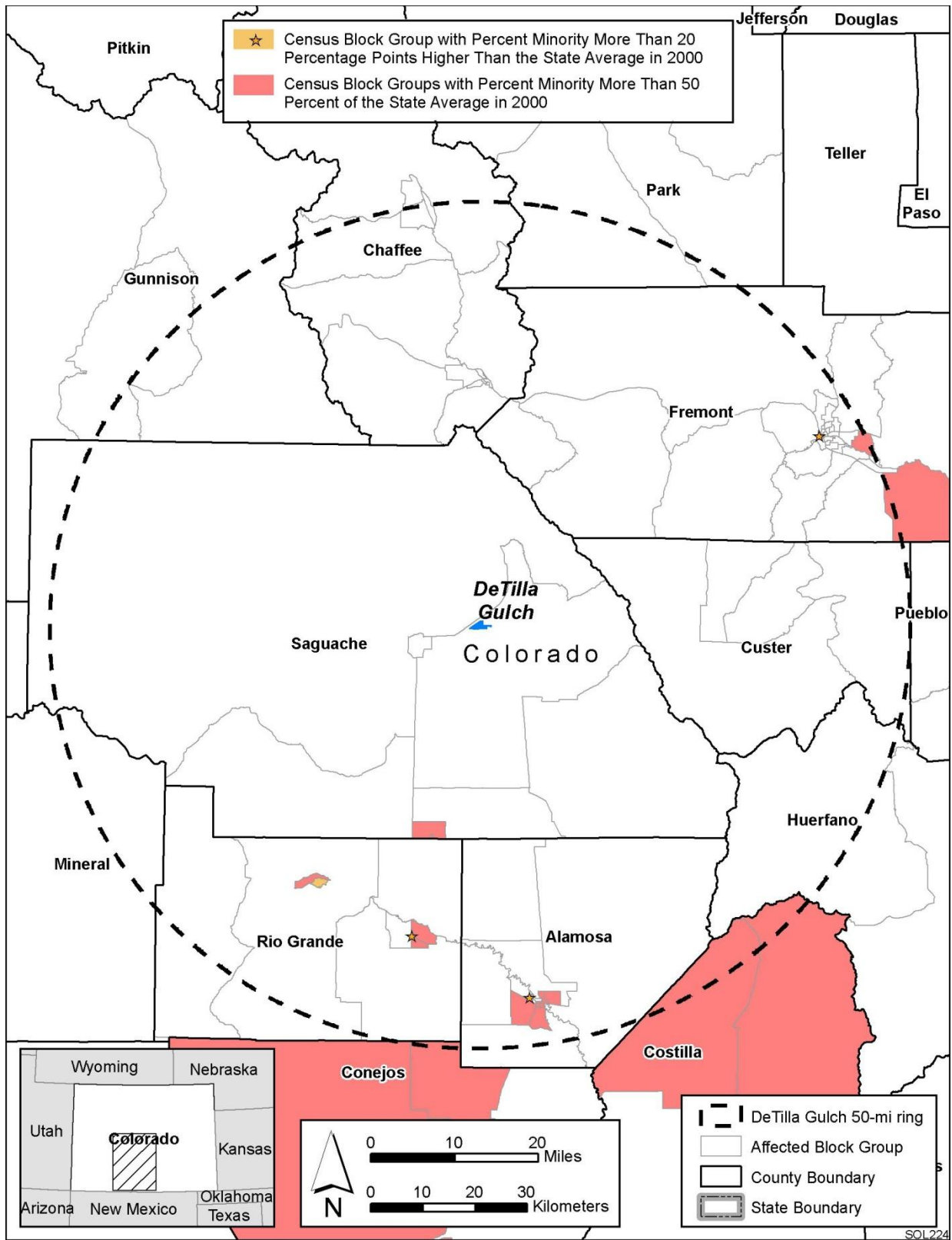
Sources: U.S. Bureau of the Census (2009a,b).

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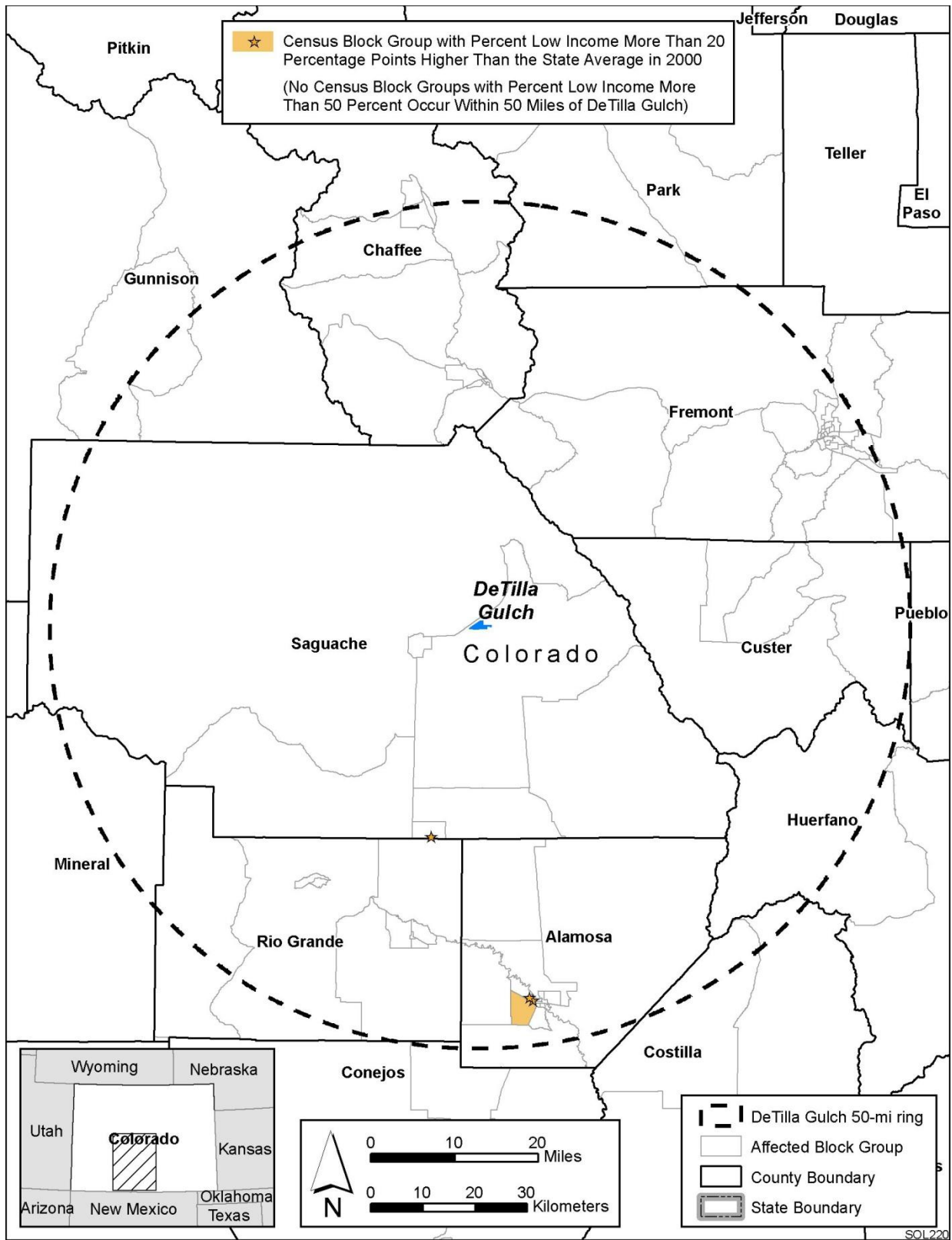
guidelines (CEQ 1997) (see Section 10.2.20.1 of the Draft Solar PEIS), within the 50-mi (80-km) radius around the boundary of the SEZ; that is, any adverse impacts of solar projects would not disproportionately affect minority populations. Because there are no low-income populations within the 50-mi (80-km) radius, there would be no impacts on low-income populations. Further analysis of any impacts that could occur would be included in subsequent NEPA reviews of individual solar projects.

10.2.20.3 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.



1
 2 **FIGURE 10.2.20.1-1 Minority Population Groups within the 50-mi (80-km) Radius Surrounding**
 3 **the Proposed De Tilla Gulch SEZ as Revised**



1

2 **FIGURE 10.2.20.1-2 Low-Income Population Groups within the 50-mi (80-km) Radius**
 3 **Surrounding the Proposed De Tilla Gulch SEZ as Revised**

1 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
2 analyses due to changes to the SEZ boundaries, and consideration of comments received as
3 applicable, no SEZ-specific design features for environmental justice have been identified. Some
4 SEZ-specific design features may be identified through the process of preparing parcels for
5 competitive offer and subsequent project-specific analysis.
6
7

8 **10.2.21 Transportation**

10 **10.2.21.1 Affected Environment**

11 The reduction in size of the SEZ does not change the information on affected
12 environment for transportation presented in the Draft Solar PEIS.
13
14

15 **10.2.21.2 Impacts**

16 As stated in the Draft Solar PEIS, the primary transportation impacts are anticipated to be
17 from commuting worker traffic. U.S. 285 provides a regional traffic corridor that could
18 experience moderate impacts for single projects that may have up to 1,000 daily workers, with an
19 additional 2,000 vehicle trips per day (maximum). This would represent up to approximately two
20 times the current AADT values for U.S. 285, or up to approximately three times the amount of
21 traffic currently using State Highway 17, depending on the distribution of new worker traffic
22 between these two routes. Local road improvements would be necessary in any portion of the
23 SEZ along U.S. 285 that might be developed so as not to overwhelm the local roads near any site
24 access point(s). CR 55 and any other access roads connected to it would require road
25 improvements to handle the additional traffic.
26
27
28
29

30 Solar development within the SEZ would affect public access along OHV routes that are
31 designated open and available for public use. Although open routes crossing areas granted
32 ROWs for solar facilities could be redesignated as closed (see Section 5.5.1 of the Draft Solar
33 PEIS), a programmatic design feature has been included under Recreation (Section A.2.2.6.1 of
34 Appendix A) that requires consideration of replacement of lost OHV route acreage and of access
35 across and to public lands.
36
37

38 **10.2.21.3 SEZ-Specific Design Features and Design Feature Effectiveness**

39 Required programmatic design features that would reduce transportation impacts are
40 described in Section A.2.2 of Appendix A of this Final Solar PEIS. The programmatic design
41 features, including local road improvements, multiple site access locations, staggered work
42 schedules, and ride-sharing, will all provide some relief to traffic congestion on local roads
43 leading to the SEZ. Depending on the location of solar facilities within the SEZ, more specific
44 access locations and local road improvements could be implemented.
45
46

1 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to these
2 analyses due to changes to the SEZ boundaries, and consideration of comments received as
3 applicable, no SEZ-specific design features to address transportation impacts in the proposed
4 De Tilla Gulch SEZ have been identified. Some SEZ-specific design features may be identified
5 through the process of preparing parcels for competitive offer and subsequent project-specific
6 analysis.
7
8

9 **10.2.22 Cumulative Impacts**

10
11 The analysis of potential impacts in the vicinity of the proposed De Tilla Gulch SEZ
12 presented in the Draft Solar PEIS is still generally applicable for this Final Solar PEIS, although
13 the impacts would be decreased because the size of the proposed SEZ has been reduced to
14 1,064 acres (4.3 km²). The following sections include an update to the information presented in
15 the Draft Solar PEIS regarding cumulative effects for the proposed De Tilla Gulch SEZ.
16
17

18 **10.2.22.1 Geographic Extent of the Cumulative Impact Analysis**

19
20 The geographic extent of the cumulative impact analysis has not changed. The extent
21 varies on the basis of the nature of the resource being evaluated and the distance at which
22 an impact may occur (thus, e.g., air quality impacts may have a greater regional extent than
23 cultural resources impacts). Lands around the SEZ are privately owned or administered by the
24 USFS, NPS, or the BLM. The BLM administers approximately 16% of the lands within a 50-mi
25 (80-km) radius of the De Tilla Gulch SEZ.
26
27

28 **10.2.22.2 Overview of Ongoing and Reasonably Foreseeable Future Actions**

29
30 The proposed De Tilla Gulch SEZ decreased from 1,522 acres (6.2 km²) to 1,064 acres
31 (4.3 km²). The Draft Solar PEIS included three other proposed SEZs in Colorado: Antonito
32 Southeast, Fourmile East, and Los Mogotes East. All of these SEZs are being carried forward to
33 the Final Solar PEIS; the areas of the Fourmile East and Los Mogotes East SEZs have been
34 decreased.
35

36 The ongoing and reasonably foreseeable future actions described below are grouped into
37 two categories: (1) actions that relate to energy production and distribution and (2) other ongoing
38 and reasonably foreseeable actions, including those related to electric power generation and
39 distribution, wildlife management, and military facility improvement (Section 10.2.22.2.2).
40 Together, these actions and trends have the potential to affect human and environmental
41 receptors within the geographic range of potential impacts over the next 20 years.
42
43

1 **10.2.22.2.1 Energy Production and Distribution**

2
3 The list of reasonably foreseeable future actions near the proposed De Tilla Gulch SEZ
4 has been updated and is presented in Table 10.2.22.2-1. Projects listed in the table are shown in
5 Figure 10.2.22.2-1.

6
7 Xcel Energy (Public Service Company of Colorado) has submitted a transmission
8 planning report to the Colorado Public Utility Commission stating that it intends to end its
9 involvement in the proposed San Luis Valley–Calumet–Comanche Transmission project
10 (Heide 2011). The project itself has not been cancelled.

11
12
13 **10.2.22.2.2 Other Actions**

14
15 None of the major ongoing and foreseeable actions within 50 mi (80 km) of the proposed
16 De Tilla Gulch SEZ listed in Table 10.2.22.2-3 of the Draft Solar PEIS have had a change in
17 their status.

18
19
20 **10.2.22.3 General Trends**

21
22 The information on general trends presented in the Draft Solar PEIS remains valid.

23
24
25 **10.2.22.4 Cumulative Impacts on Resources**

26
27 Total disturbance over 20 years in the proposed De Tilla Gulch SEZ is assumed to be
28 about 851 acres (3.4 km²) (80% of the entire proposed SEZ). This development would contribute
29 incrementally to the impacts from other past, present, and reasonably foreseeable future actions
30 in the region as described in the Draft Solar PEIS. Primary impacts from development in the
31 De Tilla Gulch SEZ may include impacts on water quantity and quality, air quality, ecological
32 resources such as habitat and species, cultural and visual resources, and specially designated
33 lands.

34
35 No additional major actions have been identified within 50 mi (80 km) of the SEZ. As a
36 result of the reduction in the developable area of the SEZ, the incremental cumulative impacts
37 associated with development in the proposed De Tilla Gulch SEZ during construction, operation,
38 and decommissioning are expected to be the same or less than those discussed in the Draft Solar
39 PEIS.

40
41 On the basis of comments received on the Draft Solar PEIS, cumulative impacts on
42 recreation in the San Luis Valley have been reconsidered. While it is unlikely that the proposed
43 De Tilla Gulch SEZ would have a large impact on recreational use or tourism throughout the
44 valley, cumulative impacts could occur because it is one of four proposed SEZs totaling about
45 16,300 acres (66 km²) on public lands, and there are additional solar energy developments on
46 private lands. Because most of the land on the valley floor of the San Luis Valley is private and

1 **TABLE 10.2.22.2-1 Ongoing and Reasonably Foreseeable Future Actions Related to Energy**
 2 **Development and Distribution near the Proposed De Tilla Gulch SEZ as Revised and in the**
 3 **San Luis Valley^a**

Description	Status	Resources Affected	Primary Impact Location
<i>Renewable Energy Development</i>			
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, 19-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	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
<i>Transmission and Distribution Systems</i>			
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.

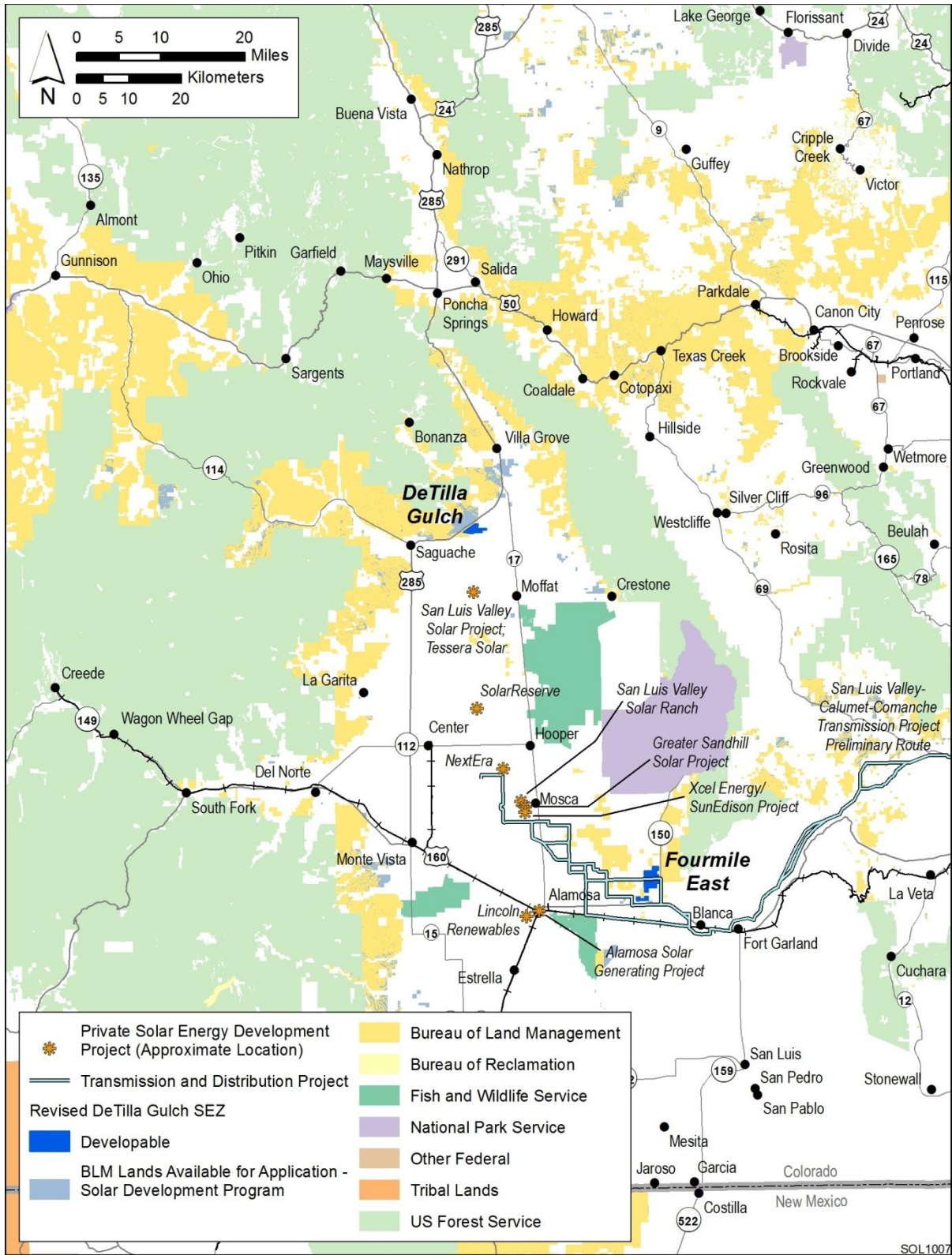
^b See SEIA (2012) for details.

^c To convert acres to km², 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.



1
 2 **FIGURE 10.22.2-1 Locations of Existing and Reasonably Foreseeable Renewable Energy**
 3 **Projects on Public Land within a 50-mi (80-km) Radius of the Proposed De Tilla Gulch SEZ**
 4 **as Revised**

1 is heavily developed for agricultural use, undeveloped public lands around the valley provide
2 accessible areas for public recreation. Although it is believed the recreational use of the proposed
3 SEZ is low, the loss of public access to such areas cumulatively leads to an overall reduction in
4 the availability of recreation that can become significant.

5
6 The CDOW has identified the potential for an impact on the availability of hunting
7 opportunities for pronghorn antelope associated with development of the De Tilla Gulch SEZ.
8 While it is unlikely that hunting occurs directly within the proposed SEZ, animals that use the
9 land likely support hunting recreation elsewhere. The relatively small potential impact on the
10 De Tilla Gulch SEZ is probably better considered in the context of the potential cumulative loss
11 of about 16,000 acres to solar development on public lands from potential development of all
12 four SEZs. Permits to hunt pronghorn in the San Luis Valley are very scarce, and impacts
13 associated with incremental habitat loss on public lands that are open to hunting may be reflected
14 in a further reduction of available hunting permits.

15 16 17 **10.2.23 Transmission Analysis** 18

19 The methodology for this transmission analysis is described in Appendix G of this Final
20 Solar PEIS. This section presents the results of the transmission analysis for the De Tilla Gulch
21 SEZ, including the identification of potential load areas to be served by power generated at the
22 SEZ and the results of the DLT analysis. Unlike Sections 10.2.2 through 10.2.22, this section is
23 not an update of previous analysis for the De Tilla Gulch SEZ; this analysis was not presented in
24 the Draft Solar PEIS. However, the methodology and a test case analysis were presented in the
25 Supplement to the Draft Solar PEIS. Comments received on the material presented in the
26 Supplement were used to improve the methodology for the assessment presented in this Final
27 Solar PEIS.

28
29 On the basis of its size, the assumption of a minimum of 5 acres (0.02 km²) of land
30 required per MW, and the assumption of a maximum of 80% of the land area developed, the
31 De Tilla Gulch SEZ is estimated to have the potential to generate 170 MW of marketable solar
32 power at full build-out.

33 34 35 **10.2.23.1 Identification and Characterization of Load Areas** 36

37 The primary candidates for De Tilla Gulch SEZ load areas are the major surrounding
38 cities. Figure 10.2.23.1-1 shows the possible load areas for the De Tilla Gulch SEZ and the
39 estimated portion of their market that could be served by solar generation. Possible load areas for
40 the De Tilla Gulch SEZ include Pueblo, Colorado Springs, and Denver, Colorado; Farmington,
41 Albuquerque, and Santa Fe, New Mexico; Salt Lake City, Utah; Phoenix, Arizona; and
42 Las Vegas, Nevada.



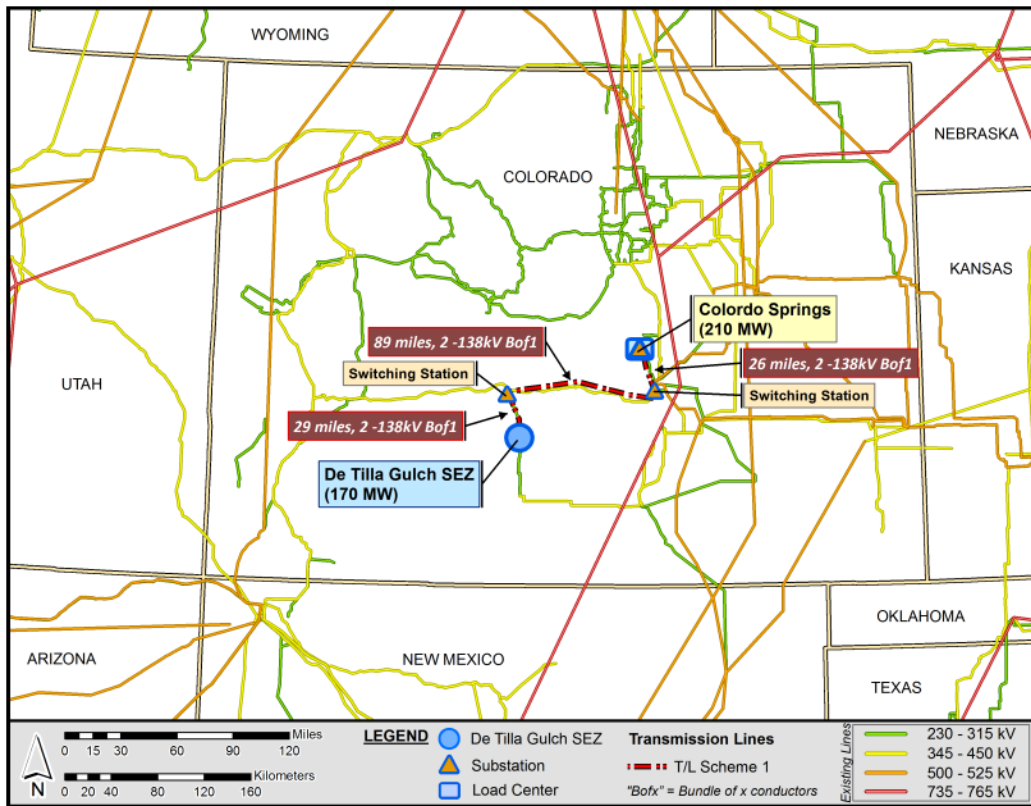
FIGURE 10.2.23.1-1 Location of the Proposed De Tilla Gulch SEZ and Possible Load Areas (Source for background map: Platts 2011)

The two load area groups examined for the De Tilla Gulch SEZ are as follows:

1. Colorado Springs, Colorado, and
2. Denver, Colorado.

Figure 10.2.23.1-2 shows the most economically viable transmission scheme for the De Tilla Gulch SEZ (transmission scheme 1) and Figure 10.2.23.1-3 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 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 170 MW could be fully allocated.

Table 10.2.23.1-1 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.



1

2 **FIGURE 10.2.23.1-2 Transmission Scheme 1 for the Proposed De Tilla Gulch**
 3 **SEZ (Source for background map: Platts 2011)**

2

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6 **10.2.23.2 Findings for the DLT Analysis**

7

8

8 The DLT analysis approach assumes that the De Tilla Gulch SEZ will require all new
 9 construction for transmission lines (i.e., dedicated lines) and substations. The new transmission
 10 lines(s) would directly convey the 170-MW output of the De Tilla Gulch SEZ to the prospective
 11 load areas for each possible transmission scheme. The approach also assumes that all existing
 12 transmission lines in the WECC region are saturated and have little or no available capacity to
 13 accommodate the SEZ’s output throughout the entire 10-year study horizon.

14

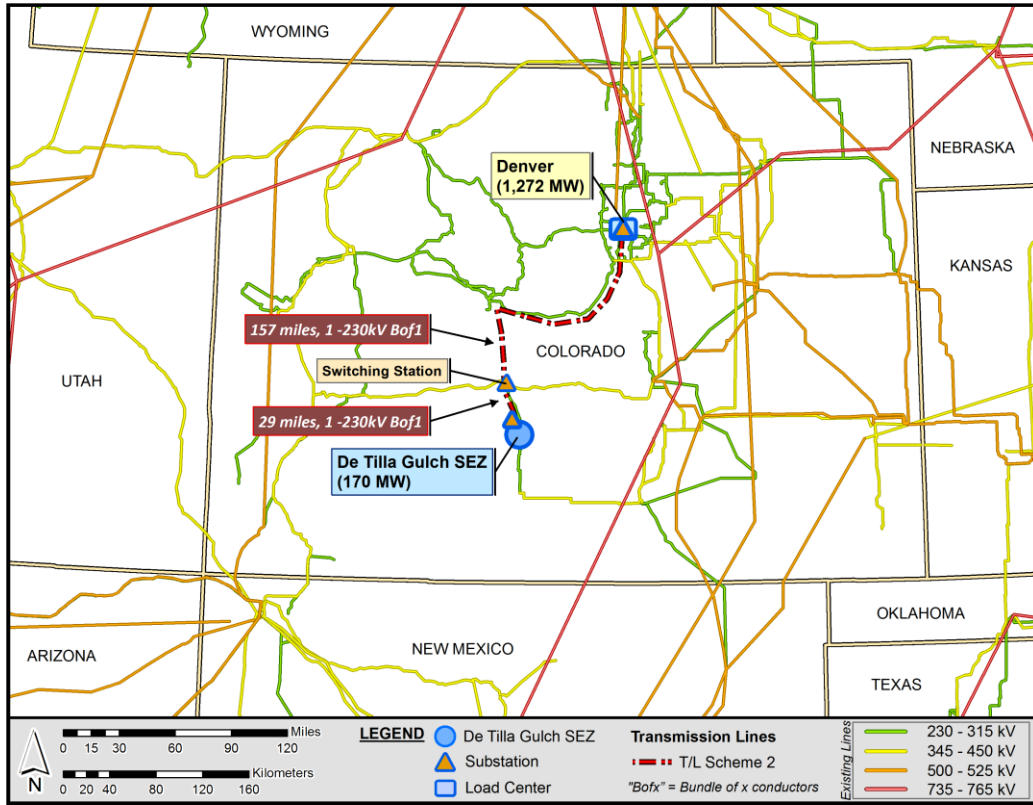
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15 Figures 10.2.23.1-2 and 10.2.23.1-3 display the pathways that new dedicated lines might
 16 follow to distribute solar power generated at the De Tilla Gulch SEZ via the two identified
 17 transmission schemes described in Table 10.2.23.1-1. These pathways parallel existing 500-,
 18 345-, 230-kV, and/or lower voltage lines. The intent of following existing lines is to avoid
 19 pathways that may be infeasible due to topographical limitations or other concerns.

20

21

21 For transmission scheme 1, serving a load center to the north, a new line would be
 22 constructed to connect with Colorado Springs (210 MW), so that the 170-MW output of the
 23 De Tilla Gulch SEZ could be fully utilized (Figure 10.2.23.1-2). This particular scheme has three
 24 segments. The first segment stretches from the SEZ, running about 29 mi (47 km) north, to the



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FIGURE 10.2.23.1-3 Transmission Scheme 2 for the Proposed De Tilla Gulch SEZ (Source for background map: Platts 2011)

TABLE 10.2.23.1-1 Candidate Load Area Characteristics for the Proposed De Tilla Gulch 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	Colorado Springs, Colorado ^a	North	420,000	1,050	210
2	Denver, Colorado ^b	North	2,543,000	6,358	1,272

^a The load area represents the city named.

^b The load area represents the metropolitan area of Denver (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).

8
9

1 first switching or junction substation. The second segment extends about 89 mi (143 km) from
2 the first switching station to a second switching substation. The third leg extends 26 mi (42 km)
3 north to Colorado Springs. The transmission configuration options were determined by using the
4 line “loadability” curve provided in American Electric Power’s *Transmission Facts* (AEP 2010).
5 Appendix G documents the line options used for this analysis and describes how the load area
6 groupings were determined.
7

8 For transmission scheme 2 serving Denver to the northeast, Figure 10.2.23.1-3 shows that
9 a new line would need to be constructed to connect from the SEZ directly to Denver
10 (1,272 MW). The line comprises two segments and has a total length of about 186 mi (301 km).
11 On the basis of engineering and operational considerations, this line would require a single-
12 circuit 230-kV bundle of one conductor (Bof1) design. The design of the transmission lines takes
13 into account the thermal, voltage drop, and steady-state stability limits associated with the
14 operation of the lines.
15

16 Table 10.2.23.2-1 summarizes the distances to the various load areas over which new
17 transmission lines would need to be constructed, as well as the assumed number of substations
18 that would be required. One substation is assumed to be installed at each load area and an
19 additional one at the SEZ. Thus, in general, the total number of substations per scheme is simply
20 equal to the number of load areas associated with the scheme plus one. Substations at the load
21 areas would consist of one or more step-down transformers, while the originating substation at
22 the SEZ would consist of several step-up transformers. The originating substation would have a
23 combined substation rating of at least 170 MW (to match the plant’s output), while the combined
24 load substations would have a similar total rating of 170 MW. For both schemes 1 and 2, note
25 that several intervening substations or booster stations (also called switching stations) are
26 installed. These substations are installed at junction points where future possible branching could
27 be made. The primary purposes for this specific design are to strengthen the line segments and to
28 provide a voltage-boosting mechanism so that a lower transmission voltage can be utilized to
29 drive the cost down. In general, switching stations carry no local load but are assumed to be
30 equipped with switching gears (e.g., circuit breakers and connecting switches) to reroute power
31 as well as, in some cases, with additional equipment to regulate voltage.
32

33 Table 10.2.23.2-2 provides an estimate of the total land area disturbed for construction of
34 new transmission facilities under each of the schemes evaluated. The most favorable
35 transmission scheme with respect to minimizing the costs and area disturbed would be scheme 1,
36 which would serve Colorado Springs and for which the construction of new transmission lines
37 and substations is estimated to disturb about 1,409 acres (5.7 km²) of land. The second most
38 favorable transmission scheme with respect to minimizing the costs and area disturbed would be
39 scheme 2 (serving Denver). For this scheme, the construction of new transmission lines and
40 substations is estimated to disturb a land area on the order of 3,390 acres (13.7 km²).
41

42 Table 10.2.23.2-3 shows the estimated NPV of both transmission schemes and takes into
43 account the cost of constructing the lines and the substations and the projected revenue stream
44 over the 10-year horizon. A positive NPV indicates that revenues more than offset investments.
45 This calculation does not include the cost of producing electricity.
46

1 **TABLE 10.2.23.2-1 Potential Transmission Schemes, Estimated Solar Markets, and Distances to**
 2 **Load Areas for the Proposed De Tilla Gulch 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	Colorado Springs, Colorado ^a	210	210	144	144	138	4
2	Denver, Colorado ^b	1,272	1,272	186	186	230	3

a The load area represents the city named.

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

c From Table 10.2.23.1-1.

d To convert mi to km, multiply by 1.6093.

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TABLE 10.2.23.2-2 Comparison of the Various Transmission Line Configurations with Respect to Land Use Requirements for the Proposed De Tilla Gulch SEZ

Transmission Scheme	City/Load Area Name	Total Distance (mi) ^c	No. of Substations	Land Use (acres) ^d		
				Transmission Line	Substation	Total
1	Colorado Springs, Colorado ^a	144	4	1,396.4	12.2	1,408.6
2	Denver, Colorado ^b	186	2	3,381.8	8.1	3,389.9

a The load area represents the city named.

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

c To convert mi to km, multiply by 1.6093.

d To convert acres to km², multiply by 0.004047.

7
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9

1 **TABLE 10.2.23.2-3 Comparison of Potential Transmission Lines with Respect to NPV (Base Case)**
 2 **for the Proposed De Tilla Gulch 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	Colorado Springs, Colorado ^a	110.0	11.2	29.8	230.0	108.8
2	Denver, Colorado ^b	204.6	11.2	29.8	230.0	14.2

^a The load area represents the city named.

^b The load area represents the metropolitan area of Denver (i.e., the identified city plus adjacent communities).

3
 4
 5 The most economically attractive configuration (transmission scheme 1) has the highest
 6 positive NPV and serves Colorado Springs. The secondary case (transmission scheme 2), which
 7 excludes one or more of the primary pathways used in scheme 1, is less economically attractive
 8 and focuses on delivering power to Denver. Scheme 2 exhibits a positive but substantially lower
 9 NPV than scheme 1 for the assumed utilization factor of 20%.

10
 11 Table 10.2.23.2-4 shows the effect of varying the value of the utilization factor on the
 12 NPV of the transmission schemes. It also shows that as the utilization factor is increased, the
 13 economic viability of the lines also increases. Utilization factors can be raised by allowing the
 14 new dedicated lines to market other power generation outputs in the region in addition to that of
 15 its associated SEZ.

16
 17 The findings of the DLT analysis for the proposed De Tilla Gulch SEZ are as follows:

- 18 • Transmission scheme 1, which identifies Colorado Springs as the primary
 19 market, represents the most favorable option based on NPV and land use
 20 requirements. This scheme would result in new land disturbance of about
 21 1,409 acres (5.7 km²).
- 22 • Transmission scheme 2, which represents an alternative configuration, serves
 23 Denver. In terms of defining potential upper-bound impacts of new
 24 transmission infrastructure development, this configuration would result in
 25 new land disturbance of about 3,390 acres (13.7 km²).
- 26 • Other load area configurations are possible but would be less favorable than
 27 scheme 1 in terms of NPV and, in most cases, also in terms of land use
 28 requirements. If new electricity generation at the proposed De Tilla Gulch
 29 SEZ is not sent to either of the two markets identified above, the potential
 30 upper-bound impacts in terms of cost would be greater.

1 **TABLE 10.2.23.2-4 Effect of Varying the Utilization Factor on the NPV of the Transmission**
 2 **Schemes for the Proposed De Tilla Gulch SEZ**

Transmission Scheme	City/Load Area Name	NPV (\$ million) at Different Utilization Factors					
		20%	30%	40%	50%	60%	70%
1	Colorado Springs, Colorado ^a	108.8	223.8	338.8	453.8	568.8	683.7
2	Denver, Colorado ^b	14.2	129.2	244.2	359.2	474.2	589.1

^a The load area represents the city named.

^b The load area represents the metropolitan area of Denver (i.e., the identified city plus adjacent communities).

- The analysis of transmission requirements for the proposed De Tilla Gulch SEZ indicates no reduction of impacts from increasing the solar-eligible load assumption for either transmission scheme 1, which brings power to Colorado Springs, or transmission scheme 2, which brings power to Denver. Increasing the solar-eligible percentage would have no effect, because an adequate load area was identified under the 20% assumption that would accommodate all of the SEZ’s capacity. Thus, line distances and voltages would not be affected by increasing the solar-eligible load assumption, and, similarly, the associated costs and land disturbance would not be affected.

10.2.24 Impacts of the Withdrawal

The BLM is proposing to withdraw 1,064 acres (4.3 km²) of public land comprising the proposed De Tilla Gulch 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

1 development, such as the establishment of open pit mining, construction of roads for hauling
2 materials, extraction of ores from tunnels or adits, or construction of facilities to process the
3 material mined, that could preclude use of the SEZ for solar energy development. For the
4 De Tilla Gulch SEZ, the impacts of the proposed withdrawal on mineral resources and related
5 economic activity and employment are expected to be negligible because the mineral potential of
6 the lands within the SEZ is low (BLM 2012). There has been no documented mining within the
7 SEZ, and there are no known locatable mineral deposits within the land withdrawal area.
8 According to the LR2000 (accessed in May 2012), there are no recorded mining claims within
9 the land withdrawal area.

10
11 Although the mineral potential of the lands within the De Tilla Gulch SEZ is low, the
12 proposed withdrawal of lands within the SEZ could preclude many types of mining activity over
13 a 20-year period, resulting in the avoidance of potential mining-related adverse impacts. Impacts
14 commonly related to mining development include increased soil erosion and sedimentation,
15 water use, generation of contaminated water in need of treatment, creation of lagoons and ponds
16 (hazardous to wildlife), toxic runoff, air pollution, establishment of noxious weeds and invasive
17 species, habitat destruction or fragmentation, disturbance of wildlife, blockage of migration
18 corridors, increased visual contrast, noise, destruction of cultural artifacts and fossils and/or their
19 context, disruption of landscapes and sacred places of interest to tribes, increased traffic and
20 related emissions, and conflicts with other land uses (e.g., recreational).

21 22 23 **10.2.25 References**

24
25 *Note to Reader:* This list of references identifies Web pages and associated URLs where
26 reference data were obtained for the analyses presented in this Final Solar PEIS. It is likely that
27 at the time of publication of this Final Solar PEIS, some of these Web pages may no longer be
28 available or the URL addresses may have changed. The original information has been retained
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35

1 **10.2.26 Errata for the Proposed De Tilla Gulch SEZ**

2
3 This section presents corrections to material presented in the Draft Solar PEIS and the
4 Supplement to the Draft. The need for these corrections was identified in several ways: through
5 comments received on the Draft Solar PEIS and the Supplement to the Draft (and verified by the
6 authors), through new information obtained by the authors subsequent to publication of the Draft
7 and Supplement, or through additional review of the original material by the authors.
8 Table 10.2.26-1 provides corrections to information presented in the Draft Solar PEIS and the
9 Supplement to the Draft Solar PEIS.

10

TABLE 10.2.26-1 Errata for the Proposed De Tilla Gulch SEZ (Section 10.2 of the Draft Solar PEIS and Section C.3.2 of the Supplement to the Draft Solar PEIS)

Section No.	Page No.	Line No.	Figure No.	Table No.	Correction
10.2.1.3	10.2-13			10.2.1.3-1	“Weak to moderate contrasts could be observed from the northern portions of the [Baca] NWR,” should read “Weak contrasts could be observed from the northern portions of the NWR.”
10.2.11.2	10.2-202				All uses of the term “neotropical migrants” in the text and tables of this section should be replaced with the term “passerines.”
10.2.15.2.1	10.2-202	31			“If a 10.2-hour daytime...” should read “If a 10-hour daytime...”

1 **10.3 FOURMILE EAST**

2
3
4 **10.3.1 Background and Summary of Impacts**

5
6
7 **10.3.1.1 General Information**

8
9 The proposed Fourmile East SEZ is located in Alamosa County in south-central
10 Colorado. The town of Alamosa is located about 13 mi (21 km) west of the SEZ and had an
11 estimated 2008 population of 8,745. In 2008, the county population was 15,783. U.S. 160 runs
12 from west to east about 0.6 mi (1 km) south of the SEZ, while CO 150 runs north–south near the
13 eastern border of the SEZ; Great Sands Dunes National Park is located about 9 mi (14 km) north
14 of the SEZ on CO 150. The SLRG Railroad serves the area. As of October 28, 2011, there were
15 no pending solar project applications within or adjacent to the SEZ.

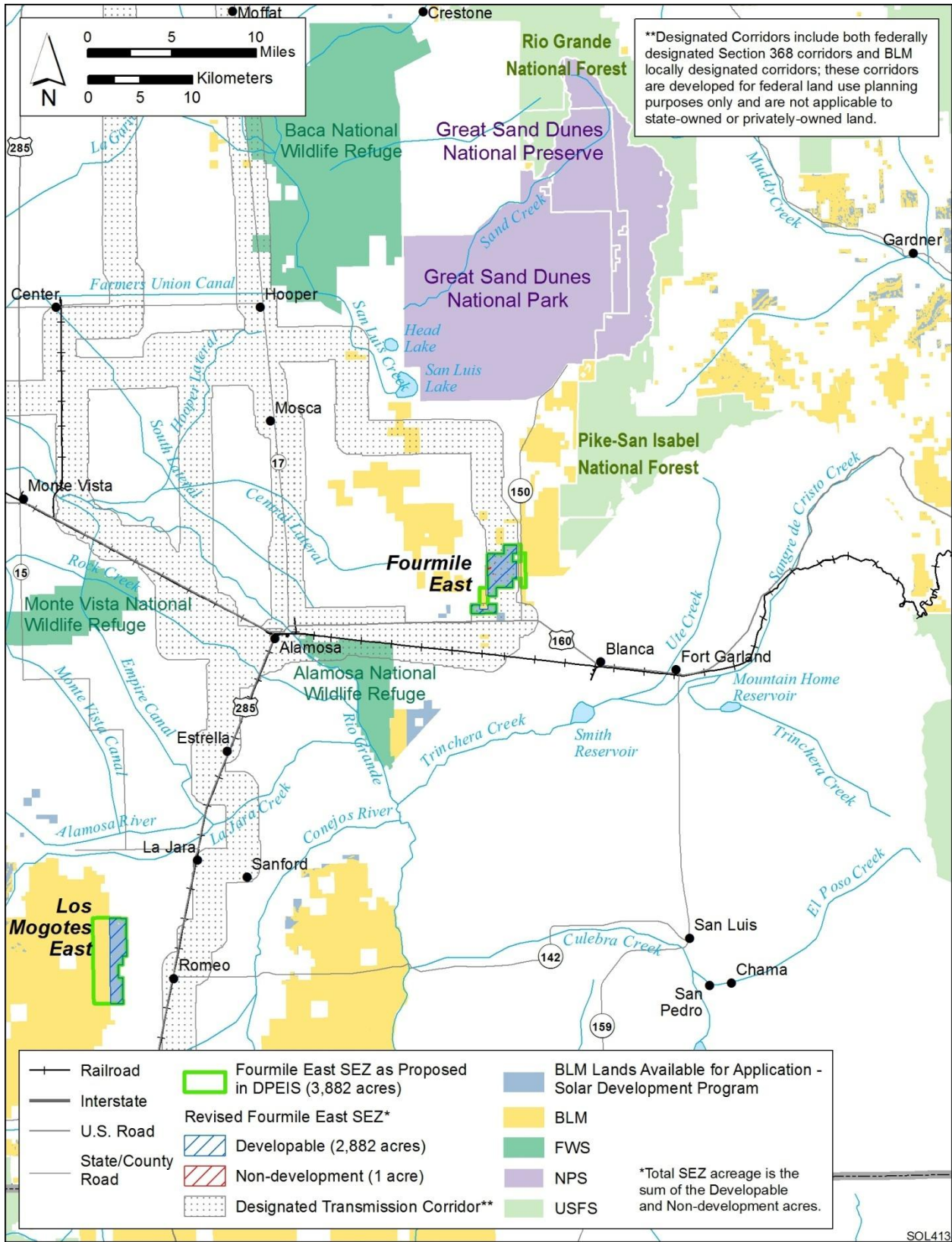
16
17 As published in the Draft Solar PEIS (BLM and DOE 2010), the proposed Fourmile East
18 SEZ had a total area of 3,882 acres (15.7 km²) (see Figure 10.3.1.1-1). In the Supplement to the
19 Draft Solar PEIS (BLM and DOE 2011), the size of the SEZ was reduced, eliminating 999 acres
20 (4 km²) and identifying a total of about 1 acre (0.004 km²) of dispersed wetlands as a non-
21 development area. The eliminated areas are mainly along the eastern boundary of the SEZ and
22 include a small area on the west side of the proposed SEZ (see Figure 10.3.1.1-2). Eliminating
23 these areas is primarily intended to avoid or minimize impacts on known cultural resources, a
24 historic playa basin, Caminos Antiguos Scenic Byway, the Old Spanish National Historic Trail,
25 the Pike National Historic Trail, big game winter range, and important riparian habitat. The
26 remaining developable area within the SEZ area is 2,882 acres (11.7 km²).

27
28 Because of the extensive potential impacts from solar development in the portion of the
29 Fourmile East SEZ that has been eliminated, those lands are proposed as solar ROW exclusion
30 areas; that is, applications for solar development on those lands will not be accepted by the BLM.

31
32 The analyses in the following sections update the affected environment and potential
33 environmental, cultural, and socioeconomic impacts associated with utility-scale solar energy
34 development in the Fourmile East SEZ as described in the Draft Solar PEIS.

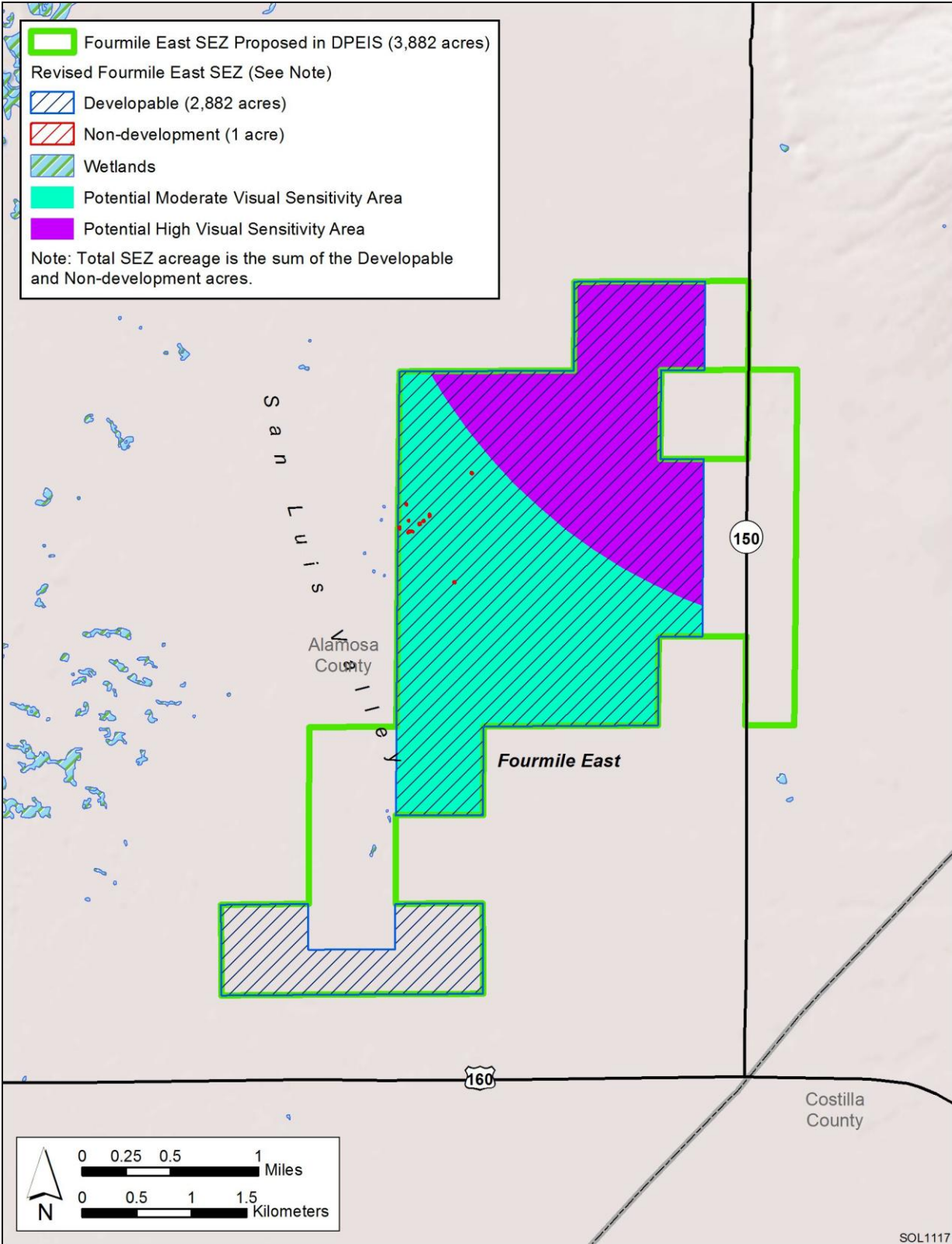
35
36
37 **10.3.1.2 Development Assumptions for the Impact Analysis**

38
39 Maximum development of the proposed Fourmile East SEZ was assumed to be
40 80% of the total SEZ area over a period of 20 years, a maximum of 2,306 acres (9.3 km²)
41 (Table 10.3.1.2-1). Full development of the Fourmile East SEZ would allow development
42 of facilities with an estimated total of between 256 MW (power tower, dish engine, or PV
43 technologies, 9 acres/MW [0.04 km²/MW]) and 461 MW (solar trough technologies,
44 5 acres/MW [0.02 km²/MW]) of electrical power capacity.



1

2 **FIGURE 10.3.1.1-1 Proposed Fourmile East SEZ as Revised**



1

2 **FIGURE 10.3.1.1-2 Developable and Non-development Areas for the Proposed Fourmile East**
 3 **SEZ as Revised**

1 **TABLE 10.3.1.2-1 Assumed Development Acreages, Solar MW Output, and Nearest Major Access**
 2 **Road and Transmission Line for the Proposed Fourmile East SEZ as Revised**

Total Developable Acreage and Assumed Developed Acreage (80% of Total)	Assumed Maximum SEZ Output for PV 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
2,882 acres ^a and 2,306 acres	256 MW ^b 461 MW ^c	Adjacent (CO 150)	2 mi ^d and 69 kV	0 acres	Adjacent/ through ^f

- a To convert acres to km², multiply by 0.004047.
- b Maximum power output if the SEZ were fully developed using PV technologies, assuming 9 acres/MW (0.04 km²/MW) of land required.
- c Maximum power output if the SEZ were fully developed using solar trough technologies, assuming 5 acres/MW (0.02 km²/MW) of land required.
- d To convert mi to km, multiply by 1.609.
- 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 A BLM locally designated corridor covers the entire proposed Fourmile East SEZ.

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Availability of transmission from SEZs to load centers will be an important consideration for future development in SEZs. For the proposed Fourmile East SEZ, the nearest existing transmission line as identified in the Draft Solar PEIS is a 69-kV line 2 mi (3.2 km) south 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 that line would be inadequate for 256 to 461 MW of new capacity. Therefore, at full build-out capacity, new transmission lines and possibly upgrades of existing transmission lines would be required to bring electricity from the proposed Fourmile East SEZ to load centers. An assessment of the most likely load center destinations for power generated at the Fourmile East SEZ and a general assessment of the impacts of constructing and operating new transmission facilities to those load centers are provided in Section 10.3.23. 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.

The transmission assessment for the Fourmile East SEZ has been updated, and the hypothetical transmission corridor assessed in the Draft Solar PEIS is no longer applicable. For this updated assessment, the 61 acres (0.25 km²) 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 10.3.23).

1 Most of the Fourmile East SEZ overlaps a locally designated transmission corridor that
2 does not currently contain any transmission facilities. For this impact assessment, it is assumed
3 that up to 80% of the proposed SEZ could be developed. This does not take into account the
4 potential limitations to solar development that may result from siting constraints associated with the
5 corridor. The development of solar facilities and the existing corridor will be dealt with by the BLM
6 on a case-by-case basis. See Section 10.3.2.2 on impacts on lands and realty for further discussion.
7

8 For the proposed Fourmile East SEZ, both CO 150 and U.S. 160 run within 1 mi (2 km)
9 of the SEZ. Existing road access to the proposed Fourmile East SEZ should be adequate to
10 support construction and operation of solar facilities. No additional road construction outside of
11 the SEZ is assumed to be required to support solar development, as summarized in
12 Table 10.3.1.2-1.
13

14 **10.3.1.3 Programmatic and SEZ-Specific Design Features**

15
16
17 The proposed programmatic design features for each resource area to be required under
18 BLM's Solar Energy Program are presented in Section A.2.2 of Appendix A of this Final Solar
19 PEIS. These programmatic design features are intended to avoid, minimize, and/or mitigate
20 adverse impacts from solar energy development and will be required for development on all
21 BLM-administered lands, including SEZ and non-SEZ lands.
22

23 The discussions below addressing potential impacts from solar energy development on
24 specific resource areas (Sections 10.3.2 through 10.3.22) also provide an assessment of the
25 effectiveness of the programmatic design features in mitigating adverse impacts from solar
26 development within the SEZ. SEZ-specific design features to address impacts specific to the
27 proposed Fourmile East SEZ may be required in addition to the programmatic design features.
28 The proposed SEZ-specific design features for the Fourmile East SEZ have been updated on the
29 basis of revisions to the SEZ since the Draft Solar PEIS (such as boundary changes and the
30 identification of non-development areas), and on the basis of comments received on the Draft
31 and Supplement to the Draft Solar PEIS. All applicable SEZ-specific design features identified
32 to date (including those from the Draft Solar PEIS that are still applicable) are presented in
33 Sections 10.3.2 through 10.3.22.
34

35 **10.3.2 Lands and Realty**

36 **10.3.2.1 Affected Environment**

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38
39
40
41 The total developable acreage of the proposed Fourmile East SEZ has been reduced to
42 2,882 acres (11.7 km²), with an assumed developable area (80%) of 2,306 acres (9.3 km²). The
43 description of the condition of the SEZ contained in the Draft Solar PEIS remains accurate, with
44 the exception that because of the boundary change, CO 50 no longer passes through the SEZ. It
45 now is located 0.25 mi (0.4 km) east of the eastern border of the SEZ, and a short road ROW
46 would be required to access the SEZ from the highway. The boundary adjustment of the SEZ has

1 also resulted in a 400-acre (1.6-km²) portion of the southwestern corner of the proposed SEZ not
2 being contiguous with the rest of the SEZ (Figure 10.3.1.1-1). Access to this detached parcel of
3 the SEZ would require a separate ROW of about 0.5 mi (0.8 km). A BLM-designated
4 transmission corridor covers all of the proposed SEZ.
5
6

7 **10.3.2.2 Impacts**

8
9 Full development of the SEZ would disturb up to 2,306 acres (9.3 km²) and would
10 exclude many existing and potential uses of the public land. Because the SEZ is undeveloped and
11 rural, utility-scale solar energy development would introduce a new and discordant land use into
12 the area. The boundary adjustment of the SEZ has further fragmented the public land ownership
13 in the area and may make the isolated public lands more difficult to manage. If the public lands
14 are developed for solar energy production, similar development could be induced on neighboring
15 state and private lands with landowner agreement.
16

17 Most of the proposed Fourmile East SEZ overlaps a locally designated transmission
18 corridor. This existing corridor will be used primarily for the siting of transmission lines and
19 other infrastructure such as pipelines. The existing corridor will be the preferred location for any
20 transmission development that is required to support solar development and future transmission
21 grid improvements related to the build-out of the Fourmile East SEZ. Any use of the corridor
22 lands within the Fourmile East SEZ for solar energy facilities, such as solar panels or heliostats,
23 must be compatible with the future use of the existing corridor. The BLM will assess solar
24 projects in the vicinity of the existing corridor on a case-by-case basis. The BLM will review and
25 approve individual project plans of development to ensure compatible development that
26 maintains the use of the corridor.
27

28 The additional description of impacts in the Draft Solar PEIS remains valid.
29
30

31 **10.3.2.3 SEZ-Specific Design Features and Design Feature Effectiveness**

32
33 Required programmatic design features that would reduce impacts on lands and realty
34 activities are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing
35 the programmatic design features will provide some mitigation for identified impacts but will not
36 mitigate all adverse impacts. For example, impacts related to the exclusion of many existing and
37 potential uses of the public land, the visual impact of an industrial-type solar facility within an
38 otherwise rural area, and induced land use changes on state and private lands, if any, may not be
39 fully mitigated.
40

41 No SEZ-specific design features for lands and realty have been identified through this
42 Final Solar PEIS, Some SEZ-specific design features may be established for parcels within the
43 Fourmile East SEZ through the process of preparing parcels for competitive offer and subsequent
44 project-specific analysis.
45
46

1 **10.3.3 Specially Designated Areas and Lands with Wilderness Characteristics**
2
3

4 **10.3.3.1 Affected Environment**
5

6 The affected environment section in the Draft Solar PEIS is generally accurate,
7 with some corrections and modifications. A recently maintained inventory of wilderness
8 characteristics was used to determine whether public lands within the SEZ have wilderness
9 characteristics. The finding of this inventory was that these lands do not contain wilderness
10 characteristics.
11

12 Because the eastern boundary of the proposed SEZ has been shifted to the west, the route
13 of the Old Spanish Trail is now about 1.25 mi (2 km) from the SEZ at the nearest point.
14

15
16 **10.3.3.2 Impacts**
17

18 The description of impacts presented in the Draft Solar PEIS remains valid, with the
19 following updates. While the size of the proposed SEZ has been reduced by 999 acres (4 km²),
20 solar energy development of the remaining portion of the SEZ will still result in the development
21 of a very large industrial site in an area that otherwise is currently rural. Elevated and relatively
22 nearby viewpoints such as Blanca Peak and the slightly elevated portions of the Old Spanish
23 National Historic Trail will still have significant views of development within the SEZ. A high-
24 potential segment of the Trail has been identified directly to the northeast of the SEZ. Solar
25 development in the SEZ may have a major impact on the historic and visual integrity of the
26 Blanca Peak and the Trail.
27

28 Tall facilities such as power towers would have a larger visual impact than shorter
29 facilities. Site-specific analysis, including consideration of the potential for visible glint and glare
30 from solar facility mirrors and panels, will need to be completed before impacts can be fully
31 assessed. Because of the proximity of the SEZ to the Blanca Wetlands ACEC/SRMA, it is likely
32 there will be an adverse impact on visitor use of the portion of the ACEC/SRMA nearest to the
33 SEZ. Where the scenic highway passes within 0.25 mi (0.4 km) to 0.50 mi (0.8 km) from the
34 boundary of the SEZ, development within the SEZ still would be very visible and has the
35 potential to detract from the visitor experience on the highway. The westward relocation of the
36 eastern boundary of the SEZ will remove the “tunnel effect” that would have been created by
37 development on both sides of the highway and will reduce the impact on highway users. There
38 also is potential for adverse impact on the Sangre de Cristo NHA.
39

40
41 **10.3.3.3 SEZ-Specific Design Features and Design Feature Effectiveness**
42

43 Required programmatic design features that would reduce impacts on specially
44 designated areas are described in Section A.2.2 of Appendix A of this Final Solar PEIS (design
45 features for specially designated areas, cultural resources, and visual resources would address
46 impacts). Implementing the programmatic design features will provide some mitigation for the

1 identified impacts. Exceptions to this may include impacts on recreational users of the Blanca
2 Wetlands ACEC, impacts on wilderness characteristics in the Sangre de Cristo WA, and, impacts
3 on users of the Los Antiguos Scenic Byway. Programmatic design features will be applied to
4 address SEZ-specific resources and conditions, for example:

- 5
6 • For projects in the Fourmile East SEZ that are located within the viewshed of
7 the Old Spanish National Historic Trail, a National Trail inventory will be
8 required to determine the area of possible adverse impact on resources,
9 qualities, values, and associated settings of the Trail; to prevent substantial
10 interference; and to determine any areas unsuitable for development. Residual
11 impacts will be avoided, minimized, and/or mitigated to the extent practicable
12 according to program policy standards. Programmatic design features have
13 been included in BLM's Solar Energy Program to address impacts on
14 National Historic Trails (see Section A.2.2.23 of Appendix A).

15
16 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
17 analyses due to changes to the SEZ boundaries, and consideration of comments received as
18 applicable, the following SEZ-specific design feature has been identified:

- 19
20 • As part of project-specific analysis, early consultation should be initiated with
21 the entity responsible for developing the management plan for the Sangre de
22 Cristo NHA to understand how development could be consistent with the
23 goals of the NHA.

24
25 The need for additional SEZ-specific design features will be identified through the
26 process of preparing parcels for competitive offer and subsequent project-specific analysis.

27 28 29 **10.3.4 Rangeland Resources**

30 31 32 **10.3.4.1 Livestock Grazing**

33 34 35 ***10.3.4.1.1 Affected Environment***

36
37 The analysis in the Draft Solar PEIS indicated that there are two BLM seasonal grazing
38 allotments that would be affected by the proposed SEZ. Since the eastern boundary of the SEZ
39 has been moved about 0.25 mi (0.4 km) west of CO 150, only the Tobin Allotment now would
40 be affected by the SEZ. About 44% of the Tobin Allotment is now located within the SEZ, and
41 the allotment permittee is authorized to graze 139 AUMs.

42 43 44 ***10.3.4.1.2 Impacts***

45
46 For the SEZ as presented in the Draft Solar PEIS, about 60% of the Tobin allotment was
47 within the SEZ, and it was assumed to be likely that the grazing permit on the public lands would

1 be cancelled and that all 139 AUMs would be lost. This is still a likely outcome, although a
2 smaller percentage (44%) of the allotment is within the proposed SEZ. For the purposes of this
3 Final Solar PEIS, it is assumed that the allotment would be cancelled and the permittee would be
4 displaced. In this scenario, all 139 AUMs would be lost. While the specific situation of the
5 grazing permittee is not known, it is clear that loss of all or part of the grazing permit would be a
6 significant adverse impact. Economic losses would not be limited to the value of the lost grazing
7 opportunity but would extend to the value of the overall ranch operation, including any private
8 lands tied to the grazing operation. While the permittee would be reimbursed for the portion of
9 the value of range improvements on the permits, this would cover their economic loss.

10 11 12 ***10.3.4.1.3 SEZ-Specific Design Features and Design Feature Effectiveness***

13
14 Required programmatic design features that would reduce impacts on livestock grazing
15 are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the
16 programmatic design features will provide some mitigation for identified impacts should only
17 portions of the grazing permit be affected, but they would not mitigate a complete loss of the
18 grazing permit, any loss of livestock AUMs, or the loss of value in the ranching operations
19 including private land values.

20
21 No SEZ-specific design features to protect livestock grazing have been identified in this
22 Final Solar PEIS. Some SEZ-specific design features may be identified through the process of
23 preparing parcels for competitive offer and subsequent project-specific analysis.

24 25 26 **10.3.4.2 Wild Horses and Burros**

27 28 29 ***10.3.4.2.1 Affected Environment***

30
31 As presented in the Draft Solar PEIS, no wild horse or burro HMAs occur within the
32 proposed Fourmile East SEZ or in proximity to it. The reduced size of the SEZ does not alter
33 these data.

34 35 36 ***10.3.4.2.2 Impacts***

37
38 As presented in the Draft Solar PEIS, solar energy development within the proposed
39 Fourmile East SEZ would not affect wild horses and burros. The reduction in size of the SEZ
40 does not affect this conclusion.

41 42 43 ***10.3.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness***

44
45 Because solar energy development within the proposed Fourmile East SEZ would not
46 affect wild horses and burros, no SEZ-specific design features to address wild horses and burros
47 have been identified in this Final Solar PEIS.

1 **10.3.5 Recreation**

2
3
4 **10.3.5.1 Affected Environment**

5
6 The area of the proposed Fourmile East SEZ has been reduced by about 26%, to
7 2,882 acres (11.7 km²), by removing areas mainly along the eastern boundary of the SEZ.
8

9 Commenters have pointed out that most of the recreational discussion in the Draft Solar
10 PEIS was focused internally within the SEZ and did not address the larger part that public and
11 other federal lands play in the landscape and tourism economy of the San Luis Valley. A
12 summary of the better-known attractions within the valley includes Great Sand Dunes
13 National Park and Preserve, the Old Spanish National Historic Trail, two scenic railroads, the
14 Los Caminos Antiguos Scenic Byway, the Sangre de Cristo Mountains, three national wildlife
15 refuges, and numerous designated wilderness areas; these are among the highlights of the
16 recreational and tourism opportunities on federal lands in the area. Tourism is an important part
17 of the valley economy and an important focus for future economic growth.
18

19 The land within the Fourmile East SEZ is flat, plain, and not an important recreational
20 use area, but it is adjacent to both U.S. 160 and CO 150, which make up part of the heavily
21 traveled and important visitor route, the Los Caminos Antiguos Scenic Byway, also the main
22 access route into Great Sand Dunes National Park. In addition, the SEZ sits near the base of the
23 magnificent Sangre de Cristo Mountains and 14,345-ft (4,372-m) Blanca Peak, which is the
24 fourth-highest mountain in Colorado. The Rio Grande Scenic Railroad runs east–west about
25 2.5 mi (4 km) south of the SEZ.
26

27
28 **10.3.5.2 Impacts**

29
30 Solar development of the SEZ still will be readily visible to travelers on the Los Caminos
31 Antiguos Scenic Byway and to travelers headed to the national park and preserve, but the
32 modification to the SEZ that removes the potential development on the east side of CO 150 will
33 reduce the level of impact on travelers and on the view of the Sangre de Cristos and Blanca Peak.
34 The boundary change will also provide additional distance between the SEZ and the Old Spanish
35 National Historic Trail, but it is anticipated that the viewshed of the Trail would still be
36 adversely affected. Whether there will be any adverse impacts on recreational visitors traveling
37 to the national park or visiting the Trail is not known. Visual impacts on surrounding recreational
38 areas would be greater with taller solar facilities such as power towers and facilities with wet
39 cooling. Visitors to areas located at elevations higher than that of the SEZ (e.g., Great Sand
40 Dunes National Park, Zapata Falls recreation area, Sangre de Cristo wilderness areas) will see
41 the solar development within the SEZ, but the impact on recreational use of these areas is
42 unknown at this time. Whether there is significant glint or glare from reflective surfaces of solar
43 facilities and what types of technologies might be employed will have a big impact on visibility.
44 The focus and intent of the relatively new Sangre de Cristo NHA is not yet well defined, so it has
45 not been possible to assess how solar development may interact with the objectives of the NHA.

1 There may be some potential to provide interpretive activities focused on solar energy and
2 development that would be of interest to travelers.
3

4 In addition, lands that are outside of the proposed SEZ may be acquired or managed for
5 mitigation of impacts on other resources (e.g., sensitive species). Managing these lands for
6 mitigation could further exclude or restrict recreational use, potentially leading to additional
7 losses in recreational opportunities in the region. The impact of acquisition and management of
8 mitigation lands would be considered as a part of the environmental analysis of specific solar
9 energy projects.
10

11 **10.3.5.3 SEZ-Specific Design Features and Design Feature Effectiveness**

12
13
14 Required programmatic design features that would reduce impacts on resources are
15 described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the
16 programmatic design features will help reduce impacts of individual solar projects but will not
17 address the larger question of what level of solar energy development would cause adverse
18 impacts on tourism and recreational segments of the local economy. In addition, implementing
19 the programmatic design features for recreation will not mitigate the loss of recreation access to
20 public lands developed for solar energy production.
21

22 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
23 analyses due to changes in the SEZ boundaries, and consideration of comments received as
24 applicable, the following SEZ-specific design feature has been identified:
25

- 26 • Tourism is an important economic growth area for the San Luis Valley, and
27 the four proposed SEZs are located in visible locations adjacent to the
28 principal highway routes into the valley. Because of the location of the SEZs,
29 there is potential to influence visitors' perception of the tourism climate in the
30 valley. As projects are proposed for the SEZs, the potential impacts on
31 tourism should be considered and reviewed with local community leaders.
32

33 The need for additional SEZ-specific design features will be identified through the
34 process of preparing parcels for competitive offer and subsequent project-specific analysis.
35
36

37 **10.3.6 Military and Civilian Aviation**

38 **10.3.6.1 Affected Environment**

39
40
41
42 Although the size of the SEZ has been reduced, the remaining proposed SEZ is still
43 located under an MTR and is identified by the BLM as an area of required consultation with
44 the DoD.
45
46

1 **10.3.6.2 Impacts**

2
3 Through comments on the Draft Solar PEIS, the military has indicated that it has no
4 concerns about potential impacts on its activities associated with solar development. There also
5 are no anticipated impacts on civilian aviation.
6

7
8 **10.3.6.3 SEZ-Specific Design Features and Design Feature Effectiveness**

9
10 Required programmatic design features that would reduce impacts on military and
11 civilian aviation are described in Section A.2.2 of Appendix A of this Final Solar PEIS. The
12 programmatic design features require early coordination with the DoD to identify and avoid,
13 minimize, and/or mitigate, if possible, any potential impacts on the use of military airspace.
14

15 No SEZ-specific design features for military and civilian aviation have been identified in
16 this Final Solar PEIS. Some SEZ-specific design features may be identified through the process
17 of preparing parcels for competitive offer and subsequent project-specific analysis.
18

19
20 **10.3.7 Geologic Setting and Soil Resources**

21
22
23 **10.3.7.1 Affected Environment**

24
25
26 ***10.3.7.1.1 Geologic Setting***

27
28 Data provided in the Draft Solar PEIS remain valid, with the following update:
29

- 30 • The terrain of the proposed Fourmile East SEZ is relatively flat with a very
31 gentle dip to the west and northwest (Figure 10.3.7.1-1). The boundaries
32 of the Fourmile East SEZ have been changed to eliminate 999 acres (4.0 km²),
33 mainly along the eastern boundary of the SEZ, as well as a small area on the
34 west side. Within this area, additional small wetland areas with a total area of
35 about 1 acre (0.0040 km²) have been identified as a non-development area.
36 Based on these changes, the elevations range from about 7,660 ft (2,335 m)
37 near the new northeastern corner of the site to less than 7,600 ft (2,316 m)
38 along its western boundary.
39

40
41 ***10.3.7.1.2 Soil Resources***

42
43 Data provided in the Draft Solar PEIS remain valid, with the following updates:
44

- 45 • Soils within the proposed Fourmile East SEZ as revised are predominantly the
46 loamy fine sands and loamy sands of the Space City, Hooper, and Mosca

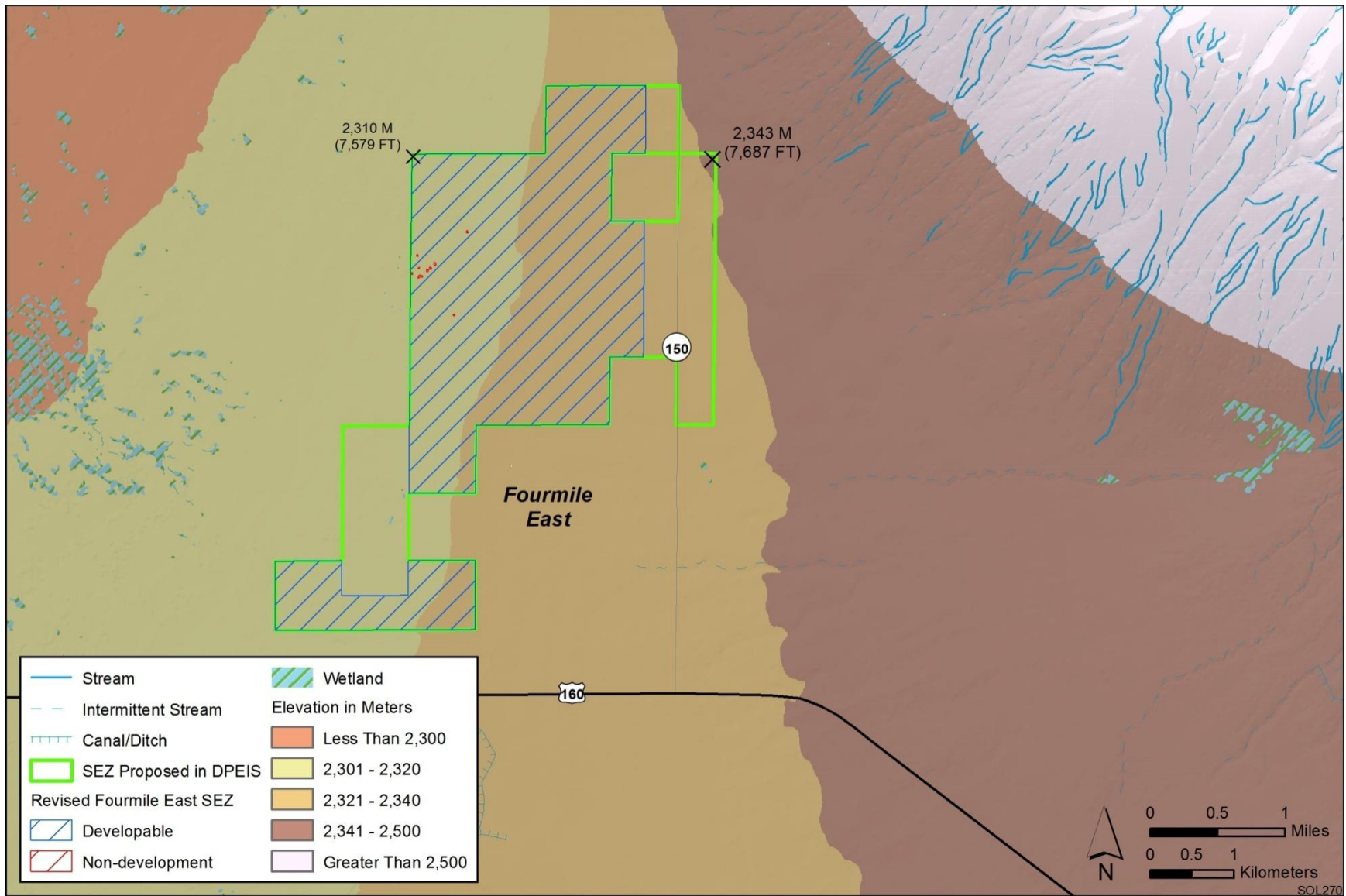


FIGURE 10.3.7.1-1 General Terrain of the Proposed Fourmile East SEZ as Revised

1 Series, which now make up about 86% of the soil coverage at the site. Dune
2 land soils still cover less than 1% of the SEZ.

- 3
- 4 • Soil unit coverage at the proposed Fourmile East SEZ as revised is shown in
5 Figure 10.3.7.1-2. The new SEZ boundaries eliminate 622 acres (2.5 km²) of
6 the Space City loamy fine sand (0 to 3% slopes), 167 acres (0.66 km²) of the
7 Laney loam, 151 acres (0.61 km²) of the Hooper clay loam, 59 acres
8 (0.24 km²) of the Corlett–Hooper complex, and 1 acre (0.0040 km²) of the
9 Hooper loamy sand (non-development wetland areas) (Table 10.3.7.1-1).

10
11

12 **10.3.7.2 Impacts**

13
14 Impacts on soil resources would occur mainly as a result of ground-disturbing activities
15 (e.g., grading, excavating, and drilling), especially during the construction phase of a solar
16 project. The assessment provided in the Draft Solar PEIS remains valid, with the following
17 update:

- 18
- 19 • Impacts related to wind erodibility are reduced because the new SEZ
20 boundaries eliminate 833 acres (3.4 km²) of highly erodible soils and
21 167 acres (0.66 km²) of moderately erodible soils from development. The
22 coverage by dune land sands (13 acres, or 0.053 km²), which have a high
23 wind erosion potential, remains the same.

24
25

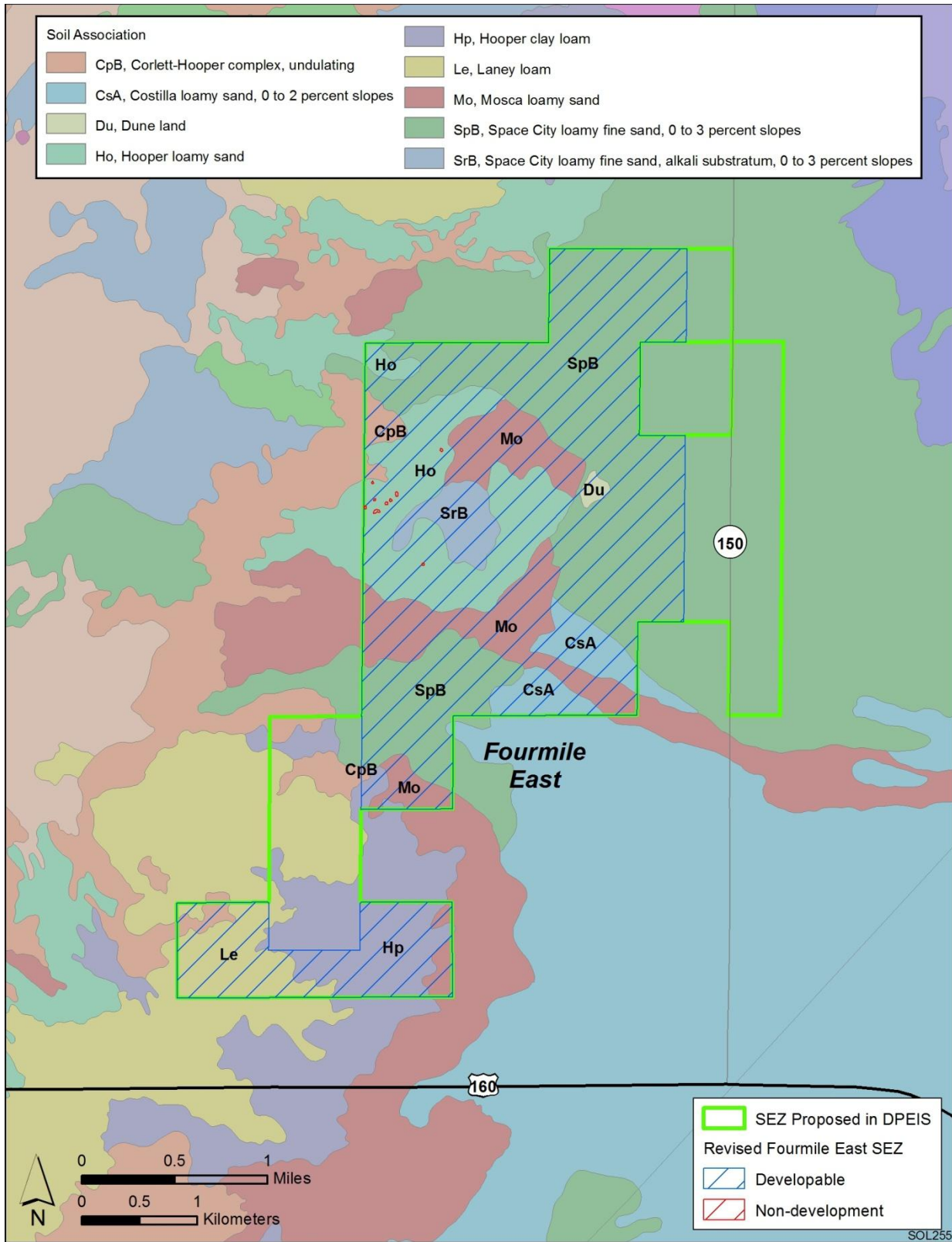
26 **10.3.7.3 SEZ-Specific Design Features and Design Feature Effectiveness**

27
28 Required programmatic design features that would reduce impacts on soils are described
29 in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the programmatic design
30 features will reduce the potential for soil impacts during all project phases.

31
32 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
33 analyses due to changes to the SEZ boundaries, and consideration of comments received as
34 applicable, the following SEZ-specific design feature for soil resources has been identified:

- 35
- 36 • The need for a study of the eolian processes that maintain the sand dune fields
37 in Great Sand Dunes National Park should be determined. The study would
38 support the assessment of whether building a solar facility close to the park
39 could have impacts on the sand dunes there (by disrupting these processes).

40
41 The need for additional SEZ-specific design features will be identified through the
42 process of preparing parcels for competitive offer and subsequent project-specific analysis.



1

2 **FIGURE 10.3.7.1-2 Soil Map for the Proposed Fourmile East SEZ as Revised (Source:**
 3 **NRCS 2008)**

1 **TABLE 10.3.7.1-1 Summary of Soil Map Units within the Proposed Fourmile East SEZ as Revised**

Map Unit Symbol	Map Unit Name	Erosion Potential		Description	Area, in Acres ^c (Percentage of SEZ)
		Water ^a	Wind ^b		
SpB	Space City loamy fine sand (0 to 3% slope)	Slight	High (WEG 2) ^d	Level to nearly level soils along isolated low ridges on the valley floor. Parent material consists of eolian sands derived from igneous rock. Somewhat excessively drained with high surface-runoff potential (low infiltration rate) and rapid permeability. Shrink-swell potential is low. Available water capacity is low. Moderate rutting hazard. Used mainly as rangeland.	1,264 (44.9)
Mo	Mosca loamy sand	Slight	High (WEG 2)	Nearly level soils on floodplains. Parent material consists of alluvium derived from igneous rock. Deep and well drained with moderate surface-runoff potential and moderate permeability; moderately to strongly alkaline. Shrink-swell potential is low. Available water capacity is low. Moderate rutting hazard. Used locally for irrigated crops and pastureland. Farmland of unique importance. ^e	466 (16.2)
Ho	Hooper loamy sand	Slight	High (WEG 2)	Level to nearly level soils on floodplains. Parent material consists of alluvium derived from igneous rock. Deep and well drained with high surface-runoff potential (low infiltration rate) and slow permeability; strongly alkaline. Shrink-swell potential is low to moderate. Available water capacity is low. Moderate rutting hazard. Used mainly as rangeland.	463 (16.1) ^f
Hp	Hooper clay loam	Slight	High (WEG 1)	Level to nearly level soils on floodplains. Parent material consists of alluvium derived from igneous rock. Deep and well drained with high surface runoff potential (low infiltration rate) and slow permeability; strongly alkaline. Most areas are without vegetation; provides some cover for wildlife. Shrink-swell potential is moderate to high. Available water capacity is very low. Severe rutting hazard. Used mainly as rangeland.	203 (7.1)

TABLE 10.3.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Erosion Potential		Description	Area, in Acres ^c (Percentage of SEZ)
		Water ^a	Wind ^b		
Le	Laney loam	Slight	Moderate (WEG 4)	Nearly level soils on floodplains. Parent material consists of alluvium derived from igneous rock. Deep and well drained, with moderate surface-runoff potential and moderate permeability. Shrink-swell potential is low to moderate. Available water capacity is moderate. Severe rutting hazard. Used mainly as rangeland.	174 (6.1)
CsA	Costilla loamy sand (0 to 2%)	Slight	High (WEG 1)	Level to nearly level soils on floodplains. Parent material consists of wind-worked alluvium. Deep and somewhat excessively drained with low runoff potential (high infiltration rate) and rapid permeability. Shrink-swell potential is low. Available water capacity is low. Moderate rutting hazard. Used locally for irrigated cropland.	150 (5.2)
SrB	Space City loamy fine sand, alkali substratum (0 to 3% slope)	Slight	High (WEG 2)	Level to nearly level soils along isolated low ridges on the valley floor. Parent material consists of eolian sands derived from igneous rock. Somewhat excessively drained, with low surface runoff potential (high infiltration rate) and rapid permeability. Strongly alkaline below 24 in. ^g Shrink-swell potential is low. Available water capacity is low. Moderate rutting hazard. Used mainly as rangeland.	94 (3.3)
CpB	Corlett–Hooper complex, undulating	Slight	High (WEG 1)	Composed of 45% Corlett sand and loamy sand, 40% Hooper loamy sand and sandy loam, and 15% minor components. Parent material consists of eolian deposits; soils occur on and between sand dunes. Undulating, deep and moderately well drained with low surface runoff potential (high infiltration rate) and rapid permeability. Shrink-swell potential is low. Available water capacity is very low. Severe rutting hazard.	56 (1.9)

TABLE 10.3.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Erosion Potential		Description	Area, in Acres ^c (Percentage of SEZ)
		Water ^a	Wind ^b		
u	Dune land	Very severe	High (WEG 1)	Constantly shifting medium-grained sand deposited by wind blowing across the valley. Parent material consists of eolian sands. Little or no vegetation; low surface runoff potential (high infiltration rate) and very rapid permeability. Shrink-swell potential is low. Available water capacity is very low. Severe rutting hazard.	13 (<1)

^a 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. A rating of “very severe” indicates that significant erosion is expected; loss of soil productivity and damage are likely and erosion control measures are costly and generally impractical.

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

^c To convert acres to km², multiply by 0.004047.

^d 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 m²) per year, for each of the wind erodibility groups: WEG 1, 220 tons (200 metric tons) per acre (4,000 m²) per year (average); WEG 2, 134 tons (122 metric tons) per acre (4,000 m²) per year; WEGs 3 and 4 (and 4L), 86 tons (78 metric tons) per acre (4,000 m²) per year; WEG 5, 56 tons (51 metric tons) per acre (4,000 m²) per year; WEG 6, 48 tons (44 metric tons) per acre (4,000 m²) per year; WEG 7, 38 tons (34 metric tons) per acre (4,000 m²) per year; and WEG 8, 0 tons (0 metric tons) per acre (4,000 m²) per year.

^e Farmland is of unique importance for the production of food, feed, fiber, forage, or oilseed crops.

^f One acre (0.0040 km²) within the Hooper loamy sand is currently categorized as a non-development area (denoted by red areas in Figure 10.3.7.1-2).

^g To convert in. to cm, multiply by 2.54.

Sources: NRCS (2009); USDA (1968).

1 **10.3.8 Minerals (Fluids, Solids, and Geothermal Resources)**
2

3 A mineral potential assessment for the proposed Fourmile East SEZ has been prepared
4 and reviewed by BLM mineral specialists knowledgeable about the region where the SEZ is
5 located (BLM 2012). The BLM is proposing to withdraw the SEZ from settlement, sale, location,
6 or entry under the general land laws, including the mining laws, for a period of 20 years (see
7 Section 2.2.2.2.4 of the Final Solar PEIS). The potential impacts of this withdrawal are discussed
8 in Section 10.3.24.
9

10
11 **10.3.8.1 Affected Environment**
12

13 There are no oil and gas leases, mining claims, or geothermal leases located in the
14 proposed SEZ. The description in the Draft Solar PEIS remains valid.
15

16
17 **10.3.8.2 Impacts**
18

19 There are no anticipated impacts on mineral resources from the development of solar
20 energy facilities in the proposed SEZ. The analysis of impacts on mineral resources in the Draft
21 Solar PEIS remains valid.
22

23
24 **10.3.8.3 SEZ-Specific Design Features and Design Feature Effectiveness**
25

26 Required programmatic design features that will reduce impacts on mineral resources
27 are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the
28 programmatic design features will provide adequate protection of mineral resources.
29

30 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
31 analyses due to changes to the SEZ boundaries, and consideration of comments received as
32 applicable, no SEZ-specific design features for minerals have been identified in this Final Solar
33 PEIS. Some SEZ-specific design features may be identified through the process of preparing
34 parcels for competitive offer and subsequent project-specific analysis.
35

36
37 **10.3.9 Water Resources**
38

39
40 **10.3.9.1 Affected Environment**
41

42 The overall size of the Fourmile East SEZ has been reduced by 26% from the area
43 described in the Draft Solar PEIS, resulting in a total area of 2,883 acres (11.7 km²). The
44 description of the affected environment given in the Draft Solar PEIS relevant to water resources
45 at the Fourmile East SEZ remains valid and is summarized in the following paragraphs.
46

1 The Fourmile East SEZ is within the Rio Grande Headwaters subbasin of the Rio Grande
2 hydrologic region. The SEZ is located in the eastern part of the San Luis Valley bounded by the
3 San Juan Mountains to the west and the Sangre de Cristo Mountains to the east. Precipitation and
4 snowfall in the eastern part of the valley are about 8.5 in./yr (22 cm/yr) and 24 in./yr (61 cm/yr),
5 respectively, with much greater amounts in the surrounding mountains. Annual pan evaporation
6 rates are estimated to be on the order of 54 in./yr (137 cm/yr). No permanent surface water
7 features, intermittent/ephemeral washes, or flood hazards have been identified within the SEZ.
8 Several small palustrine wetlands have been identified along the western boundary of the SEZ,
9 which are temporally flooded throughout the year and have been identified as non-development
10 areas (total area of 1 acre [0.004 km²]). Groundwater in the San Luis Valley is primarily in
11 basin-fill deposits with an upper unconfined aquifer and a lower confined aquifer, which are
12 separated by a series of confining clay layers and unfractured volcanic rocks. The Fourmile East
13 SEZ sits atop the distal area of an alluvial fan, above an unconfined aquifer about 125 ft (38 m)
14 thick. Groundwater monitoring wells within the SEZ have reported depths to groundwater
15 ranging from 32 to 52 ft (10 to 16 m) below the surface and indicate a groundwater flow from
16 east to west. Water quality in the aquifers of the San Luis Valley varies, and in 2007, the level of
17 TDS in the groundwater surrounding the SEZ was well below the maximum contaminant level.
18

19 The Fourmile East SEZ is located in the Colorado Division 3 management zone
20 (Rio Grande Basin) of the CDWR, where both surface water and groundwater rights are over-
21 appropriated. The Rio Grande Compact of 1938 obligates Colorado to meet water delivery
22 schedules to New Mexico, and governs much of the water management decision making in the
23 San Luis Valley. In order to balance water uses within the San Luis Valley and to meet treaty
24 obligations, several water management mechanisms have been developed that affect existing
25 water rights and water rights transfers. The two primary water management considerations
26 affecting solar energy development are the need for an augmentation water plan, and the rules set
27 by the recently formed Special Improvement District Number 1 (Subdistrict #1). Augmentation
28 water plans were described in the Draft Solar PEIS (Section 10.3.9.1.3), but essentially require
29 junior water rights holders to have additional water reserves to ensure that more senior water
30 rights are not hindered. The water management plan for Subdistrict #1 was ruled on in June 2010
31 and places restrictions on groundwater withdrawals in an effort to restore groundwater levels in
32 the unconfined aquifer. None of the Colorado SEZs are located within the boundaries of
33 Subdistrict #1, which primarily includes central portions of the San Luis Valley currently used
34 for agriculture. However, given that water rights are overappropriated in the San Luis Valley and
35 largely clustered within Subdistrict #1, it is likely that any new water diversions and water right
36 transfers would involve these new groundwater management considerations.
37

38 In addition to the water resources information provided in the Draft Solar PEIS, this
39 section provides a planning-level inventory of available climate, surface water, and groundwater
40 monitoring stations within the immediate vicinity of the Fourmile East SEZ and surrounding
41 basin. Additional data regarding climate, surface water, and groundwater conditions are
42 presented in Tables 10.3.9.1-1 through 10.3.9.1-7 and in Figures 10.3.9.1-1 and 10.3.9.1-2.
43 Fieldwork and hydrologic analyses needed to determine 100-year floodplains and jurisdictional
44 water bodies would need to be coordinated with appropriate federal, state, and local agencies.
45 Areas within the Fourmile East SEZ that are found to be within a 100-year floodplain will be
46

1
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TABLE 10.3.9.1-1 Watershed and Water Management Basin Information Relevant to the Proposed Fourmile East SEZ as Revised

Basin	Name	Area (acres) ^a
Subregion (HUC4) ^b	Rio Grande Headwaters (1301)	4,871,764
Cataloging unit (HUC8)	San Luis (13010003)	1,021,562
Groundwater basin	San Luis Valley	2,000,000
SEZ	Fourmile East	2,883

^a To convert acres to km², multiply by 0.004047.

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

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TABLE 10.3.9.1-2 Climate Station Information Relevant to the Proposed Fourmile East SEZ as Revised

Climate Station (COOP ID ^a)	Elevation ^b (ft) ^c	Distance to SEZ (mi) ^d	Period of Record	Mean Annual Precipitation (in./yr) ^e	Mean Annual Snowfall (in./yr)
Alamosa 2S, Colorado (050128)	7,533	14	2005–2011	7.07	28.80
Blanca, Colorado (050776)	7,750	8	1909–2010	8.56	24.30
Great Sand Dunes NM, Colorado (053541)	8,120	15	1950–2011	11.16	41.00
La Veta Pass, Colorado (054870)	9,245	25	1909–1954	21.60	150.10

^a National Weather Service’s Cooperative Station Network station identification code.

^b Surface elevations for the proposed Fourmile East SEZ range from 7,585 to 7,675 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 2.54.

Source: NOAA (2012).

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TABLE 10.3.9.1-3 Total Lengths of Selected Streams at the Subregion, Cataloging Unit, and SEZ Scale Relevant to the Proposed Fourmile East SEZ as Revised

Water Feature	Subregion, HUC4 (ft) ^a	Cataloging Unit, HUC8 (ft)	SEZ (ft)
Unclassified streams	19,502	12,089	0
Perennial streams	14,694,407	2,241,783	0
Intermittent/ephemeral streams	94,288,163	14,696,358	0
Canals	12,151,458	3,537,124	0

^a To convert ft to m, multiply by 0.3048.

Source: USGS (2012a).

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TABLE 10.3.9.1-4 Stream Discharge Information Relevant to the Proposed Fourmile East SEZ as Revised

Parameter	Station (USGS ID)		
	San Luis Creek near Poncha Pass, Colorado (08224110)	San Luis Creek above Villa Grove, Colorado (08224113)	Closed Basin Project Canal above Hwy 150 near Mosca, Colorado (373947105421101)
Period of record	1984–1986	1984–1986	2004–2011
No. of observations	16	17	73
Discharge, median (ft ³ /s) ^a	1.22	1.32	16.8
Discharge, range (ft ³ /s)	0.74–3.48	0.72–3.57	0.37–23.3
Discharge, most recent observation (ft ³ /s)	1.25	0.96	15
Distance to SEZ (mi) ^b	55	66	11

^a To convert ft³ to m³, multiply by 0.0283.

^b To convert mi to km, multiply by 1.6093.

Source: USGS (2012b).

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1 **TABLE 10.3.9.1-5 Surface Water Quality Data Relevant to the Proposed Fourmile East SEZ as Revised**

Parameter	Station (USGS ID) ^a					
	08224110	08224200	08224500	08226700	08227500	08234200
Period of record	1979–1984	1967–1970	1967–1981	1967–1970	1967–1981	1966–2000
No. of records	60	56	86	66	73	93
Temperature (°C) ^b	9.75 (0–28)	4.75 (0–10)	5.5 (0–21)	5.25 (0–12)	2 (0–13.5)	6.95 (0–15.3)
Total dissolved solids (mg/L)	NA ^c	38.5 (37–40)	202 (70–436)	175.5 (128–191)	59 (39–68)	122 (101–150)
Dissolved oxygen (mg/L)	NA	NA	6.6	NA	NA	8.25 (7.2–11.1)
pH	NA	7.2 (6.9–7.4)	6.7 (3.6–7.6)	7.65 (7.5–7.8)	7.15 (7.1–7.4)	8 (7.3–8.2)
Total nitrogen (mg/L)	NA	NA	NA	NA	NA	NA
Phosphorus (mg/L as P)	NA	NA	NA	NA	NA	NA
Organic carbon (mg/L)	NA	NA	NA	NA	NA	NA
Calcium (mg/L)	NA	8.2 (8–9.2)	39 (10–49)	39.5 (29–44)	17 (10–20)	24 (16.9–33)
Magnesium (mg/L)	NA	1.2 (1–2.2)	7.1 (2.7–15)	11.5 (9.2–13)	1.5 (1–2.4)	5.815 (4.41–7.3)
Sodium (mg/L)	NA	1.45 (1.4–1.7)	4.9 (2.4–7.2)	2.15 (1.2–2.8)	1.4 (0.7–1.9)	7.2 (5.8–9.6)
Chloride (mg/L)	NA	1.45 (0.8–1.8)	1.6 (0.9–2.6)	1.1 (0.9–2.3)	0.9 (0.8–1.1)	2.95 (1.5–3.7)
Sulfate (mg/L)	NA	5.5 (4.5–5.8)	125.5 (28–311)	56 (38–67)	4.6 (3.8–5.5)	10.85 (7.18–14)
Arsenic (mg/L)	NA	NA	NA	NA	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).

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TABLE 10.3.9.1-6 Water Quality Data from Groundwater Samples Relevant to the Proposed Fourmile East SEZ as Revised

Parameter	Station (USGS ID) ^a		
	372920105405601	373104105403801	373247105382301
Period of record	1979	1978	1979
No. of records	2	1	2
Temperature (°C) ^b	13.75 (11.5–16)	20.5	13.5
Total dissolved solids (mg/L)	44 (42–46)	94	74
Dissolved oxygen (mg/L)	NA ^c	NA	NA
pH	8.4 (8.3–8.5)	8.5	8.6
Nitrate + nitrite (mg/L as N)	0.23 (0.22–0.24)	0.02	0.13
Phosphate (mg/L)	NA	0.03	NA
Organic carbon (mg/L)	NA	2.8	NA
Calcium (mg/L)	16 (15–17)	18	14
Magnesium (mg/L)	1.35 (1.1–1.6)	1	0.5
Sodium (mg/L)	15.5 (15–16)	7.4	6.1
Chloride (mg/L)	2.2 (2.1–2.3)	1.3	2.2
Sulfate (mg/L)	12 (10–14)	7.3	1.1
Arsenic (mg/L)	3	2	NA

^a Median values 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).

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TABLE 10.3.9.1-7 Groundwater Surface Elevations Relevant to the Proposed Fourmile East SEZ as Revised

Parameter	Station (USGS ID)		
	372923105383501	372948105385202	373106105363401
Period of record	1976–2011	1982–2005	1980–2005
No. of observations	378	25	60
Surface elevation (ft) ^a	7,598	7,587	7,529
Well depth (ft)	50	113	80
Depth to water, median (ft)	28.03	22.68	47.8
Depth to water, range (ft)	20.5–32.6	14.36–25	41.64–50.75
Depth to water, most recent observation (ft)	32.57	25	50.75
Distance to SEZ (mi) ^b	2	2	1

^a To convert ft to m, multiply by 0.3048.

^b To convert mi to km, multiply by 1.6093.

Source: USGS (2012b).

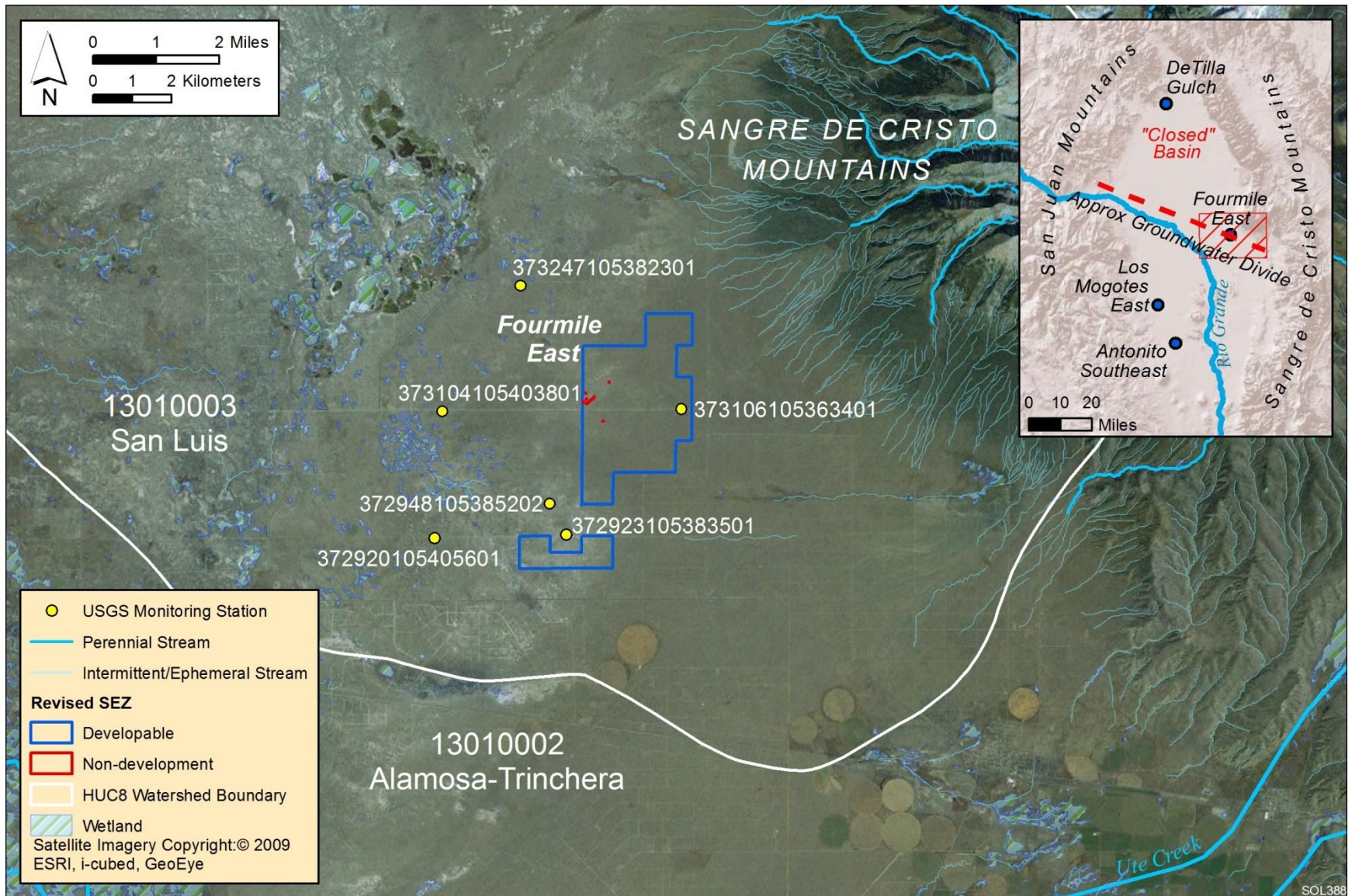


FIGURE 10.3.9.1-1 Water Features near the Proposed Fourmile East SEZ as Revised

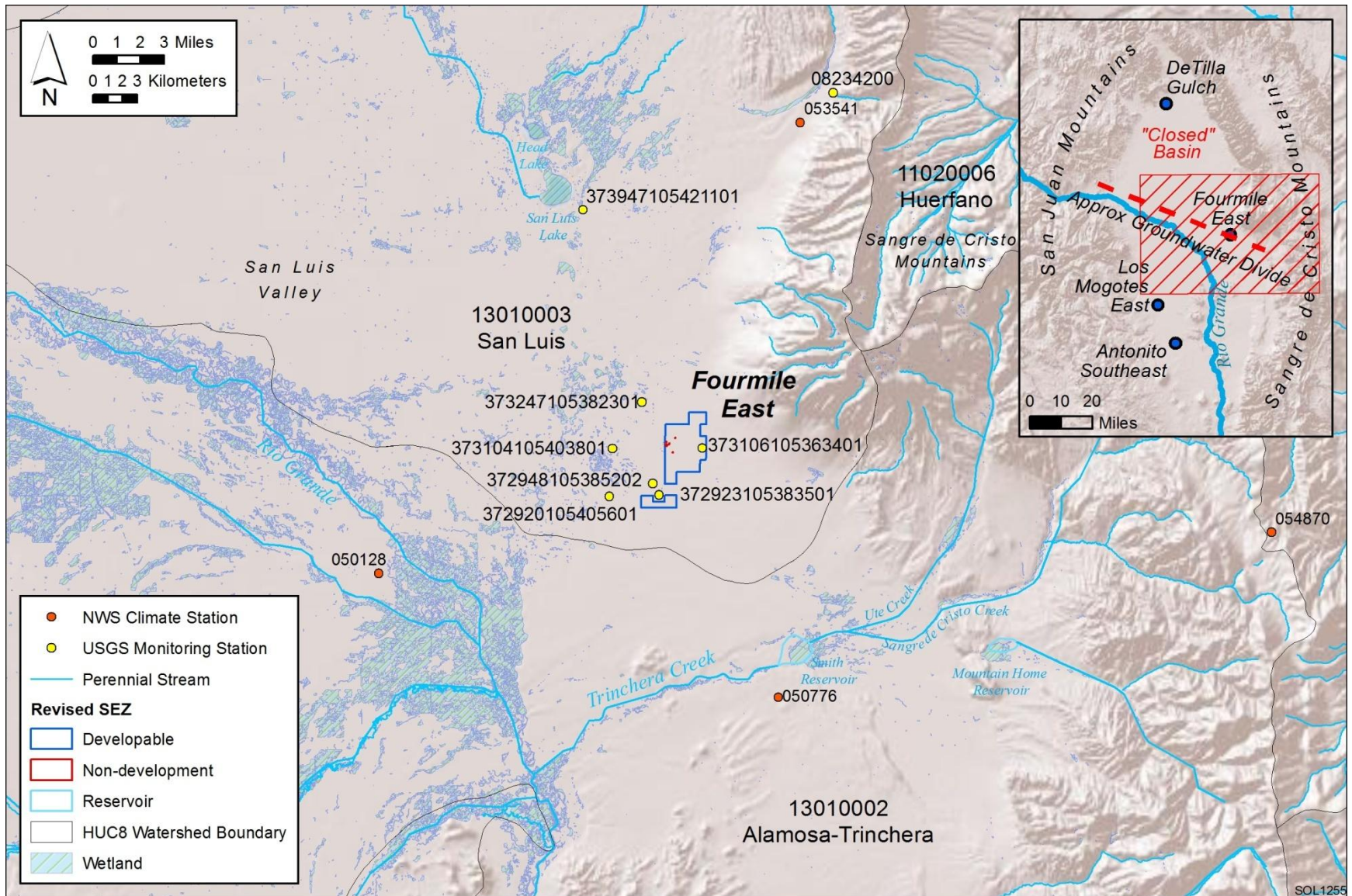


FIGURE 10.3.9.1-2 Water Features within the San Luis Watershed, Which Includes the Proposed Fourmile East SEZ as Revised

1 identified as non-development areas. Any water features within the Fourmile East SEZ
2 determined to be jurisdictional will be subject to the permitting process described in the CWA.
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5 **10.3.9.2 Impacts**

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8 ***10.3.9.2.1 Land Disturbance Impacts on Water Resources***

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10 The discussion of land disturbance effects on water resources in the Draft Solar PEIS
11 remains valid. As stated in the Draft Solar PEIS, land disturbance impacts in the vicinity of
12 the proposed Fourmile East SEZ could potentially affect drainage patterns and groundwater
13 recharge. The alteration of natural drainage pathways during construction can lead to impacts
14 related to flooding, loss of water delivery to downstream regions, and alterations to riparian
15 vegetation and habitats.
16

17 Land clearing, land leveling, and vegetation removal during the development of the SEZ
18 have the potential to disrupt intermittent/ephemeral stream channels. Several programmatic
19 design features described in Section A.2.2 of Appendix A of this Final Solar PEIS would avoid,
20 minimize, and/or mitigate impacts associated with the disruption of intermittent/ephemeral water
21 features. Additional analyses of intermittent/ephemeral streams are presented in this update,
22 including an evaluation of functional aspects of stream channels with respect to groundwater
23 recharge, flood conveyance, sediment transport, geomorphology, and ecological habitats. Only
24 a summary of the results from these surface water analyses is presented in this section; more
25 information on methods and results is presented in Appendix O.
26

27 The study region considered for the intermittent/ephemeral stream evaluation relevant
28 to the Fourmile East SEZ is a subset of the San Luis watershed (HUC8), for which
29 information regarding stream channels is presented in Tables 10.3.9.1-3 and 10.3.9.1-4 of
30 this Final Solar PEIS. The results of the intermittent/ephemeral stream evaluation are shown
31 in Figure 10.3.9.2-1, which depicts flow lines from the National Hydrography Dataset
32 (USGS 2012a) labeled as low, moderate, and high sensitivity to land disturbance. Within the
33 study area, 12% of the intermittent/ephemeral stream channels had low sensitivity and 88% had
34 moderate sensitivity to land disturbance. No intermittent/ephemeral stream channels were
35 identified in the Fourmile East SEZ, but several stream reaches with moderate sensitivity to land
36 disturbance are located more than 1 mi (1.6 km) east of the SEZ, all of which drain the Sangre de
37 Cristo Mountains.
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40 ***10.3.9.2.2 Water Use Requirements for Solar Energy Technologies***

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42 Changes in the Fourmile East SEZ boundaries resulted in changes to the estimated water
43 use requirements and a reduction in the land affected by surface disturbances. This section
44 presents changes in water use estimates for the reduced SEZ area and additional analyses
45 pertaining to groundwater. The additional analyses of groundwater include a basin-scale water
46 budget and a simplified, one-dimensional groundwater model of potential groundwater

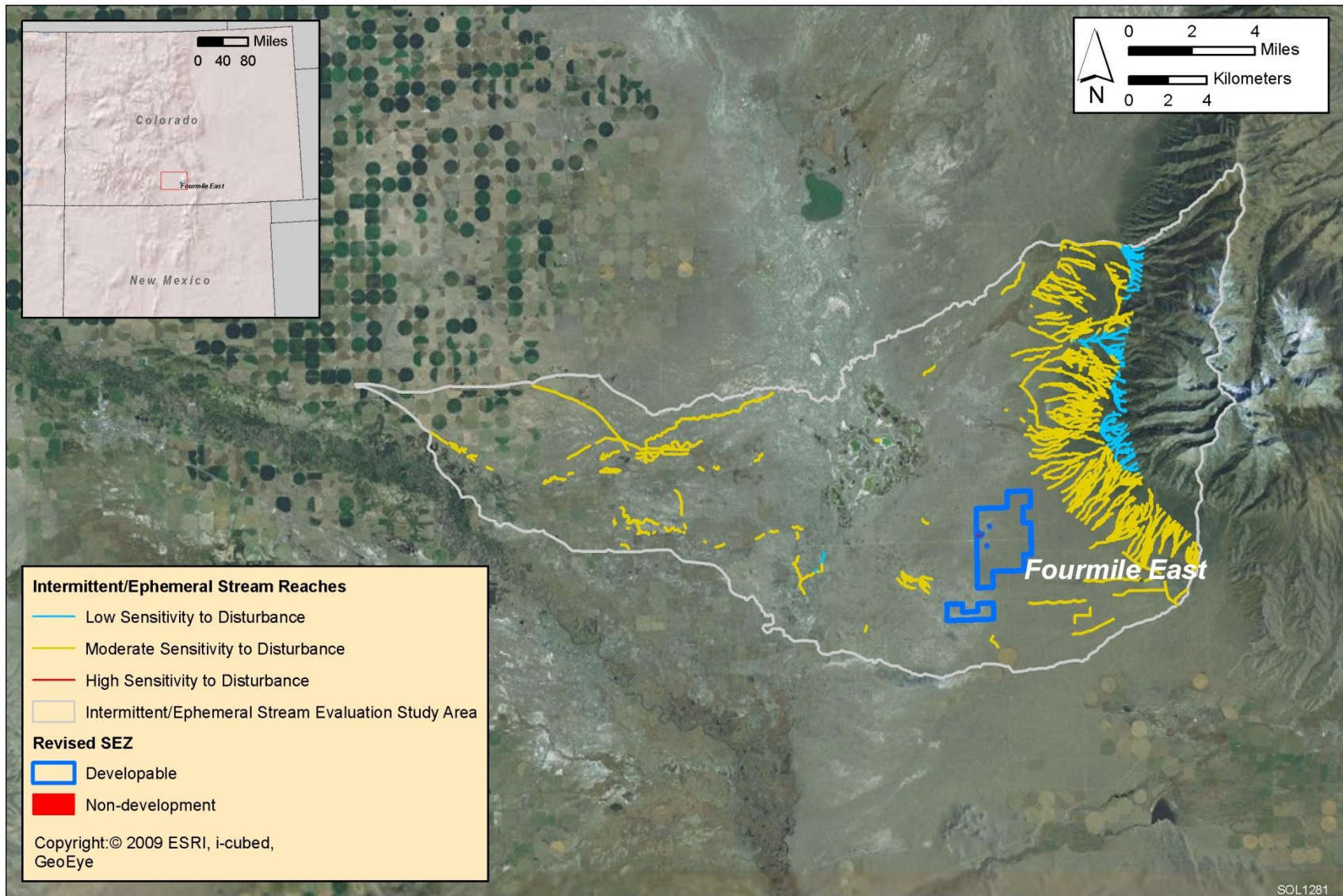


FIGURE 10.3.9.2-1 Intermittent/Ephemeral Stream Channel Sensitivity to Surface Disturbances in the Vicinity of the Proposed Fourmile East SEZ as Revised

drawdown. 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. Table 10.3.9.2-1 presents the revised estimates of water requirements for both construction and operation of solar facilities at the Fourmile East SEZ assuming full build-out of the SEZ and accounting for its decreased size.

The Fourmile East 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 10.3.9.2-2 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

TABLE 10.3.9.2-1 Estimated Water Requirements for the Proposed Fourmile East SEZ as Revised^a

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Construction—Peak Year				
<i>Water use requirements</i>				
Fugitive dust control (ac-ft) ^b	612	706	706	706
Potable supply for workforce (ac-ft)	74	34	14	7
Total water use requirements (ac-ft)	686	740	720	713
<i>Wastewater generated</i>				
Sanitary wastewater (ac-ft)	74	34	14	7
Operations				
<i>Water use requirements</i>				
Mirror/panel washing (ac-ft/yr)	231	128	128	13
Potable supply for workforce (ac-ft/yr)	6	3	3	<1
Dry cooling (ac-ft/yr)	92–461	51–256	NA	NA
Wet cooling (ac-ft/yr)	2,075–6,686	1,153–3,715	NA	NA
<i>Total water use requirements</i>				
Non-cooled technologies (ac-ft/yr)	NA ^c	NA	131	13
Dry-cooled technologies (ac-ft/yr)	329–698	182–387	NA	NA
Wet-cooled technologies (ac-ft/yr)	2,312–6,923	1,284–3,846	NA	NA
<i>Wastewater generated</i>				
Blowdown (ac-ft/yr)	131	73	NA	NA
Sanitary wastewater (ac-ft/yr)	6	3	3	<1

^a See Section M.9.2 of Appendix M of the Draft Solar PEIS for methods used in estimating water use requirements.

^b To convert ac-ft to m³, multiply by 1,234.

^c NA = not applicable.

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TABLE 10.3.9.2-2 Water Budget for the San Luis Valley, Which Includes the Proposed Fourmile East SEZ as Revised

Process	Amount
<i>Inputs</i>	
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
<i>Outputs</i>	
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
<i>Groundwater storage</i>	
Storage (ac-ft)	2,026,783

^a To convert ac-ft to m³, multiply by 1,234.

^b Colorado DWR (2004).

Source: Mayo et al. (2007).

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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 streamflow inputs with output dominated by evapotranspiration by agricultural lands, riparian areas, and meadows.

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The estimated total water use requirements during the peak construction year are as high as 740 ac-ft/yr (912,800 m³/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 13 to 2,312 ac-ft/yr (16,000 to 2.8 million m³/yr) or 260 to 46,240 ac-ft (320,700 to 57 million m³) over the 20-year operational period. From a groundwater budgeting perspective, all pumping scenarios over the 20-year operational period represent less than 2% of the groundwater storage, and all annual pumping scenarios are less than 1% of the current withdrawals in the basin.

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

1 the temporal and spatial components of how groundwater withdrawals affect groundwater
 2 surface elevations, groundwater flow rates, and connectivity to surface water features such as
 3 streams, wetlands, playas, and riparian vegetation. A one-dimensional groundwater modeling
 4 analysis was performed to present a simplified depiction of the spatial and temporal effects of
 5 groundwater withdrawals by examining groundwater drawdown in a radial direction around the
 6 center of the SEZ for the low, medium, and high pumping scenarios, considering pumping from
 7 the upper unconfined aquifer only. A detailed discussion of the groundwater modeling analysis is
 8 presented in Appendix O. It should be noted, however, that the aquifer parameters used for the
 9 one-dimensional groundwater model (Table 10.3.9.2-3) represent available literature data and
 10 that the model aggregates these value ranges into a simplistic representation of the aquifers.

11
 12 Depth to groundwater is typically on the order of 50 ft (15 m) below the surface in the
 13 vicinity of the Fourmile East SEZ. The one-dimensional groundwater modeling results for the
 14 upper unconfined aquifer suggest that groundwater drawdown in the vicinity of the SEZ
 15 (approximately a 2-mi [3.2-km] radius) ranges from up to 55 ft (17 m) for the high pumping
 16 scenario, up to 8 ft (2 m) for the medium pumping scenario, and less than 1 ft (0.3 m) for the
 17 low pumping scenario (Figure 10.3.9.2-2). The extent of groundwater drawdown is primarily

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 19
 20 **TABLE 10.3.9.2-3 Aquifer Characteristics and**
 21 **Assumptions Used in the One-Dimensional Groundwater**
 22 **Model for the Proposed Fourmile East SEZ as Revised**

Parameter	Value
<i>Upper, unconfined aquifer</i>	
Aquifer type/conditions	Unconfined/basin fill
Aquifer thickness (ft) ^a	125
Hydraulic conductivity (ft/day)	50
Transmissivity (ft ² /day)	6,250
Specific yield	0.15
<i>Lower, confined aquifer</i>	
Aquifer type/conditions	Confined/basin fill
Aquifer thickness (ft)	500
Hydraulic conductivity (ft/day)	15
Transmissivity (ft ² /day)	7,500
<i>Upper and lower aquifers</i>	
Storage coefficient	0.0000025
Analysis period (yr)	20
High pumping scenario (ac-ft/yr) ^b	2,312
Medium pumping scenario (ac-ft/yr)	329
Low pumping scenario (ac-ft/yr)	13

^a To convert ft to m, multiply by 0.3048.

^b To convert ac-ft to m³, multiply by 1,234.

Source: Colorado DWR (2004).

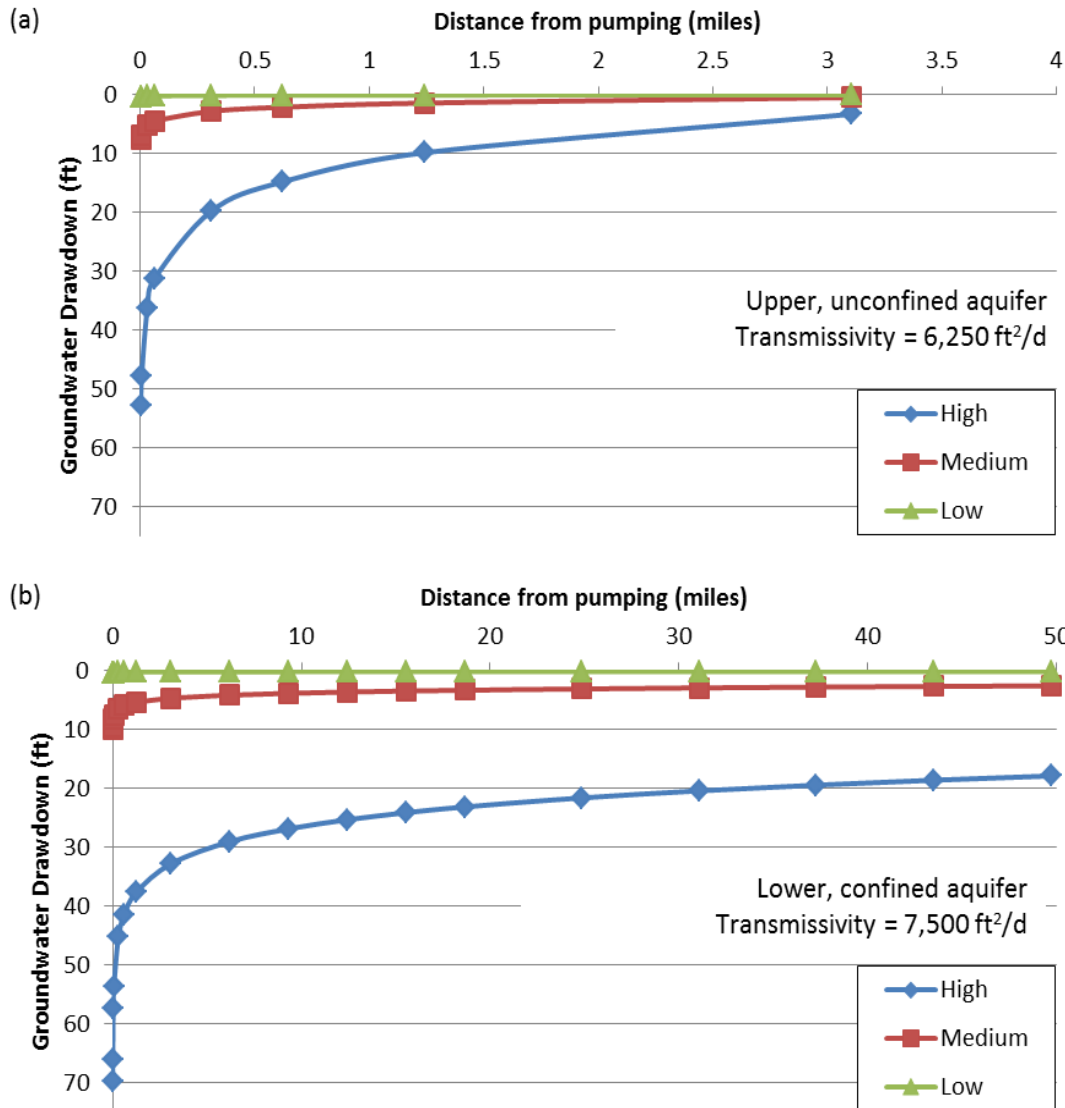


FIGURE 10.3.9.2-2 Estimated One-Dimensional Groundwater Drawdown in (a) Upper Unconfined Aquifer and (b) Lower Confined Aquifer Resulting from High, Medium, and Low Groundwater Pumping Scenarios over the 20-Year Operational Period at the Proposed Fourmile East SEZ as Revised

restricted to the vicinity of the SEZ for all pumping scenarios. The modeling results for the lower confined aquifer suggest significant groundwater drawdown for the high pumping scenario, ranging from 20 to 70 ft (6 to 21 m) and extending more than 50 mi (80 km) from the SEZ (Figure 10.3.9.2-2). The low and medium pumping scenarios have a much lower impact on groundwater drawdown, from 0 to 10 ft (0 to 3 m).

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

1 of water moved through the San Luis Valley. Groundwater modeling results suggest that the
2 high pumping scenario would have a localized groundwater drawdown effect if groundwater
3 were extracted from the unconfined aquifer, but a more significant impact extending more
4 than 50 mi (80 km) away from the SEZ if withdrawn from the confined aquifer. As stated
5 in Section 10.3.9.1, water management of the San Luis Valley is restrictive given its
6 overappropriated water rights and its obligations to maintain flows in the Rio Grande.
7 Ultimately, any proposed groundwater withdrawals for solar energy facilities would be reviewed
8 for impacts by the Colorado DWR and would be subject to the rules and court decisions outlined
9 in Case Numbers 06CV64 and 07CW52 (Colorado District Court 2010).

10 11 12 ***10.3.9.2.3 Off-Site Impacts: Roads and Transmission Lines***

13
14 As stated in the Draft Solar PEIS, impacts associated with the construction of roads and
15 transmission lines primarily deal with water use demands for construction, water quality
16 concerns relating to potential chemical spills, and land disturbance effects on the natural
17 hydrology. Water needed for transmission line construction activities (e.g., for soil compaction,
18 dust suppression, and potable supply for workers) could be trucked to the construction area from
19 an off-site source. If this occurred, water use impacts at the SEZ would be negligible. The Draft
20 Solar PEIS assessment of impacts on water resources from road and transmission line
21 construction remains valid.

22 23 24 ***10.3.9.2.4 Summary of Impacts on Water Resources***

25
26 The additional information and analyses of water resources presented in this update agree
27 with the information provided in the Draft Solar PEIS, which indicates that the San Luis Valley
28 is a high-elevation basin, with predominantly agricultural land use, and is the headwaters of the
29 Rio Grande, where surface water and groundwater processes are coupled and managed jointly.
30 Groundwater in the San Luis Valley is found in both the upper unconfined aquifer and the lower
31 confined aquifer, and historical diversions of both surface water and groundwater for irrigation
32 have affected streamflows and groundwater levels. Water management plays a significant role
33 in the San Luis Valley, because it pertains to ensuring river flows in the Rio Grande according to
34 the Rio Grande Compact, which is the primary responsibility of the Colorado DWR.

35
36 Disturbance to intermittent/ephemeral stream channels within the Fourmile East SEZ
37 should not have a significant impact on the critical functions of groundwater recharge, sediment
38 transport, flood conveyance, and ecological habitat, given the relatively small footprint of the
39 SEZ with respect to the study area and the absence of stream channels within the SEZ.
40 Groundwater withdrawals pose the greatest threat to water resources in the San Luis Valley.
41 The water budgeting and groundwater modeling analyses suggest that significant groundwater
42 drawdown could occur both locally and off-site under the high pumping scenario if groundwater
43 were extracted from either the unconfined or confined aquifer. The low and medium pumping
44 scenarios are preferable because their estimated groundwater drawdown is much less.
45 Ultimately, the process of transferring water rights established by the Colorado DWR will
46 determine how much water can be used by proposed solar facilities. As stated in the Draft Solar

1 PEIS, given the restrictive nature of water rights and the need for augmentation water reserves, it
2 would be difficult for any projects seeking more than 1,000 ac-ft/yr (1.2 million m³/yr) of water
3 to be successful in obtaining the needed water rights (McDermott 2010).
4

5 Predicting impacts associated with groundwater withdrawal is often difficult, given the
6 heterogeneity of aquifer characteristics, the long time period between the onset of pumping and
7 its effects, and limited data. Another consideration relevant to the San Luis Valley is that the
8 transfer of water rights will likely come from the purchase of existing irrigation water rights,
9 which will result in a change in the location of the point of diversion and a change in land use
10 patterns in the basin, both of which can affect groundwater processes. One of the primary
11 mitigation measures to protect water resources is the implementation of long-term monitoring
12 and adaptive management (see Section A.2.4 of Appendix A). For groundwater, this requires a
13 combination of monitoring and modeling to fully identify the temporal and spatial extent of
14 potential impacts. Water management in the San Luis Valley relies on several water monitoring
15 and modeling tools developed by the Colorado DWR and the CWCB that are a part of the
16 Colorado's Decision Support Systems (available at [http://cdss.state.co.us/Pages/
17 CDSHome.aspx](http://cdss.state.co.us/Pages/CDSHome.aspx)), and these tools should be implemented with respect to long-term monitoring
18 and adaptive management strategies for solar energy development occurring within the San Luis
19 Valley.
20

21 22 **10.3.9.3 SEZ-Specific Design Features and Design Feature Effectiveness** 23

24 Required programmatic design features that would reduce impacts on surface water
25 and groundwater are described in Section A.2.2 of Appendix A of this Final Solar PEIS.
26 Implementing the programmatic design features will provide some protection of and reduce
27 impacts on water resources.
28

29 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
30 analyses, and consideration of comments received as applicable, the following SEZ-specific
31 design feature for water resources has been identified:
32

- 33 • Groundwater analyses suggest full build-out of wet-cooled technologies is not
34 feasible; for mixed-technology development scenarios, any proposed wet-
35 cooled projects would have to reduce water requirements to less than
36 approximately 1,000 ac-ft/yr (1.2 million m³/yr) in order to secure water
37 rights and comply with water management in the San Luis Valley.
38

39 The need for additional SEZ-specific design features will be identified through the process
40 of preparing parcels for competitive offer and subsequent project-specific analysis.
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1 **10.3.10 Vegetation**

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4 **10.3.10.1 Affected Environment**

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6 Revisions to the boundaries of the proposed Fourmile East SEZ have eliminated several
7 wetlands mapped by the NWI and a playa in the southwestern portion of the SEZ. In addition,
8 several NWI-mapped wetland areas within the west-central portion of the SEZ, with a total of
9 about 1 acre (0.004 km²), were identified as non-development areas in the Supplement to the
10 Draft Solar PEIS.

11
12 As presented in Section 10.3.10.1 of the Draft Solar PEIS, 5 cover types were identified
13 within the area of the proposed Fourmile East SEZ, while 35 cover types were identified in the
14 area of indirect effects, including the previously assumed transmission line corridor and within
15 5 mi (8 km) of the SEZ boundary. For this updated assessment, a specifically located
16 hypothetical transmission line is no longer being assumed (see Section 10.3.23 for an updated
17 transmission assessment for this SEZ). Sensitive habitats on the SEZ include wetlands, sand
18 dunes, ephemeral washes, and playas. Because of the SEZ boundary changes, the Inter-Mountain
19 Basins Playa cover type no longer occurs within the SEZ. Figure 10.3.10.1-1 shows the cover
20 types within the affected area of the Fourmile East SEZ as revised.

21
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23 **10.3.10.2 Impacts**

24
25 As presented the Draft Solar PEIS, the construction of solar energy facilities within the
26 proposed Fourmile East SEZ would result in direct impacts on plant communities because of
27 the removal of vegetation within the facility footprint during land-clearing and land-grading
28 operations. Approximately 80% of the SEZ would be expected to be cleared with full
29 development of the SEZ. As a result of the new configuration of the SEZ boundary,
30 approximately 2,306 acres (9.3 km²) would be cleared.

31
32 Overall impact magnitude categories were based on professional judgment and include
33 (1) *small*: a relatively small proportion ($\leq 1\%$) of the cover type within the SEZ region would be
34 lost; (2) *moderate*: an intermediate proportion (> 1 but $\leq 10\%$) of a cover type would be lost; and
35 (3) *large*: $> 10\%$ of a cover type would be lost.

36
37
38 **10.3.10.2.1 Impacts on Native Species**

39
40 The analysis presented in the Draft Solar PEIS for the original Fourmile East SEZ
41 developable area indicated that development would result in a small impact on all land cover
42 types occurring within the SEZ (Table 10.3.10.1-1 in the Draft Solar PEIS). Development within
43 the Fourmile East SEZ could still directly affect most of the cover types evaluated in the Draft
44 Solar PEIS, with the exception of Inter-Mountain Basins Playa; the reduction in the developable
45 area would result in reduced (and still small) impact levels on all cover types in the affected area,
46 compared to original estimates in the Draft Solar PEIS.

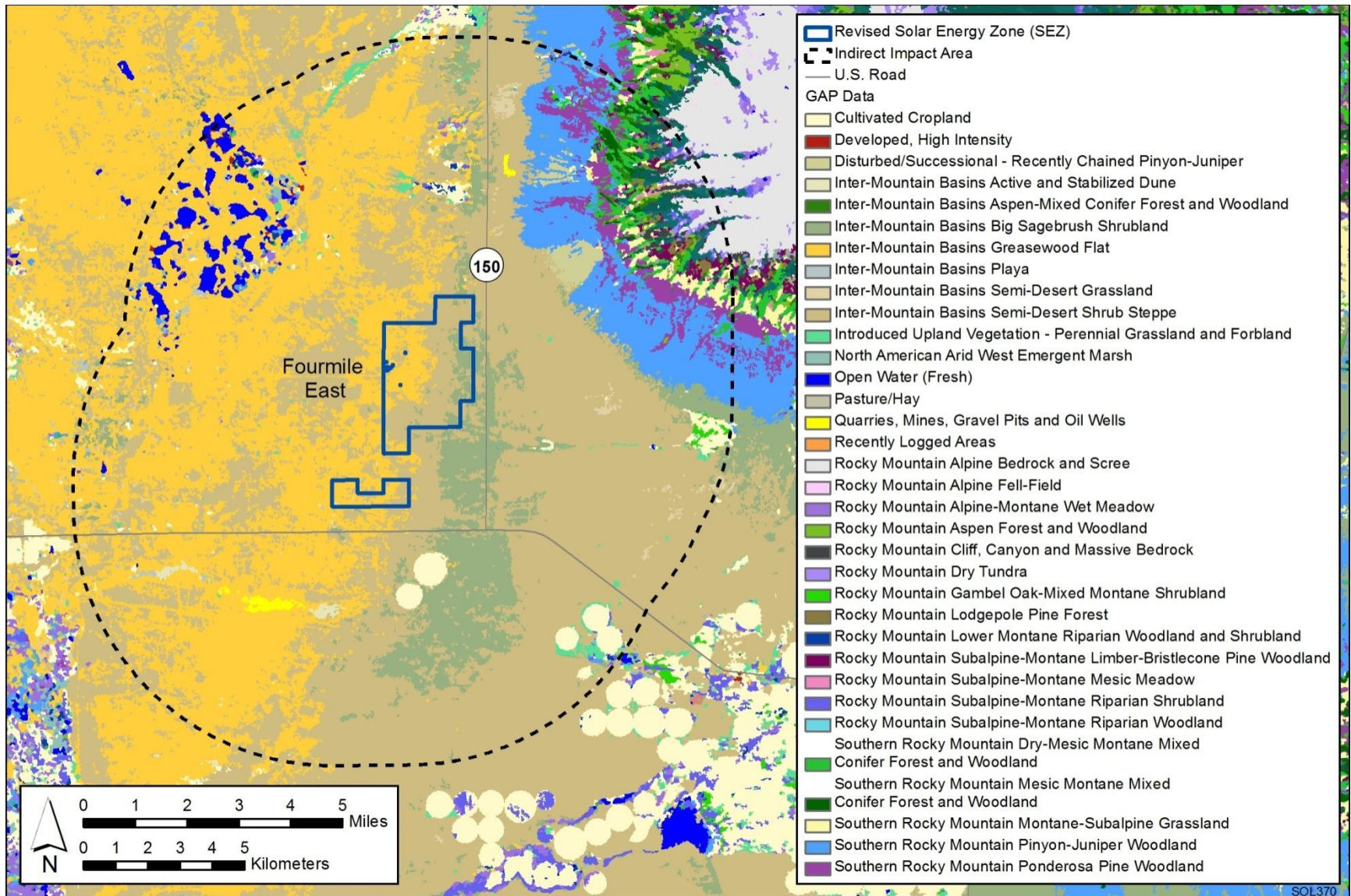


FIGURE 10.3.10.1-1 Land Cover Types within the Proposed Fourmile East SEZ as Revised

1 Direct impacts on the NWI-mapped wetlands that occur within the excluded and
2 non-developable portions of the SEZ or in the previously identified transmission corridor would
3 not occur. However, direct impacts on unmapped wetlands within the remaining developable
4 areas of the SEZ could still occur. In addition, indirect impacts on wetlands within or near the
5 SEZ, as described in the Draft Solar PEIS, could occur.
6
7

8 ***10.3.10.2 Impacts from Noxious Weeds and Invasive Plant Species*** 9

10 As presented in the Draft Solar PEIS, land disturbance from project activities and indirect
11 effects of construction and operation within the Fourmile East SEZ could potentially result in the
12 establishment or expansion of noxious weeds and invasive species populations, potentially
13 including those species listed in Section 10.3.10.1 in the Draft Solar PEIS. Impacts such as
14 reduced restoration success and possible widespread habitat degradation could still occur;
15 however, a small reduction in the potential for such impacts would result from the reduced
16 developable area of the SEZ.
17
18

19 **10.3.10.3 SEZ-Specific Design Features and Design Feature Effectiveness** 20

21 Required programmatic design features are described in Section A.2.2 of Appendix A
22 of this Final Solar PEIS. SEZ-specific species and habitats will determine how programmatic
23 design features are applied, for example:
24

- 25 • All wetland, playa, dry wash, and sand dune habitats and sand transport areas,
26 within the Fourmile East SEZ shall be avoided to the extent practicable, and
27 any impacts shall be minimized and mitigated in consultation with appropriate
28 agencies. A buffer area shall be maintained around wetlands and dry washes
29 to reduce the potential for impacts on these habitats on or near the SEZ.
30
- 31 • Appropriate engineering controls shall be used to minimize impacts on
32 wetland, playa, dry wash, and riparian habitats, including downstream
33 occurrences, resulting from surface water runoff, erosion, sedimentation,
34 altered hydrology, accidental spills, or fugitive dust deposition to these
35 habitats. Appropriate buffers and engineering controls will be determined
36 through agency consultation.
37
- 38 • Groundwater withdrawals shall be limited to reduce the potential for indirect
39 impacts on wetland habitats or springs that are associated with groundwater
40 discharge, such as the Blanca wetlands.
41

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

1 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
2 analyses due to changes to the SEZ boundaries, and consideration of comments received as
3 applicable, no SEZ-specific design features for vegetation in the proposed Fourmile East SEZ
4 have been identified. Some SEZ-specific design features may be identified through the process
5 of preparing parcels for competitive offer and subsequent project-specific analysis.
6
7

8 **10.3.11 Wildlife and Aquatic Biota**

9

10 For the assessment of potential impacts on wildlife and aquatic biota, overall impact
11 magnitude categories were based on professional judgment and include (1) *small*: a
12 relatively small proportion ($\leq 1\%$) of the species' habitat within the SEZ region would be lost;
13 (2) *moderate*: an intermediate proportion (> 1 but $\leq 10\%$) of the species' habitat would be lost;
14 and (3) *large*: $> 10\%$ of the species' habitat would be lost.
15
16

17 **10.3.11.1 Amphibians and Reptiles**

18
19

20 ***10.3.11.1.1 Affected Environment***

21

22 As presented in the Draft Solar PEIS, amphibian and reptile species expected to occur
23 within the SEZ include the Great Plains toad (*Bufo cognatus*), Woodhouse's toad (*Bufo*
24 *woodhousii*), fence lizard (*Sceloporus undulatus*), gopher snake (*Pituophis catenifer*), western
25 rattlesnake (*Crotalus viridis*), short-horned lizard (*Phrynosoma hernandesi*), and western
26 terrestrial garter snake (*Thamnophis elegans*). The reduction in the size of the Fourmile East
27 SEZ does not alter the potential for these species to occur in the affected area.
28
29

30 ***10.3.11.1.2 Impacts***

31

32 As presented in the Draft Solar PEIS, solar energy development within the Fourmile East
33 SEZ could affect potentially suitable habitats for several amphibian and reptile species. The
34 analysis presented in the Draft Solar PEIS for the original Fourmile East SEZ boundaries
35 indicated that development would result in a small overall impact on representative amphibian
36 and reptile species (Table 10.3.11.1-1 in the Draft Solar PEIS). Development within the revised
37 boundaries of the Fourmile East SEZ could still affect the same species evaluated in the Draft
38 Solar PEIS; however, the reduction in the developable area would result in reduced (and still
39 small) impact levels compared to original estimates in the Draft Solar PEIS.
40
41

42 ***10.3.11.1.3 SEZ-Specific Design Features and Design Feature Effectiveness***

43

44 Required programmatic design features that will reduce impacts on amphibian and reptile
45 species are described in Section A.2.2 of Appendix A of this Final Solar PEIS. SEZ-specific
46 species and habitats will determine how programmatic design features are applied, for example:

- Appropriate engineering controls shall be used to minimize impacts on the washes that drain off of the Sangre de Cristo Mountains and on Smith Reservoir resulting from surface water runoff, erosion, sedimentation, accidental spills, or fugitive dust deposition to these habitats.

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

Because of the changes to the SEZ boundaries, the SEZ-specific design feature identified in Section 11.3.11.1.3 of the Draft Solar PEIS (i.e., wetland habitats should be avoided) is no longer applicable. On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those analyses due to changes to the SEZ boundaries, and consideration of comments received as applicable, no SEZ-specific design features for amphibian and reptile species in the proposed Fourmile East SEZ 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.

10.3.11.2 Birds

10.3.11.2.1 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 Fourmile East SEZ. Representative bird species identified in the Draft Solar PEIS included 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*), American kestrel (*Falco sparverius*), golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), short-eared owl (*Asio flammeus*), Swainson's hawk (*Buteo swainsoni*), and mourning dove (*Zenaida macroura*). The reduction in the size of the Fourmile East SEZ does not alter the potential for these species or other bird species to occur in the affected area.

10.3.11.2.2 Impacts

As presented in the Draft Solar PEIS, solar energy development within the Fourmile East SEZ could affect potentially suitable habitats of bird species. The analysis presented in the Draft Solar PES for the original Fourmile East SEZ boundaries indicated that development would result in a small overall impact on the representative bird species (Table 10.3.11.2-1 in the Draft Solar PEIS). Development within the revised boundaries of the Fourmile East SEZ could still affect the same species evaluated in the Draft Solar PEIS; however, the reduction in the developable area would result in reduced (and still small) impact levels compared to original estimates in the Draft Solar PEIS.

1 **10.3.11.2.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 Required programmatic design features that would reduce impacts on bird species are
4 described in Section A.2.2 of Appendix A of this Final Solar PEIS. SEZ-specific species and
5 habitats will determine how programmatic design features are applied, for example:
6

- 7 • Appropriate engineering controls shall be used to minimize impacts resulting
8 from surface water runoff, erosion, sedimentation, accidental spills, or fugitive
9 dust deposition.
10
11 • If present, prairie dog colonies (which could provide habitat or a food source
12 for some raptor species) shall be avoided to the extent practicable.
13

14 If these programmatic design features are implemented, impacts on bird species will be
15 reduced.
16

17 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
18 analyses due to changes to the SEZ boundaries, and consideration of comments received as
19 applicable, the following SEZ-specific design feature for birds has been identified:
20

- 21 • If present, prairie dog colonies (which could provide habitat or a food source
22 for some raptor species) should be avoided to the extent practicable.
23

24 If SEZ-specific design features are implemented in addition to required programmatic
25 design features, it is anticipated that impacts on bird species would be small. The need for
26 additional SEZ-specific design features will be identified through the process of preparing
27 parcels for competitive offer and subsequent project-specific analysis.
28
29

30 **10.3.11.3 Mammals**
31

32 **10.3.11.3.1 Affected Environment**
33

34 As presented in the Draft Solar PEIS, a large number of mammal species were identified
35 that could occur or have potentially suitable habitat within the affected area of the proposed
36 Fourmile East SEZ. Representative mammal species identified in the Draft Solar PEIS included
37 Fourmile East SEZ. Representative mammal species identified in the Draft Solar PEIS included
38 (1) big game species: the American black bear (*Ursus americanus*), bighorn sheep (*Ovis*
39 *canadensis*), cougar (*Puma concolor*), elk (*Cervis canadensis*), mule deer (*Odocoileus*
40 *hemionus*), and pronghorn (*Antilocapra americana*); (2) furbearers and small game species:
41 the American badger (*Taxidea taxus*), coyote (*Canis latrans*), desert cottontail (*Sylvilagus*
42 *audubonii*), red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*), and white-tailed
43 jackrabbit (*Lepus townsendii*); and (3) small nongame species: the big brown bat (*Eptesicus*
44 *fuscus*), deer mouse (*Peromyscus maniculatus*), least chipmunk (*Tamias minimus*), little brown
45 myotis (*Myotis lucifugus*), northern pocket gopher (*Thomomys talpoides*), Ord's kangaroo rat
46 (*Dipodomys ordii*), thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*), and western

1 small-footed myotis (*Myotis ciliolabrum*). The reduction in the size of the Fourmile East SEZ
2 does not alter the potential for these species or any additional mammal species to occur in the
3 affected area.

6 ***10.3.11.3.2 Impacts***

8 As presented in the Draft Solar PEIS, solar energy development within the Fourmile East
9 SEZ could affect potentially suitable habitats of mammal species. The analysis presented in the
10 Draft Solar PEIS for the original Fourmile East SEZ boundaries indicated that development
11 would result in a small overall impact on all representative mammal species analyzed
12 (Table 10.3.11.3-1 in the Draft Solar PEIS). Development within the revised boundaries for the
13 Fourmile East SEZ could still affect the same representative mammal species evaluated in the
14 Draft Solar PEIS; however, the reduction in the developable area would result in reduced (and
15 still small) impact levels compared to original estimates in the Draft Solar PEIS. The 213-acre
16 (0.9-km²) portion of the SEZ that overlapped elk summer range for the original Fourmile East
17 SEZ configuration is largely excluded from the revised SEZ.

20 ***10.3.11.3.3 SEZ-Specific Design Features and Design Feature Effectiveness***

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

- 26 • Pre-disturbance surveys shall be conducted within the SEZ to determine the
27 use of the SEZ as a movement or migratory corridor or as important habitat
28 for elk, mule deer, and pronghorn. If such use is identified, mitigation using
29 spatial strategies, temporal strategies, or both shall be developed in
30 coordination with appropriate federal or state agencies.
- 32 • Prairie dog colonies shall be avoided to the extent practicable to reduce
33 impacts on species such as desert cottontail and thirteen-lined ground squirrel.

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

- 40 • To the extent practicable, construction activities should be avoided while
41 pronghorn are on their winter range within the immediate area of the proposed
42 Fourmile East SEZ.
- 44 • Prairie dog colonies should be avoided to the extent practicable to reduce
45 impacts on species such as desert cottontail and thirteen-lined ground squirrel.

1 If SEZ-specific design features are implemented in addition to required programmatic
2 design features, impacts on mammal species would be small. The need for additional SEZ-
3 specific design features will be identified through the process of preparing parcels for
4 competitive offer and subsequent project-specific analysis.
5
6

7 **10.3.11.4 Aquatic Biota**

8
9

10 ***10.3.11.4.1 Affected Environment***

11

12 There are no permanent water bodies or perennial streams within the boundaries of the
13 Fourmile East SEZ or the area of indirect effects. A number of ephemeral washes pass through
14 the SEZ that do not extend directly to nearby perennial streams. The boundaries of the Fourmile
15 East SEZ have been reduced compared to the boundaries given in the Draft Solar PEIS. Based on
16 these changes, updates to the Draft Solar PEIS include the following:
17

- 18 • Outside of the indirect effects area, but within 50 mi (80 km) of the SEZ, there
19 are approximately 967 mi (1,556 km) of perennial streams, 47 mi (76 km) of
20 intermittent streams, and 192 mi (309 km) of canals.
21
- 22 • There are approximately 6,463 acres (26.1 km²) of lake and reservoir habitat
23 within 50 mi (80 km) of the SEZ.
24
- 25 • Wetlands within the SEZ have been identified as non-development areas.
26
- 27 • The route of a new transmission line described in the Draft Solar PEIS is no
28 longer assumed.
29

30 Aquatic biota present in the SEZ have not been characterized. As stated in Appendix C
31 of the Supplement to the Draft Solar PEIS, site surveys can be conducted at the project-specific
32 level to characterize the aquatic biota, if present, in wetlands within the SEZ.
33
34

35 ***10.3.11.4.2 Impacts***

36

37 The types of impacts on aquatic habitats and biota that could occur from development
38 of utility-scale solar energy facilities are discussed in Section 5.10.3 of the Draft Solar PEIS and
39 this Final Solar PEIS. Aquatic habitats, including wetland areas, present on or near the Fourmile
40 East SEZ could be affected by solar energy development in a number of ways, including
41 (1) direct disturbance, (2) deposition of sediments, (3) changes in water quantity, and
42 (4) degradation of water quality. The impact assessment provided in the Draft Solar PEIS
43 remains valid, with the following updates:
44

- The amount of surface water features within the SEZ and in the area of indirect effects that could potentially be affected by solar energy development is less because the size of the SEZ has been reduced.
- The small emergent wetlands located along the western edge of the SEZ have been identified as non-development areas; therefore, construction activities would not directly affect wetlands. However, as described in the Draft Solar PEIS, the wetlands could be affected indirectly by solar development activities within the SEZ. The amount of aquatic habitat provided by the wetlands within the Fourmile East SEZ is less than 1% of total wetland surface area in the 50-mi (80-km) SEZ region. Consequently, the potential impacts on populations of aquatic biota from direct alteration would be small.

10.3.11.4.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features applicable to aquatic 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:

- Undisturbed buffer areas and sediment and erosion controls shall be maintained around the wetlands along the western boundary of the SEZ.
- Development shall avoid any additional wetlands identified during future site-specific fieldwork.
- The use of heavy machinery and pesticides shall be avoided within the immediate catchment basins for the wetlands along the western boundary of the SEZ.

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 Fourmile East SEZ would be small.

On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those analyses due to changes to the SEZ boundaries, and consideration of comments received as applicable, no SEZ-specific design features for water resources 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.

1 **10.3.12 Special Status Species**

2
3
4 **10.3.12.1 Affected Environment**

5
6 As presented in the Draft Solar PEIS, 59 special status species were identified that could
7 occur or have potentially suitable habitat within the affected area of the proposed Fourmile East
8 SEZ. The reduction in the size of the Fourmile East SEZ does not alter the potential for these
9 species or any additional special status species to occur in the affected area. However, field
10 surveys conducted for the BLM following the publication of the Draft Solar PEIS have indicated
11 that one additional special status bat species could occur in the SEZ affected area—the fringed
12 myotis (*Myotis thysanodes*). Figure 10.3.12.1-1 shows the known or potential occurrences of
13 species in the affected area of the revised Fourmile East SEZ that are listed, proposed, or
14 candidates for listing under the ESA.

15
16 Following the publication of the Draft Solar PEIS, the BLM conducted field surveys for
17 special status bat species, as well as Gunnison prairie dog (*Cynomys gunnisoni*) and western
18 burrowing owl (*Athene cunicularia*), in the Fourmile East SEZ. Surveys for bat species were
19 conducted in the SEZ by using passive and active acoustic monitoring techniques at various
20 times between June 16, 2011, and October 15, 2011 (Rodriguez 2011). Survey results indicated
21 high bat activity during night hours within the SEZ. The big free-tailed bat (*Nyctinomops*
22 *macrotis*) was the only special status bat species recorded on the SEZ. However, the documented
23 presence of the fringed myotis in the De Tilla Gulch SEZ suggests that the fringed myotis could
24 occur throughout the San Luis Valley and potentially within the Fourmile East SEZ. No roosting
25 habitat for any bat species was observed on the SEZ (Rodriguez 2011). Additional life ecological
26 and natural history information for the fringed myotis is provided below.

27
28 Field surveys for Gunnison prairie dog and western burrowing owl were conducted on
29 July 14, 2011 (Garcia and Harvey 2011). No Gunnison prairie dog activity was recorded in any
30 portion of the SEZ. However, there are established Gunnison prairie dog colonies 10 mi (16 km)
31 north of the SEZ. Burrowing owls were not recorded on the SEZ during the field surveys.
32 However, burrowing owls may nest among prairie dog colonies surrounding the SEZ; the
33 Fourmile East SEZ may occur within the home range of any of these individuals (Garcia and
34 Harvey 2011).

35
36
37 **Fringed Myotis.** The fringed myotis is a year-round resident in western Colorado, where
38 it forages in a variety of habitats including ponderosa pine woodlands, greasewood flats,
39 oakbrush, and shrublands. This species was not evaluated for the Fourmile East SEZ in the
40 Draft Solar PEIS. The species roosts in caves, rock crevices, or in buildings. The fringed
41 myotis was not recorded on the Fourmile East SEZ during field surveys conducted in 2011
42 (Rodriguez 2011). However, fringed myotis was recorded on the De Tilla Gulch SEZ, suggesting
43 that the species could occur elsewhere in the San Luis Valley and potentially within the revised
44 area of the Fourmile East SEZ. According to the SWReGAP habitat suitability model, potentially
45 suitable foraging habitat for the fringed myotis could occur on the revised area of the Fourmile
46

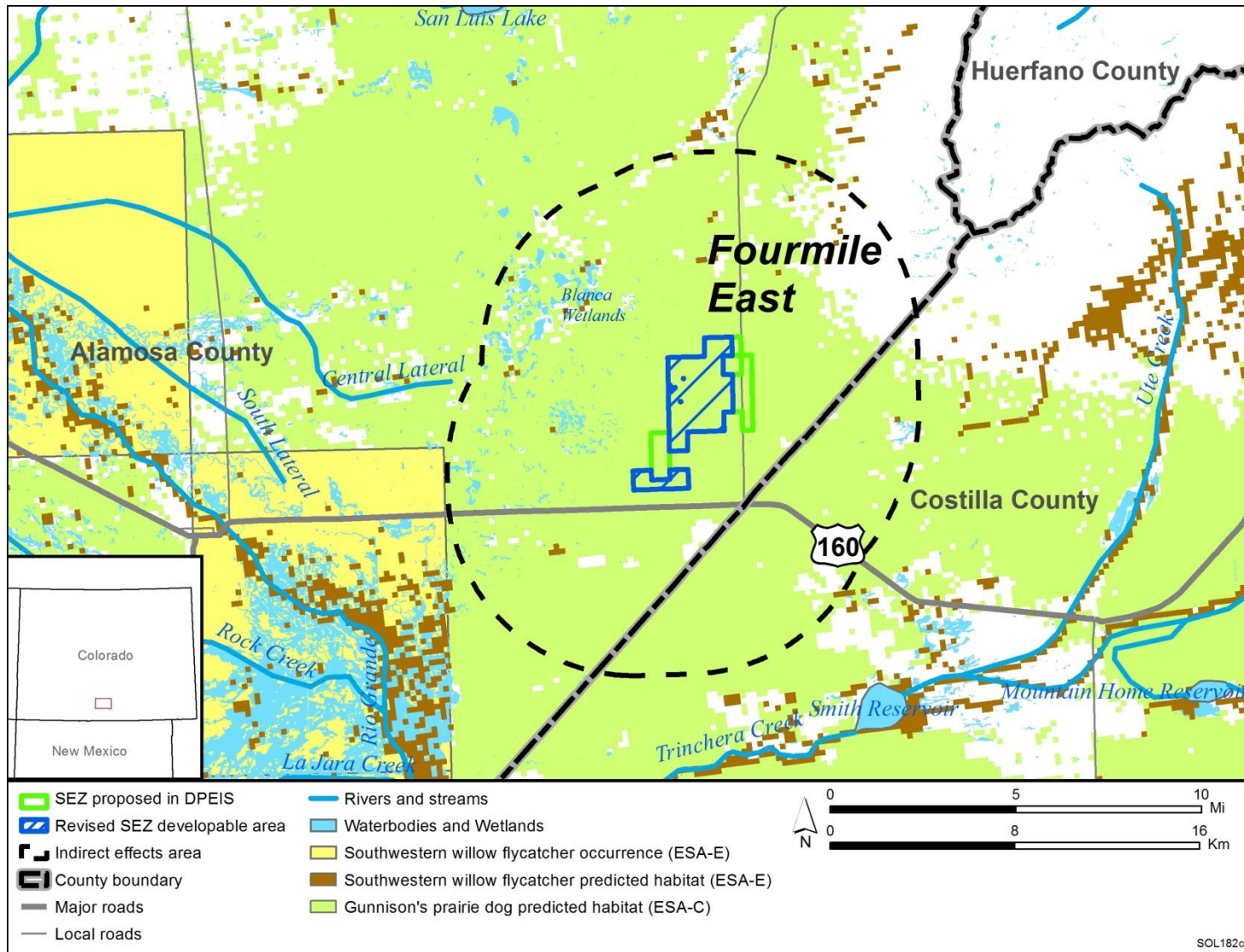


FIGURE 10.3.12.1-1 Developable Area for the Proposed Fourmile East SEZ as Revised and Known or Potential Occurrences of Species Listed as Threatened or Endangered, Proposed, or Candidates for Listing under the ESA

1 East SEZ and throughout portions of the area of indirect effects (Table 10.3.12.1-1). There is no
2 potentially suitable roosting habitat (rocky cliffs and outcrops) in the area of direct effects.
3
4

5 **10.3.12.2 Impacts**

6

7 Overall impact magnitude categories were based on professional judgment and include
8 (1) *small*: a relatively small proportion ($\leq 1\%$) of the special status species' habitat within the
9 SEZ region would be lost; (2) *moderate*: an intermediate proportion (> 1 but $\leq 10\%$) of the special
10 status species' habitat would be lost; and (3) *large*: $> 10\%$ of the special status species' habitat
11 would be lost.
12

13 As presented in the Draft Solar PEIS, solar energy development within the Fourmile East
14 SEZ could affect potentially suitable habitats of special status species. The analysis presented
15 in the Draft Solar PEIS for the original Fourmile East SEZ boundaries indicated that
16 development would result in no impact or a small overall impact on all special status species
17 (Table 10.3.12.1-1 in the Draft Solar PEIS). Development within the revised area of the Fourmile
18 SEZ could still affect the same 59 species evaluated in the Draft Solar PEIS; however, the
19 reduction in the developable area would result in reduced (and still small) impact levels
20 compared to original estimates in the Draft Solar PEIS.
21

22 Field surveys conducted for the BLM following the publication of the Draft Solar PEIS
23 indicated that one additional special status bat species could occur in the SEZ affected area—the
24 fringed myotis. Impacts on this species are described below.
25
26

27 **Fringed Myotis.** The fringed myotis is a year-round resident in southwestern Colorado
28 and is known to occur within the San Luis Valley. Although this species is not known to occur in
29 the proposed Fourmile East SEZ, field surveys conducted in 2011 documented the presence of
30 this species in the De Tilla Gulch SEZ (Rodriguez 2011). According to the SWReGAP habitat
31 suitability model, approximately 2,800 acres (11.3 km²) of suitable foraging habitat on the
32 revised area of the Fourmile East SEZ may be directly affected by construction and operations
33 (Table 10.3.12.1-1). This direct effects area represents less than 0.1% of potentially suitable
34 habitat in the SEZ region. About 83,000 acres (336 km²) of potentially suitable habitat occurs in
35 the area of indirect effects; this area represents about 2.2% of the available suitable habitat in the
36 region (Table 10.3.12.1-1). Most of the potentially suitable habitat in the affected area is foraging
37 habitat represented by desert shrubland. There is no potentially suitable roosting habitat (rocky
38 cliffs and outcrops) in the area of direct effects; however, it is possible for individuals to roost in
39 nearby habitats within the area of indirect effects (Rodriguez 2011).
40

41 The overall impact on the fringed myotis from construction, operation, and
42 decommissioning of utility-scale solar energy facilities within the revised area of the Fourmile
43 East SEZ is considered small, because the amount of potentially suitable foraging habitat for this
44 species in the area of direct effects represents less than 1% of potentially suitable foraging
45 habitat in the SEZ region. The implementation of design features is expected to be sufficient to
46 reduce indirect impacts on this species to negligible levels. Avoidance of all potentially suitable

TABLE 10.3.12.1-1 Habitats, Potential Impacts, and Potential Mitigation for Special Status Species That Could Be Affected by Solar Energy Development on the Proposed Fourmile East 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	
Mammals						
Fringed myotis	<i>Myotis thysanodes</i>	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 3,800,000 acres ⁱ of potentially suitable habitat occurs within the SEZ region.	2,800 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	83,000 acres of potentially suitable habitat (2.2% 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.

- ^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 10.3.12.1-1 of the Draft Solar PEIS.
- ^b BLM-S = listed as a sensitive species by the BLM; FWS-SC = USFWS species of concern.
- ^c Potentially suitable habitat was determined using SWReGAP habitat suitability models (USGS 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 potential habitat that could be affected relative to availability within the analysis area. Habitat availability for each species within the analysis area was determined using SWReGAP habitat suitability models (USGS 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 and within 5 mi (8 km) of the SEZ boundary. Indirect effects include effects from surface runoff or dust from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ.
- ^g Overall impact magnitude categories were based on professional judgment and include (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 km², multiply by 0.004047.

1 foraging habitats is not feasible, because potentially suitable habitat is widespread throughout the
2 area of direct effects and readily available in other portions of the SEZ region.
3
4

5 **10.3.12.3 SEZ-Specific Design Features and Design Feature Effectiveness** 6

7 Required programmatic design features are described in Section A.2.2 of Appendix A of
8 this Final Solar PEIS. SEZ-specific resources and conditions will determine how programmatic
9 design features are applied, for example:
10

- 11 • Pre-disturbance surveys shall be conducted within the SEZ to determine the
12 presence and abundance of special status species, including those identified in
13 Table 10.3.12.1-1 of the Draft Solar PEIS, as well as the fringed myotis.
14 Disturbance to occupied habitats for these species shall be avoided or
15 minimized to the extent practicable. If avoiding or minimizing impacts on
16 occupied habitats is not possible, translocation of individuals from areas of
17 direct effects or compensatory mitigation of direct effects on occupied habitats
18 may be used to reduce impacts. A comprehensive mitigation strategy for
19 special status species that uses one or more of these options to offset the
20 impacts of development shall be developed in coordination with the
21 appropriate federal and state agencies.
22
- 23 • Avoiding or limiting groundwater withdrawals for solar energy development
24 on the SEZ shall be employed to reduce impacts on groundwater-dependent
25 special status species, including those species that may occur in riparian or
26 aquatic habitats supported by groundwater. These species include the
27 southwestern willow flycatcher and western snowy plover.
28
- 29 • Coordination with the USFWS and CDOW shall be conducted to address the
30 potential for impacts on the Gunnison's prairie dog, a candidate for listing
31 under the ESA. Coordination would identify an appropriate survey protocol,
32 avoidance measures, and, potentially, translocation or compensatory
33 mitigation.
34

35 If the programmatic design features are implemented, it is anticipated that the majority of
36 impacts on the special status species from habitat disturbance and groundwater use would be
37 reduced.
38

39 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
40 analyses due to changes to the SEZ boundaries, and consideration of comments received as
41 applicable, no SEZ-specific design features for special status species in the proposed Fourmile
42 East SEZ have been identified. Some SEZ-specific design features may be identified through the
43 process of preparing parcels for competitive offer and subsequent project-specific analysis.
44
45

1 **10.3.13 Air Quality and Climate**

2
3
4 **10.3.13.1 Affected Environment**

5
6 Except as noted below, the information on air quality and climate presented in the
7 affected environment section of the Draft Solar PEIS remains valid.

8
9
10 **10.3.13.1.1 Existing Air Emissions**

11
12 The Draft Solar PEIS presented Alamosa County emissions data for 2002. More recent
13 data for 2008 (CDPHE 2011) were reviewed. The two emissions inventories are from different
14 sources and assumptions. In the more recent data, emissions of NO_x, CO, and VOCs were lower,
15 while emissions of SO₂, PM₁₀ and PM_{2.5} were higher. These changes would not affect modeled
16 air quality impacts presented in this update.

17
18
19 **10.3.13.1.2 Air Quality**

20
21 The calendar quarterly average NAAQS of 1.5 µg/m³ for lead (Pb) presented in
22 Table 10.3.13.1-2 of the Draft Solar PEIS has been replaced by the rolling 3-month standard
23 (0.15 µg/m³). The federal 24-hour and annual SO₂, 1-hour O₃, and annual PM₁₀ standards have
24 been revoked as well (EPA 2011). All Colorado SAAQS, except 3-hour SO₂ standard of
25 700 µg/m³, have been revoked since publication of the Draft Solar PEIS. These changes will not
26 affect the modeled air quality impacts presented in this update.

27
28 The size of the proposed Fourmile East SEZ was reduced by about 26%, from
29 3,882 acres (15.7 km²) to 2,882 acres (11.7 km²). However, distances to the nearest Class I areas
30 remain the same as in the Draft Solar PEIS.

31
32
33 **10.3.13.2 Impacts**

34
35
36 **10.3.13.2.1 Construction**

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38
39 **Methods and Assumptions**

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41 Except for the area disturbed at any one time during construction, the methods and
42 assumptions have not changed from those presented in the Draft Solar PEIS. Based on the
43 reduction in the area of the proposed Fourmile East SEZ, air quality for this Final Solar PEIS
44 was remodeled assuming that 2,306 acres (9.3 km²), 80% of the updated developable area,
45 would be disturbed at any one time. The Draft Solar PEIS assumed disturbance of an area of
46 3,000 acres (12.1 km²).

1 **Results**

2
3 Since the annual PM₁₀ standard has been rescinded, the discussion of annual PM₁₀
4 impacts in the Draft Solar PEIS is no longer applicable. Table 10.3.13.2-1 has been updated for
5 this Final Solar PEIS. The concentration values in the table are based on updated air quality
6 modeling reflecting the updated boundaries of the proposed SEZ.
7

8 Given the reduced area of the proposed SEZ, the concentrations predicted for this Final
9 Solar PEIS are less than or equal to those predicted in the Draft Solar PEIS, but the conclusions
10 presented in the Draft Solar PEIS remain valid.¹ Predicted 24-hour PM₁₀ and 24-hour PM_{2.5}
11 concentration levels could exceed NAAQS levels used for comparison at the SEZ boundaries
12 and in the immediately surrounding area during the construction phase of a solar development.
13 These high particulate levels would be limited to the immediate area surrounding the SEZ
14 boundaries and would decrease quickly with distance. Predicted total concentrations for annual
15 PM_{2.5} would be below the standard level used for comparison.
16

17 At the nearest residence, about 0.8 mi (1.3 km) southwest of the proposed SEZ, predicted
18 maximum 24-hour PM₁₀ concentration increments would be about 107 µg/m³; predicted
19 concentrations at the nearby towns of Alamosa, Blanca, Estrella, Mosca, Fort Garland, La Jara,
20 and Sanford would be less than 16 µg/m³. The conclusion of the Draft Solar PEIS that total
21 particulate levels (background plus the increment due to construction activities) at these locations
22 would not exceed standard levels remains valid.
23

24 Consistent with the conclusions of the Draft Solar PEIS, construction activities could
25 result in concentrations above Class I PSD PM₁₀ increment levels at the nearest federal Class I
26 area (the Great Sand Dunes WA), but the PM₁₀ increments would not be exceeded at other
27 nearby Class I areas (La Garita WA and Weminuche WA, and Wheeler Peak WA, New Mexico).
28

29 Overall, predicted 24-hour PM₁₀ and 24-hour PM_{2.5} concentration levels could exceed
30 standard levels used for comparison at the SEZ boundaries and immediately surrounding areas
31 during the construction phase of a solar development. To reduce potential impacts on ambient air
32 quality and in compliance with BLM design features, aggressive dust control measures would be
33 used. Potential air quality impacts on neighboring communities would be much lower. Predicted
34 total concentrations for annual PM_{2.5} would be below the standard level. Modeling indicates that
35 construction activities could result in concentrations above Class I PSD PM₁₀ increment levels at
36 the nearest federal Class I area, Great Sand Dunes WA. However, construction activities are not
37 subject to the PSD program; the comparison is made as an indicator of possible dust levels in the
38 WA during the limited construction period and as a screen to gage the size of the potential

¹ 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 so on, is not known; thus air quality modeling cannot be conducted. It has been assumed that 80% of the developable area of 2,882 acres (9.3 km²) 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 presented in this Final Solar PEIS.

1 **TABLE 10.3.13.2-1 Maximum Air Quality Impacts from Emissions Associated with**
 2 **Construction Activities for the Proposed Fourmile East SEZ as Revised**

Pollutant ^a	Averaging Time	Rank ^b	Concentration (µg/m ³)				Percentage of NAAQS	
			Maximum Increment ^b	Background	Total	NAAQS	Increment	Total
PM ₁₀	24 hours	H6H	428	27.0	455	150	285	303
PM _{2.5}	24 hours	H8H	29.5	16.0	45.5	35	84	130
	Annual	- ^c	7.1	4.0	11.1	15	47	74

^a PM_{2.5} = particulate matter with a diameter of ≤2.5 µm; PM₁₀ = 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.

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impact. Therefore, it is anticipated that the potential impacts of construction activities on ambient air quality would be moderate and temporary.

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With the reduced size of the Fourmile East SEZ, emissions from construction equipment and vehicles would be less than those estimated in the Draft Solar PEIS. Any potential impacts on AQRVs at nearby federal Class I areas would be less; thus the conclusions in the Draft Solar PEIS remain valid. Emissions from construction-related equipment and vehicles are temporary and could cause some unavoidable but short-term impacts.

15 **10.3.13.2.2 Operations**

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The reduction in the size of the proposed Fourmile East SEZ by about 26%, from 3,882 acres (15.7 km²) to 2,882 acres (11.7 km²), reduces the generating capacity and annual power generation and thus reduces the potentially avoided emissions presented in the Draft Solar PEIS. Total revised power generation capacity ranging from 256 to 461 MW is estimated for the Fourmile East SEZ for various solar technologies. As explained in the Draft Solar PEIS, the estimated amount of emissions avoided for the solar technologies evaluated depends only on the megawatts of conventional fossil fuel-generated power avoided. Updated estimates for emissions potentially avoided by a solar facility can be obtained from the table in the Draft Solar PEIS by reducing the tabulated estimates by about 26%, as shown in the revised

1 Table 10.3.13.2-2. For example, for the technologies estimated to require 9 acres/MW (power
2 tower, dish engine, and PV), up to 684 tons per year (= 74.25% × the low-end value of 922 tons
3 per year tabulated in the Draft Solar PEIS) of NO_x could be avoided by full solar development of
4 the proposed Fourmile East SEZ as revised for this Final Solar PEIS. Although the total
5 emissions avoided by full solar development of the proposed Fourmile East SEZ are reduced
6 from those presented in the Draft Solar PEIS, the conclusions of the Draft Solar PEIS remain
7 valid. Solar facilities built in the Fourmile East SEZ could avoid relatively more fossil fuel
8 emissions than those built in other states with less reliance on fossil fuel-generated power.
9

10 **10.3.13.2.3 Decommissioning and Reclamation**

11 The discussion in the Draft Solar PEIS remains valid. Decommissioning and reclamation
12 activities would be of short duration, and their potential impacts on air quality would be
13 moderate and temporary.
14

15 **10.3.13.3 SEZ-Specific Design Features and Design Feature Effectiveness**

16 Required programmatic design features that would reduce air quality impacts are
17 described in Section A.2.2 of Appendix A of this Final Solar PEIS. Limiting dust generation
18 during construction and operations is a required programmatic design feature under the BLM
19 Solar Energy Program. These extensive fugitive dust control measures would keep off-site PM
20 levels as low as possible during construction.
21

22 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
23 analyses due to changes to the SEZ boundaries, and consideration of comments received as
24 applicable, no SEZ-specific design features for air quality for the proposed Fourmile East SEZ
25 have been identified. Some SEZ-specific design features may be identified through the process
26 of preparing parcels for competitive offer and subsequent project-specific analysis.
27

28 **10.3.14 Visual Resources**

29 **10.3.14.1 Affected Environment**

30 The boundaries of the proposed Fourmile East SEZ have been revised to eliminate
31 999 acres (4 km²), mainly along the eastern boundary of the SEZ, as well as a small area on
32 the west side of the proposed SEZ. The proposed SEZ is now approximately 2.5 mi (4.0 km)
33 north to south (at its greatest extent) and 1.8 mi (2.9 km) east to west (at its greatest extent). The
34 remaining developable area within the SEZ is 2,882 acres (11.7 km²). Because of the reduction
35 in size of the SEZ, the total acreage of the lands visible within the 25-mi (40-km) viewshed of
36 the SEZ has decreased.
37

1 **TABLE 10.3.13.2-2 Annual Emissions from Combustion-Related Power Generation Avoided by**
 2 **Full Solar Development of the Proposed Fourmile East SEZ as Revised**

Area Size (acres) ^a	Capacity (MW) ^b	Power Generation (GWh/yr) ^c	Emissions Avoided (tons/yr; 10 ³ tons/yr for CO ₂) ^d			
			SO ₂	NO _x	Hg	CO ₂
2,882	256–461	449–808	594–1,068	684–1,232	0.004–0.007	443–798
Percentage of total emissions from electric power systems in the state of Colorado ^e			0.94–1.7%	0.94–1.7%	0.94–1.7%	0.94–1.7%
Percentage of total emissions from all source categories in the state of Colorado ^f			0.50–0.91%	0.17–0.30%	– ^g	0.43–0.77%
Percentage of total emissions from electric power systems in the six-state study area ^e			0.24–0.43%	0.19–0.33%	0.13–0.24%	0.17–0.30%
Percentage of total emissions from all source categories in the six-state study area ^f			0.13–0.23%	0.03–0.05%	–	0.05–0.10%

a To convert acres to km², multiply by 0.004047.

b It is assumed that the SEZ would eventually have development on 80% of the lands and that a range of 5 acres (0.020 km²) per MW (for parabolic trough technology) to 9 acres (0.036 km²) per MW (power tower, dish engine, and photovoltaic technologies) would be required.

c Assumed a capacity factor of 20%.

d Composite combustion-related emission factors for SO₂, NO_x, Hg, and CO₂ of 2.64, 3.05, 1.71 × 10⁻⁵, and 1,976 lb/MWh, respectively, were used for the state of Colorado.

e Emission data for all air pollutants are for 2005.

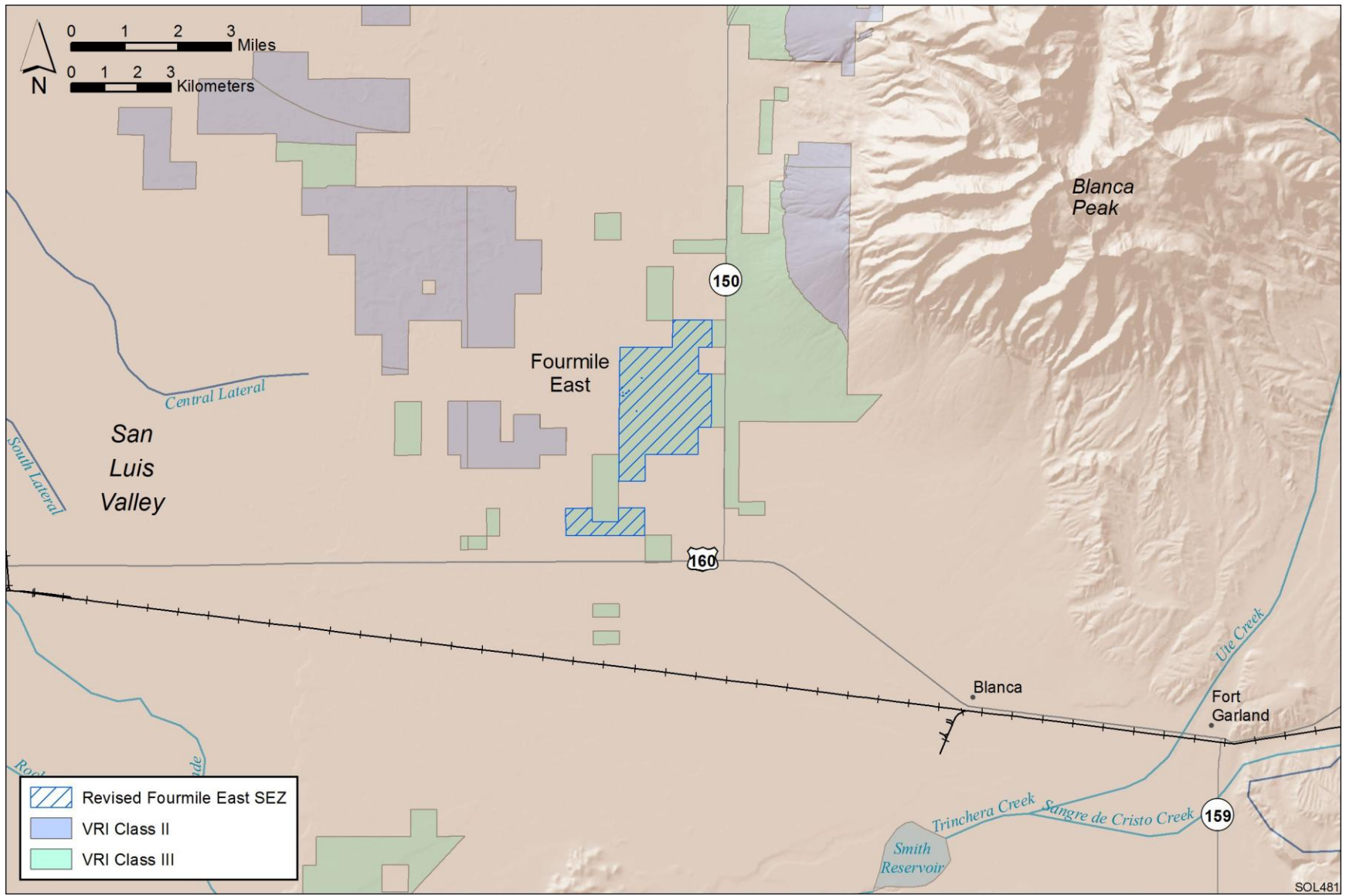
f Emission data for SO₂ and NO_x are for 2002, while those for CO₂ are for 2005.

g A dash indicates not estimated.

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

3
 4
 5 Because of the reduction in land available for development in the eastern portions of the
 6 SEZ, CO 150 no longer passes through the SEZ. It now runs parallel to the eastern boundary of
 7 the SEZ, at a distance of approximately 0.25 mi (0.40 km). This portion of CO 150 is also
 8 designated as the Los Caminos Antiguos Scenic Byway.
 9

10 An updated VRI map for the SEZ and surrounding lands is shown in Figure 10.3.14.1-1;
 11 it provides information from the BLM's 2009 VRI, which was finalized in October 2011
 12 (BLM 2011a). The value for the SEZ still is VRI Class III.
 13



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FIGURE 10.3.14.1-1 Visual Resource Inventory Values for the Proposed Fourmile East SEZ as Revised

1 Lands in the La Jara Field Office within the 25-mi (40-km), 650-ft (198-m) viewshed of
2 the revised SEZ include 21,087 acres (85.3 km²) of VRI Class II areas; 18,436 acres (74.6 km²)
3 of VRI Class III areas; and 21 acres (0.1 km²) of VRI Class IV areas.
4
5

6 **10.3.14.2 Impacts**

7

8 The reduction in size of the SEZ would reduce the total visual impacts associated with
9 solar energy development in the SEZ. It would limit the total amount of solar facility
10 infrastructure that would be visible and would reduce the geographic extent of the visible
11 infrastructure.
12

13 The reduction in size of the SEZ proposed in the Supplement to the Draft Solar PEIS
14 eliminated approximately 26% of the original SEZ. The resulting visual contrast reduction for
15 any given point within view of the SEZ would vary greatly depending on the viewpoint's
16 distance and direction from the SEZ. Contrast reduction generally would be greatest for
17 viewpoints closest to the portions of the SEZ that were eliminated and especially for those that
18 had broad, wide-angle views of these areas. In general, contrast reductions also would be larger
19 for elevated viewpoints relative to non-elevated viewpoints, because the reduction in area of the
20 solar facilities would be more apparent when looking down at the SEZ than when looking
21 across it.
22
23

24 ***10.3.14.2.1 Impacts on the Proposed Fourmile East SEZ***

25

26 Although the reduction in size of the SEZ would reduce visual contrasts associated with
27 solar development, solar development still would involve major modification of the existing
28 character of the landscape; it likely would dominate the views from most locations within the
29 SEZ. Additional impacts would occur as a result of the construction, operation, and
30 decommissioning of related facilities, such as access roads and electric transmission lines. In
31 general, strong visual contrasts from solar development still would be expected for viewing
32 locations within the SEZ.
33
34

35 ***10.3.14.2.2 Impacts on Lands Surrounding the Proposed Fourmile East SEZ***

36

37 For the Draft Solar PEIS, preliminary viewshed analyses were conducted to identify
38 which lands surrounding the proposed SEZ could have views of solar facilities in at least some
39 portion of the SEZ (see Appendices M and N of the Draft Solar PEIS for important information
40 on assumptions and limitations of the methods used). Four viewshed analyses were conducted,
41 assuming four different heights representative of project elements associated with potential solar
42 energy technologies: PV and parabolic trough arrays, 24.6 ft (7.5 m); solar dishes and power
43 blocks for CSP technologies, 38 ft (11.6 m); transmission towers and short solar power towers,
44 150 ft (45.7 m); and tall solar power towers, 650 ft (198.1 m).
45

1 These same viewsheds were recalculated in order to account for the boundary changes
2 described in the Supplement to the Draft Solar PEIS. Figure 10.3.14.2-1 shows the combined
3 results of the viewshed analyses for all four solar technologies. The colored portions indicate
4 areas with clear lines of sight to one or more areas within the SEZ and from which solar facilities
5 within these areas of the SEZ would be expected to be visible, assuming the absence of screening
6 vegetation or structures and adequate lighting and other atmospheric conditions. The light brown
7 areas are locations from which PV and parabolic trough arrays located in the SEZ could be
8 visible. Solar dishes and power blocks for CSP technologies would be visible from the areas
9 shaded light brown and the additional areas shaded light purple. Transmission towers and short
10 solar power towers would be visible from the areas shaded light brown and light purple and the
11 additional areas shaded dark purple. Power tower facilities located in the SEZ could be visible
12 from areas shaded light brown, light purple, and dark purple and at least the upper portions of
13 power tower receivers could be visible from the additional areas shaded medium brown.
14
15

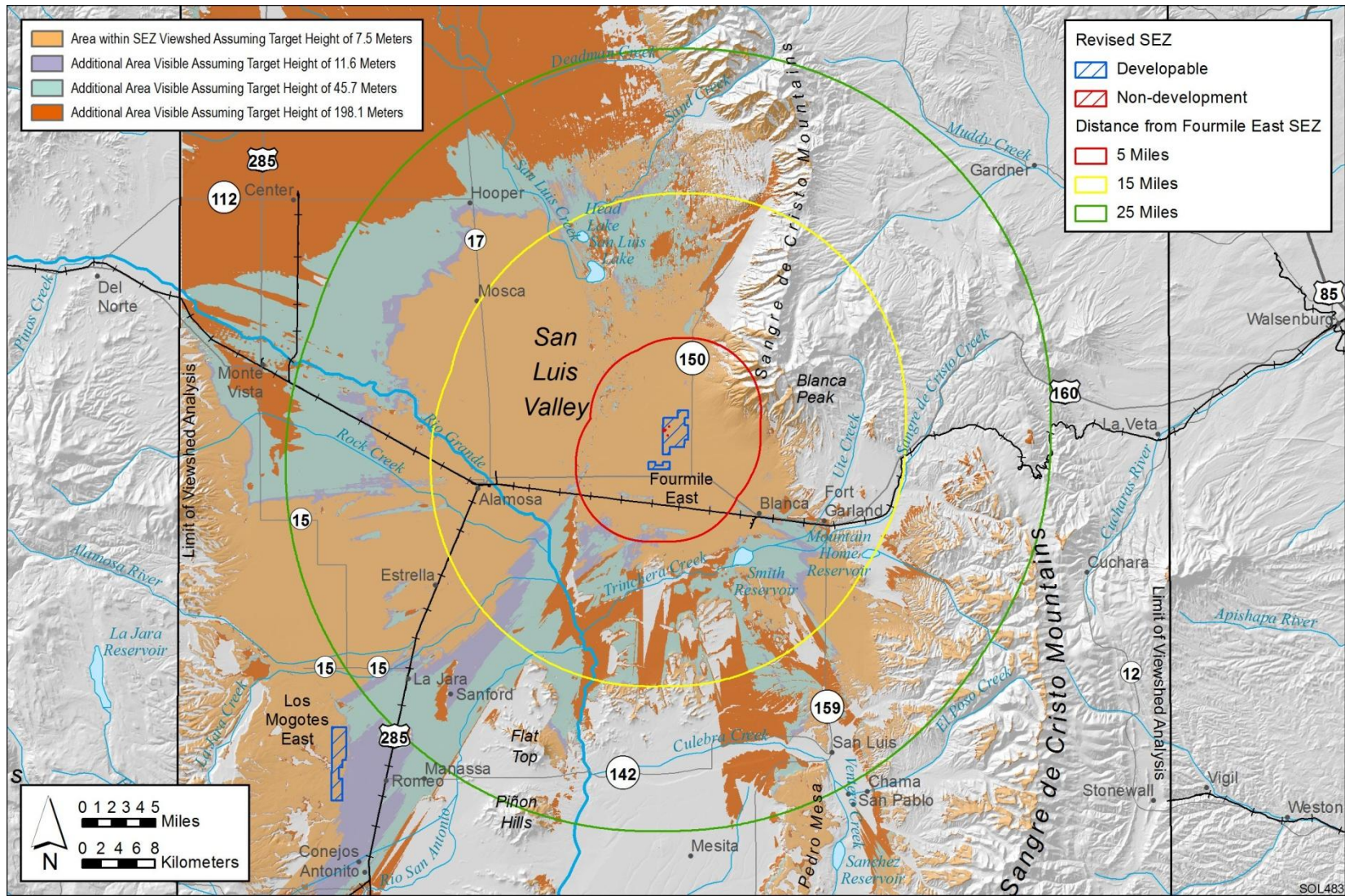
16 ***10.3.14.2.3 Impacts on Selected Federal-, State-, and BLM-Designated Sensitive*** 17 ***Visual Resource Areas and Other Lands and Resources*** 18

19 Figure 10.3.14.2-2 shows the results of a GIS analysis that overlays selected federal-,
20 state-, and BLM-designated sensitive visual resource areas onto the combined tall solar power
21 tower (650 ft [198.1 m]) and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds, in order
22 to illustrate which of these sensitive visual resource areas could have views of solar facilities
23 within the SEZ and therefore potentially would be subject to visual impacts from those facilities.
24 Distance zones that correspond with BLM's VRM system-specified foreground-midleground
25 distance (5 mi [8 km]), background distance (15 mi [24.1 km]), and a 25-mi (40.2-km) distance
26 zone are shown as well, in order to indicate the effect of distance from the SEZ on impact levels,
27 which are highly dependent on distance. A similar analysis was conducted for the Draft Solar
28 PEIS.
29

30 The scenic resources included in the analysis were as follows:

- 31
- 32 • National Parks, National Monuments, National Recreation Areas, National
33 Preserves, National Wildlife Refuges, National Reserves, National
34 Conservation Areas, National Historic Sites;
- 35
- 36 • Congressionally authorized Wilderness Areas;
- 37
- 38 • Wilderness Study Areas;
- 39
- 40 • National Wild and Scenic Rivers;
- 41
- 42 • Congressionally authorized Wild and Scenic Study Rivers;
- 43
- 44 • National Scenic Trails and National Historic Trails;
- 45
- 46 • National Historic Landmarks and National Natural Landmarks;

1



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2 **FIGURE 10.3.14.2-1 Viewshed Analyses for the Proposed Fourmile East SEZ as Revised and Surrounding Lands, Assuming**
 3 **Viewshed Heights of 24.6 ft (7.5 m), 38 ft (11.6 m), 150 ft (45.7 m), and 650 ft (198.1 m) (shaded areas indicate lands from which**
 4 **solar development and/or associated structures within the SEZ could be visible)**

- 1 • All-American Roads, National Scenic Byways, State Scenic Highways, and
- 2 BLM- and USFS-designated scenic highways/byways;
- 3
- 4 • BLM-designated Special Recreation Management Areas; and
- 5
- 6 • ACECs designated because of outstanding scenic qualities.
- 7

8 The results of the GIS analysis are summarized in Table 10.3.14.2-1. The change in size
9 of the SEZ alters the viewshed, such that the visibility of the SEZ and solar facilities within the
10 SEZ from the surrounding lands would be reduced. With the reduction in size of the SEZ, solar
11 energy development within the SEZ would be expected to create minimal or weak visual
12 contrasts for viewers within many of the surrounding scenic resource areas and other resources
13 listed in Table 10.3.14.2-1. Exceptions include the Sangre de Cristo Wilderness Area, the Old
14 Spanish National Historic Trail, Blanca Wetlands Special Recreation Management Area, Zapata
15 Falls SRMA, and the Los Caminos Antiguos Scenic Byway. In these areas, moderate or strong
16 visual contrasts still could occur.

17
18 Solar development on lands in the SEZ visible from and in close proximity to the Sangre
19 de Cristo WA and portions of the Old Spanish National Historic Trail has a higher potential to
20 cause visual impacts on these areas. As such, the BLM has identified areas in the SEZ visible
21 from and within 3 mi (4.8 km) of the Sangre de Cristo WA and of the centerline of the high-
22 potential segment of the Old Spanish National Historic Trail as potential high visual sensitivity
23 areas, where solar development would be subject to specific additional design features that will
24 be identified when project-specific environmental analyses are conducted. The BLM also has
25 identified areas in the SEZ visible from and between 3 mi (4.8 km) and 5 mi (8 km) of the
26 Sangre de Cristo WA and of the centerline of the high-potential segment of the Old Spanish
27 National Historic Trail as potential moderate visual sensitivity areas, where solar development
28 also would be subject to specific, additional design features to be identified in conjunction with
29 project-specific analysis.

30
31 In addition to these areas, impacts on other lands and resources were evaluated: the
32 surrounding communities of Alamosa, Blanca, and Mosca; the West Fork of the North Branch of
33 the Old Spanish National Historic Trail; Blanca Peak; and the Rio Grande Scenic Railroad.

34 35 36 ***10.3.14.2.4 Summary of Visual Resource Impacts for the Proposed Fourmile*** 37 ***East SEZ*** 38

39 The visual contrast analysis in the Draft Solar PEIS determined that because there could
40 be multiple solar facilities within the Fourmile East SEZ, a variety of technologies employed,
41 and a range of supporting facilities required, solar development within the SEZ would make it
42 essentially industrial in appearance and would contrast strongly with the surrounding, mostly
43 natural-appearing landscape.

44
45 The elimination of acreage within the SEZ would reduce the visual contrast associated
46 with solar facilities as seen both within the SEZ and from surrounding lands in both daytime and

1 **TABLE 10.3.14.2-1 Selected Potentially Affected Sensitive Visual Resources within a 25-mi**
 2 **(40-km) Viewshed of the Proposed Fourmile East SEZ as Revised, Assuming a Target Height of**
 3 **650 ft (198.1 m)**

Feature Type	Feature Name (Total Acreage/ Linear Distance) ^{a,b}	Feature Area or Linear Distance ^c		
		Visible within 5 mi	Visible Between	
			5 and 15 mi	15 and 25 mi
National Park	Great Sand Dunes (80,913 acres)	0 acres	34,678 acres (43%)	23,153 acres (29%)
National Preserve	Great Sand Dunes (41,670 acres)	0 acres	48 acres (0%)	5,866 acres (14%)
National Historic Trail	Old Spanish ^d (2,700 mi)	12 mi (0%)	19.7 mi (1%)	13.1 mi (0%)
National Historic Landmark	Pike's Stockade (4 acres)	0 acres	0 acres	4 acres (100%)
WAs	Great Sand Dunes (32,846 acres)	0 acres	8,629 acres (26%)	9,174 acres (28%)
	Sangre de Cristo (217,695 acres)	1,194 acres (1%)	2,339 acres (1%)	6,623 acres (3%)
WSAs	San Luis Hills (10,896 acres)	0 acres	0 acres	956 acres (9%)
	Sand Castle (1,097 acres)	0 acres	884 acres (81%)	67 acres (6%)
NWRs	Alamosa (12,098 acres)	0 acres	11,215 acres (93%)	0 acres
	Monte Vista (14,761 acres)	0 acres	0 acres	10,230 acres (69%)
	Baca (92,596 acres)	0 acres	928 acres (1%)	46,249 acres (50%)
ACECs	San Luis Hills (39,421 acres)	0 acres	0 acres	5,489 acres (14%)
	Rio Grande River Corridor (4,644 acres)	0 acres	0 acres	132 acres (3%)
Scenic Highways/Byways	Los Caminos Antiguos ^e (129 mi)	13.1 mi (10%)	45.0 mi (35%)	8.4 mi (7%)

TABLE 10.3.14.2-1 (Cont.)

Feature Type	Feature Name (Total Acreage/ Linear Distance) ^{a,b}	Feature Area or Linear Distance ^c		
		Visible within 5 mi	Visible Between	
			5 and 15 mi	15 and 25 mi
SRMAs	Blanca Wetlands (8,598 acres)	7,515 acres (87%)	1,065 acres (12%)	0 acres
	Rio Grande River Corridor (4,367 acres)	0 acres	0 acres	320 acres (7 %)
	Zapata Falls (3,702 acres)	20 acres (1%)	2,315 acres (63%)	0 acres

^a To convert acres to km², multiply by 0.004047.

^b To convert mi to km, multiply by 1.609.

^c Percentage of total feature acreage or road length viewable.

^d Source: BLM (2011b).

^e Source: America’s Byways (2011).

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nighttime views. The reductions in visual contrast resulting from the revision can be summarized as follows:

- Within the Fourmile East SEZ: Contrasts experienced by viewers within the eastern portion of the SEZ and within a small portion of the west side of the SEZ would be reduced due to the elimination of 999 acres (4.0 km²) from the SEZ. However, strong contrasts still would result in the remaining developable area.
- Great Sand Dunes National Park (NP): A very slight reduction in contrasts would be anticipated; solar development within the SEZ still would cause weak contrasts. Contrast levels still would generally be higher at higher elevation viewpoints and at viewpoints in the western portion of the national park.
- Great Sand Dunes National Preserve: A very slight reduction in contrasts would be anticipated; solar development within the SEZ still would cause minimal to weak contrasts.
- Great Sand Dunes WA: A very slight reduction in contrasts would be anticipated; solar development within the SEZ still would cause weak contrasts.

- 1 • Sangre de Cristo WA: A slight reduction in contrasts would be anticipated;
2 solar development within the SEZ still would cause weak to strong contrasts,
3 depending on viewer location in the WA. Stronger contrasts would be
4 observed from elevated viewpoints, in which viewers would look down onto
5 the SEZ.
6
- 7 • San Luis Hills WSA: A very slight reduction in contrasts would be
8 anticipated; solar development within the SEZ still would cause minimal to
9 weak contrasts.
10
- 11 • Sand Castle WSA: A very slight reduction in contrasts would be anticipated;
12 solar development within the SEZ still would cause weak contrasts.
13
- 14 • Old Spanish National Historic Trail: A reduction in contrasts would result due
15 to the elimination of acreage to the east and west of CO 150. The Old Spanish
16 National Historic Trail was approximately 1 mi (1.6 km) east of the SEZ, as it
17 was originally proposed in the Draft Solar PEIS. It is now approximately
18 1.3 mi (2.1 km) away at the point of closest approach. Solar development
19 within the SEZ still would cause strong contrasts for Trail users immediately
20 to the east of the SEZ, where generally open views of the solar development
21 would be present. Lower contrasts would be observed from locations on the
22 Trail farther from the SEZ.
23
- 24 • Pike’s Stockade National Historic Landmark: No reduction in contrasts would
25 be anticipated; solar development within the SEZ still would cause minimal
26 contrasts.
27
- 28 • Alamosa NWR: No reduction in contrasts would be anticipated; solar
29 development within the SEZ still would cause weak contrasts.
30
- 31 • Baca NWR: No reduction in contrasts would be anticipated; solar
32 development within the SEZ still would cause minimal to weak contrasts.
33
- 34 • Monte Vista NWR: No reduction in contrasts would be anticipated; solar
35 development within the SEZ still would cause minimal contrasts.
36
- 37 • Rio Grande River Corridor ACEC: No reduction in contrasts would be
38 anticipated; solar development within the SEZ still would cause minimal
39 contrasts.
40
- 41 • San Luis Hills ACEC: A very slight reduction in contrasts would be
42 anticipated; solar development within the SEZ still would cause minimal to
43 weak contrasts.
44

- 1 • Blanca Wetlands SRMA: A slight reduction in contrasts would be anticipated;
2 solar development within the SEZ still would cause weak to strong contrasts,
3 dependent on the viewer location within the SRMA.
4
- 5 • Rio Grande Corridor SRMA: See above for the Rio Grande River Corridor
6 ACEC.
7
- 8 • Zapata Falls SRMA: A slight reduction in contrasts would be anticipated;
9 solar development within the SEZ still would cause weak to moderate
10 contrasts.
11
- 12 • Los Caminos Antiguos Scenic Byway: Portions of the byway were located
13 within the SEZ as it was originally proposed in the Draft Solar PEIS. Portions
14 of this byway are now approximately 0.25 mi (0.4 km) from the SEZ at the
15 point of closest approach. A reduction in contrasts would be anticipated in
16 those locations that once were part of the SEZ, as solar development would no
17 longer be immediately adjacent to the byway; however, solar development
18 within the SEZ still would cause strong contrasts for byway travelers on those
19 portions of the byway nearest to the SEZ, where generally open views of the
20 solar development would be present. Lower contrasts would be observed from
21 locations on the byway farther from the SEZ.
22
- 23 • West Fork of the North Branch of the Old Spanish Trail: No reduction in
24 contrasts would be anticipated; solar development within the SEZ still would
25 cause minimal contrasts.
26
- 27 • Blanca Peak: A slight reduction in contrasts would be anticipated. Views from
28 Blanca Peak would have full visibility of the SEZ; therefore, solar
29 development within the SEZ still would cause moderate contrasts.
30
- 31 • Alamosa: A very slight reduction in contrasts would be anticipated; solar
32 development within the SEZ still would cause minimal to weak contrasts.
33
- 34 • Blanca: A slight reduction in contrasts would be anticipated; solar
35 development within the SEZ still would cause weak contrasts.
36
- 37 • Mosca: A very slight reduction in contrasts would be anticipated; solar
38 development within the SEZ still would cause minimal to weak contrasts.
39
- 40 • Rio Grande Scenic Railway: A slight reduction in contrasts would be
41 anticipated; solar development within the SEZ still would cause strong
42 contrasts for some points on the railroad.
43

44 In addition to these areas, the Trujillo Homestead National Historic Landmark is located
45 within the 650-ft (198.1-m) viewshed. The landmark was designated in early 2012, although the
46 property was listed on the NRHP since February 2004 (DOI 2012; History Colorado 2011). The

1 property is located approximately 7.5 mi (12.1 km) east of Hooper. Because of the distance and
2 the relative elevation of the homestead as compared to the SEZ, the expected contrast levels
3 would be minimal.
4
5

6 **10.3.14.3 SEZ-Specific Design Features and Design Feature Effectiveness**

7

8 Required programmatic design features that would reduce impacts on visual resources are
9 described in Section A.2.2 of Appendix A of this Final Solar PEIS. While application of the
10 programmatic design features would reduce potential visual impacts somewhat, the degree of
11 effectiveness of these design features could be assessed only at the site- and project-specific
12 level. Given the large scale, reflective surfaces, and strong regular geometry of utility-scale solar
13 energy facilities and the lack of screening vegetation and landforms within the SEZ viewshed,
14 siting the facilities away from sensitive visual resource areas and other sensitive viewing areas
15 would be the primary means of mitigating visual impacts. The effectiveness of other visual
16 impact mitigation measures generally would be limited. Utility-scale solar energy development
17 using any of the solar technologies analyzed in this Final Solar PEIS and at the scale analyzed
18 would be expected to result in large adverse visual impacts that could not be mitigated.
19

20 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
21 analyses due to changes to the SEZ boundaries, and consideration of comments received as
22 applicable, the following SEZ-specific design features for visual resources in the proposed
23 Fourmile East SEZ have been identified:
24

- 25 • The development of power tower facilities should be prohibited within the
26 SEZ. The San Luis Valley is a regionally important tourist destination and is
27 an area with many small communities and numerous important historic,
28 cultural, and recreational resources. The valley contains numerous historic
29 sites, two scenic railways, two scenic highways, several wildlife refuges,
30 Great Sand Dunes NP and Preserve, the Rio Grande WSR, congressionally
31 designated WAs, the Sangre de Cristo NHA, and various other attractions that
32 draw tourists to the region. A number of these areas overlook the San Luis
33 Valley from the surrounding mountains and include elevated viewpoints that
34 would have clear views of power tower facilities in the Valley. The height of
35 solar power tower receiver structures, combined with the intense light
36 generated by the receivers atop the towers, would be expected to create strong
37 visual contrasts that could not be effectively screened from view for most
38 areas surrounding the SEZ. The effective area of impact from power tower
39 structures is much larger than that for comparably rated lower height facilities,
40 which makes it more likely that they would conflict with the growing tourism
41 focus of the Valley. In addition, for power towers higher than 200 ft (61 m),
42 hazard navigation lighting that could be visible for very long distances would
43 likely be required. Prohibiting the development of power tower facilities
44 would remove this source of impacts, thus substantially reducing potential
45 visual impacts on the Old Spanish National Historic Trail, Sangre de Cristo
46 WA, and the Los Caminos Antiguos Scenic Byway.

- Special visual impact mitigation shall be considered for solar development on lands in the SEZ visible from and within 5 mi (8 km) of the Sangre de Cristo WA and of the centerline of the high-potential segment of the Old Spanish National Historic Trail. Solar development on lands in the SEZ visible from and in close proximity to the Sangre de Cristo WA and portions of the Old Spanish National Historic Trail has a higher potential to cause visual impacts on the roadway. As such, the BLM has identified areas in the SEZ visible from and within 3 mi (5 km) of the Sangre de Cristo WA and of the centerline of the high-potential segment of the Old Spanish National Historic 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. The BLM also has identified areas in the SEZ visible from and between 3 mi (5 km) and 5 mi (8 km) of the Sangre de Cristo WA and of the centerline of the high-potential segment of the Old Spanish National Historic Trail as potential moderate visual sensitivity areas, where solar development also would be subject to specific, additional design features to be identified in conjunction with project-specific analysis.

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

10.3.15 Acoustic Environment

10.3.15.1 Affected Environment

The size of the proposed Fourmile East SEZ was reduced by about 26%, from 3,882 acres (15.7 km²) to 2,882 acres (11.7 km²). As noted below, with this change in the proposed boundaries, distances to the sensitive receptors are greater than or equal to those in the Draft Solar PEIS.

10.3.15.2 Impacts

Based on the boundary changes and reduced size of the proposed Fourmile East SEZ, noise impacts from construction and operations were remodeled for this Final Solar PEIS. The distance to the nearest residence remained the same as in the Draft Solar PEIS.

10.3.15.2.1 Construction

Except as noted below for impacts on specially designated areas, the conclusions in the Draft Solar PEIS remain valid for this Final Solar PEIS.

1 The distance to the closest residence is about 0.8 mi (1.3 km) southwest of the SEZ. For
2 construction activities occurring near the closest residence, estimated noise levels at this
3 residence would be about 44 dBA, which is somewhat higher than a typical daytime mean rural
4 background level of 40 dBA. However, estimated 43 dBA L_{dn} at this residence falls well below
5 the EPA guideline of 55 dBA L_{dn} for residential areas.
6

7 On the basis of comments received and recent references as applicable, this Final Solar
8 PEIS used an updated approximate significance threshold of 55 dBA corresponding to the onset
9 of adverse physiological impacts (Barber et al. 2010) to update the analysis of potential noise
10 impacts on terrestrial wildlife in areas of special concern. As a result of this updated analysis, the
11 conclusion in the Draft Solar PEIS that wildlife would not be adversely affected has been
12 updated for this Final Solar PEIS as follows. With construction activities occurring near the
13 western SEZ boundary, estimated noise level at the boundary of the Blanca Wetlands
14 SRMA/ACEC (about 0.5 mi [0.8 km] to the west) is about 50 dBA. This estimated level is below
15 the updated significance threshold; thus noise from construction in the proposed Fourmile East
16 SEZ is not anticipated to adversely affect wildlife in the nearby specially designated area.
17 However, as discussed in Section 5.10.2 of this Final Solar PEIS, there is the potential for other
18 effects to occur at lower noise levels (Barber et al. 2011). With these impacts and the potential
19 for impacts at lower noise levels, impacts on terrestrial wildlife from construction noise would
20 have to be considered on a project-specific basis, including site-specific background levels and
21 hearing sensitivity for site-specific terrestrial wildlife of concern.
22

23 With the updated boundaries, the distance to the Old Spanish National Historic Trail
24 increased to about 1.2 mi (2.0 km) east of the SEZ boundary. For construction activities
25 occurring near the northeastern SEZ boundary, the updated estimated noise level at the Old
26 Spanish National Historic Trail would be about 42 dBA, which is just above the typical daytime
27 mean rural background level of 40 dBA but less than a just noticeable difference of 3 dBA.
28 The conclusion in the Draft Solar PEIS that construction occurring near the eastern SEZ
29 boundary would result in minor noise impacts on the Old Spanish National Historic Trail is
30 updated for this Final Solar PEIS to conclude that the noise impacts would be negligible and
31 temporary.
32

33 Overall, construction activities would cause some unavoidable but localized short-term
34 impacts on neighboring communities, particularly for activities occurring near the southwestern
35 proposed SEZ boundary, close to nearby residences. No adverse vibration impacts are
36 anticipated from construction activities, including pile driving for dish engines.
37
38

39 ***10.3.15.2.2 Operations***

40
41 With the decrease in size of the proposed SEZ, the updated noise estimates in this Final
42 Solar PEIS remain the same as or less than as those in the Draft Solar PEIS, and, except as noted
43 below for wildlife impacts in specially designated areas, the conclusions presented in the Draft
44 Solar PEIS remain valid.
45
46

1 **Parabolic Trough and Power Tower**

2
3 If TES were not used for parabolic trough and power tower technologies (12 hours of
4 daytime operations only), the estimated noise level from the power block would be about
5 42 dBA at the nearest residence, located 0.8 mi (1.3 km) from the SEZ boundary, which is a little
6 higher than the typical daytime mean rural background level of 40 dBA. The day-night average
7 noise level of 43 dBA L_{dn} would be well below the EPA guideline of 55 dBA L_{dn} for residential
8 areas. If TES were used, the estimated nighttime noise level of 52 dBA at the nearest residence
9 would be higher than the typical nighttime mean rural background level of 30 dBA. The day-
10 night average noise level is estimated to be about 53 dBA L_{dn} , which is lower than EPA
11 guideline of 55 dBA L_{dn} for residential areas. The assumptions are conservative in terms of
12 operating hours, and no credit was given to other attenuation mechanisms. Thus it is likely that
13 noise levels would be lower than 53 dBA L_{dn} at the nearest residence, even if TES were used at a
14 solar facility. Nonetheless, operating parabolic trough or power tower facilities using TES and
15 located near the southwestern SEZ boundary could result in noise impacts on the nearest
16 residence, depending on background noise levels and meteorological conditions.

17
18 As stated above under construction impacts, for this Final Solar PEIS an updated
19 approximate significance threshold of 55 dBA was used to evaluate potential noise impacts on
20 terrestrial wildlife in areas of special concern. With TES operating near the western SEZ
21 boundary, estimated daytime and nighttime noise levels at the boundary of the Blanca Wetlands
22 SRMA/ACEC (about 0.5 mi [0.8 km] to the west) would be about 45 and 55 dBA, respectively.
23 These estimated levels are below and the same as the significance threshold, respectively; thus
24 noise from operations of a parabolic trough or power tower facility equipped with TES in the
25 proposed Fourmile East SEZ is not anticipated to adversely affect wildlife in the nearby specially
26 designated area. However, as discussed in Section 5.10.2, there is the potential for other effects
27 to occur at lower noise levels (Barber et al. 2011). With these impacts and the potential for
28 impacts at lower noise levels, noise impacts on terrestrial wildlife from a parabolic trough or
29 power tower facility equipped with TES would have to be considered on a project-specific basis,
30 including site-specific background levels and hearing sensitivity for site-specific terrestrial
31 wildlife of concern.

32
33 Associated with operations of a parabolic trough or power tower facility equipped with
34 TES occurring at the northeastern SEZ, the estimated daytime and nighttime noise levels at the
35 Old Spanish National Historic Trail (about 1.2 mi [2.0 km] to the east) would be about 39 and
36 49 dBA, respectively, which are just below and far above the typical daytime and nighttime
37 mean rural background levels of 40 and 30 dBA. Accordingly, a parabolic trough or power tower
38 facility located near the northeastern SEZ boundary could result in noise impacts on the Old
39 Spanish National Historic Trail during nighttime hours.

40 **Dish Engines**

41
42 The reduced size of the proposed SEZ would reduce the maximum potential number of
43 dish engines. The estimated noise level at the nearest residence, about 0.8 mi (1.3 km) from the
44 SEZ boundary, would be about 42 dBA, which is somewhat higher than the typical daytime
45
46

1 mean rural background level of 40 dBA, and the estimated 43 dBA L_{dn} at this residence is well
2 below the EPA guideline of 55 dBA L_{dn} for residential areas. On the basis of other attenuation
3 mechanisms, noise levels at the nearest residence would be lower than the values estimated
4 above. The conclusion in the Draft Solar PEIS that noise from dish engines could adversely
5 affect the nearest residence is updated for this Final Solar PEIS to conclude that noise from dish
6 engines could minimally affect the nearest residence, depending on background noise levels and
7 meteorological conditions.

8
9 As stated above under construction impacts, for this Final Solar PEIS an updated
10 approximate significance threshold of 55 dBA was used to evaluate potential noise impacts on
11 terrestrial wildlife in areas of special concern. The estimated noise level from operation of a dish
12 engine solar facility at the boundary of the Blanca Wetlands SRMA/ACEC (about 0.5 mi
13 [0.8 km] to the west) would be about 46 dBA. This estimated level is below the significance
14 threshold; thus noise from operations in the proposed Fourmile East SEZ is not anticipated to
15 adversely affect wildlife in the nearby specially designated area. However, as discussed in
16 Section 5.10.2, there is the potential for other effects to occur at lower noise levels (Barber et al.
17 2011). With these impacts and the potential for impacts at lower noise levels, noise impacts on
18 terrestrial wildlife from a dish engine facility would have to be considered on a project-specific
19 basis, including consideration of site-specific background levels and hearing sensitivity for site-
20 specific terrestrial wildlife of concern.

21
22 Assuming full build-out of the SEZ with dish engine facilities, the estimated noise level
23 at the Old Spanish National Historic Trail, about 1.2 mi (2.0 km) to the east of the SEZ, would
24 be about 43 dBA, which is above the typical daytime mean rural background level of 40 dBA but
25 comparable to a just noticeable difference of 3 dBA. Thus, dish engine noise from the proposed
26 Fourmile East SEZ is unlikely to affect users of the Old Spanish National Historic Trail.

27
28 Changes in the proposed Fourmile East SEZ boundaries would not alter the discussions
29 of vibration, transformer and switchyard noise, and corona discharge presented in the Draft Solar
30 PEIS. Noise impacts from transmission line corona discharge would be negligible.

31 32 33 ***10.3.15.1.3 Decommissioning and Reclamation***

34
35 The discussion in the Draft Solar PEIS remains valid. Decommissioning and reclamation
36 activities would be of short duration, and their potential noise impacts would be minor and
37 temporary. Potential noise and vibration impacts on surrounding communities would be minimal.

38 39 40 **10.3.15.3 SEZ-Specific Design Features and Design Feature Effectiveness**

41
42 Required programmatic design features that would reduce noise impacts are described in
43 Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the programmatic design
44 features will provide some protection from noise impacts.

1 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
2 analyses due to changes to the SEZ boundaries, and consideration of comments received as
3 applicable, no SEZ-specific design features for noise for the proposed Fourmile East SEZ have
4 been identified. Some SEZ-specific design features may be identified through the process of
5 preparing parcels for competitive offer and subsequent project-specific analysis.
6
7

8 **10.3.16 Paleontological Resources**

10 **10.3.16.1 Affected Environment**

11 Data provided in the Draft Solar PEIS remain valid, with the following update:
12

- 13 • The BLM Regional Paleontologist may have additional information regarding
14 the paleontological potential of the SEZ and be able to verify the PFYC of the
15 SEZ as Class 1 and 4/5 as used in the Draft Solar PEIS.
16
17
18

19 **10.3.16.2 Impacts**

20 The assessment provided in the Draft Solar PEIS remains valid. Impacts on significant
21 paleontological resources are possible in those areas where the Alamosa Formation is determined
22 to be at a depth that could be affected by solar energy development. However, a more detailed
23 look at the geological deposits is necessary to determine whether a paleontological survey is
24 warranted.
25
26
27

28 **10.3.16.3 SEZ-Specific Design Features and Design Feature Effectiveness**

29 Required programmatic design features are described in Section A.2.2 of Appendix A
30 of this Final Solar PEIS. Impacts would be minimized through the implementation of required
31 programmatic design features, including a stop-work stipulation in the event that paleontological
32 resources are encountered during construction, as described in Section A.2.2 of Appendix A.
33
34
35

36 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
37 analyses due to changes in the SEZ boundaries, and consideration of comments received as
38 applicable, the following SEZ-specific design feature for paleontological resources has been
39 identified:
40

- 41 • The depth of the Alamosa Formation within the proposed Fourmile East SEZ
42 should be determined to identify any design features that might be needed in
43 that area if solar energy development occurs.
44

45 The need for and nature of additional SEZ-specific design features will depend on results
46 of future paleontological investigations. Some SEZ-specific design features may be identified

1 through the process of preparing parcels for competitive offer and subsequent project-specific
2 analysis.

3
4 As additional information on paleontological resources (e.g., from regional
5 paleontologists or from new surveys) becomes available, the BLM will post the data to the
6 project Web site (<http://solareis.anl.gov>) for use by applicants, the BLM, and other stakeholders.
7

8 9 **10.3.17 Cultural Resources**

10 11 **10.3.17.1 Affected Environment**

12 Data provided in the Draft Solar PEIS remain valid, with the following updates:
13

- 14
15 • The six archaeological sites located in the footprint of the proposed Fourmile
16 East SEZ in the Draft Solar PEIS are no longer located in the SEZ; however,
17 the potential exists for additional cultural resources to be discovered in the
18 SEZ.
- 19
20 • The distance to the Old Spanish National Historic Trail, located to the east of
21 the proposed Fourmile East SEZ, has been increased from 1 mi (1.6 km) to
22 about 1.3 mi (2.1 km).
- 23
24 • The Trujillo Homestead National Historic Landmark, designated in January
25 2012, encompasses approximately 35 acres (0.14 km²) of land about 15 mi
26 (24 km) north of the Fourmile East SEZ and consists of two nineteenth-
27 century Hispanic ranch properties (see Section 10.1.17.1 of this Final Solar
28 PEIS for details).
- 29
30 • Additional information may be available to characterize the SEZ and its
31 surrounding area in the future (after this Final Solar PEIS is completed), as
32 follows:
 - 33 – Results of an ethnographic study currently being conducted by TRC
34 Solutions, which focuses on Native American use of lands being analyzed
35 for solar development within the San Luis Valley. The study will discuss
36 sensitive and traditional use areas. Interviews with tribal members and
37 field visits will facilitate the identification of resources and sites of
38 traditional and religious importance to tribes.
 - 39 – Results of a Class II sample survey of the SEZ designed to obtain a
40 statistically valid sample of archeological properties and their distribution
41 within the SEZ. Results from the ethnographic study and the sample
42 inventory can be combined to project cultural sensitivity zones as an aid in
43 planning future solar developments.
 - 44 – Identification of the location of the Old Spanish National Historic Trail in
45 the vicinity of the SEZ and viewshed analyses from key observation points
46

1 along the Trail. A high potential segment of the Trail has been identified
2 directly to the northeast from Crestone, Colorado, to the SEZ. It is clearly
3 within the viewshed of the SEZ and would be affected visually. A
4 mitigation strategy would need to be developed to address unavoidable
5 impacts on the Old Spanish National Historic Trail.

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

11 12 13 **10.3.17.2 Impacts**

14
15 Impacts on significant cultural resources are highly likely in the proposed Fourmile East
16 SEZ. Cultural resource surveys would need to be conducted to identify significant cultural
17 prehistoric and historic resources, and a survey of the Old Spanish National Historic Trail would
18 need to occur to determine the location, integrity, and significance of portions of the Trail from
19 which future potential development in the SEZ could be viewed. The assessment provided in the
20 Draft Solar PEIS remains valid, with the following updates:

- 21
22 • The increase in distance from the SEZ boundary to the Old Spanish National
23 Historic Trail from 1 mi (1.6 km) to about 1.3 mi (2.1 km) is not sufficient to
24 mitigate potential visual impacts from solar energy development on the Trail
25 (see Section 10.3.14.2).
- 26
27 • Little to no visual contrast is expected from the viewpoint of the Trujillo
28 Homestead National Historic Landmark toward the Fourmile East SEZ;
29 therefore no adverse effect on this historic property is anticipated.
- 30
31 • Impacts on significant cultural resources and cultural landscapes associated
32 with American Latino heritage are possible throughout the San Luis Valley.

33 34 35 **10.3.17.3 SEZ-Specific Design Features and Design Feature Effectiveness**

36
37 Required programmatic design features that would reduce impacts on cultural resources
38 are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Programmatic design
39 features will be applied to address SEZ-specific resources and conditions, for example:

- 40
41 • For projects in the Fourmile East SEZ that are located within the viewshed
42 of the Old Spanish National Historic Trail, a National Trail inventory will
43 be required to determine the area of possible adverse impact on resources,
44 qualities, values, and associated settings of the trail; to prevent substantial
45 interference; and to determine any areas unsuitable for development. Residual
46 impacts will be avoided, minimized, and/or mitigated to the extent practicable

1 according to program policy standards. Programmatic design features have
2 been included in BLM's Solar Energy Program to address impacts on
3 National Historic Trails (see Section A.2.2.23 of Appendix A).
4

5 Programmatic design features also assume that the necessary surveys, evaluations, and
6 consultations will occur. Ongoing consultation with the Colorado SHPO and the appropriate
7 Native American governments would be conducted during the development of the proposed
8 Fourmile East SEZ. It is likely that some adverse effects on significant resources in the valley
9 could be mitigated to some degree through such efforts, although not enough to eliminate the
10 adverse effects unless significant resources are avoided entirely.
11

12 Even assuming the implementation of programmatic design features, adverse effects on
13 historic properties in the proposed Fourmile East SEZ are likely to occur. Factors in addition to
14 those addressed above for the Old Spanish National Historic Trail that lead to this conclusion
15 include the following: (1) the area's high potential to contain significant cultural sites, including
16 Native American human remains and associated cultural items; and (2) its proximity to (and
17 visual impacts on) at least three areas previously identified as traditionally significant to the
18 Navajo and the Tewa Clans of the Upper Rio Grande Pueblos, and possibly the Ute and Jicarilla
19 Apache (i.e., the Great Sand Dunes, San Luis Lakes, and Blanca Peak).
20

21 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
22 analyses due to changes to the SEZ boundaries, and consideration of comments received as
23 applicable, the following SEZ-specific design features for cultural resources in the proposed
24 Fourmile East SEZ have been identified:
25

- 26 • Development of an MOA may be needed among the BLM, Colorado SHPO,
27 and other parties, such as the ACHP, to address the adverse effects of solar
28 energy development on historic properties. The agreement may specify
29 avoidance, minimization, or mitigation measures. Should an MOA be
30 developed to resolve adverse effects on the Old Spanish National Historic
31 Trail, the Trail Administration for the Old Spanish Trail (BLM-NMSO and
32 National Park Service [NPS] Intermountain Trails Office, Santa Fe) should be
33 included in the development of that MOA.
34
- 35 • The possibility of encountering Native American human remains in the
36 vicinity of the proposed Fourmile East SEZ should be discussed during
37 consultation. Tribal participation in the Section 106 process will take place
38 according to the Solar Programmatic Agreement (PA), including opportunities
39 for tribal input regarding inventory design and treatment decisions and
40 procedures for inadvertent discoveries during construction and operations.
41

42 The need for and nature of additional SEZ-specific design features would depend on
43 the findings of future investigations. Some SEZ-specific design features may be established
44 through the process of preparing parcels for competitive offer and subsequent project-specific
45 analysis.
46

1 **10.3.18 Native American Concerns**

2
3
4 **10.3.18.1 Affected Environment**

5
6 Data provided in the Draft Solar PEIS remain valid but will be supplemented in the
7 future by the results of the ethnographic study being completed in the San Luis Valley (see
8 Section 10.1.17.1).

9
10
11 **10.3.18.2 Impacts**

12
13 The description of potential concerns provided in the Draft Solar PEIS remains valid. No
14 direct impacts from solar energy development are likely to occur on known culturally significant
15 areas (i.e., San Luis Lakes, the Great Sand Dunes, and Blanca Peak); however, indirect visual
16 and auditory impacts are possible. Because tribes typically regard archaeological sites and the
17 remains of their ancestors as culturally important, the high probability of prehistoric resources in
18 the SEZ could be a concern to Native Americans. It is likely that traditional plant and animal
19 habitats would be directly affected with solar energy development in the proposed Fourmile
20 East SEZ.

21
22
23 **10.3.18.3 SEZ-Specific Design Features and Design Feature Effectiveness**

24
25 Required programmatic design features that would reduce impacts on Native American
26 concerns are described in Section A.2.2 of Appendix A of this Final Solar PEIS. For example,
27 impacts would be minimized through the avoidance of sacred sites, water sources, and tribally
28 important plant and animal species. Programmatic design features require that the necessary
29 surveys, evaluations, and consultations would occur. The tribes would be notified regarding the
30 results of archaeological surveys, and they would be contacted immediately upon any discovery
31 of Native American human remains and associated cultural items.

32
33 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
34 analyses due to changes in SEZ boundaries, and consideration of comments received as
35 applicable, no SEZ-specific design features to address Native American concerns in the proposed
36 Fourmile East SEZ have been identified. The need for and nature of SEZ-specific design features
37 would be determined during government-to-government consultation with affected tribes as part
38 of the process of preparing parcels for competitive offer and subsequent project-specific analysis.
39 Potentially significant sites and landscapes in the vicinity of the SEZ associated with Blanca
40 Peak, Great Sand Dunes, and San Luis Lakes, as well as trail systems, mountain springs, mineral
41 resources, burial sites, ceremonial areas, water resources, and plant and animal resources, should
42 be considered and discussed during consultation.

1 **10.3.19 Socioeconomics**

2
3
4 **10.3.19.1 Affected Environment**

5
6 Although the boundaries of the Fourmile East SEZ have been reduced compared to the
7 boundaries given in the Draft Solar PEIS, the socioeconomic ROI, the area in which site
8 employees would live and spend their wages and salaries, and into which any in-migration would
9 occur, includes the same counties and communities as described in the Draft Solar PEIS; that is,
10 no updates to the affected environment information given in the Draft Solar PEIS are required.
11

12
13 **10.3.19.2 Impacts**

14
15 Socioeconomic resources in the ROI around the SEZ could be affected by solar energy
16 development through the creation of direct and indirect employment and income, the generation
17 of direct sales and income taxes, SEZ acreage rental and capacity payments to BLM, the
18 in-migration of solar facility workers and their families, and impacts on local housing markets
19 and on local community service employment. The impact assessment provided in the Draft Solar
20 PEIS remains valid, with the following updates.
21

22
23 **10.3.19.2.1 Solar Trough**

24
25
26 **Construction**

27
28 Total construction employment impacts in the ROI (including direct and indirect impacts)
29 from the use of solar trough technologies would be 2,156 jobs (Table 10.3.19.2-1). Construction
30 activities would constitute 9.2% of total ROI employment. A solar development would also
31 produce \$117.3 million in income. Direct sales taxes would be \$0.1 million; direct income taxes,
32 \$4.6 million.
33

34 With the scale of construction activities and the low likelihood that the entire
35 construction workforce in the required occupational categories would be available in the ROI,
36 construction of a solar facility would mean that some in-migration of workers and their families
37 from outside the ROI would be required, with up to 1,405 persons in-migrating into the ROI.
38 Although in-migration may potentially affect local housing markets, the relatively small number
39 of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile
40 home parks) would mean that the impact of solar facility construction on the number of vacant
41 rental housing units is not expected to be large, with up to 485 rental units expected to be
42 occupied in the ROI. This occupancy rate would represent 35.5% of the vacant rental units
43 expected to be available in the ROI.
44

1
2
3

TABLE 10.3.19.2-1 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Fourmile East SEZ as Revised with Trough Facilities

Parameter	Maximum Annual Construction Impacts ^a	Annual Operations Impacts ^b
Employment (no.)		
Direct	1,262	100
Total	2,156	151
Income ^c		
Total	117.3	4.9
Direct state taxes ^c		
Sales	0.1	0.1
Income	4.6	0.1
BLM payments ^c		
Rental	NA ^d	0.2
Capacity ^e	NA	3.0
In-migrants (no.)	1,405	64
Vacant housing ^f (no.)	485	40
Local community service employment		
Teachers (no.)	19	1
Physicians (no.)	2	0
Public safety (no.)	2	0

^a Construction impacts were based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 461 MW (corresponding to 2,306 acres [9 km²] of land disturbance) could be built.

^b Operations impacts were based on full build-out of the site, producing a total output of 461 MW.

^c Values are reported in \$ million 2008.

^d NA = not applicable.

^e The BLM annual capacity payment was based on a fee of \$6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010), assuming a solar facility with no storage capability, and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884 per MW.

^f Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

1 In addition to the potential impact on housing markets, in-migration would affect
2 community service employment (education, health, and public safety). An increase in such
3 employment would be required to meet existing levels of service in the ROI. Accordingly, up to
4 19 new teachers, 2 physicians, and 2 public safety employees (career firefighters and uniformed
5 police officers) would be required in the ROI. These increases would represent 2.9% of total
6 ROI employment expected in these occupations.

7 8 9 **Operations**

10
11 Total operations employment impacts on the ROI (including direct and indirect
12 impacts) of a full build-out of the SEZ using solar trough technologies would be 151 jobs
13 (Table 10.3.19.2-1). Such a solar development would also produce \$4.9 million in income.
14 Direct sales taxes would be \$0.1 million; direct income taxes, \$0.1 million. Based on fees
15 established by the BLM (BLM 2010), acreage rental payments would be \$0.2 million, and solar
16 generating capacity payments, at least \$3.0 million.

17
18 As for the construction workforce, operation of a solar facility likely would require
19 some in-migration of workers and their families from outside the ROI, with up to 64 persons
20 in-migrating into the ROI. Although in-migration may potentially affect local housing markets,
21 the relatively small number of in-migrants and the availability of temporary accommodations
22 (hotels, motels, and mobile home parks) would mean that the impact of solar facility operation
23 on the number of vacant owner-occupied housing units is not expected to be large, with up to
24 40 owner-occupied units expected to be occupied in the ROI.

25
26 In addition to the potential impact on housing markets, in-migration would affect
27 community service (education, health, and public safety) employment. An increase in such
28 employment would be required to meet existing levels of service in the ROI. Accordingly, one
29 new teacher would be required in the ROI.

30 31 32 **10.3.19.2.2 Power Tower**

33 34 35 **Construction**

36
37 Total construction employment impacts in the ROI (including direct and indirect impacts)
38 from the use of power tower technologies would be 859 jobs (Table 10.3.19.2-2). Construction
39 activities would constitute 3.7% of total ROI employment. Such a solar development would
40 also produce \$46.7 million in income. Direct sales taxes would be less than \$0.1 million; direct
41 income taxes, \$1.8 million.

42
43 With the scale of construction activities and the low likelihood that the entire
44 construction workforce in the required occupational categories would be available in the local
45 workforce, construction of a solar facility would mean that some in-migration of workers and
46 their families from outside the ROI would be required, with up to 590 persons in-migrating into

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TABLE 10.3.19.2-2 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Fourmile East SEZ as Revised with Power Tower Facilities

Parameter	Maximum Annual Construction Impacts ^a	Annual Operations Impacts ^b
Employment (no.)		
Direct	503	52
Total	859	72
Income ^c		
Total	46.7	2.2
Direct state taxes ^c		
Sales	<0.1	<0.1
Income	1.8	0.1
BLM payments ^c		
Rental	NA ^d	0.2
Capacity ^e	NA	1.7
In-migrants (no.)	590	33
Vacant housing ^f (no.)	193	21
Local community service employment		
Teachers (no.)	8	0
Physicians (no.)	1	0
Public safety (no.)	1	0

^a Construction impacts were based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 256 MW (corresponding to 2,306 acres [9 km²] of land disturbance) could be built.

^b Operations impacts were based on full build-out of the site, producing a total output of 256 MW.

^c Values are reported in \$ million 2008.

^d NA = not applicable.

^e The BLM annual capacity payment was based on a fee of \$6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010), assuming a solar facility with no storage capability, and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884 per MW.

^f Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

1 the ROI. Although in-migration may potentially affect local housing markets, the relatively small
2 number of in-migrants and the availability of temporary accommodations (hotels, motels, and
3 mobile home parks) would mean that the impact of solar facility construction on the number of
4 vacant rental housing units is not expected to be large, with up to 193 rental units expected to be
5 occupied in the ROI. This occupancy rate would represent 14.1% of the vacant rental units
6 expected to be available in the ROI.

7
8 In addition to the potential impact on housing markets, in-migration would affect
9 community service (education, health, and public safety) employment. An increase in such
10 employment would be required to meet existing levels of service in the ROI. Accordingly, up to
11 eight new teachers, one physician, and one public safety employee (career firefighters and
12 uniformed police officers) would be required in the ROI. These increases would represent 1.2%
13 of total ROI employment expected in these occupations.

14 15 16 **Operations**

17
18 Total operations employment impacts on the ROI (including direct and indirect
19 impacts) of a full build-out of the SEZ using power tower technologies would be 72 jobs
20 (Table 10.3.19.2-2). Such a solar development would also produce \$2.2 million in income.
21 Direct sales taxes would be less than \$0.1 million; direct income taxes, \$0.1 million. Based on
22 fees established by the BLM (BLM 2010), acreage rental payments would be \$0.2 million, and
23 solar generating capacity payments, at least \$1.7 million.

24
25 As for the construction workforce, operation of a solar facility likely would require
26 some in-migration of workers and their families from outside the ROI, with up to 33 persons
27 in-migrating into the ROI. Although in-migration may potentially affect local housing markets,
28 the relatively small number of in-migrants and the availability of temporary accommodations
29 (hotels, motels, and mobile home parks) would mean that the impact of solar facility operation
30 on the number of vacant owner-occupied housing units is not expected to be large, with up to
31 21 owner-occupied units expected to be required in the ROI.

32
33 No new community service employment would be required to meet existing levels of
34 service in the ROI.

35 36 37 ***10.3.19.2.3 Dish Engine***

38 39 40 **Construction**

41
42 Total construction employment impacts on the ROI (including direct and indirect
43 impacts) from the use of dish engine technologies would be 349 jobs (Table 10.3.19.2-3).
44 Construction activities would constitute 1.5% of total ROI employment. Such a solar
45 development would also produce \$19.0 million in income. Direct sales taxes would be less than
46 \$0.1 million; direct income taxes, \$0.7 million.

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TABLE 10.3.19.2-3 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Fourmile East SEZ as Revised with Dish Engine Facilities

Parameter	Maximum Annual Construction Impacts ^a	Annual Operations Impacts ^b
Employment (no.)		
Direct	204	50
Total	349	70
Income ^c		
Total	19.0	2.2
Direct state taxes ^c		
Sales	<0.1	<0.1
Income	0.7	0.1
BLM payments ^c		
Rental	NA ^d	0.2
Capacity ^e	NA	1.7
In-migrants (no.)	227	32
Vacant housing ^f (no.)	79	20
Local community service employment		
Teachers (no.)	3	0
Physicians (no.)	0	0
Public safety (no.)	0	0

^a Construction impacts were based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 256 MW (corresponding to 2,306 acres [9 km²] of land disturbance) could be built.

^b Operations impacts were based on full build-out of the site, producing a total output of 256 MW.

^c Values are reported in \$ million 2008.

^d NA = not applicable.

^e The BLM annual capacity payment was based on a fee of \$6,570 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010), assuming a solar facility with no storage capability, and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884 per MW.

^f Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

1 With the scale of construction activities and the low likelihood that the entire
2 construction workforce in the required occupational categories would be available in the local
3 workforce, construction of a solar facility would mean that some in-migration of workers and
4 their families from outside the ROI would be required, with up to 227 persons in-migrating into
5 the ROI. Although in-migration may potentially affect local housing markets, the relatively small
6 number of in-migrants and the availability of temporary accommodations (hotels, motels, and
7 mobile home parks) would mean that the impact of solar facility construction on the number of
8 vacant rental housing units is not expected to be large, with up to 79 rental units expected to be
9 occupied in the ROI. This occupancy rate would represent 5.8% of the vacant rental units
10 expected to be available in the ROI.

11
12 In addition to the potential impact on housing markets, in-migration would affect
13 community service (education, health, and public safety) employment. An increase in such
14 employment would be required to meet existing levels of service in the ROI. Accordingly, up to
15 three new teachers would be required in the ROI. This increase would represent 0.5% of total
16 ROI employment expected in this occupation.

17 18 19 **Operations**

20
21 Total operations employment impacts in the ROI (including direct and indirect
22 impacts) of a full build-out of the SEZ using dish engine technologies would be 70 jobs
23 (Table 10.3.19.2-3). Such a solar development would also produce \$2.2 million in income.
24 Direct sales taxes would be less than \$0.1 million; direct income taxes, \$0.1 million. Based on
25 fees established by the BLM (BLM 2010), acreage rental payments would be \$0.2 million, and
26 solar generating capacity payments, at least \$1.7 million.

27
28 As for the construction workforce, operation of a solar facility likely would require
29 some in-migration of workers and their families from outside the ROI, with up to 32 persons
30 in-migrating into the ROI. Although in-migration may potentially affect local housing markets,
31 the relatively small number of in-migrants and the availability of temporary accommodations
32 (hotels, motels, and mobile home parks) would mean that the impact of solar facility operation
33 on the number of vacant owner-occupied housing units is not expected to be large, with up to
34 20 owner-occupied units expected to be required in the ROI.

35
36 No new community service employment would be required to meet existing levels of
37 service in the ROI.

38 39 **10.3.19.2.4 Photovoltaic**

40 41 42 43 **Construction**

44
45 Total construction employment impacts in the ROI (including direct and indirect impacts)
46 from the use of PV technologies would be 163 jobs (Table 10.3.19.2-4). Construction activities

1
2
3

TABLE 10.3.19.2-4 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Fourmile East SEZ as Revised with PV Facilities

Parameter	Maximum Annual Construction Impacts ^a	Annual Operations Impacts ^b
Employment (no.)		
Direct	95	5
Total	163	7
Income ^c		
Total	8.9	0.2
Direct state taxes ^c		
Sales	<0.1	<0.1
Income	0.3	<0.1
BLM payments ^c		
Rental	NA ^d	0.2
Capacity ^e	NA	1.3
In-migrants (no.)	106	3
Vacant housing ^f (no.)	37	2
Local community service employment		
Teachers (no.)	1	0
Physicians (no.)	0	0
Public safety (no.)	0	0

^a Construction impacts were based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 256 MW (corresponding to 2,306 acres [9 km²] of land disturbance) could be built.

^b Operations impacts were based on full build-out of the site, producing a total output of 256 MW.

^c Values are reported in \$ million 2008.

^d NA = not applicable.

^e The BLM annual capacity payment was based on a fee of \$5,256 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010), assuming full build-out of the site.

^f Construction activities would affect vacant rental housing; operations activities would affect owner-occupied housing.

4
5

1 would constitute 0.7% of total ROI employment. Such a solar development would also produce
2 \$8.9 million in income. Direct sales taxes would be less than \$0.1 million; direct income taxes,
3 \$0.3 million.

4
5 With the scale of construction activities and the likelihood of local worker availability
6 in the required occupational categories, construction of a solar facility would mean that some
7 in-migration of workers and their families from outside the ROI would be required, with up to
8 106 persons in-migrating into the ROI. Although in-migration may potentially affect local
9 housing markets, the relatively small number of in-migrants and the availability of temporary
10 accommodations (hotels, motels, and mobile home parks) would mean that the impact of solar
11 facility construction on the number of vacant rental housing units is not expected to be large,
12 with up to 37 rental units expected to be occupied in the ROI. This occupancy rate would
13 represent 2.7% of the vacant rental units expected to be available in the ROI.

14
15 In addition to the potential impact on housing markets, in-migration would affect
16 community service (education, health, and public safety) employment. An increase in such
17 employment would be required to meet existing levels of service in the ROI. Accordingly,
18 one new teacher would be required in the ROI. This increase would represent 0.2% of total
19 ROI employment expected in this occupation.

20 21 22 **Operations**

23
24 Total operations employment impacts in the ROI (including direct and indirect impacts)
25 of a full build-out of the SEZ using PV technologies would be 7 jobs (Table 10.3.19.2-4). Such a
26 solar development would also produce \$0.2 million in income. Direct sales taxes would be less
27 than \$0.1 million; direct income taxes, less than \$0.1 million. Based on fees established by the
28 BLM (BLM 2010), acreage rental payments would be \$0.2 million, and solar generating capacity
29 payments, at least \$1.3 million.

30
31 As for the construction workforce, operation of a solar facility likely would require some
32 in-migration of workers and their families from outside the ROI, with up to three persons
33 in-migrating into the ROI. Although in-migration may potentially affect local housing markets,
34 the relatively small number of in-migrants and the availability of temporary accommodations
35 (hotels, motels, and mobile home parks) would mean that the impact of solar facility operation
36 on the number of vacant owner-occupied housing units is not expected to be large, with up to
37 two owner-occupied units expected to be required in the ROI.

38
39 No new community service employment would be required to meet existing levels of
40 service in the ROI.

41 42 43 **10.3.19.3 SEZ-Specific Design Features and Design Feature Effectiveness**

44
45 Required programmatic design features that would reduce socioeconomic impacts are
46 described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the

1 programmatic design features will reduce the potential for socioeconomic impacts during all
2 project phases.

3
4 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
5 analyses due to changes to the SEZ boundaries, and consideration of comments received as
6 applicable, no SEZ-specific design features to address socioeconomic impacts in the proposed
7 Fourmile East SEZ have been identified. Some SEZ-specific design features may be identified
8 through the process of preparing parcels for competitive offer and subsequent project-specific
9 analysis.

10 11 12 **10.3.20 Environmental Justice**

13 14 15 **10.3.20.1 Affected Environment**

16
17 The data presented in the Draft Solar PEIS have changed due to the change in boundaries
18 of the proposed Fourmile East SEZ. The affected environment information presented in the Draft
19 Solar PEIS has also changed, as reflected in the following discussion.

20
21 The data in Table 10.3.20.1-1 show the minority and low-income composition of the total
22 population located within a 50-mi (80-km) radius of the proposed SEZ based on 2000 Census
23 data and CEQ guidelines (CEQ 1997). Individuals identifying themselves as Hispanic or Latino
24 are included in the table as a separate entry. However, because Hispanics can be of any race, this
25 number also includes individuals also identifying themselves as being part of one or more of the
26 population groups listed in the table.

27
28 A large number of minority and low-income individuals are located in the 50-mi (80-km)
29 area around the boundary of the SEZ. Within the 50-mi (80-km) radius in Colorado, 43.2% of
30 the population is classified as minority, while 18.5% is classified as low-income. The number of
31 minority or low-income individuals does not exceed the state average by 20 percentage points or
32 more and does not exceed 50% of the total population in the radius; that is, there are no minority
33 or low-income populations in the Colorado portion of the 50-mi (80-km) area based on
34 2000 Census data and CEQ guidelines.

35
36 Within the 50-mi (80-km) radius in New Mexico, 55.6% of the population is classified as
37 minority, while 17.4% is classified as low-income. Although the number of minority individuals
38 does not exceed the state average by 20 percentage points or more, the number of minority
39 individuals exceeds 50% of the total population in the radius area, meaning that there are
40 minority populations in the 50-mi (80-km) radius based on 2000 Census data and CEQ
41 guidelines. The number of low-income individuals does not exceed the state average by
42 20 percentage points or more and does not exceed 50% of the total population in the radius; that
43 is, there are no low-income populations in the New Mexico portion of the 50-mi (80 km) area.

44
45 In the Colorado portion of the 50-mi (80-km) radius, more than 50% of the population in
46 all but one of the block groups in Conejos County is made up of minority population groups,

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TABLE 10.3.20.1-1 Minority and Low-Income Populations within the 50-mi (80-km) Radius Surrounding the Proposed Fourmile East SEZ as Revised

Parameter	Colorado	New Mexico
Total population	66,670	9,859
White, non-Hispanic	37,871	4,374
Hispanic or Latino	26,485	5,147
Non-Hispanic or Latino minorities	2,314	338
One race	1,464	171
Black or African American	404	18
American Indian or Alaskan Native	666	93
Asian	262	30
Native Hawaiian or other Pacific Islander	26	3
Some other race	106	27
Two or more races	850	167
Total minority	28,799	5,485
Low-income	11,886	1,720
Percentage minority	43.2	55.6
State percentage minority	25.5	55.3
Percentage low-income	18.5	17.4
State percentage low-income	9.3	18.4

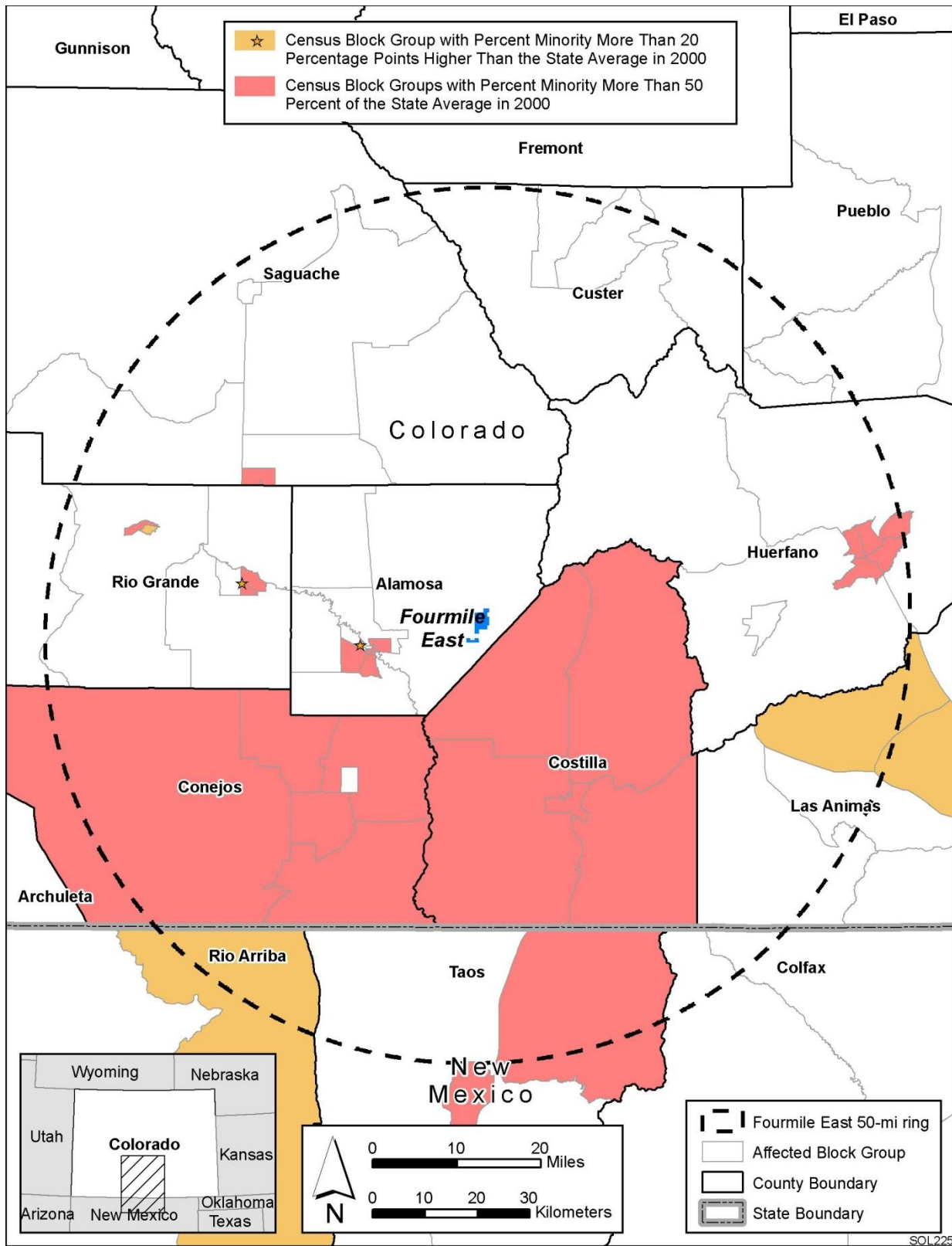
Sources: U.S. Bureau of the Census (2009a,b).

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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), Center (Saguache County), and Walsenburg (Huerfano County) are also more than 50% minority. In the New Mexico portion of the radius, Rio Arriba County has one block group in which the minority population is more than 20 percentage points higher than the state average, while there are two block groups with more than a 50% minority in Taos County.

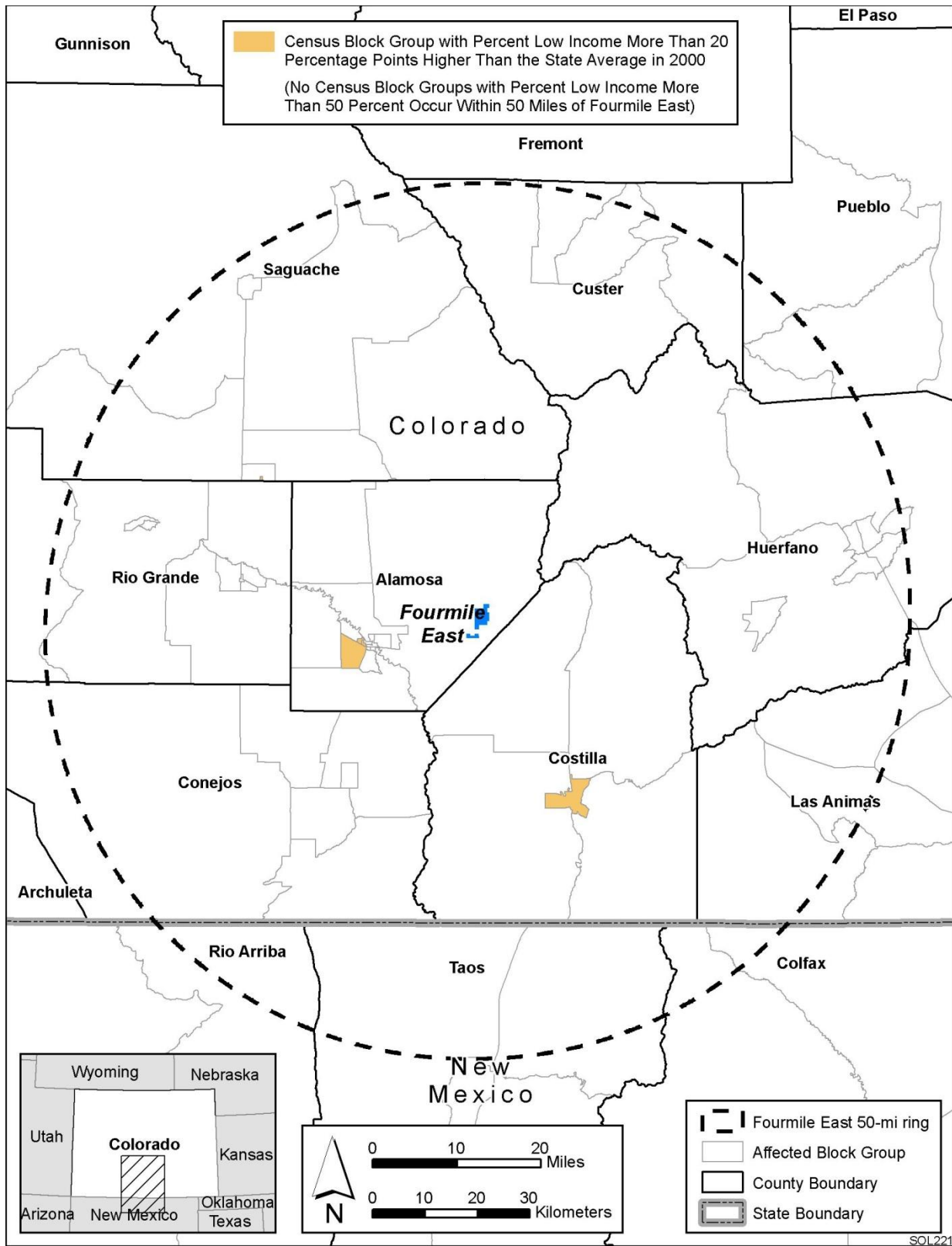
Low-income populations in the 50-mi (80-km) radius are limited to two block groups in the Colorado portion, in the cities of San Luis (Costilla County) and Alamosa, both of which have low-income population shares that are more than 20 percentage points higher than the state average.

Figures 10.3.20.1-1 and 10.3.20.1-2 show the locations of minority and low-income population groups in the 50-mi (80-km) radius around the boundary of the SEZ.



1

2 **FIGURE 10.3.20.1-1 Minority Population Groups within the 50-mi (80-km) Radius Surrounding**
 3 **the Proposed Fourmile East SEZ as Revised**



1

2 **FIGURE 10.3.20.1-2 Low-Income Population Groups within the 50-mi (80-km) Radius**
 3 **Surrounding the Proposed Fourmile East SEZ as Revised**

1 **10.3.20.2 Impacts**

2
3 Potential impacts (e.g., from noise and dust during construction and operations, visual
4 impacts, cultural impacts, and effects on property values) on low-income and minority
5 populations could be incurred as a result of the construction and operation of solar facilities
6 involving each of the four technologies. Although impacts are likely to be small, there are
7 minority populations defined by CEQ guidelines (CEQ 1997) (see Section 10.3.20.1 of the Draft
8 Solar PEIS) within the New Mexico portion of the 50-mi (80-km) radius around the boundary of
9 the SEZ; thus any adverse impacts of solar projects would disproportionately affect minority
10 populations. Further analysis of these impacts would be included in subsequent NEPA reviews of
11 individual solar projects. Because there are no low-income populations within the 50-mi (80-km)
12 radius, according to CEQ guidelines, there would be no impacts on low-income populations.
13

14
15 **10.3.20.3 SEZ-Specific Design Features and Design Feature Effectiveness**

16
17 Required programmatic design features that would reduce potential environmental justice
18 impacts are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the
19 programmatic design features will reduce the potential for environmental justice impacts.
20

21 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
22 analyses due to changes to the SEZ boundaries, and consideration of comments received as
23 applicable, no SEZ-specific design features for environmental justice in the proposed Fourmile
24 East SEZ have been identified. Some SEZ-specific design features may be identified through the
25 process of preparing parcels for competitive offer and subsequent project-specific analysis.
26

27
28 **10.3.21 Transportation**

29
30
31 **10.3.21.1 Affected Environment**

32
33 The reduction in size of the SEZ does not change the information on affected
34 environment for transportation provided in the Draft Solar PEIS.
35

36
37 **10.3.21.2 Impacts**

38
39 As stated in the Draft Solar PEIS, the primary transportation impacts are anticipated to be
40 from commuting worker traffic. U.S. 160 provides a regional traffic corridor that could
41 experience moderate impacts for projects that may have up to 1,000 daily workers with an
42 additional 2,000 vehicle trips per day (maximum). Some parts of U.S. 160 could experience
43 approximately a 50% increase in the daily traffic load, and the amount of traffic currently on
44 CO 150 could increase approximately threefold. Local road improvements would be necessary in
45 any portion of the SEZ along U.S. 160 that might be developed so as not to overwhelm the local

1 roads near any site access point(s). CO 150 and any other access roads connected to it would
2 require road improvements to handle the additional traffic.

3
4 Solar development within the SEZ would affect public access along OHV routes that are
5 designated open and available for public use. Although open routes crossing areas granted
6 ROWs for solar facilities could be redesignated as closed (see Section 5.5.1 of the Draft Solar
7 PEIS), a programmatic design feature has been included under Recreation (Section A.2.2.6.1 of
8 Appendix A) that requires consideration of replacement of lost OHV route acreage and of access
9 across and to public lands.

10 11 12 **10.3.21.3 SEZ-Specific Design Features and Design Feature Effectiveness**

13
14 Required programmatic design features that would reduce transportation impacts are
15 described in Section A.2.2 of Appendix A of this Final Solar PEIS. The programmatic design
16 features, including local road improvements, multiple site access locations, staggered work
17 schedules, and ride-sharing, will all provide some relief to traffic congestion on local roads
18 leading to the SEZ. Depending on the location of solar facilities within the SEZ, more specific
19 access locations and local road improvements could be implemented.

20
21 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
22 analyses due to changes to the SEZ boundaries, and consideration of comments received as
23 applicable, no SEZ-specific design features to address transportation impacts in the proposed
24 Fourmile East SEZ have been identified. Some SEZ-specific design features may be identified
25 through the process of preparing parcels for competitive offer and subsequent project-specific
26 analysis.

27 28 29 **10.3.22 Cumulative Impacts**

30
31 The analysis of potential impacts in the vicinity of the proposed Fourmile East SEZ
32 presented in the Draft Solar PEIS is still generally applicable for this Final Solar PEIS, although
33 the impacts would be decreased because the size of the proposed SEZ has been reduced to
34 2,883 acres (11.7 km²). The following sections include an update to the information presented in
35 the Draft Solar PEIS regarding cumulative effects for the proposed Fourmile East SEZ.

36 37 38 **10.3.22.1 Geographic Extent of the Cumulative Impacts Analysis**

39
40 The geographic extent of the cumulative impact analysis has not changed. The extent
41 varies on the basis of the nature of the resource being evaluated and the distance at which
42 an impact may occur (thus, e.g., air quality impacts may have a greater regional extent than
43 cultural resources impacts). Lands around the SEZ are privately owned or administered by the
44 USFS, NPS, or the BLM. The BLM administers approximately 11% of the lands within a 50-mi
45 (80-km) radius of the Fourmile East SEZ.

1 **10.3.22.2 Overview of Ongoing and Reasonably Foreseeable Future Actions**
2

3 The proposed Fourmile East SEZ decreased from 3,882 acres (15.7 km²) to 2,883 acres
4 (11.7 km²). The Draft Solar PEIS included three other proposed SEZs in Colorado: Antonito
5 Southeast, De Tilla Gulch, and Los Mogotes East. All these proposed SEZs are being carried
6 forward to the Final Solar PEIS; the areas of the De Tilla Gulch and Los Mogotes East SEZs
7 have been decreased.
8

9 The ongoing and reasonably foreseeable future actions described below are grouped into
10 two categories: (1) actions that relate to energy production and distribution, including potential
11 solar energy projects under the proposed action (Section 10.3.22.2.1); and (2) other ongoing and
12 reasonably foreseeable actions, including those related to electric power generation and
13 distribution, wildlife management, and military facility improvement (Section 10.3.22.2.2).
14 Together, these actions and trends have the potential to affect human and environmental
15 receptors within the geographic range of potential impacts over the next 20 years.
16
17

18 **10.3.22.2.1 Energy Production and Distribution**
19

20 The list of reasonably foreseeable future actions near the proposed Fourmile East SEZ
21 has been updated and is presented in Table 10.3.22.2-1. Projects listed in the table are shown in
22 Figure 10.3.22.2-1.
23

24 Xcel Energy (Public Service Company of Colorado) has submitted a transmission
25 planning report to the Colorado Public Utility Commission stating that it intends to end its
26 involvement in the proposed San Luis Valley–Calumet-Comanche Transmission project
27 (Heide 2011). The project itself has not been cancelled.
28
29

30 **10.3.22.2.2 Other Actions**
31

32 None of the major ongoing and foreseeable actions within 50 mi (80 km) of the proposed
33 Fourmile East SEZ that were listed in Table 10.3.22.2-3 of the Draft Solar PEIS have had a
34 change in their status.
35
36

37 **10.3.22.3 General Trends**
38

39 The information on general trends presented in the Draft Solar PEIS remains valid.
40
41

42 **10.3.22.4 Cumulative Impacts on Resources**
43

44 Total disturbance over 20 years in the proposed Fourmile East SEZ would be about
45 2,306 acres (9.4 km²) (80% of the entire proposed SEZ). This development would contribute
46 incrementally to the impacts from other past, present and reasonably foreseeable future actions

1 **TABLE 10.3.22.2-1 Ongoing and Reasonably Foreseeable Future Actions Related to Energy**
 2 **Development and Distribution near the Proposed Fourmile East SEZ as Revised and in the San**
 3 **Luis Valley^a**

Description	Status	Resources Affected	Primary Impact Location
<i>Renewable Energy Development</i>			
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, 19-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	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^b	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
<i>Transmission and Distribution Systems</i>			
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.

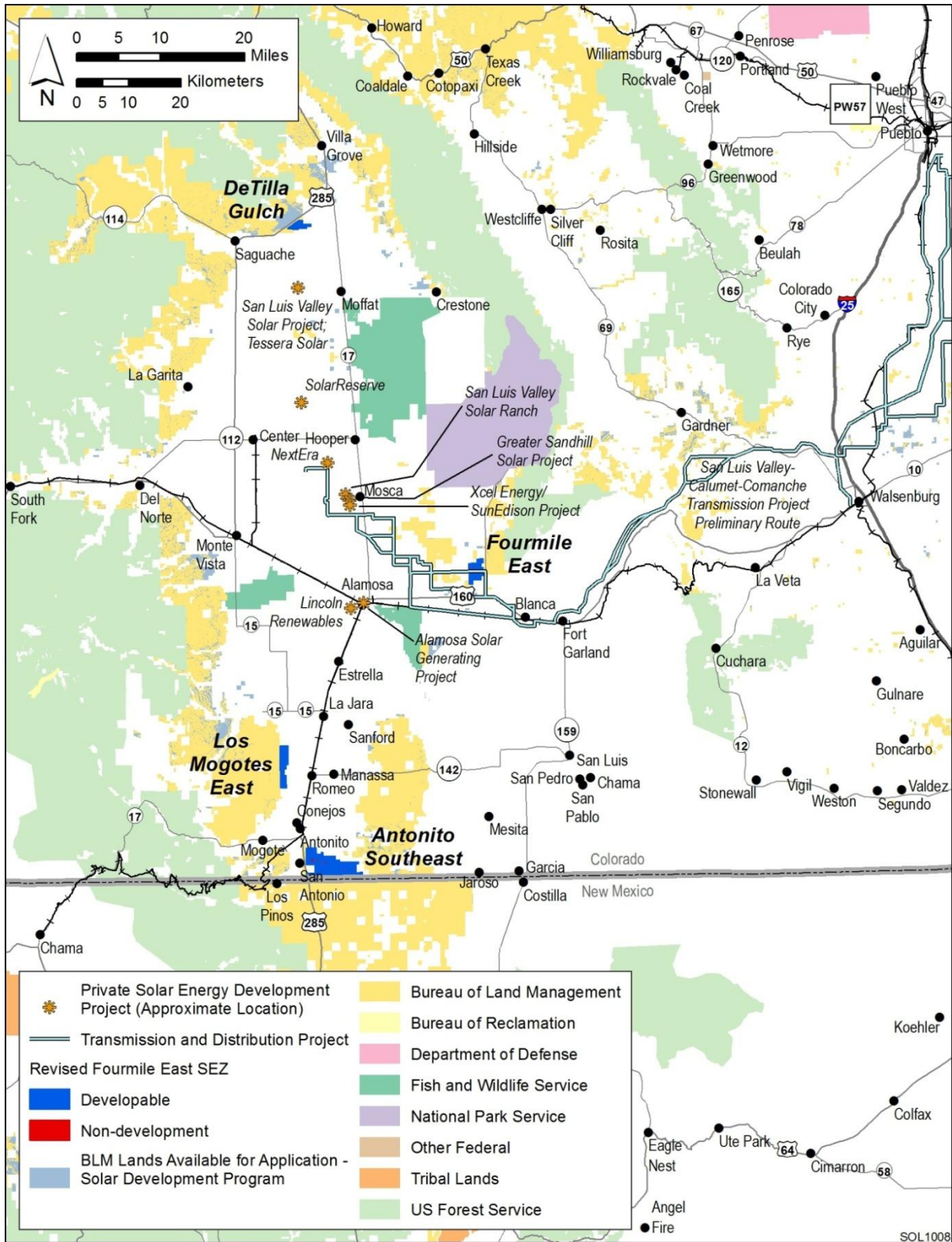
^b See SEIA (2012) for details.

^c To convert acres to km², multiply by 0.004047.

^d See Solar Feeds (2012) for details.

^e See Tetra Tech EC, Inc. (2011).

^f See Heide (2011) for details.



1
2 **FIGURE 10.3.22.2-1 Locations of Existing and Reasonably Foreseeable Renewable Energy**
3 **Projects on Public Land within a 5-mi (80-km) Radius of the Proposed Fourmile East SEZ**
4 **as Revised**

1 in the region as described in the Draft Solar PEIS. Primary impacts from development in the
2 Fourmile East SEZ may include impacts on water quantity and quality, air quality, ecological
3 resources such as habitat and species, cultural and visual resources, and specially designated
4 lands.

5
6 No additional major actions have been identified within 50 mi (80 km) of the SEZ. As a
7 result of the reduction in the developable area of the SEZ, the incremental cumulative impacts
8 associated with development in the proposed Fourmile East SEZ during construction, operation,
9 and decommissioning are expected to be the same or less than those projected in the Draft Solar
10 PEIS.

11
12 On the basis of comments received on the Draft Solar PEIS, cumulative impacts on
13 recreation in the San Luis Valley have been reconsidered. While it is unlikely that the proposed
14 Fourmile East SEZ would have a large impact on recreational use or tourism throughout the
15 Valley, cumulative impacts could occur because it is one of four potential SEZs totaling about
16 16,300 acres (66 km²) on public lands, and there are additional solar energy developments on
17 private land. The location of the SEZ along the main route into Great Sand Dunes National Park
18 has the potential of influencing the impressions of recreational visitors traveling to the park.
19 Because most of the land on the valley floor of the San Luis Valley is private and is heavily
20 developed for agricultural use, undeveloped public lands around the valley provide accessible
21 areas for public recreation. Although it is believed the recreation use of the proposed SEZ is low,
22 the loss of public access to such areas cumulatively leads to an overall reduction in the
23 availability of recreation that can become significant.

24 25 26 **10.3.23 Transmission Analysis**

27
28 The methodology for this transmission analysis is described in Appendix G of this Final
29 Solar PEIS. This section presents the results of the transmission analysis for the Fourmile East
30 SEZ, including the identification of potential load areas to be served by power generated at the
31 SEZ and the results of the DLT analysis. Unlike Sections 10.3.2 through 10.3.22, this section is
32 not an update of previous analysis for the Fourmile East SEZ; this analysis was not presented in
33 the Draft Solar PEIS. However, the methodology and a test case analysis were presented in the
34 Supplement to the Draft Solar PEIS. Comments received on the material presented in the
35 Supplement were used to improve the methodology for the assessment presented in this Final
36 Solar PEIS.

37
38 On the basis of its size, the assumption of a minimum of 5 acres (0.02 km²) of land
39 required per MW, and the assumption of a maximum of 80% of the land area developed, the
40 Fourmile East SEZ is estimated to have the potential to generate 461 MW of marketable solar
41 power at full build-out.

1 **10.3.23.1 Identification and Characterization of Load Areas**
2

3 The primary candidates for Fourmile East SEZ load areas are the major surrounding
4 cities. Figure 10.3.23.1-1 shows the possible load areas for the Fourmile East SEZ and the
5 estimated portion of their market that could be served by solar generation. Possible load areas for
6 the Fourmile East SEZ include Pueblo, Colorado Springs, and Denver, Colorado; Farmington,
7 Albuquerque, and Santa Fe, New Mexico; Salt Lake City, Utah; Phoenix, Arizona; and
8 Las Vegas, Nevada.
9

10 The two load area groups examined for Fourmile East SEZ are as follows:

- 11
- 12 1. Pueblo, Colorado Springs, and Denver, Colorado, and
 - 13
 - 14 2. Farmington and Albuquerque, New Mexico.
15

16 Figure 10.3.23.1-2 shows the most economically viable transmission scheme for the
17 Fourmile East SEZ (transmission scheme 1), and Figure 10.3.23.1-3 shows an alternative
18 transmission scheme (transmission scheme 2) that represents a logical choice should
19 transmission scheme 1 be infeasible. As described in Appendix G, the alternative shown in
20 transmission scheme 2 represents the optimum choice if one or more of the primary linkages in
21 transmission scheme 1 are excluded from consideration. The groups provide for linking loads
22 along alternative routes so that the SEZ’s output of 461 MW could be fully allocated.
23

24 Table 10.3.23.1-1 summarizes and groups the load areas according to their associated
25 transmission scheme and provides details on how the megawatt load for each area was estimated.
26

27

28 **10.3.23.2 Findings for the DLT Analysis**
29

30 The DLT analysis approach assumes that the Fourmile East SEZ will require all new
31 construction for transmission lines (i.e., dedicated lines) and substations. The new transmission
32 lines(s) would directly convey the 461-MW output of the Fourmile East SEZ to the prospective
33 load areas for each possible transmission scheme. The approach also assumes that all existing
34 transmission lines in the WECC region are saturated and have little or no available capacity to
35 accommodate the SEZ’s output throughout the entire 10-year study horizon.
36

37 Figures 10.3.23.1-1 and 10.3.23.1-2 display the pathways that new dedicated lines might
38 follow to distribute solar power generated at the Fourmile East SEZ via the two identified
39 transmission schemes described in Table 10.3.23.1-1. These pathways parallel existing 500-,
40 345-, 230-kV, and lower voltage lines. The intent of following existing lines is to avoid pathways
41 that may be infeasible due to topographical limitations or other reasons.
42

43 For transmission scheme 1, serving load centers to the north, a new line would be
44 constructed to connect with Pueblo (52 MW), Colorado Springs (210 MW), and Denver
45 (1,272 MW), so that the 461-MW output of the Fourmile East SEZ could be fully utilized
46 (Figure 10.3.23.1-2). This particular scheme has three segments. The first segment is from the

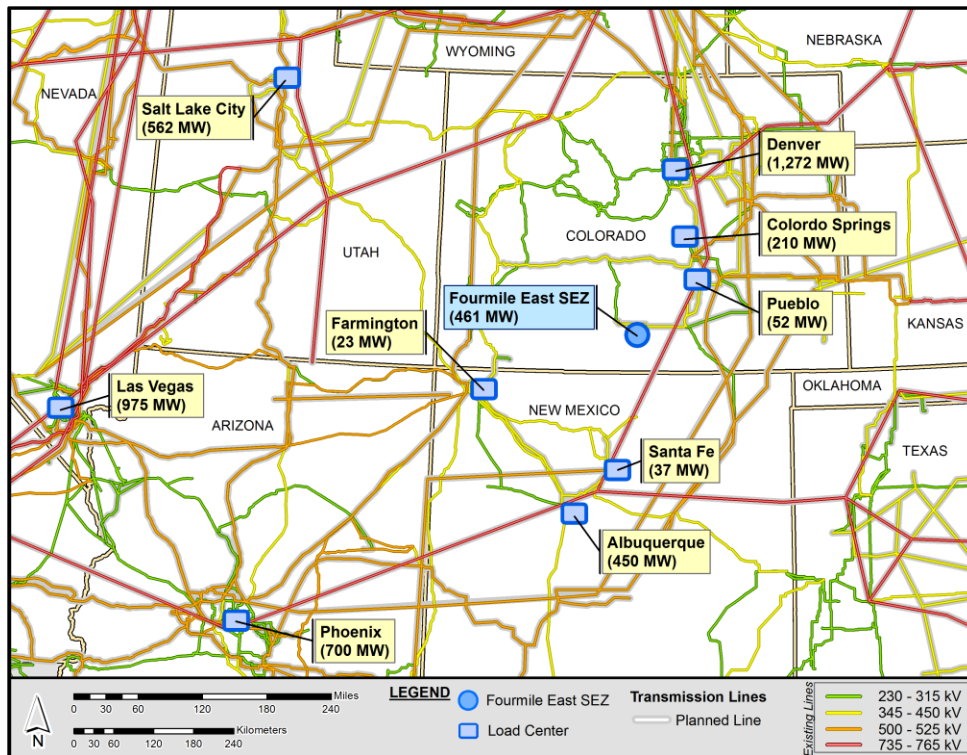


FIGURE 10.3.23.1-1 Location of the Proposed Fourmile East SEZ and Possible Load Areas (Source for background map: Platts 2011)

SEZ, running about 105 mi (169 km) northeast to Pueblo. On the basis of engineering and operational considerations, this segment would require a single-circuit 345-kV bundle of two conductor (Bof2) transmission design. The second leg goes north about 43 mi (69 km) from Pueblo to Colorado Springs. The third and final leg extends 63 mi (101 km) farther north to Denver. The transmission configuration options 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, serving load centers to the southwest, Figure 10.3.23.1-3 shows that new lines would be constructed to connect with Farmington (23 MW) and Albuquerque (450 MW), so that the 461-MW output of the Fourmile East SEZ could be fully utilized. This scheme has two segments. The first segment, from the SEZ to Farmington, is 331 mi (533 km) long, and the second segment, from Farmington to Albuquerque, is about 173 mi (278 km) long. Again, the transmission configuration for each leg, or segment, varies and was determined by using the line “loadability” curve provided in American Electric Power’s *Transmission Facts* (AEP 2010), with the constraint that the full output of the SEZ (461 MW) would be completely marketed.

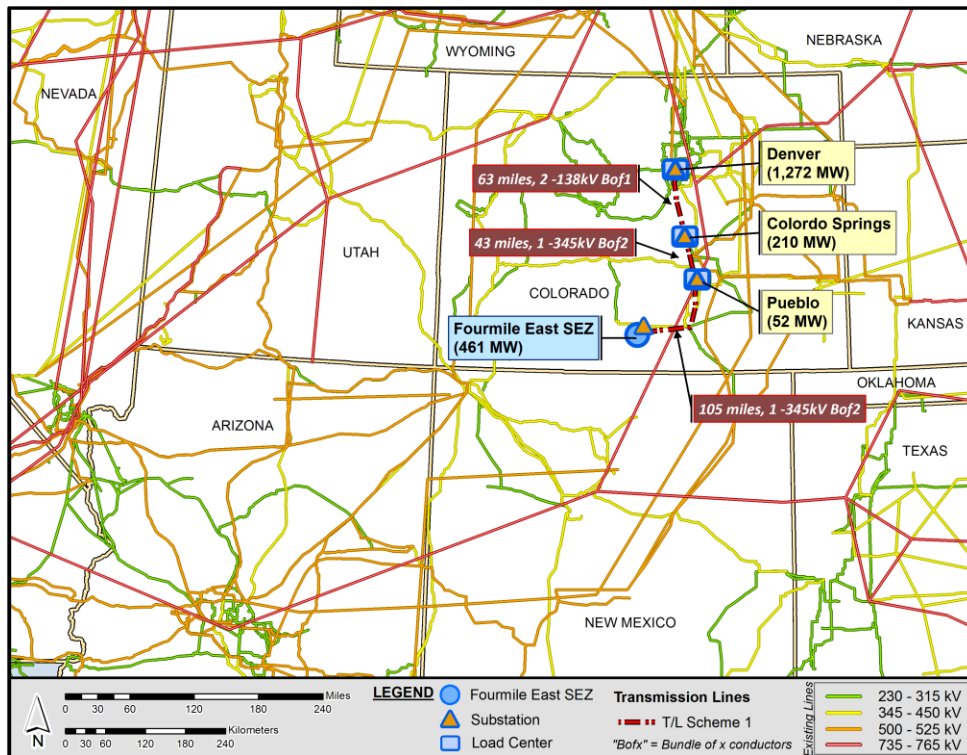
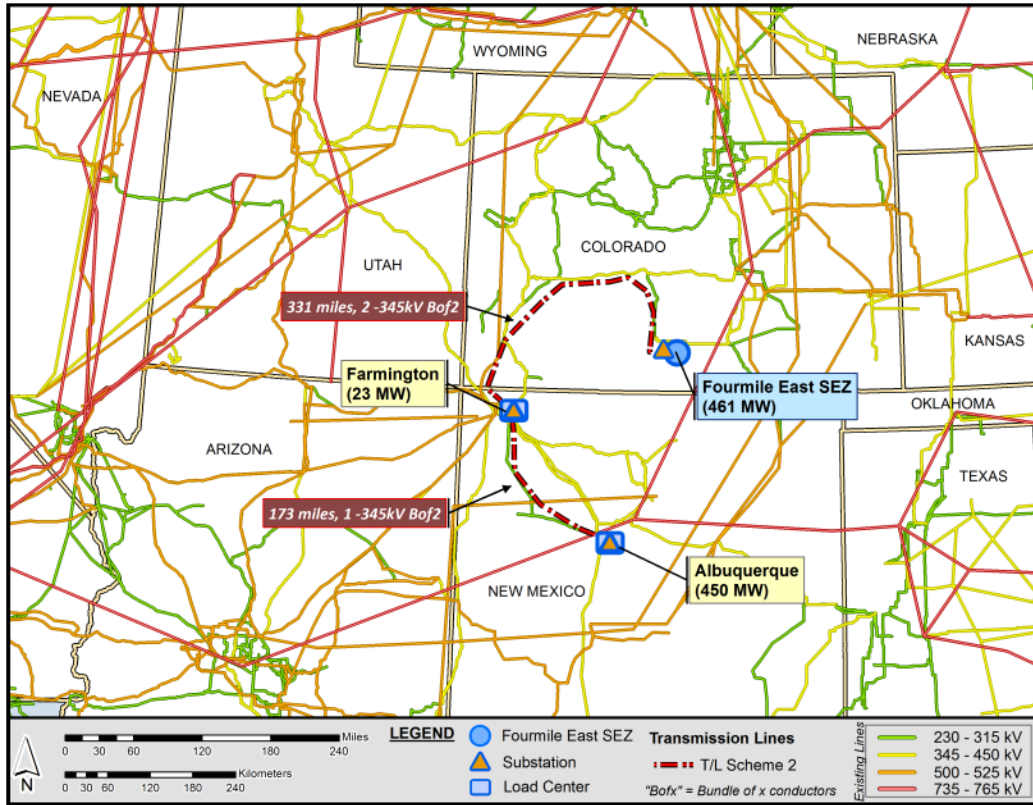


FIGURE 10.3.23.1-2 Transmission Scheme 1 for the Proposed Fourmile East SEZ (Source for background map: Platts 2011)

Table 10.3.23.2-1 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. The originating substation would have a rating of at least 461 MW (to match the plant's output), while the combined load substations would have a similar total rating of 461 MW. 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.

Table 10.3.23.2-2 provides an estimate of the total land area disturbed for construction of new transmission facilities under each of the schemes evaluated. The most favorable transmission scheme with respect to minimizing costs and the area disturbed would be scheme 1, which would serve Pueblo, Colorado Springs, and Denver and for which the construction of new transmission lines and substations is estimated to disturb about 3,761 acres (15.2 km²) of land. The less favorable transmission scheme with respect to minimizing costs and the area disturbed would be scheme 2 (serving Farmington and Albuquerque). For this scheme, the construction of



1

2 **FIGURE 10.3.23.1-3 Transmission Scheme 2 for the Proposed Fourmile East SEZ**
 3 **(Source for background map: Platts 2011)**

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6

TABLE 10.3.23.1-1 Candidate Load Area Characteristics for the Proposed Fourmile East 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	900,000	2,269	450

^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).

7

8

1 **TABLE 10.3.23.2-1 Potential Transmission Schemes, Estimated Solar Markets, and Distances to**
 2 **Load Areas for the Proposed Fourmile East 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	105	211	345, 138	4
	Colorado Springs, Colorado ^a	210		43			
	Denver, Colorado ^b	1,272		63			
2	Farmington, New Mexico ^a	23	473	331	504	345	3
	Albuquerque, New Mexico ^b	450		173			

^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 10.3.23.1-1.

^d To convert mi to km, multiply by 1.6093.

3
4

5 **TABLE 10.3.23.2-2 Comparison of the Various Transmission Line Configurations with Respect to**
 6 **Land Use Requirements for the Proposed Fourmile East 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	211	4	3,750.3	10.2	3,760.5
	Colorado Springs, Colorado ^a					
	Denver, Colorado ^b					
2	Farmington, New Mexico ^a	504	3	10,690.9	10.2	10,701.1
	Albuquerque, New Mexico ^b					

^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 km², multiply by 0.004047.

7
8

1 new transmission lines and substations is estimated to disturb a land area on the order of
2 10,701 acres (43.3 km²).
3

4 Table 10.3.23.2-3 shows the estimated NPV of both transmission schemes and takes into
5 account the cost of constructing the lines, the substations, and the projected revenue stream over
6 the 10-year horizon. A positive NPV indicates that revenues more than offset investments. This
7 calculation does not include the cost of producing electricity.
8

9 The most economically attractive configuration (transmission scheme 1) has the highest
10 positive NPV and serves the Colorado cities of Pueblo, Colorado Springs, and Denver. The
11 secondary case (transmission scheme 2), which excludes one or more of the primary pathways
12 used in scheme 1, is less economically attractive and focuses on delivering power to Farmington
13 and Albuquerque. For the assumed utilization factor of 20%, scheme 2 exhibits a negative NPV,
14 implying that this option may not be economically viable under the current assumptions.
15

16 Table 10.3.23.2-4 shows the effect of varying the value of the utilization factor on the
17 NPV of the transmission schemes. The table shows that at about 50% utilization, NPVs for both
18 schemes are positive. It also shows that as the utilization factor is increased, the economic
19 viability of the lines also increases. Utilization factors can be raised by allowing the new
20 dedicated lines to market other power generation outputs in the region in addition to that of its
21 associated SEZ.
22

23 The findings of the DLT analysis for the proposed Fourmile East SEZ are as follows:
24

- 25 • Transmission scheme 1, which identifies the cities of Pueblo, Colorado
26 Springs, and Denver (in that specific sequence) as the primary markets,
27 represents the most favorable option based on NPV and land use
28 requirements. This scheme would result in new land disturbance of about
29 3,761 acres (15.2 km²).
30
- 31 • Transmission scheme 2, which represents an alternative configuration,
32 identifies Farmington and Albuquerque as the primary market. In terms of
33 defining potential upper-bound impacts of new transmission infrastructure
34 development, this configuration would result in new land disturbance of about
35 10,701 acres (43.3 km²). In terms of NPV, however, this scheme may not be
36 economically viable under the current assumptions.
37
- 38 • Other load area configurations are possible but would be less favorable than
39 scheme 1 in terms of NPV and, in most cases, also in terms of land use
40 requirements. If new electricity generation at the proposed Fourmile East SEZ
41 is not sent to either of the two markets identified above, the potential upper-
42 bound impacts in terms of cost would be greater.
43
- 44 • The analysis of transmission requirements for the proposed Fourmile East
45 SEZ would be expected to show lower costs and less land disturbance if solar-
46 eligible load assumptions were increased, although the magnitude of those

1 **TABLE 10.3.23.2-3 Comparison of Potential Transmission Lines with Respect to NPV (Base Case)**
 2 **for the Proposed Fourmile East 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	373.7	28.0	74.3	573.6	171.9
2	Farmington, New Mexico ^a Albuquerque, New Mexico ^b	1,208.1	28.0	74.3	573.6	-662.5

^a The load area represents the city named.

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

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TABLE 10.3.23.2-4 Effect of Varying the Utilization Factor on the NPV of the Transmission Schemes for the Proposed Fourmile East 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	171.9	458.7	745.6	1,032.3	1,319.1	1,605.9
2	Farmington, New Mexico ^a Albuquerque, New Mexico ^b	-662.5	-375.7	-88.9	197.9	484.7	771.5

^a The load area represents the city named.

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

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changes would vary due to a number of factors. In general, for cases such as the Fourmile East 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.

1 **10.3.24 Impacts of the Withdrawal**

2
3 The BLM is proposing to withdraw 2,883 acres (12 km²) of public land comprising the
4 proposed Fourmile East SEZ from settlement, sale, location, or entry under the general land
5 laws, including the mining laws, for a period of 20 years (see Section 2.2.2.2.4 of the Final Solar
6 PEIS). The public lands would be withdrawn, subject to valid existing rights, from settlement,
7 sale, location, or entry under the general land laws, including the mining laws. This means that
8 the lands could not be appropriated, sold, or exchanged during the term of the withdrawal, and
9 new mining claims could not be filed on the withdrawn lands. Mining claims filed prior to the
10 segregation or withdrawal of the identified lands would take precedence over future solar energy
11 development. The withdrawn lands would remain open to the mineral leasing, geothermal
12 leasing, and mineral material laws, and the BLM could elect to lease the oil, gas, coal, or
13 geothermal steam resources, or to sell common-variety mineral materials, such as sand and
14 gravel, contained in the withdrawn lands. In addition, the BLM would retain the discretion to
15 authorize linear and renewable energy ROWs on the withdrawn lands.
16

17 The purpose of the proposed land withdrawal is to minimize the potential for conflicts
18 between mineral development and solar energy development for the proposed 20-year
19 withdrawal period. Under the land withdrawal, there would be no mining-related surface
20 development, such as the establishment of open pit mining, construction of roads for hauling
21 materials, extraction of ores from tunnels or adits, or construction of facilities to process the
22 material mined, that could preclude use of the SEZ for solar energy development. For the
23 Fourmile East SEZ, the impacts of the proposed withdrawal on mineral resources and related
24 economic activity and employment are expected to be negligible because the mineral potential of
25 the lands within the SEZ is low (BLM 2012). There has been no documented mining within the
26 SEZ, and there are no known locatable mineral deposits within the land withdrawal area.
27 According to the LR2000 (accessed in January 2012), there are no recorded mining claims
28 within the land withdrawal area.
29

30 Although the mineral potential of the lands within the Fourmile East SEZ is low, the
31 proposed withdrawal of lands within the SEZ would preclude many types of mining activity over
32 a 20-year period, resulting in the avoidance of potential mining-related adverse impacts. Impacts
33 commonly related to mining development include increased soil erosion and sedimentation,
34 water use, generation of contaminated water in need of treatment, creation of lagoons and ponds
35 (hazardous to wildlife), toxic runoff, air pollution, establishment of noxious weeds and invasive
36 species, habitat destruction or fragmentation, disturbance of wildlife, blockage of migration
37 corridors, increased visual contrast, noise, destruction of cultural artifacts and fossils and/or their
38 context, disruption of landscapes and sacred places of interest to tribes, increased traffic and
39 related emissions, and conflicts with other land uses (e.g., recreational).
40

41
42 **10.3.25 References**

43
44 *Note to Reader:* This list of references identifies Web pages and associated URLs where
45 reference data were obtained for the analyses presented in this Final Solar PEIS. It is likely that
46 at the time of publication of this Final Solar PEIS, some of these Web pages may no longer be

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1 **10.3.26 Errata for the Proposed Fourmile East SEZ**

2
3 This section presents corrections to material presented in the Draft Solar PEIS and the
4 Supplement to the Draft. The need for these corrections was identified in several ways: through
5 comments received on the Draft Solar PEIS and the Supplement to the Draft (and verified by
6 the authors), through new information obtained by the authors subsequent to publication of the
7 Draft Solar PEIS and the Supplement to the Draft, or through additional review of the original
8 material by the authors. Table 10.3.26-1 provides corrections to information presented in the
9 Draft Solar PEIS and the Supplement to the Draft.

10
11

TABLE 10.3.26-1 Errata for the Proposed Fourmile East SEZ (Section 10.3 of the Draft Solar PEIS and Section C.3.3 of the Supplement to the Draft Solar PEIS)

Section No.	Page No.	Line No.	Figure No.	Table No.	Correction
10.3.3.1	10.3-23	35–36			“Portions of State Highways 17, 150, and 159 and Alamosa County Road 6N have been designated by the state and the BLM as part of the Los Caminos Antiguos Scenic Byway,” should read, “Portions of State Highways 17, 150, and 159 and Alamosa County Road 6N have been designated as part of the Los Caminos Antiguos Scenic Byway by the Colorado Scenic and Historic Byway Commission with final approval by the Colorado Transportation Commission.”
10.3.11.2					All uses of the term “neotropical migrants” in the text and tables of this section should be replaced with the term “passerines.”
10.3.14.2.2	10.3-3	22–23			“It is located 5.1 mi (8.2 km) east–southeast of the SEZ at the closest point of approach,” should read, “It is located 5.0 mi (8.0 km) west–southwest of the SEZ at the closest point of approach.”
10.3.14.22	10.2-214	13–15			“At night, if sufficiently tall, power towers in the SEZ could have red or white flashing hazard navigation lighting that would likely be visible from the location in the National Park,” should read, “At night, if sufficiently tall, power towers in the SEZ could have red or white flashing hazard navigation lighting that would likely be visible from the location in the WA.”
10.3.14.22	10.2-214	19–21			“Under the 80% development scenario analyzed in this PEIS, solar energy development within the SEZ would be expected to create strong visual contrasts for viewers within the national park,” should read, “Under the 80% development scenario analyzed in this PEIS, solar energy development within the SEZ would be expected to create strong visual contrasts for viewers within the WA.”

1 **10.4 LOS MOGOTES EAST**

2
3
4 **10.4.1 Background and Summary of Impacts**

5
6
7 **10.4.1.1 General Information**

8
9 The proposed Los Mogotes East SEZ is located in Conejos County in south-central
10 Colorado, about 12 mi (19 km) north of the New Mexico border. In 2008, the county population
11 was 8,745, while the four-county region surrounding the SEZ—Alamosa, Conejos, Costilla, and
12 Rio Grande Counties—had a total population of 39,759. The largest nearby town is Alamosa,
13 which had a 2008 population of 8,745 and is located about 22 mi (35 km) to the northeast on
14 U.S. 285. This highway is located about 3 mi (5 km) east of the SEZ. The town of Romeo is
15 located about 3 mi (5 km) directly to the east of the SEZ on U.S. 285. The SLRG Railroad serves
16 the area. As of October 28, 2011, there were no pending solar project applications within or
17 adjacent to the SEZ.

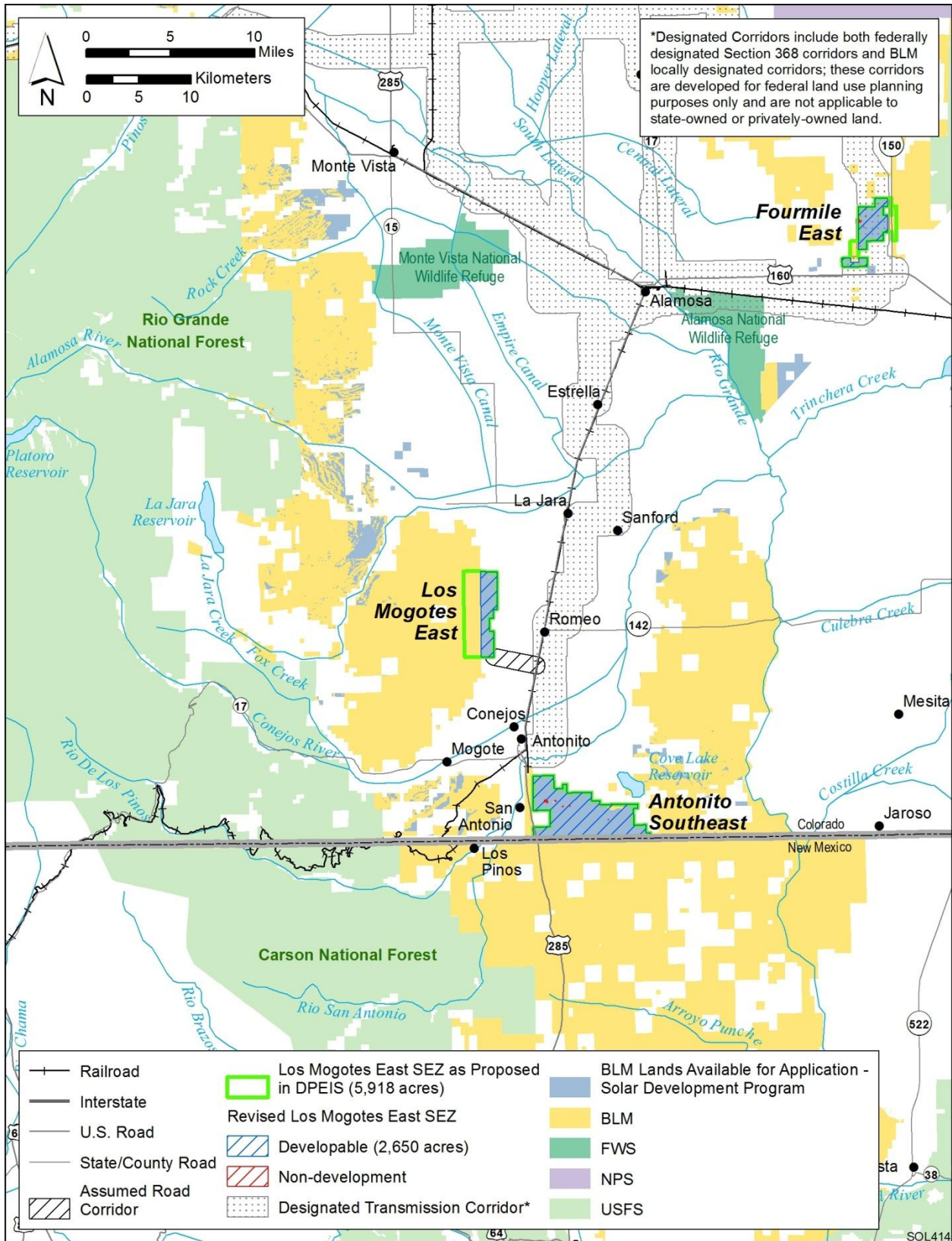
18
19 As published in the Draft Solar PEIS (BLM and DOE 2010), the proposed Los Mogotes
20 East SEZ had a total area of 5,918 acres (24 km²) (see Figure 10.4.1.1-1). In the Supplement to
21 the Draft Solar PEIS (BLM and DOE 2011), the SEZ boundaries were revised, eliminating
22 more than half of the area, that is, 3,268 acres (13.2 km²) on the western side of the SEZ (see
23 Figure 10.4.1.1-2). Excluding this area will avoid or minimize impacts on significant cultural
24 resources; grazing allotments; an important riparian area; Gunnison prairie dog, burrowing owl,
25 ferruginous hawk, mountain plover, pronghorn birthing and winter habitat; and visual resources.
26 The remaining SEZ area is 2,650 acres (10.7 km²). No additional areas for non-development
27 were identified within the SEZ.

28
29 Because of the extensive potential impacts from solar development in the portion of the
30 Los Mogotes East SEZ that has been eliminated, those lands are proposed as solar ROW
31 exclusion areas; that is, applications for solar development on those lands will not be accepted by
32 the BLM.

33
34 The analyses in the following sections update the affected environment and potential
35 environmental, cultural, and socioeconomic impacts associated with utility-scale solar energy
36 development in the proposed Los Mogotes East SEZ as described in the Draft Solar PEIS.

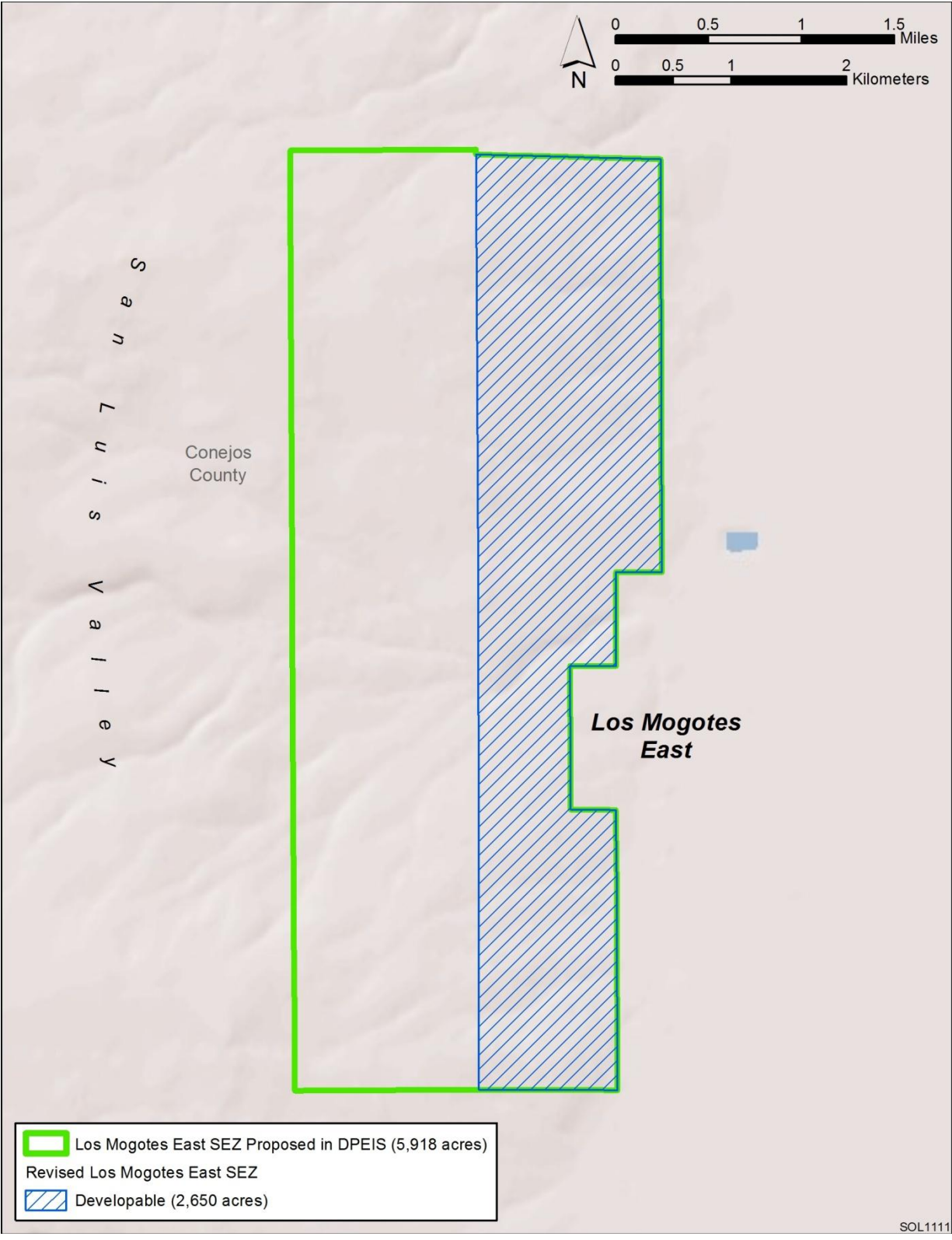
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39 **10.4.1.2 Development Assumptions for the Impact Analysis**

40
41 Maximum development of the proposed Los Mogotes East SEZ is assumed to be
42 80% of the total SEZ area over a period of 20 years, a maximum of 2,120 acres (8.58 km²)
43 (Table 10.4.1.2-1). Full development of the Los Mogotes East SEZ would allow development
44 of facilities with an estimated total of between 236 MW (dish engine or PV technologies,
45 9 acres/MW [0.04 km²/MW]) and 424 MW (solar trough technologies, 5 acres/MW
46 [0.02 km²/MW]) of electrical power capacity.



1

2 **FIGURE 10.4.1.1-1 Proposed Los Mogotes East SEZ as Revised**



1

2 **FIGURE 10.4.1.1-2 Developable and Non-development Areas for the Proposed Los Mogotes East**
 3 **SEZ as Revised**

1 **TABLE 10.4.1.2-1 Assumed Development Acreages, Solar MW Output, and Nearest Major**
 2 **Access Road and Transmission Line for the Proposed Los Mogotes East SEZ as Revised**

Total Developable Acreage and Assumed Development 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 Corridor ^e
2,650 acres ^a and 2,120 acres	236 MW ^b 424 MW ^c	3 mi ^d (U.S. 285)	Adjacent and 69 kV	22 acres	NA ^f

- a To convert acres to km², multiply by 0.004047.
- b Maximum power output if the SEZ was fully developed using power tower, dish engine, or PV technologies, assuming 9 acres/MW (0.04 km²/MW) of land required.
- c Maximum power output if the SEZ were fully developed using solar trough technologies, assuming 5 acres/MW (0.02 km²/MW) of land required.
- d To convert mi to km, multiply by 1.609.
- 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 Los Mogotes East SEZ.

3
 4
 5 Availability of transmission from SEZs to load centers will be an important consideration
 6 for future development in SEZs. For the proposed Los Mogotes East SEZ, updated data indicate
 7 that the nearest existing transmission line is a 69-kV line located about 3 mi (5 km) to the east of
 8 the SEZ (the Draft Solar PEIS had indicated that there was a 69-kV transmission line adjacent to
 9 the proposed SEZ). It is possible that this existing line could be used to provide access from the
 10 SEZ to the transmission grid, but the 69-kV capacity of the existing line would not be adequate
 11 for 236 to 424 MW of new capacity. Therefore, at full build-out capacity, new transmission lines
 12 and possibly upgrades of existing transmission lines would be required to bring electricity from
 13 the proposed Los Mogotes East SEZ to load centers. An assessment of the most likely load
 14 center destinations for power generated at the Los Mogotes East SEZ and a general assessment
 15 of the impacts of constructing and operating new transmission facilities to those load centers is
 16 provided in Section 10.4.23. In addition, the generic impacts of transmission and associated
 17 infrastructure construction and of line upgrades for various resources are discussed in Chapter 5
 18 of this Final Solar PEIS. Project-specific analyses would also be required to identify the specific
 19 impacts of new transmission construction and line upgrades for any projects proposed within
 20 the SEZ.

21
 22 For the proposed Los Mogotes East SEZ, U.S. 285 runs north–south about 3 mi (5 km)
 23 to the east of the SEZ. Assuming construction of a new access road to reach U.S. 285 would
 24 be needed to support construction and operation of solar facilities, approximately 22 acres
 25 (0.09 km²) of land disturbance would occur (a 60-ft [18.3-m] wide ROW was assumed), as
 26 summarized in Table 10.4.1.2-1.

1 **10.4.1.3 Programmatic and SEZ-Specific Design Features**
2

3 The proposed programmatic design features for each resource area to be required under
4 the BLM Solar Energy Program are presented in Section A.2.2 of Appendix A of this Final Solar
5 PEIS. These programmatic design features are intended to avoid, minimize, and/or mitigate
6 adverse impacts from solar energy development and will be required for development on all
7 BLM-administered lands, including SEZ and non-SEZ lands.
8

9 The discussions below addressing potential impacts of solar energy development on
10 specific resource areas (Sections 10.4.2 through 10.4.22) also provide an assessment of the
11 effectiveness of the programmatic design features in mitigating adverse impacts from solar
12 development within the SEZ. SEZ-specific design features to address impacts specific to the
13 proposed Los Mogotes East SEZ may be required in addition to the programmatic design
14 features. The proposed SEZ-specific design features for the Los Mogotes East SEZ have been
15 updated on the basis of revisions to the SEZ since the Draft Solar PEIS (such as boundary
16 changes and the identification of non-development areas) and on the basis of comments received
17 on the Draft Solar PEIS and the Supplement to the Draft. All applicable SEZ-specific design
18 features identified to date (including those from the Draft Solar PEIS that are still applicable) are
19 presented in Sections 10.4.2 through 10.4.22.
20
21

22 **10.4.2 Lands and Realty**
23

24 **10.4.2.1 Affected Environment**
25
26

27 The proposed Los Mogotes East SEZ has been reduced in size to 2,650 acres (10.7 km²)
28 by moving the western boundary of the SEZ to the east. Three county roads provide access to the
29 SEZ, and two roads cross the area and provide access to a well-blocked area of public land west
30 of the proposed SEZ. Two sections of state-owned land abut the SEZ, one on the north and one
31 on the south.
32

33 **10.4.2.2 Impacts**
34
35

36 Solar development in the proposed SEZ would establish a large industrial area that would
37 exclude many existing and potential uses of the land, perhaps in perpetuity. Because the SEZ is
38 undeveloped and rural, utility-scale solar energy development would introduce a new and
39 discordant land use in the area. Access routes to lands west of the SEZ could be affected by solar
40 energy development if legal access through the SEZ is not maintained. If the public lands are
41 developed for solar energy production, similar development could be induced on neighboring
42 state and private lands with landowner agreement.
43
44

1 **10.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

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

10
11 No SEZ-specific design features for lands and realty have been identified through this
12 Final Solar PEIS. Some SEZ-specific design features may be established for parcels within the
13 Los Mogotes East SEZ through the process of preparing parcels for competitive offer and
14 subsequent project-specific analysis.

15
16
17 **10.4.3 Specially Designated Areas and Lands with Wilderness Characteristics**
18

19
20 **10.4.3.1 Affected Environment**
21

22 There are six categories of specially designated areas within 25 mi (40 km) of the
23 proposed Los Mogotes East SEZ. The affected environment section of the Draft Solar PEIS
24 accurately describes these areas with one addition. A recently maintained inventory of
25 wilderness characteristics determined that public lands within the proposed SEZ do not contain
26 wilderness characteristics.

27
28
29 **10.4.3.2 Impacts**
30

31 Solar energy development of the SEZ will still result in the development of a very large
32 industrial site in an area that otherwise is currently rural and undeveloped. The level of visual
33 impacts on specially designated areas would be affected by the types of solar technologies
34 deployed within the SEZ. Shorter facilities, facilities with less reflectivity, and facilities that do
35 not use wet cooling would be expected to have less potential for adverse visual impact on these
36 areas.

37
38 Elevated viewpoints such as the slightly elevated portions of the CTSR or nearby
39 viewpoints such as the West Fork of the North Branch of the Old Spanish Trail or the
40 Los Caminos Antiguos Scenic Byway would have significant views of development within the
41 SEZ and would likely be adversely affected. Site-specific analysis, including consideration of the
42 potential for visible glint and glare from solar panels, and the visibility of structures, will need to
43 be completed before impacts can be fully assessed and potential mitigation measures considered.
44 Travelers coming north or west on the Los Caminos Antiguos Scenic Byway would be looking
45 directly into the SEZ, and development within the SEZ would be very visible, having the
46 potential to detract from the visitor experience. The route of a portion of the West Fork of the

1 North Branch of the Old Spanish Trail parallels and passes within 1.0 mi (1.6 km) of the SEZ.
2 Solar development in the SEZ may have a major impact on the historic and visual integrity of the
3 Trail, depending on the determination of the integrity and historical significance of the portion of
4 the Trail from which solar development could be seen. Development within the SEZ also may be
5 inconsistent with the purposes for which the Sangre de Cristo NHA was designated.
6

7 The Los Mogotes ACEC, which is located 2 mi (3.2 km) west of the ACEC, is designated
8 for protection of wildlife resources. Development of solar energy facilities in the SEZ has the
9 potential to introduce additional vehicular and human presence in or near the ACEC that could
10 impair its overall value to wildlife.
11

12 **10.4.3.3 SEZ-Specific Design Features and Design Feature Effectiveness**

13
14
15 Required programmatic design features that would reduce impacts on specially
16 designated areas are described in Section A.2.2 of Appendix A of this Final Solar PEIS (design
17 features for specially designated areas, cultural resources, and visual resources would address
18 impacts). Implementing the programmatic design features will provide some mitigation for the
19 identified impacts but would not eliminate potential impacts on the Los Caminos Antiguos
20 Scenic Byway. Impacts on the Sangre de Cristo National Heritage Area also may not be
21 mitigated by the programmatic design features. Programmatic design features will be applied
22 to address SEZ-specific resources and conditions, for example:
23

- 24 • For projects in the Los Mogotes SEZ that are located within the viewshed of
25 the West Fork of the North Branch of the Old Spanish Trail, a National Trail
26 inventory will be required to determine the area of possible adverse impact
27 on resources, qualities, values, and associated settings of the Trail; to
28 prevent substantial interference; and to determine any areas unsuitable for
29 development. Residual impacts will be avoided, minimized, and/or mitigated
30 to the extent practicable according to program policy standards. Programmatic
31 design features have been included in BLM's Solar Energy Program to
32 address impacts on National Historic Trails (see Section A.2.2.23 of
33 Appendix A).
34

35 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
36 analyses due to changes to the SEZ boundaries, and consideration of comments received as
37 applicable, the following SEZ-specific design feature has been identified:
38

- 39 • Early consultation should be initiated with the entity responsible for
40 developing the management plan for the Sangre de Cristo NHA to understand
41 how development of the SEZ could be consistent with NHA plans and goals.
42

43 The need for additional SEZ-specific design features will be identified through the
44 process of preparing parcels for competitive offer and subsequent project-specific analysis.
45
46

1 **10.4.4 Rangeland Resources**

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3
4 **10.4.4.1 Livestock Grazing**

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7 ***10.4.4.1.1 Affected Environment***

8
9 Although the proposed SEZ has been reduced in size, it still includes portions of three
10 seasonal grazing allotments: Ciscom Flat (#14212), Capulin (#14207), and Little Mogotes
11 (#24222). The allotments are used by four permittees and support a total forage production of
12 2,337 AUMs per year. There are livestock management facilities, including fences and watering
13 places in the SEZ. Table 10.4.4.1-1 summarizes key acreage and production data for these
14 allotments.

15
16
17 ***10.4.4.1.2 Impacts***

18
19 Should utility-scale solar development occur within the SEZ, grazing would be excluded
20 from the areas developed, as provided for in the BLM grazing regulations (43 CFR Part 4100).
21 The reduction in the size of the proposed SEZ has reduced the potential impact on all three
22 allotments, especially on the Ciscom Flat allotment. Even with the reduction in the size of the
23 SEZ, there still would be a major impact on the Ciscom Flat allotment that may have serious
24 long-term consequences for this operation. The impact on the other two allotments would be
25 substantially less, but the actual significance of their losses is undetermined at this time. While
26 the specific situation of each of the grazing permittees is not known, loss of a portion of their
27 grazing permit would be an adverse impact on them. Economic losses would not be limited to
28 the value of the lost grazing opportunity but would extend also to the value of the overall ranch
29 operations including any private lands tied to the grazing operations. While permittees would be
30 reimbursed for their portion of the value of range improvements on their permits, this would not
31 cover their economic loss. By using the simplified methodology utilized in the Draft Solar PEIS,
32 the estimated losses by allotment are shown in Table 10.4.4.1-1 Actual losses would be
33 determined based on the amount of actual forage lost on the lands excluded from the grazing
34 permits, not on the percentage of the allotment that is lost.

35
36
37 ***10.4.4.1.3 SEZ-Specific Design Features and Design Feature Effectiveness***

38
39 Required programmatic design features that would reduce impacts on livestock grazing
40 are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the
41 programmatic design features will provide some mitigation for identified impacts, but they
42 would not mitigate the loss of livestock AUMs or the loss of value in ranching operations
43 including private land values.

1
2

TABLE 10.4.4.1-1 Grazing Allotments within the Proposed Los Mogotes East SEZ as Revised

Allotment	Total Acres ^a	Percentage Total in SEZ ^b	Active BLM AUMs	Estimated Loss of AUMs	No. of Permittees
Ciscom Flat	4,320	38	191	73	1
Capulin	8,790	3.4	742	25	1
Little Mogotes	13,803	6.4	1,404	90	2

^a Total acreage, including public and state land, and AUMs, is from the BLM Rangeland Administration System report (BLM 2008). To convert acres to km², multiply by 0.004047.

^b Represents the percentage of public land in the allotment, within the SEZ.

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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 **10.4.4.2 Wild Horses and Burros**

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12
13
14

10.4.4.2.1 Affected Environment

15 As presented in the Draft Solar PEIS, no wild horse or burro HMAs occur within the
16 proposed Los Mogotes East SEZ or in proximity to it. The reduction of the SEZ to less than half
17 its original size does not alter these data.

18
19

20 ***10.4.4.2.2 Impacts***

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24

As presented in the Draft Solar PEIS, solar energy development within the proposed Los Mogotes East SEZ would not affect wild horses and burros. The reduction in size of the SEZ does not affect this conclusion.

25
26

27 ***10.4.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness***

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29
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31

Because solar energy development within the proposed Los Mogotes East SEZ would not affect wild horses and burros, no SEZ-specific design features to address wild horses and burros have been identified in this Final Solar PEIS.

32
33

1 **10.4.5 Recreation**

2
3
4 **10.4.5.1 Affected Environment**

5
6 The area of the proposed Los Mogotes East SEZ has been reduced by about 55%, to
7 2,650 acres (10.7 km²) by moving the western boundary of the SEZ to the east.
8

9 Commentors have pointed out that most of the recreation discussion in the Draft Solar
10 PEIS focused internally within the SEZ and did not address the larger part that public and other
11 federal lands play in the landscape and tourism economy of the San Luis Valley. A summary of
12 the better known attractions within the valley includes Great Sand Dunes National Park and
13 Preserve, the Old Spanish Trail, two scenic railroads, the Los Caminos Antiguos Scenic Byway,
14 the Sangre de Cristo Mountains, three national wildlife refuges, and numerous designated
15 wilderness areas; these are among the highlights of the recreational and tourism opportunities in
16 the area. The Los Mogotes East SEZ is adjacent to U.S. 285, which is the major access route into
17 the Valley from the south and which is a part of the Los Caminos Antiguos Scenic Byway.
18 Tourism is an important part of the Valley economy and is an important focus for future
19 economic growth.
20

21 While the public land within the proposed Los Mogotes East SEZ is flat and generally
22 unremarkable, it is also large and conspicuous because it is undeveloped and is readily accessible
23 to recreational users. It also adjoins a large block of public lands to the west. As described in the
24 Draft Solar PEIS, the area supports a range of dispersed recreation activities, although it is
25 believed that levels of recreational use are low. The CDOW has commented the area is important
26 habitat for pronghorn antelope, an important species for hunting in the area. More detailed
27 information on impacts on these species can be found in Section 10.4.11.3.2 of the Draft Solar
28 PEIS.
29

30
31 **10.4.5.2 Impacts**

32
33 Solar development of the proposed Los Mogotes East SEZ still will be readily visible
34 to travelers on U.S. 285 and on the Los Caminos Antiguos Scenic Byway. Since the proposed
35 SEZ is large, solar development of the area has the potential to influence the impressions of
36 recreational and tourism visitors entering the San Luis Valley via routes near the SEZ. Whether
37 there would be a potential impact on recreation and tourism in the valley because of the solar
38 development along these access routes is unknown. There may be potential to provide
39 interpretive activities focused on solar energy and development that would be of interest to
40 travelers.
41

42 Because the route of the Old Spanish Trail is so near the SEZ, it is anticipated that the
43 viewshed of the Trail would be adversely affected by solar development within the SEZ and
44 may reduce the potential future recreational attraction of the Trail. However, the integrity and
45 historical significance of the portion of the Trail near to the proposed SEZ remain undetermined.
46

1 Visual impacts on surrounding recreational use areas would be greater with taller solar
2 facilities such as power towers and facilities with wet cooling. Visitors to areas located at higher
3 elevations than the SEZ (e.g., San Luis Hills ACEC and WSA, CTSR) will see the solar
4 development within the SEZ, but the impact on recreational use of these areas is unknown at this
5 time. The types of solar technologies employed and whether there is significant glint or glare
6 from reflective surfaces of solar facilities would play a large role in the extent of visibility of
7 solar development. The focus and intent of the relatively new Sangre de Cristo NHA is not yet
8 well defined, so it has not been possible to assess how solar development may interact with the
9 objectives of the NHA.

10
11 The CDOW has commented there is a specific concern about the loss of pronghorn
12 antelope habitat in Game Management Unit (GMU) 81, where the SEZ is located. There are
13 limited antelope hunting permits issued in the GMU, and reductions in habitat that would occur
14 due to solar development within the SEZ could result in a reduction in antelope hunting
15 opportunities. However, the overall impact on pronghorn was estimated to be small in this
16 assessment (see Section 10.4.11.4.2 of the Draft Solar PEIS), because only a small portion of the
17 available habitat in the valley occurs within the proposed SEZ.

18
19 In addition, lands that are outside of the proposed SEZ may be acquired or managed for
20 mitigation of impacts on other resources (e.g., sensitive species). Managing these lands for
21 mitigation could further exclude or restrict recreational use, potentially, leading to additional
22 losses in recreational opportunities in the region. The impact of acquisition and management of
23 mitigation lands would be considered as a part of the environmental analysis of specific solar
24 energy projects.

25 26 27 **10.4.5.3 SEZ-Specific Design Features and Design Feature Effectiveness**

28
29 Required programmatic design features that would reduce impacts on recreational
30 resources are described in Section A.2.2 of Appendix A of this Final Solar PEIS (design features
31 for both specially designated areas and visual resources also would address some impacts). Some
32 additional SEZ-specific design features may be established when specific projects are being
33 considered within the SEZ. Implementing the programmatic design features will provide some
34 mitigation for the identified impacts but will not mitigate the loss of recreational access to public
35 lands developed for solar energy production. Likewise, a loss of wildlife-related hunting
36 recreation would not be mitigated.

37
38 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
39 analyses, and consideration of comments received as applicable, the following SEZ-specific
40 design feature has been identified:

- 41
42
- 43 • Tourism is an important economic growth area for the San Luis Valley, and
44 the proposed Los Mogotes East SEZ is located in a visible location adjacent to
45 a principal highway route into the Valley. Because of the location of the SEZ,
there is potential to influence visitors' perception of the tourism climate in the

1 Valley. As projects are proposed for the SEZ, the potential impacts on tourism
2 should be considered and reviewed with local community leaders.
3

4 The need for additional SEZ-specific design features will be identified through the
5 process of preparing parcels for competitive offer and subsequent project-specific analysis.
6
7

8 **10.4.6 Military and Civilian Aviation**

9

10 **10.4.6.1 Affected Environment**

11

12
13 There are no identified military or civilian aviation uses in close proximity to the
14 proposed Los Mogotes East SEZ.
15

16 **10.4.6.2 Impacts**

17

18
19 There are no identified impacts on military or civilian aviation facilities associated with
20 the proposed Los Mogotes East SEZ.
21

22 **10.4.6.3 SEZ-Specific Design Features and Design Feature Effectiveness**

23

24
25 Required programmatic design features that would reduce impacts on military and
26 civilian aviation are described in Section A.2.2 of Appendix A of this Final Solar PEIS. The
27 programmatic design features require early coordination with the DoD to identify and mitigate,
28 if possible, any potential impacts on the use of military airspace.
29

30 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of
31 comments received as applicable, no SEZ-specific design features to protect military or civilian
32 airspace for the proposed Los Mogotes East SEZ have been identified. Some SEZ-specific
33 design features may be identified through the process of preparing parcels for competitive offer
34 and subsequent project-specific analysis.
35

36 **10.4.7 Geologic Setting and Soil Resources**

37

38 **10.4.7.1 Affected Environment**

39

40 ***10.4.7.1.1 Geologic Setting***

41
42

43
44
45 Data provided in the Draft Solar PEIS remain valid, with the following update:
46

- 1 • The terrain of the proposed Los Mogotes East SEZ is relatively flat with a
2 gentle dip to the east (Figure 10.4.7.1-1). The boundaries of the SEZ have
3 been changed to eliminate more than half of the area, 3,268 acres (13.2 km²),
4 on the western side of the site. Based on these changes, the elevations range
5 from about 7,850 ft (2,393 m) along the new western site boundary to about
6 7,710 ft (2,350 m) along its eastern boundary.
7
8

9 **10.4.7.1.2 Soil Resources**

10 Data provided in the Draft Solar PEIS remain valid, with the following updates:
11
12

- 13 • Soils within the proposed Los Mogotes East SEZ as revised are predominantly
14 the very stony and cobbly loams of the Travelers and Garita Series, which
15 now make up about 95% of the soil coverage at the site.
16
17 • Soil unit coverage at the proposed Los Mogotes East SEZ as revised is shown
18 in Figure 10.4.7.1-2. The new SEZ boundaries eliminate 2,333 acres (9.4 km²)
19 of the Travelers very stony loam (1 to 3% slopes), 465 acres (1.9 km²) of the
20 Garita cobbly loam (3 to 25% slopes), 454 acres (1.8 km²; all) of the
21 Travelers very stony loam (3 to 25%), and 4 acres (0.016 km²) of the Monte
22 loam (0 to 1% slopes) (Table 10.4.7.1-1).
23
24

25 **10.4.7.2 Impacts**

26
27 Impacts on soil resources would occur mainly as a result of ground-disturbing activities
28 (e.g., grading, excavating, and drilling), especially during the construction phase of a solar
29 project. The assessment provided in the Draft Solar PEIS remains valid, with the following
30 update:
31

- 32 • Impacts related to wind erodibility are reduced because the new SEZ
33 boundaries eliminate 469 acres (1.9 km²) of moderately erodible soils from
34 development.
35
36

37 **10.4.7.3 SEZ-Specific Design Features and Design Feature Effectiveness**

38
39 Required programmatic design features that would reduce impacts on soils are described
40 in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the programmatic design
41 features will reduce the potential for soil impacts during all project phases.
42

43 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
44 analyses due to changes to the SEZ boundaries, and considering comments received as
45 applicable, no SEZ-specific design features were identified for soil resources at the proposed
46

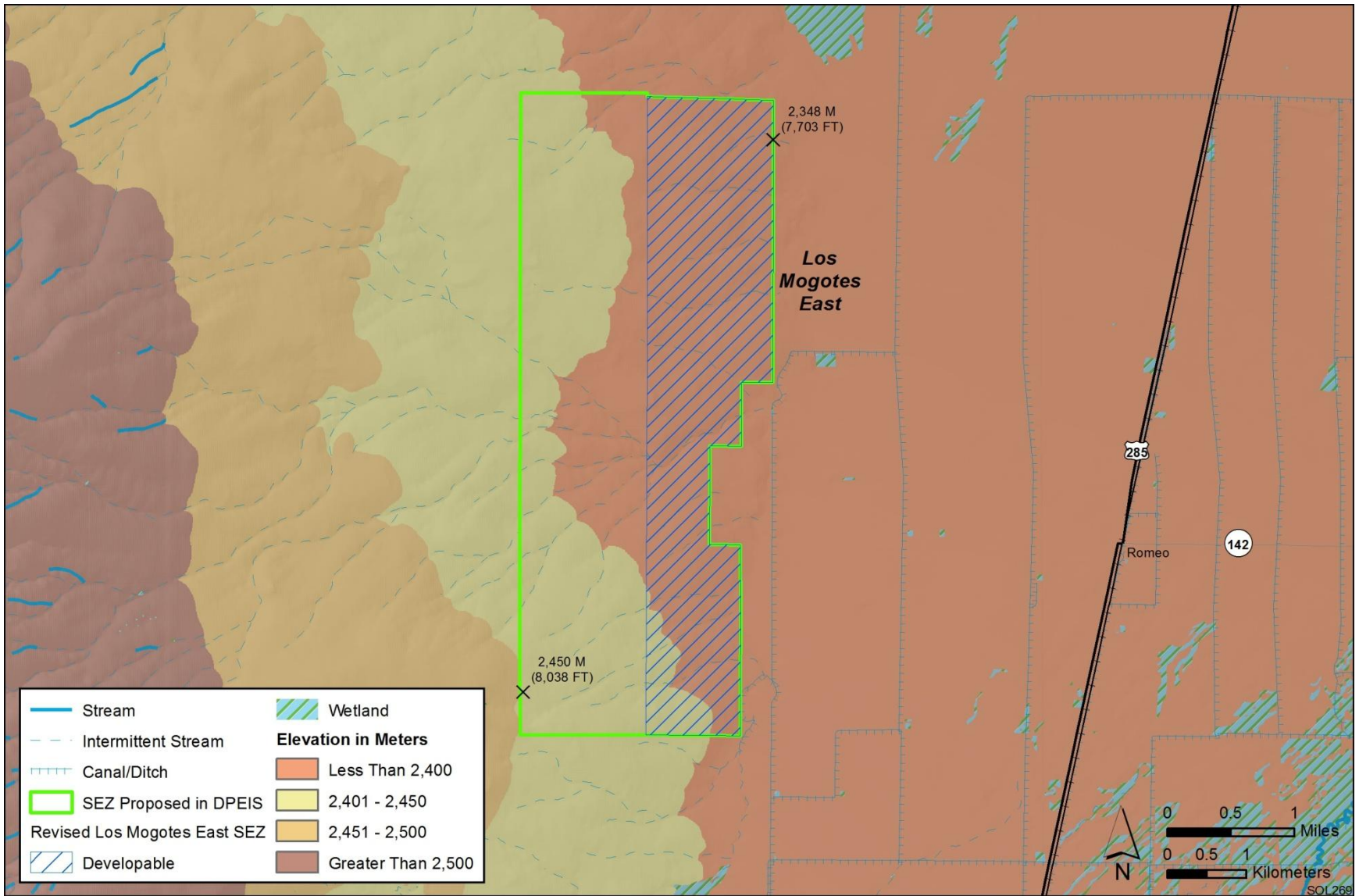
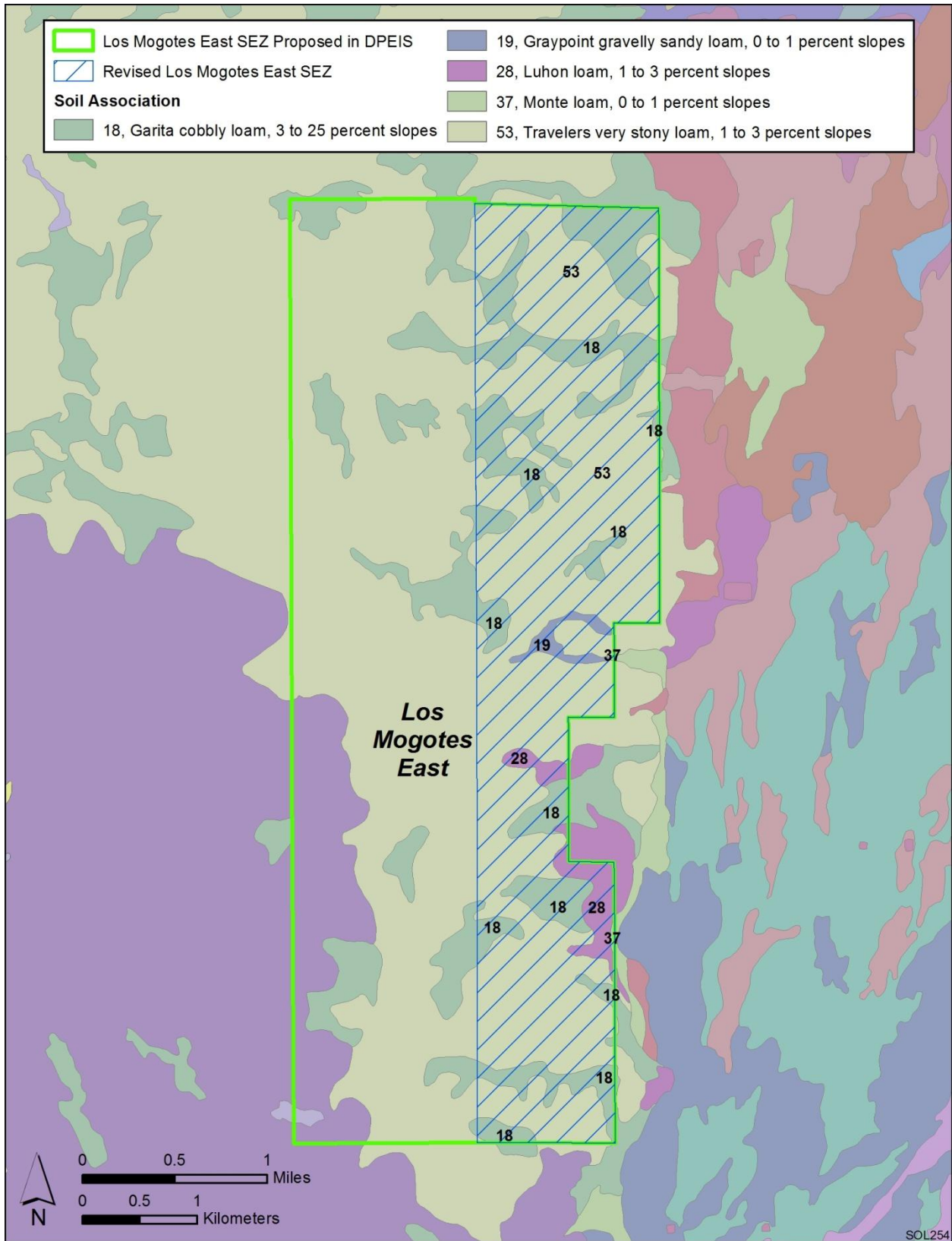


FIGURE 10.4.7.1-1 General Terrain of the Proposed Los Mogotes East SEZ as Revised



1

2 **FIGURE 10.4.7.1-2 Soil Map for the Proposed Los Mogotes East SEZ as Revised (NRCS 2008)**

1 **TABLE 10.4.7.1-1 Summary of Soil Map Units within the Proposed Los Mogotes East SEZ as Revised**

Map Unit Symbol	Map Unit Name	Erosion Potential		Description	Area in Acres ^c (percentage of SEZ)
		Water ^a	Wind ^b		
53	Travelers very stony loam (1 to 3%)	Slight	Low (WEG 8) ^d	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 high surface-runoff potential (low infiltration rate) and moderate to moderately rapid permeability. Available water capacity is very low. Used mainly as rangeland. Susceptible to compaction.	1,916 (72.3)
18	Garita cobbly loam (3 to 25%)	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 derived from basalt. Deep and well drained, with moderate surface-runoff potential and moderate permeability. Available water capacity is low. Used mainly as native pastureland. Susceptible to compaction.	610 (23.01)
53	Travelers very stony loam (3 to 25%)	Slight	Low (WEG 8)	Nearly level to gently sloping soils on mesas and hill slopes 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 (low infiltration rate) and moderate to moderately rapid permeability. Available water capacity is very low. Used mainly as rangeland. Susceptible to compaction.	454 (8)
28	Luhon loam (1 to 3%)	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 moderate surface-runoff potential and moderate permeability. Available water capacity is high. Used mainly as native pastureland; prime farmland if irrigated. ^e Susceptible to compaction; severe rutting hazard.	90 (3.4)

TABLE 10.4.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Erosion Potential		Description	Area in Acres ^c (percentage of SEZ)
		Water ^a	Wind ^b		
19	Graypoint gravelly sandy loam (0 to 1%)	Slight	Moderate (WEG 4)	Nearly level soils on broad fans and fan terraces. Formed in alluvium derived from basalt. Deep and somewhat poorly drained, with moderate surface-runoff potential and moderate permeability. Shrink-swell potential is low to moderate. Available water capacity is low. Used mainly as rangeland and irrigated cropland, pasture, and hay land. Susceptible to compaction.	32 (1.2)
37, 38	Monte loam (0 to 3%)	Slight	Moderate (WEG 4)	Nearly level soils on alluvial fans and floodplains. Parent material consists of alluvium derived from rhyolite and latite. Soils are deep and well drained, with moderate surface-runoff potential and moderate permeability. Available water capacity is high. Used mainly for native rangeland and irrigated cropland; prime farmland if irrigated. Susceptible to compaction; severe rutting hazard.	3 (<1)

^a 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.

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

^c To convert acres to km², multiply by 0.004047.

^d 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 m²) per year, for each of the wind erodibility groups: WEG 1, 220 tons (200 metric tons) per acre (4,000 m²) per year (average); WEG 2, 134 tons (122 metric tons) per acre (4,000 m²) per year; WEGs 3 and 4 (and 4L), 86 tons (78 metric tons) per acre (4,000 m²) per year; WEG 5, 56 tons (51 metric tons) per acre (4,000 m²) per year; WEG 6, 48 tons (44 metric tons) per acre (4,000 m²) per year; WEG 7, 38 tons (34 metric tons) per acre (4,000 m²) per year; and WEG 8, 0 tons (0 metric tons) per acre (4,000 m²) per year.

^e 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.

Source: NRCS (2009).

1 Los Mogotes East SEZ. Some SEZ-specific design features may be identified through the
2 process of preparing parcels for competitive offer and subsequent project-specific analysis.
3
4

5 **10.4.8 Minerals (Fluids, Solids, and Geothermal Resources)** 6

7 A mineral potential assessment for the proposed Los Mogotes East SEZ has been
8 prepared and reviewed by BLM mineral specialists knowledgeable about the region where the
9 SEZ is located (BLM 2012). The BLM is proposing to withdraw the SEZ from settlement, sale,
10 location, or entry under the general land laws, including the mining laws, for a period of 20 years
11 (see Section 2.2.2.2.4 of the Final Solar PEIS). The potential impacts of this withdrawal are
12 discussed in Section 10.4.24.
13
14

15 **10.4.8.1 Affected Environment** 16

17 There are no oil and gas leases, mining claims, or geothermal leases located in the
18 proposed SEZ. The description in the Draft Solar PEIS remains valid.
19
20

21 **10.4.8.2 Impacts** 22

23 There are no anticipated impacts on mineral resources from the development of solar
24 energy facilities in the proposed SEZ. The analysis of impacts on mineral resources in the Draft
25 Solar PEIS remains valid.
26
27

28 **10.4.8.3 SEZ-Specific Design Features and Design Feature Effectiveness** 29

30 Required programmatic design features that will reduce impacts on mineral resources are
31 described in Appendix A of this Final Solar PEIS. Implementing the programmatic design
32 features will provide adequate protection of mineral resources.
33

34 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
35 analyses due to changes to the SEZ boundaries, and consideration of comments received as
36 applicable, no SEZ-specific design features for minerals have been identified in this Final Solar
37 PEIS. Some SEZ-specific design features may be identified through the process of preparing
38 parcels for competitive offer and subsequent project-specific analysis.
39
40

41 **10.4.9 Water Resources** 42 43

44 **10.4.9.1 Affected Environment** 45

46 The overall size of the Los Mogotes East SEZ has been reduced by 55% from the area
47 described in the Draft Solar PEIS, resulting in a total area of 2,650 acres (10.7 km²). The

1 description of the affected environment given in the Draft Solar PEIS relevant to water resources
2 at the Los Mogotes East SEZ remains valid and is summarized in the following paragraphs.
3

4 The Los Mogotes East SEZ is within the Rio Grande Headwaters subbasin of the
5 Rio Grande hydrologic region. The SEZ is located in the southern portion of the San Luis Valley
6 bounded by the San Juan Mountains to the west and the Sangre de Cristo Mountains to the east.
7 Precipitation and snowfall in the southern part of the valley is about 7 in./yr (18 cm/yr) and
8 25 in./yr (64 cm/yr), respectively, with much greater amounts in the surrounding mountains.
9 Pan evaporation rates are estimated to be on the order of 54 in./yr (137 cm/yr). No permanent
10 surface water features or wetlands have been identified within the SEZ. There are several
11 intermittent/ephemeral washes within the SEZ that drain across the site from the west to
12 east. Flood hazards have not been identified, but intermittent flooding may occur along the
13 intermittent/ephemeral washes. Groundwater in the San Luis Valley is primarily in basin-fill
14 deposits with an upper unconfined aquifer and a lower confined aquifer, which are separated by a
15 series of confining clay layers and unfractured volcanic rocks. There are no confining clay layers
16 in the vicinity of the Los Mogotes East SEZ; however, a basalt layer that is near the surface acts
17 as a confining unit over the basin-fill aquifer. Groundwater monitoring wells near the SEZ have
18 reported depths to groundwater ranging from 15 to 35 ft (5 to 11 m) and indicate a groundwater
19 flow from west to east. Water quality in the aquifers of the San Luis Valley varies, but total
20 dissolved solids concentrations in the southern portion of the valley are generally below
21 maximum contaminant levels.
22

23 The Los Mogotes East SEZ is located in the Colorado Division 3 management zone
24 (Rio Grande Basin) of the Colorado DWR, where both surface water and groundwater rights are
25 overappropriated. The Rio Grande Compact of 1938 obligates Colorado to meet water delivery
26 schedules to New Mexico and governs much of the water management decision making in the
27 San Luis Valley. In order to balance water uses within the San Luis Valley and to meet treaty
28 obligations, several water management mechanisms have been developed that affect existing
29 water rights and water rights transfers. The two primary water management considerations
30 affecting solar energy development are the need for an augmentation water plan and the rules set
31 by the recently formed Special Improvement District Number 1 (Subdistrict #1). Augmentation
32 water plans were described in the Draft Solar PEIS (Section 10.4.9.1.3), but they essentially
33 require junior water rights holders to have additional water reserves to ensure that more senior
34 water rights are not hindered. The water management plan for Subdistrict #1 was ruled on in
35 June 2010 and places restrictions on groundwater withdrawals in an effort to restore groundwater
36 levels in the unconfined aquifer. None of the Colorado SEZs are located within the boundaries of
37 Subdistrict #1, which primarily includes central portions of the San Luis Valley currently used
38 for agriculture. However, because water rights are overappropriated in the San Luis Valley and
39 largely clustered within Subdistrict #1, it is likely that any new water diversions and water rights
40 transfers would involve these new groundwater management considerations.
41

42 In addition to the water resources information provided in the Draft Solar PEIS, this
43 section provides a planning-level inventory of available climate, surface water, and groundwater
44 monitoring stations within the immediate vicinity of the Los Mogotes East SEZ and surrounding
45 basin. Additional data regarding climate, surface water, and groundwater conditions are
46 presented in Tables 10.4.9.1-1 through 10.4.9.1-7 and in Figures 10.4.9.1-1 and 10.4.9.1-2.

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3

TABLE 10.4.9.1-1 Watershed and Water Management Basin Information Relevant to the Proposed Los Mogotes East SEZ as Revised

Basin	Name	Area (acres) ^b
Subregion (HUC4) ^a	Rio Grande Headwaters (1301)	4,888,552
Cataloging unit (HUC8)	Alamosa–Trinchera (13010002)	1,647,652
Groundwater basin	San Luis Valley	2,000,000
SEZ	Los Mogotes East	2,650

^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 km², multiply by 0.004047.

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TABLE 10.4.9.1-2 Climate Station Information Relevant to the Proposed Los Mogotes East 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.)
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
Platoro, Colorado (056559)	9,834	27	1949–1991	27.10	237.30
Waverly 1W, Colorado (058860)	7,603	17	2004–2011	7.61	31.90

^a National Weather Service’s Cooperative Station Network station identification code.

^b Surface elevations for the proposed Los Mogotes East SEZ range from 7,710 to 8,030 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).

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TABLE 10.4.9.1-3 Total Lengths of Selected Streams at the Subregion, Cataloging Unit, and SEZ Scale Relevant to the Proposed Los Mogotes East SEZ as Revised

Water Feature	Subregion, HUC4 (ft) ^a	Cataloging Unit, HUC8 (ft)	SEZ (ft)
Unclassified streams	19,502	6,556	0
Perennial streams	14,694,407	3,488,426	0
Intermittent/ephemeral streams	94,288,163	30,056,019	46,981
Canals	12,151,458	5,521,867	0

^a To convert ft to m, multiply by 0.3048.

Source: USGS (2012a).

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5
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TABLE 10.4.9.1-4 Stream Discharge Information Relevant to the Proposed Los Mogotes East SEZ as Revised

Parameter	Station (USGS ID)		
	La Jara Creek at Gallegos Ranch, near Capulin, Colorado (08238000)	La Jara Creek near Capulin, Colorado (08238010)	Conejos River near Mogote, Colorado (08246500)
Period of record	1916–1982	1925–1935	1903–2010
No. of observations	54	10	102
Discharge, median (ft ³ /s) ^a	254	211	2,260
Discharge, range (ft ³ /s)	30–653	93–670	441–9,000
Discharge, most recent observation (ft ³ /s)	166	111	2,330
Distance to SEZ (mi) ^b	8	7	12

^a To convert ft³ to m³, multiply by 0.0283.

^b To convert mi to km, multiply by 1.6093.

Source: USGS (2012b).

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TABLE 10.4.9.1-5 Surface Water Quality Data Relevant to the Proposed Los Mogotes East SEZ as Revised

Parameter	Station (USGS ID) ^a		
	08238000	08246500	371634106092301
Period of record	1978–1981	1967–2002	1995–1996
No. of records	67	209	13
Temperature (°C) ^b	6.5 (0–19)	6 (0–19.5)	14 (0–21)
Total dissolved solids (mg/L)	NA ^c	70 (37–77)	NA
Dissolved oxygen (mg/L)	NA	8.4	8.6 (6.2–11)
pH	NA	7.15 (6.8–8.3)	8.4 (6.2–8.8)
Total nitrogen (mg/L)	NA	<0.14	NA
Phosphorus (mg/L as P)	NA	0.015	NA
Organic carbon (mg/L)	NA	1.8	NA
Calcium (mg/L)	NA	12.5 (6–16)	NA
Magnesium (mg/L)	NA	1.795 (1–2.7)	NA
Sodium (mg/L)	NA	2.7 (1–3.2)	NA
Chloride (mg/L)	NA	1.1 (0.5–2.5)	NA
Sulfate (mg/L)	NA	4.1 (2.41–5)	NA
Arsenic (µg/L)	NA	1	NA
Copper (µg/L)	NA	0.3	NA
Zinc (µg/L)	NA	< 1.0	NA
Nickel (µg/L)	NA	0.47)	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).

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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 Los Mogotes East SEZ that are found to be within a 100-year floodplain will be identified as non-development areas. Any water features within the Los Mogotes East SEZ determined to be jurisdictional will be subject to the permitting process described in the CWA.

10
11

10.4.9.2 Impacts

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10.4.9.2.1 Land Disturbance Impacts on Water Resources

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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 Los Mogotes East SEZ could potentially affect drainage patterns and groundwater recharge. The alteration of natural drainage pathways during construction can lead to impacts

1
2
3

TABLE 10.4.9.1-6 Water Quality Data from Groundwater Samples Relevant to the Proposed Los Mogotes East SEZ as Revised

Parameter	Station (USGS ID) ^a	
	370936106010501	371330105564601
Period of record	1993–2000	1981
No. of records	2	1
Temperature (°C) ^b	15.25 (15–15.5)	15
Total dissolved solids (mg/L)	67	NA ^c
Dissolved oxygen (mg/L)	6.6	NA
pH	7.3 (7.2–7.4)	NA
Nitrate + nitrite (mg/L as N)	0.07	0.35
Phosphate (mg/L)	0.199	NA
Organic carbon (mg/L)	0.8	NA
Calcium (mg/L)	11.6	17
Magnesium (mg/L)	1.7	3.1
Sodium (mg/L)	2.1	7.7
Chloride (mg/L)	0.29	NA
Sulfate (mg/L)	1.81	NA
Arsenic (µg/L)	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).

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TABLE 10.4.9.1-7 Groundwater Surface Elevations Relevant to the Proposed Los Mogotes East SEZ as Revised

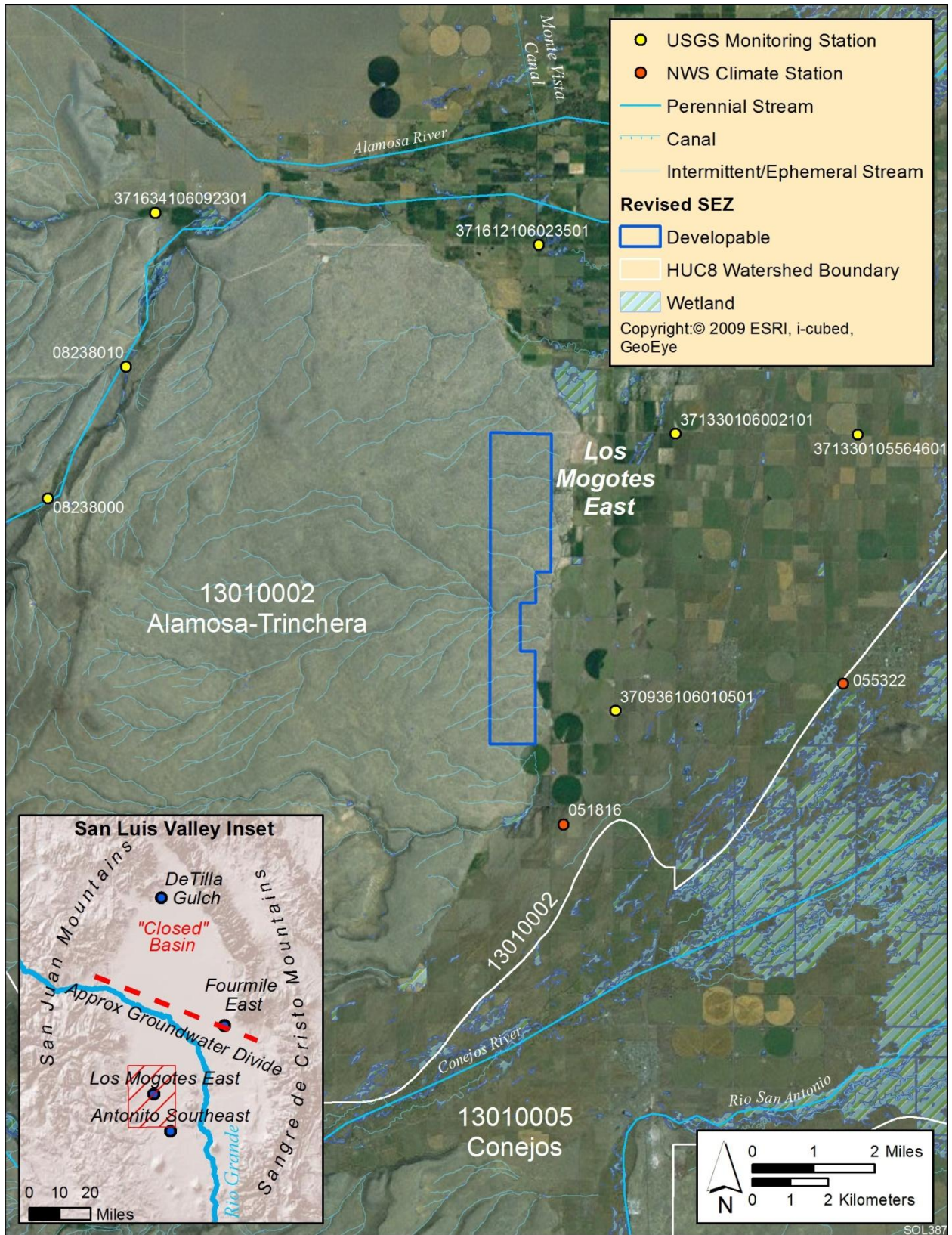
Parameter	Station (USGS ID)		
	371330106002101	370936106010501	371612106023501
Period of record	1980–2011	1993–2005	1969–2011
No. of observations	369	9	39
Surface elevation (ft) ^a	7,655	7,782	7,677
Well depth (ft)	32	25	22
Depth to water, median (ft)	4.99	14.92	6
Depth to water, range (ft)	1.4–9.96	8.77–17.7	4.42–9.73
Depth to water, most recent observation (ft)	6.1	15.25	6.82
Distance to SEZ (mi) ^b	3	3	5

^a To convert ft to m, multiply by 0.3048.

^b To convert mi to km, multiply by 1.6093.

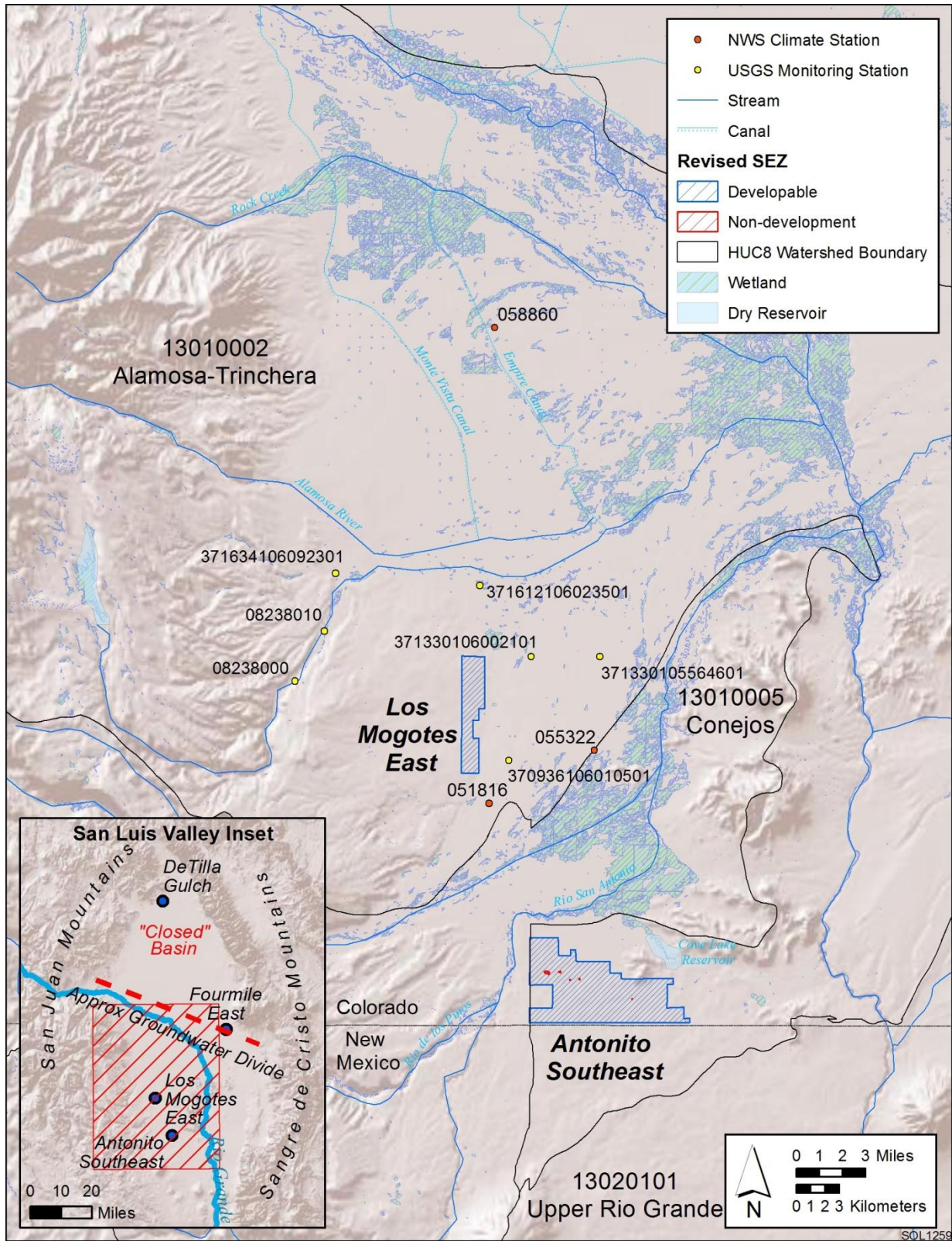
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Source: USGS (2012b).



1

2 **FIGURE 10.4.9.1-1 Surface Water Features near the Proposed Los Mogotes East SEZ as Revised**



1

2 **FIGURE 10.4.9.1-2 Surface Water and Groundwater Features within the Rio Grande Basin,**
 3 **Which Includes the Proposed Los Mogotes East SEZ as Revised**

1 related to flooding, loss of water delivery to downstream regions, and changes to riparian
2 vegetation and habitats. The alteration of the SEZ boundaries removed several
3 intermittent/ephemeral stream reaches, which reduces the potential for adverse impacts
4 associated with land disturbance activities.
5

6 Land clearing, land leveling, and vegetation removal during the development of the SEZ
7 have the potential to disrupt intermittent/ephemeral stream channels. Several programmatic
8 design features described in Section A.2.2 of Appendix A of this Final Solar PEIS would avoid,
9 minimize, and/or mitigate impacts associated with the disruption of intermittent/ephemeral water
10 features. Additional analyses of intermittent/ephemeral streams are presented in this update,
11 including an evaluation of functional aspects of stream channels with respect to groundwater
12 recharge, flood conveyance, sediment transport, geomorphology, and ecological habitats. Only a
13 summary of the results from these surface water analyses is presented in this section; more
14 information on methods and results is presented in Appendix O.
15

16 The study region considered for the intermittent/ephemeral stream evaluation relevant to
17 the Los Mogotes East SEZ is a subset of the Alamosa–Trinchera watershed (HUC8), for which
18 information regarding stream channels is presented in Tables 10.4.9.1-3 and 10.4.9.1-4 of this
19 Final Solar PEIS. The results of the intermittent/ephemeral stream evaluation are shown in
20 Figure 10.4.9.2-1, which depicts flow lines from the National Hydrography Dataset (USGS
21 2012a) labeled as low, moderate, and high sensitivity to land disturbance. Within the study area,
22 83% of the intermittent/ephemeral stream channels had low sensitivity and 17% had moderate
23 sensitivity to land disturbance. All the intermittent/ephemeral channel reaches within the
24 Los Mogotes East SEZ were classified as having low sensitivity to land disturbance, but some of
25 these channels transition to having moderate sensitivity to land disturbance immediately down-
26 gradient of the SEZ.
27
28

29 ***10.4.9.2.2 Water Use Requirements for Solar Energy Technologies*** 30

31 Changes in the Los Mogotes East SEZ boundaries resulted in changes to the estimated
32 water use requirements and a reduction in the land affected by surface disturbances. This section
33 presents changes in water use estimates for the reduced SEZ area and additional analyses
34 pertaining to groundwater. The additional analyses of groundwater include a basin-scale water
35 budget and a simplified, one-dimensional groundwater model of potential groundwater
36 drawdown. Only a summary of the results from these groundwater analyses is presented in this
37 section; more information on methods and results is presented in Appendix O.
38

39 Table 10.4.9.2-1 presents the revised estimates of water requirements for both
40 construction and operation of solar facilities at the Los Mogotes East SEZ, assuming full build-
41 out of the SEZ and accounting for its decreased size. The reduction in area of 55% has resulted
42 in an approximately equal reduction in total water use requirements.
43

44 The Los Mogotes East SEZ is located in the San Luis Valley, where both surface
45 waters and groundwater are managed conjunctively. Previous studies on water resources in the
46 San Luis Valley typically present a basin-scale water balance, which considers inputs and

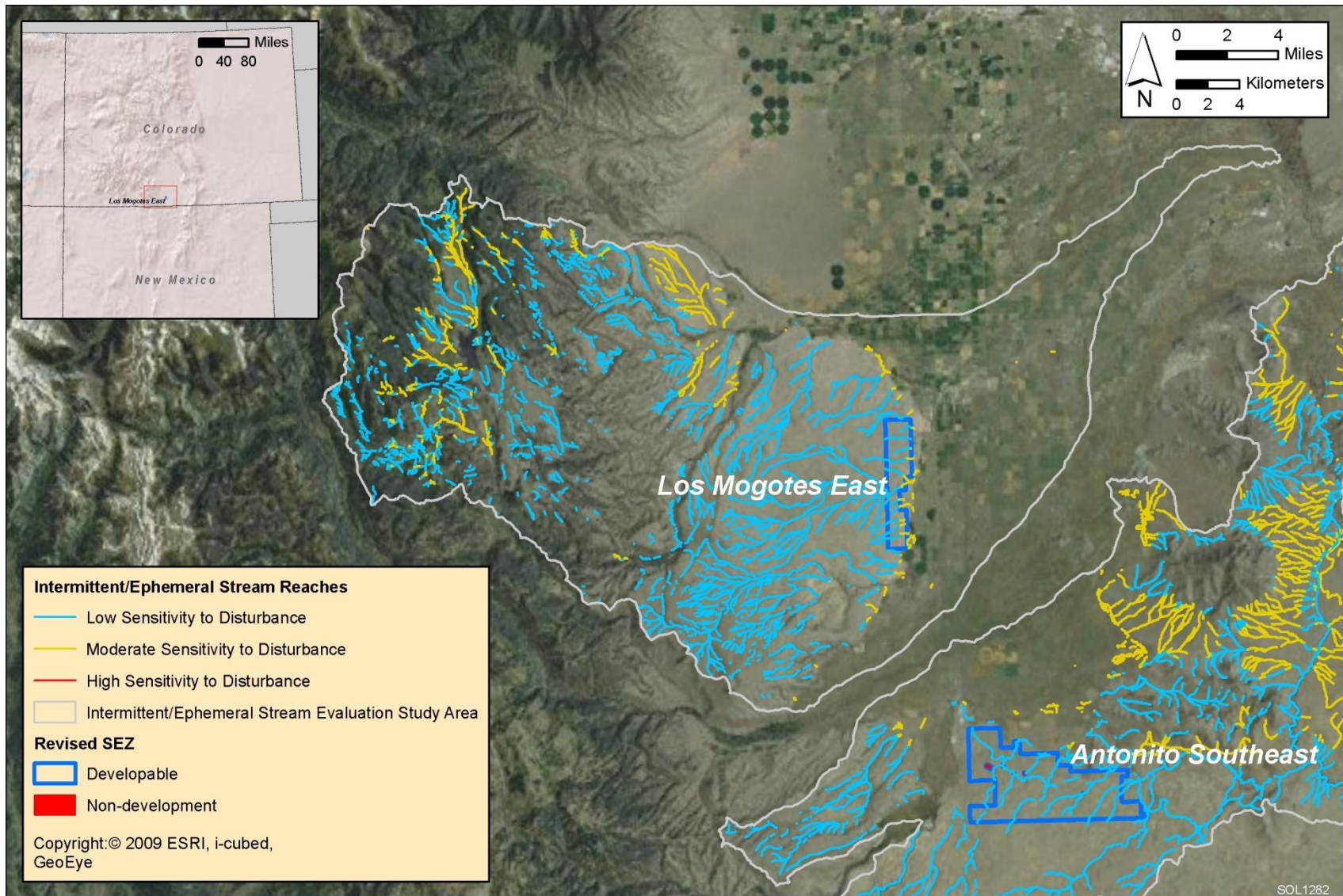


FIGURE 10.4.9.2-1 Intermittent/Ephemeral Stream Channel Sensitivity to Surface Disturbances in the Vicinity of the Proposed Los Mogotes East SEZ as Revised

1 **TABLE 10.4.9.2-1 Estimated Water Requirements for the Proposed Los Mogotes East SEZ**
 2 **as Revised^a**

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Construction—Peak Year				
<i>Water use requirements</i>				
Fugitive dust control (ac-ft) ^b	612	649	649	649
Potable supply for workforce (ac-ft)	74	32	13	7
Total water use requirements (ac-ft)	686	681	662	656
<i>Wastewater generated</i>				
Sanitary wastewater (ac-ft)	74	32	13	7
Operations				
<i>Water use requirements</i>				
Mirror/panel washing (ac-ft/yr)	212	118	118	12
Potable supply for workforce (ac-ft/yr)	6	3	3	<1
Dry cooling (ac-ft/yr)	85–424	47–236	NA	NA
Wet cooling (ac-ft/yr)	1,908–6,148	1,060–3,416	NA	NA
<i>Total water use requirements</i>				
Non-cooled technologies (ac-ft/yr)	NA ^c	NA	121	12
Dry-cooled technologies (ac-ft/yr)	303–642	168–357	NA	NA
Wet-cooled technologies (ac-ft/yr)	2,126–6,366	1,181–3,537	NA	NA
<i>Wastewater generated</i>				
Blowdown (ac-ft/yr)	120	67	NA	NA
Sanitary wastewater (ac-ft/yr)	6	3	3	<1

^a See Section M.9.2 of Appendix M of the Draft Solar PEIS for methods used in estimating water use requirements.

^b To convert ac-ft to m³, multiply by 1,234.

^c NA = not applicable.

3
 4
 5 outputs of water via precipitation, surface water flows, and groundwater (e.g., Mayo et al. 2007).
 6 Table 10.4.9.2-2 presents an example water balance for the San Luis Valley that considers all
 7 water inputs and outputs from the valley. As noted by Mayo et al. (2007), it is difficult to
 8 reconcile some of the historical water budgets presented for the San Luis Valley; however, it can
 9 generally be stated that the water budget is predominately a balance of precipitation and stream
 10 flow inputs with output dominated by evapotranspiration by agricultural lands, riparian areas,
 11 and meadows.

12
 13 The estimated total water use requirements during the peak construction year are as high
 14 as 686 ac-ft/yr (846,200 m³/yr), which does not constitute a significant amount given the short
 15 duration of this water demand relative to water resources within the region. The long duration
 16 of groundwater pumping during operations (20 years) poses a greater threat to groundwater
 17 resources. This analysis considered low, medium, and high groundwater pumping scenarios that

1
2
3

TABLE 10.4.9.2-2 Water Budget for the San Luis Valley, Which Includes the Proposed Los Mogotes East SEZ as Revised

Process	Amount
<i>Inputs</i>	
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
<i>Outputs</i>	
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
<i>Groundwater Storage</i>	
Storage (ac-ft)	2,026,783

^a To convert ac-ft to m³, multiply by 1,234.

^b Colorado DWR (2004).

Source: Mayo et al. (2007).

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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 12 to 2,126 ac-ft/yr (14,800 to 2.6 million m³/yr), or 240 to 42,520 ac-ft (296,000 to 52.4 million m³) over the 20-year operational period. From a groundwater budgeting perspective, the high pumping scenario over the 20-year analysis period represents 2% of the groundwater storage, and its annual pumping rate is on the order of 0.3% 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.

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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

1 the upper unconfined aquifer and lower confined aquifer separately. A detailed discussion of the
 2 groundwater modeling analysis is presented in Appendix O. It should be noted, however, that the
 3 aquifer parameters used for the one-dimensional groundwater model (Table 10.4.9.2-3) represent
 4 available literature data, and that the model aggregates these value ranges into a simplistic
 5 representation of the aquifers.

6
 7 Depth to groundwater in the unconfined aquifer is typically on the order of 15 to 35 ft
 8 (5 to 11 m) in the vicinity of the Los Mogotes East SEZ, and the confined aquifer is on the order
 9 of 200 to 300 ft (61 to 91 m) below the surface. The one-dimensional groundwater modeling
 10 results for the upper unconfined aquifer suggest that groundwater drawdown in the vicinity of the
 11 SEZ (approximately a 2-mi [3.2-km] radius) ranges from up to 15 ft (5 m) for the high pumping
 12 scenario, up to 3 ft (1 m) for the medium pumping scenario, and less than 1 ft (0.3 m) for the low
 13 pumping scenario (Figure 10.4.9.2-2). The extent of groundwater drawdown is primarily
 14 restricted to the vicinity of the SEZ for all pumping scenarios. The modeling results for the lower
 15 confined aquifer suggest significant groundwater drawdown occurs for the high pumping
 16 scenario, ranging from 7 to 25 ft (9 to 24 m) and extending more than 50 mi (80 km) from the
 17
 18

19 **TABLE 10.4.9.2-3 Aquifer Characteristics and**
 20 **Assumptions Used in the One-Dimensional Groundwater**
 21 **Model for the Proposed Los Mogotes East SEZ as Revised**

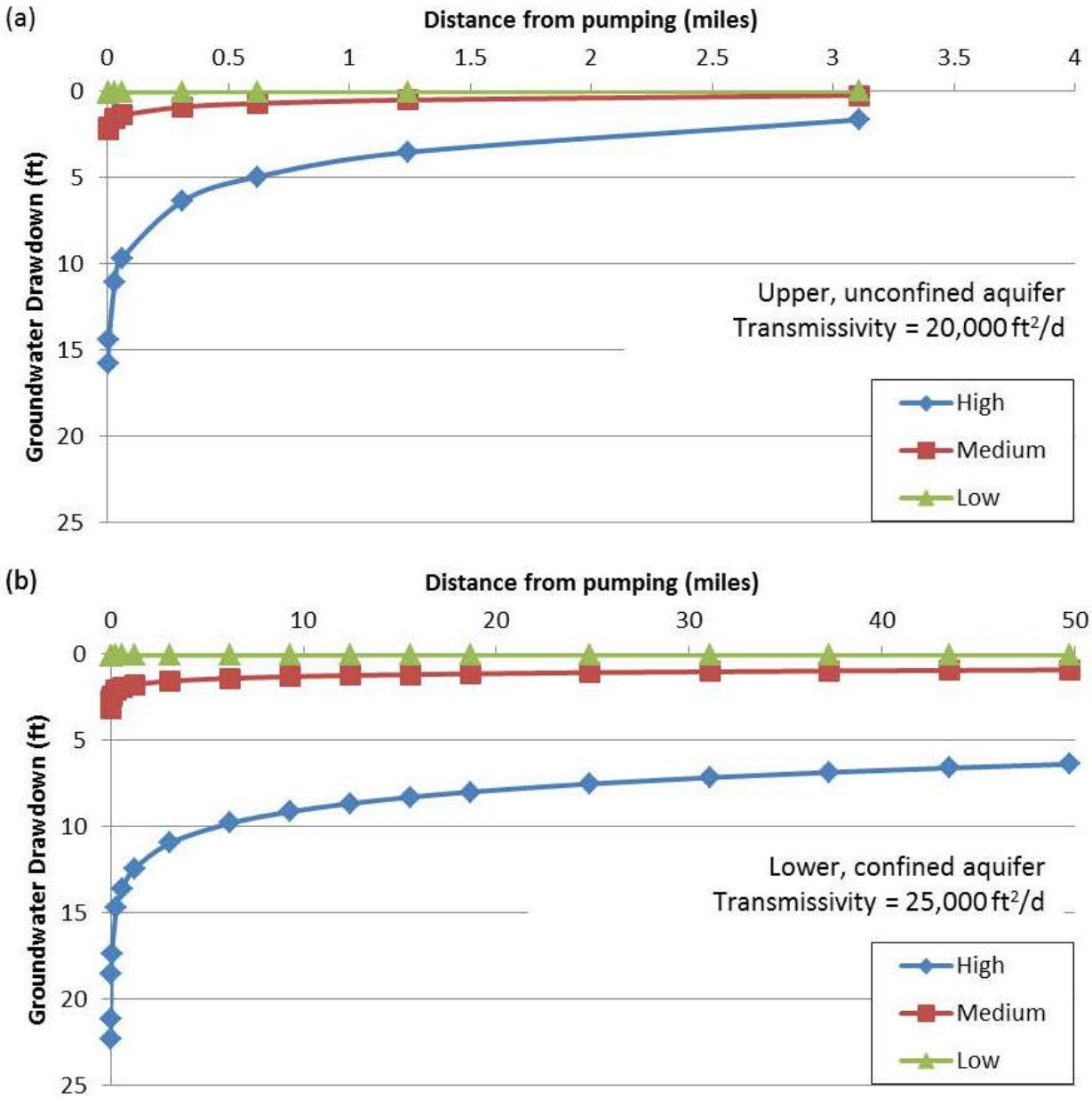
Parameter	Value
<i>Upper, unconfined aquifer</i>	
Aquifer type/conditions	Unconfined/basin fill
Aquifer thickness (ft) ^{a,b}	100
Hydraulic conductivity (ft/day)	200
Transmissivity (ft ² /day)	20,000
Specific yield	0.24
<i>Lower, confined aquifer</i>	
Aquifer type/conditions	Confined/basin fill
Aquifer thickness (ft)	500
Hydraulic conductivity (ft/day)	50
Transmissivity (ft ² /day)	25,000
Storage coefficient	0.0000025
<i>Upper and lower aquifer</i>	
Analysis period (yr)	20
High pumping scenario (ac-ft/yr) ^c	2,126
Medium pumping scenario (ac-ft/yr)	303
Low pumping scenario (ac-ft/yr)	12

^a To convert ft to m, multiply by 0.3048.

^b Mayo et al. (2007).

^c To convert ac-ft to m³, multiply by 1,234.

Source: Colorado DWR (2004).



1
 2 **FIGURE 10.4.9.2-2 Estimated One-Dimensional Groundwater Drawdown in (a) Upper**
 3 **Unconfined Aquifer and (b) Lower Confined Aquifer Resulting from High, Medium, and Low**
 4 **Groundwater Pumping Scenarios over the 20-Year Operational Period at the Proposed**
 5 **Los Mogotes East SEZ as Revised**
 6
 7
 8

1 SEZ (Figure 10.4.9.2-2). The low and medium pumping scenarios have a much lower impact on
2 groundwater drawdown, from 0 to 3 ft (0 to 1 m).
3

4 The comparison of water use requirements to the basin-scale water budget and the
5 one-dimensional groundwater modeling gives mixed results. From a groundwater budgeting
6 perspective, the three pumping scenarios considered are not significant relative to the amounts
7 of water moved through the San Luis Valley. Groundwater modeling results suggest that the
8 high pumping scenario would have a localized groundwater drawdown effect if groundwater
9 were extracted from the unconfined aquifer, but a more significant impact extending more
10 than 50 mi (80 km) away from the SEZ if withdrawn from the confined aquifer. As stated
11 in Section 10.4.9.1, water management of the San Luis Valley is restrictive, given its
12 overappropriated nature in water rights and its obligations to maintain flows in the Rio Grande.
13 Ultimately, any proposed groundwater withdrawals for solar energy facilities would be reviewed
14 for impacts by the Colorado DWR and would be subject to the rules and court decisions outlined
15 in Case Numbers 06CV64 and 07CW52 (Colorado District Court 2010).
16
17

18 ***10.4.9.2.3 Off-Site Impacts: Roads and Transmission Lines*** 19

20 As stated in the Draft Solar PEIS, impacts associated with the construction of roads and
21 transmission lines primarily deal with water use demands for construction, water quality
22 concerns relating to potential chemical spills, and land disturbance effects on the natural
23 hydrology. Water needed for transmission line construction activities (e.g., for soil compaction,
24 dust suppression, and potable supply for workers) could be trucked to the construction area from
25 an off-site source. If this occurred, water use impacts at the SEZ would be negligible. The Draft
26 Solar PEIS assessment of impacts on water resources from road and transmission line
27 construction remains valid.
28
29

30 ***10.4.9.2.4 Summary of Impacts on Water Resources*** 31

32 The additional information and analyses of water resources presented in this update agree
33 with the information provided in the Draft Solar PEIS, which indicates that the San Luis Valley
34 is a high-elevation basin, with predominately agricultural land use, and is the headwaters of the
35 Rio Grande, where surface water and groundwater processes are coupled and managed jointly.
36 Groundwater in the San Luis Valley is found in both the upper unconfined aquifer and lower
37 confined aquifer, and historical diversions of both surface water and groundwater for irrigation
38 have affected streamflows and groundwater levels. Water management plays a significant role
39 in the San Luis Valley, because it pertains to ensuring river flows in the Rio Grande according
40 to the Rio Grande Compact, which is the primary responsibility of the Colorado DWR.
41

42 Disturbance to intermittent/ephemeral stream channels within the Los Mogotes East SEZ
43 should not have a significant impact on the critical functions of groundwater recharge, sediment
44 transport, flood conveyance, and ecological habitat, given the relatively small footprint of the
45 SEZ with respect to the study area along with the low sensitivity to land disturbances of
46 identified intermittent/ephemeral streams. Several short reaches of intermittent/ephemeral stream

1 channels with moderate sensitivity to land disturbance are located immediately downgradient of
2 the SEZ; thus reducing off-site impacts associated with runoff is an important consideration for
3 siting and construction phases. Groundwater withdrawals pose the greatest threat to water
4 resources in the San Luis Valley. The water budgeting and groundwater modeling analyses
5 suggest that significant groundwater drawdown could occur both locally and off-site under the
6 high pumping scenario if groundwater were extracted from either the unconfined or confined
7 aquifer. The low and medium pumping scenarios are preferable, because estimated groundwater
8 drawdown is much less. Ultimately, the process of transferring water rights established by the
9 Colorado DWR will determine how much water can be used by proposed solar facilities. As
10 stated in the Draft Solar PEIS, given the restrictive nature of water rights and the need for
11 augmentation water reserves, it would be difficult for any projects seeking more than
12 1,000 ac-ft/yr (1.2 million m³/yr) of water to be successful in obtaining the needed water rights
13 (McDermott 2010).

14
15 Predicting impacts associated with groundwater withdrawals is often difficult, given the
16 heterogeneity of aquifer characteristics, the long time period between the onset of pumping and
17 its effects, and limited data. Another consideration relevant to the San Luis Valley is that the
18 transfer of water rights will likely come from the purchase of existing irrigation water rights,
19 which will result in a change in the location of the point of diversion and a change in land use
20 patterns in the basin, both of which can affect groundwater processes. One of the primary
21 mitigation measures to protect water resources is the implementation of long-term monitoring
22 and adaptive management (see Section A.2.4 of Appendix A). For groundwater, this requires a
23 combination of monitoring and modeling to fully identify the temporal and spatial extent of
24 potential impacts. Water management in the San Luis Valley relies on several water monitoring
25 and modeling tools developed by the Colorado DWR and the CWCB that are a part of the
26 Colorado's Decision Support Systems (available at [http://cdss.state.co.us/Pages/](http://cdss.state.co.us/Pages/CDSSHome.aspx)
27 [CDSSHome.aspx](http://cdss.state.co.us/Pages/CDSSHome.aspx)), and these tools should be implemented with respect to long-term monitoring
28 and adaptive management strategies for solar energy development occurring within the San Luis
29 Valley.

30 31 32 **10.4.9.3 SEZ-Specific Design Features and Design Feature Effectiveness**

33
34 Required programmatic design features that would reduce impacts on surface water
35 and groundwater are described in Section A.2.2 of Appendix A of this Final Solar PEIS.
36 Implementing the programmatic design features will provide some protection of and reduce
37 impacts on water resources.

38
39 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
40 analyses, and consideration of comments received as applicable, the following SEZ-specific
41 design feature has been identified:

- 42
43 • Groundwater analyses suggest full build-out of wet-cooled technologies is not
44 feasible; for mixed-technology development scenarios, any proposed wet-
45 cooled projects would have to reduce water requirements to less than

1 approximately 1,000 ac-ft/yr (1.2 million m³/yr) in order to secure water
2 rights and comply with water management in the San Luis Valley.
3

4 The need for additional SEZ-specific design features will be identified through the
5 process of preparing parcels for competitive offer and subsequent project-specific analysis.
6

7 8 **10.4.10 Vegetation**

9 10 11 **10.4.10.1 Affected Environment**

12
13 As presented in Section 10.4.10.1 of the Draft Solar PEIS, 5 cover types were identified
14 within the area of the proposed Los Mogotes East SEZ, 12 cover types were identified within the
15 access road corridor, and 26 cover types were identified within 5 mi (8 km) of the SEZ boundary
16 (the indirect impact area). Sensitive habitats on the SEZ include ephemeral washes. Because of
17 the SEZ boundary changes, the Inter-Mountain Basins Mixed Salt Desert Scrub cover type no
18 longer occurs within the SEZ. Figure 10.4.10.1-1 shows the cover types within the affected area
19 of the Los Mogotes East SEZ as revised.
20

21 22 **10.4.10.2 Impacts**

23
24 As presented in the Draft Solar PEIS, the construction of solar energy facilities within the
25 proposed Los Mogotes East SEZ would result in direct impacts on plant communities because of
26 the removal of vegetation within the facility footprint during land-clearing and land-grading
27 operations. Approximately 80% of the SEZ would be expected to be cleared with full
28 development of the SEZ. As a result of the new configuration of the SEZ boundary,
29 approximately 2,120 acres (8.58 km²) would be cleared.
30

31 Overall impact magnitude categories were based on professional judgment and include
32 (1) *small*: a relatively small proportion ($\leq 1\%$) of the cover type within the SEZ region would be
33 lost; (2) *moderate*: an intermediate proportion (> 1 but $\leq 10\%$) of a cover type would be lost; and
34 (3) *large*: $> 10\%$ of a cover type would be lost.
35

36 37 **10.4.10.2.1 Impacts on Native Species**

38
39 The analysis presented in the Draft Solar PEIS for the original Los Mogotes East SEZ
40 developable area indicated that development would result in a moderate impact on one land
41 cover type and a small impact on all other land cover types occurring within the SEZ
42 (Table 10.4.10.1-1 in the Draft Solar PEIS). Development within the revised Los Mogotes East
43 SEZ could still directly affect most of the cover types evaluated in the Draft Solar PEIS, with the
44 exception of Inter-Mountain Basins Mixed Salt Desert Scrub (previously a moderate impact); the
45 reduction in the developable area would result in reduced (and still small) impact levels on all
46 other cover types in the affected area.

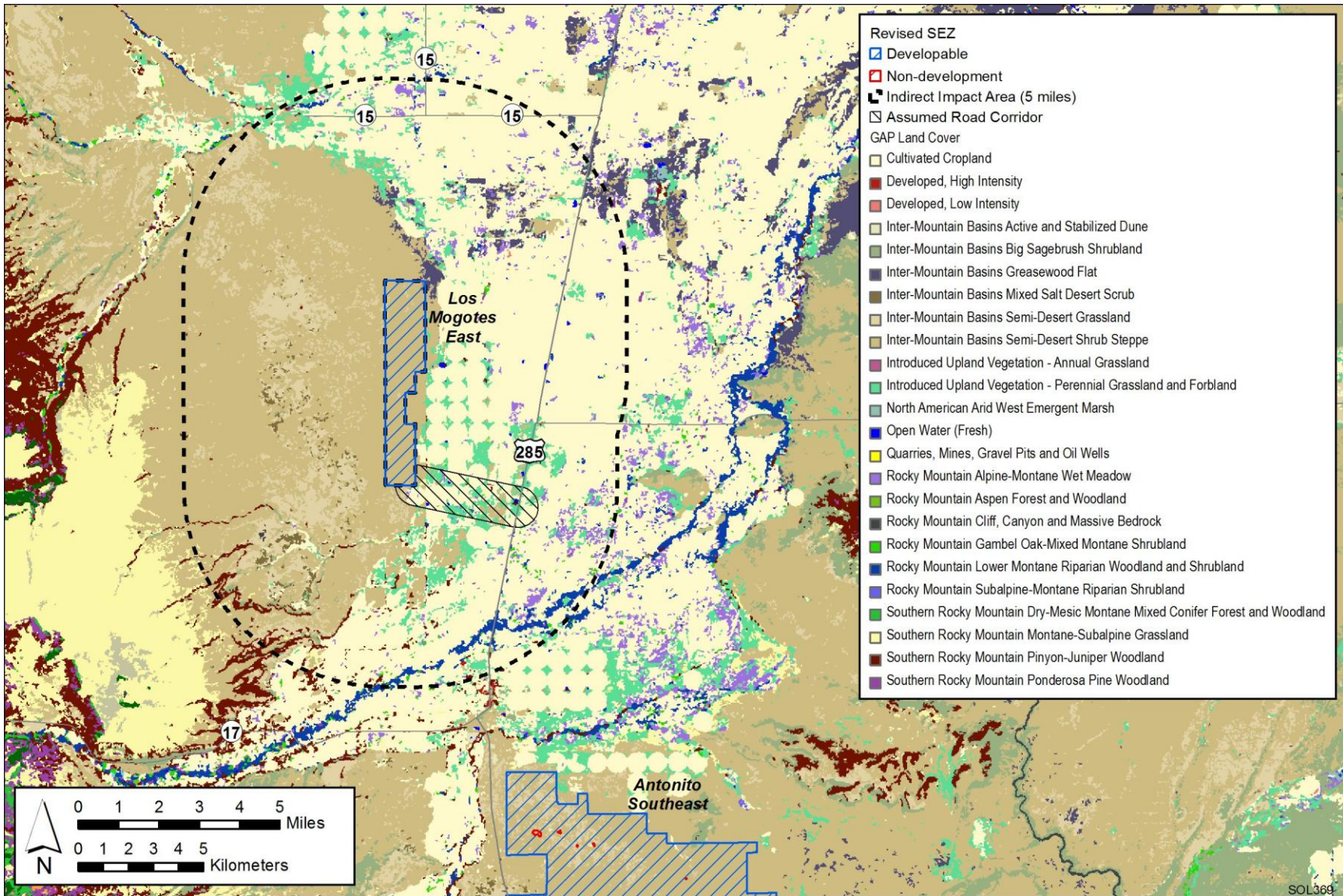


FIGURE 10.4.10.1-1 Land Cover Types within the Proposed Los Mogotes East SEZ as Revised

1 Direct impacts could still occur on unmapped wetlands within the remaining developable
2 areas of the SEZ. In addition, indirect impacts on wetlands within or near the SEZ, as described
3 in the Draft Solar PEIS, could occur.
4

6 ***10.4.10.2.2 Impacts from Noxious Weeds and Invasive Plant Species***

7

8 As presented in the Draft Solar PEIS, land disturbance from project activities and indirect
9 effects of construction and operation within the Los Mogotes East SEZ could potentially result in
10 the establishment or expansion of noxious weeds and invasive species populations, potentially
11 including those species listed in Section 10.4.10.1 in the Draft Solar PEIS. Impacts, such as
12 reduced restoration success and possible widespread habitat degradation, could still occur;
13 however, a small reduction in the potential for such impacts would result from the reduced
14 developable area of the SEZ.
15

17 **10.4.10.3 SEZ-Specific Design Features and Design Feature Effectiveness**

18

19 Required programmatic design features are described in Section A.2.2 of Appendix A
20 of this Final Solar PEIS. SEZ-specific species and habitats will determine how programmatic
21 design features are applied, for example:
22

- 23 • All dry wash habitats within the SEZ and all wetland and dry wash habitats
24 within the assumed access road corridor shall be avoided to the extent
25 practicable, and any impacts minimized and mitigated in consultation with
26 appropriate agencies. A buffer area shall be maintained around wetlands and
27 dry washes to reduce the potential for impacts on these habitats on or near
28 the SEZ.
29
- 30 • Appropriate engineering controls shall be used to minimize impacts on
31 wetland, dry wash, and riparian habitats, including downstream occurrences,
32 resulting from surface water runoff, erosion, sedimentation, altered hydrology,
33 accidental spills, or fugitive dust deposition to these habitats. Maintaining
34 sediment and erosion controls along drainages would reduce the potential for
35 impacts on wetlands near or downgradient from the SEZ. Appropriate buffers
36 and engineering controls will be determined through agency consultation.
37
- 38 • Groundwater withdrawals shall be limited to reduce the potential for indirect
39 impacts on wetland habitats or springs that are associated with groundwater
40 discharge, such as the wetlands along the Conejos River.
41

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

1 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
2 analyses due to changes to the SEZ boundaries, and consideration of comments received as
3 applicable, no SEZ-specific design features have been identified. Some SEZ-specific design
4 features may be identified through the process of preparing parcels for competitive offer and
5 subsequent project-specific analysis.
6
7

8 **10.4.11 Wildlife and Aquatic Biota**

9

10 For the assessment of potential impacts on wildlife and aquatic biota, overall impact
11 magnitude categories were based on professional judgment and include (1) *small*: a relatively
12 small proportion ($\leq 1\%$) of the species' habitat within the SEZ region would be lost;
13 (2) *moderate*: an intermediate proportion (>1 but $\leq 10\%$) of the species' habitat would be lost;
14 and (3) *large*: $>10\%$ of the species' habitat would be lost.
15
16

17 **10.4.11.1 Amphibians and Reptiles**

18
19

20 ***10.4.11.1.1 Affected Environment***

21

22 As presented in the Draft Solar PEIS, representative amphibian and reptile species
23 expected to occur within the Los Mogotes East SEZ include the Woodhouse's toad (*Bufo*
24 *woodhousii*), fence lizard (*Sceloporus undulatus*), gopher snake (*Pituophis catenifer*), western
25 rattlesnake (*Crotalus viridis*), short-horned lizard (*Phrynosoma hernandesi*), and western
26 terrestrial garter snake (*Thamnophis elegans*). The reduction in the size of the Los Mogotes East
27 SEZ does not alter the potential for these species to occur in the affected area.
28
29

30 ***10.4.11.1.2 Impacts***

31

32 As presented in the Draft Solar PEIS, solar energy development within the Los Mogotes
33 East SEZ could affect potentially suitable habitats for several amphibian and reptile species. The
34 analysis presented in the Draft Solar PEIS indicated that development would result in a small
35 overall impact on representative amphibian and reptile species (Table 10.4.11.1-1 in the Draft
36 Solar PEIS). Development within the revised boundaries of the Los Mogotes East SEZ could still
37 affect the same species evaluated in the Draft Solar PEIS; however, the reduction in the
38 developable area would result in reduced (and still small) impact levels compared to original
39 estimates in the Draft Solar PEIS.
40
41

42 ***10.4.11.1.3 SEZ-Specific Design Features and Design Feature Effectiveness***

43

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

1 species and habitats will guide how programmatic design features for amphibians and reptiles are
2 applied, for example:

- 3
- 4 • Wash habitats within the SEZ shall be avoided to the extent practicable.
- 5
- 6 • Appropriate engineering controls shall be used to minimize impacts on
7 palustrine wetlands surrounding the SEZ resulting from surface water runoff,
8 erosion, sedimentation, accidental spills, or fugitive dust deposition to these
9 habitats.

10
11 With the implementation of required programmatic design features, impacts on
12 amphibian and reptile species would be reduced.

13
14 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
15 analyses due to changes to the SEZ boundaries, and consideration of comments received as
16 applicable, the following SEZ-specific design feature has been identified:

- 17
- 18 • The access road should be sited and constructed to minimize impacts on
19 wetlands (if present within the finalized access road location).
- 20

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

25 26 27 **10.4.11.2 Birds**

28 29 30 ***10.4.11.2.1 Affected Environment***

31
32 As presented in the Draft Solar PEIS, a large number of bird species could occur or have
33 potentially suitable habitat within the affected area of the proposed Los Mogotes East SEZ.
34 Representative bird species identified in the Draft Solar PEIS included Brewer's blackbird
35 (*Euphagus cyanocephalus*), Brewer's sparrow (*Spizella breweri*), common nighthawk
36 (*Chordeiles minor*), horned lark (*Eremophila alpestris*), vesper sparrow (*Pooecetes gramineus*),
37 western meadowlark (*Sturnella neglecta*), American kestrel (*Falco sparverius*), golden eagle
38 (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), short-eared owl (*Asio flammeus*),
39 Swainson's hawk (*Buteo swainsoni*), turkey vulture (*Cathartes aura*), and mourning dove
40 (*Zenaidura macroura*). The reduction in the size of the reconfigured Los Mogotes East SEZ does
41 not alter the potential for these species or other bird species to occur in the affected area.

42 43 44 ***10.4.11.2.2 Impacts***

45
46 As presented in the Draft Solar PEIS, solar energy development within the Los Mogotes
47 East SEZ could affect potentially suitable habitats of bird species. The analysis presented in the

1 Draft Solar PEIS for the original Los Mogotes East SEZ boundaries indicated that development
2 would result in a small overall impact on the representative bird species (Table 10.4.11.2-1 in the
3 Draft Solar PEIS). Development within the revised boundaries of the Los Mogotes East SEZ
4 could still affect the same species evaluated in the Draft Solar PEIS; however, the reduction in
5 the developable area would result in reduced (and still small) impact levels compared to original
6 estimates in the Draft Solar PEIS.

9 ***10.4.11.2.3 SEZ-Specific Design Features and Design Feature Effectiveness***

10
11 Required programmatic design features that would reduce impacts on bird species are
12 described in Section A.2.2 of Appendix A of this Final Solar PEIS. SEZ-specific species and
13 habitats will determine how programmatic design features are applied, for example:

- 14
15 • Appropriate engineering controls shall be used to minimize impacts resulting
16 from surface water runoff, erosion, sedimentation, accidental spills, or fugitive
17 dust deposition.

18
19 If the programmatic design features are implemented, impacts on bird species will be
20 reduced.

21
22 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
23 analyses due to changes to the SEZ boundaries, and consideration of comments received as
24 applicable, the following SEZ-specific design features have been identified:

- 25
26 • The access road should be sited and constructed to minimize impacts on
27 wetlands and riparian areas (if present within the finalized access road
28 location).
- 29
30 • If present, prairie dog colonies (which could provide habitat or a food source
31 for some raptor species) should be avoided to the extent practicable. This
32 design feature has been at least partly met as the revised SEZ now avoids
33 known Gunnison prairie dog habitat.

34
35 If these SEZ-specific design features are implemented in addition to required
36 programmatic design features, impacts on bird species would be small. The need for additional
37 SEZ-specific design features will be identified through the process of preparing parcels for
38 competitive offer and subsequent project-specific analysis.

39 40 41 **10.4.11.3 Mammals**

42 43 44 ***10.4.11.3.1 Affected Environment***

45
46 As presented in the Draft Solar PEIS, a large number of mammal species were identified
47 that could occur or have potentially suitable habitat within the affected area of the proposed

1 Los Mogotes East SEZ. Representative mammal species identified in the Draft Solar PEIS
2 included (1) big game species: the American black bear (*Ursus americanus*), bighorn sheep
3 (*Ovis canadensis*), cougar (*Puma concolor*), elk (*Cervis canadensis*), mule deer (*Odocoileus*
4 *hemionus*), and pronghorn (*Antilocapra americana*); (2) furbearers and small game species:
5 the American badger (*Taxidea taxus*), coyote (*Canis latrans*), desert cottontail (*Sylvilagus*
6 *audubonii*), red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*), and white-tailed
7 jackrabbit (*Lepus townsendii*); and (3) small nongame species: the big brown bat (*Eptesicus*
8 *fuscus*), deer mouse (*Peromyscus maniculatus*), least chipmunk (*Tamias minimus*), little brown
9 myotis (*Myotis lucifugus*), northern pocket gopher (*Thomomys talpoides*), Ord's kangaroo rat
10 (*Dipodomys ordii*), thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*), and western
11 small-footed myotis (*Myotis ciliolabrum*). The reduction in the size of the Los Mogotes East
12 SEZ does not alter the potential for these species or any additional mammal species to occur in
13 the affected area.

14 15 16 **10.4.11.3.2 Impacts** 17

18 As presented in the Draft Solar PEIS, solar energy development within the Los Mogotes
19 East SEZ could affect potentially suitable habitats of mammal species. The analysis presented
20 in the Draft Solar PEIS for the original Los Mogotes East SEZ boundaries indicated that
21 development would result in a small overall impact on all representative mammal species
22 analyzed (Table 10.4.11.3-1 in the Draft Solar PEIS). Development within the revised
23 boundaries of the Los Mogotes East SEZ could still affect the same representative mammal
24 species evaluated in the Draft Solar PEIS; however, the reduction in the developable area
25 would result in reduced (and still small) impact levels compared to original estimates in the
26 Draft Solar PEIS.

27
28 Based on mapped activity areas, direct potential loss of overall range, winter range, and
29 severe winter range for elk; overall range for mule deer; and overall range and severe winter
30 range for pronghorn would be reduced from 4,734 acres (19.2 km²) to 2,120 acres (8.6 km²) for
31 the revised Los Mogotes East SEZ. Impact levels for these activity areas would still be small,
32 except for pronghorn severe winter range, where the impact would remain moderate. The
33 135 acres (0.5 km²) of mule deer winter range and all or most of the 3,145 acres (12.7 km²) of
34 pronghorn winter concentration area potentially directly affected by solar development for the
35 original Los Mogotes East SEZ boundaries in the Draft Solar PEIS would not be affected for the
36 revised SEZ, because these activity areas are wholly or mostly within the acreage eliminated
37 from the SEZ, respectively.

38 39 40 **10.4.11.3.3 SEZ-Specific Design Features and Design Feature Effectiveness** 41

42 Required programmatic design features that would reduce impacts on mammal species
43 are described in Section A.2.2 of Appendix A of this Final Solar PEIS. With implementation of
44 required programmatic design features, impacts on mammal species would be reduced.
45

1 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
2 analyses due to changes to the SEZ boundaries, and consideration of comments received as
3 applicable, the following SEZ-specific design features for mammals have been identified.

- 4
- 5 • Development in the 135-acre (0.55-km²) portion of the SEZ that overlaps the
6 mule deer winter range should be avoided. This design feature is no longer
7 applicable as the revised SEZ now avoids this mule deer activity area.
8
- 9 • Prairie dog colonies should be avoided to the extent practicable to reduce
10 impacts on species such as desert cottontail and thirteen-lined ground squirrel.
11 This design feature has been at least partly met, as the revised SEZ now
12 avoids known Gunnison prairie dog habitat.
13
- 14 • Construction should be curtailed during winter when big game species are
15 present.
16
- 17 • Where big game winter ranges intersect or are close to the SEZ, motorized
18 vehicles and other human disturbances should be controlled (e.g., through
19 temporary road closures when big game are present).
20
- 21 • Loss of pronghorn winter concentration area should be minimized. This
22 design feature has largely been met, as the revised SEZ now avoids all or most
23 of this pronghorn activity area.
24

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

27

28

29 **10.4.11.4 Aquatic Biota**

30

31

32 ***10.4.11.4.1 Affected Environment***

33

34 There are no permanent water bodies or perennial streams within the boundaries of the
35 proposed Los Mogotes East SEZ or the area of indirect effects, although rain events may give
36 rise to ephemeral pools on occasion. A number of ephemeral washes pass through the SEZ but
37 do not extend directly to nearby perennial streams. The boundaries of the Los Mogotes East SEZ
38 have been reduced compared to the boundaries given in the Draft Solar PEIS. Based on these
39 changes, updates to the Draft Solar PEIS include the following:

- 40
- 41 • Approximately 16 mi (26 km) of perennial stream habitat associated with
42 three streams falls within the assumed area of indirect effects within 5 mi
43 (8 km) of the SEZ, including approximately 7 mi (11 km) of the lower portion
44 of La Jara Creek, a 5-mi (8-km) section of the Conejos River, and a 3-mi
45 (5-km) segment of the lower Alamosa River.
46

- 1 • Outside of the area of indirect effects but within 50 mi (80 km) of the SEZ,
2 there are approximately 869 mi (1,938 km) of perennial streams, 198 mi
3 (319 km) of intermittent streams, and 177 mi (285 km) of canals.
4
- 5 • There are approximately 10,725 acres (4,340 km²) of lake and reservoir
6 habitat within 50 mi (80 km) of the SEZ. There are no lakes or reservoirs
7 within the areas considered for analysis of direct or indirect effects. The
8 nearest such habitat is La Jara Reservoir, approximately 11 mi (17 km) to
9 the southeast of the SEZ.

10
11 Aquatic biota present the SEZ have not been characterized. As stated in Appendix C of
12 the Supplement to the Draft Solar PEIS, site surveys can be conducted at the project-specific
13 level to characterize the aquatic biota, if present, in washes, dry lakes, and wetlands within the
14 SEZ.

15 16 17 ***10.4.11.4.2 Impacts*** 18

19 The types of impacts that could occur on aquatic habitats and biota from development of
20 utility-scale solar energy facilities are identified in Section 5.10.2.4 of the Draft Solar PEIS and
21 this Final Solar PEIS. Aquatic habitats present on or near the Los Mogotes East SEZ could be
22 affected by solar energy development in a number of ways, including (1) direct disturbance,
23 (2) deposition of sediments, (3) changes in water quantity, and (4) degradation of water quality.
24 The impact assessment provided in the Draft Solar PEIS remains valid, with the following
25 update:
26

- 27 • The amount of surface water features within the SEZ and in the area of
28 indirect effects that could potentially be affected by solar energy development
29 is less because the size of the SEZ has been reduced.
30
31

32 ***10.4.11.4.3 SEZ-Specific Design Features and Design Feature Effectiveness*** 33

34 Required programmatic design features that would reduce impacts on aquatic species are
35 described in Section A.2.2 of Appendix A of this Final Solar PEIS. SEZ-specific resources and
36 conditions will guide how programmatic design features are applied, for example:
37

- 38 • Undisturbed buffer areas and sediment and erosion controls shall be
39 maintained around drainages associated with wetland areas located in the
40 immediate vicinity of the SEZ.
41

42 It is anticipated that implementation of the programmatic design features will reduce
43 impacts on aquatic biota, and if the utilization of water from groundwater or surface water
44 sources is adequately controlled to maintain sufficient water levels in nearby aquatic habitats, the
45 potential impacts on aquatic biota from solar energy development at the Los Mogotes East SEZ
46 would be negligible.

1 On the basis of the impact analyses conducted for the Draft Solar PEIS, updates to those
2 analyses due to changes to the SEZ boundaries, and consideration of comments received as
3 applicable, no SEZ-specific design features for aquatic biota have been identified. Some SEZ-
4 specific design features may be identified through the process of preparing parcels for
5 competitive offer and subsequent project-specific analysis.
6
7

8 **10.4.12 Special Status Species**

9

10 **10.4.12.1 Affected Environment**

11

12
13 There were 51 special status species identified in the Draft Solar PEIS that could occur or
14 have potentially suitable habitat within the affected area of the proposed Los Mogotes East SEZ.
15 The reduction in the size of the Los Mogotes East SEZ does not alter the potential for these
16 species to occur in the affected area.
17

18 Since publication of the Draft Solar PEIS, three additional special status species have
19 been identified—Mexican spotted owl (*Strix occidentalis lucida*), western yellow-billed cuckoo
20 (*Coccyzus americanus occidentalis*), and fringed myotis (*Myotis thysanodes*)—that could occur
21 in the affected area of the Los Mogotes East SEZ based on known occurrences and the presence
22 of potentially suitable habitat. These three additional species are discussed in the remainder of
23 this section.
24

25 Following the publication of the Draft Solar PEIS, the BLM conducted field surveys for
26 special status bat species, as well as Gunnison prairie dog (*Cynomys gunnisoni*) and western
27 burrowing owl (*Athene cunicularia*), in the Los Mogotes East SEZ. Surveys for bat species were
28 conducted in the SEZ by using passive and active acoustic monitoring techniques at various
29 times between June 16, 2011, and October 15, 2011 (Rodriguez 2011). The big free-tailed bat
30 (*Nyctinomops macrotis*) was the only special status bat species recorded on the SEZ. However,
31 the documented presence of the fringed myotis in the De Tilla Gulch SEZ suggests that the
32 fringed myotis could occur throughout the San Luis Valley and potentially within the
33 Los Mogotes East SEZ. No roosting habitat for this species was observed on the SEZ
34 (Rodriguez 2011).
35

36 Field surveys for Gunnison prairie dog and western burrowing owl were conducted on
37 July 26, 2011 (Garcia and Harvey 2011). No Gunnison prairie dog activity was recorded in any
38 portion of the SEZ. However, there are established Gunnison prairie dog colonies within 2 mi
39 (3 km) north of the SEZ. Burrowing owls were not recorded on the SEZ during the field surveys.
40 However, burrowing owls were observed among prairie dog colonies on Colorado state land
41 within 3 mi (2 km) north of the SEZ. On June 4, 2008, a burrowing owl was observed
42 approximately 1 mi (1.6 km) west of the Los Mogotes East SEZ. On the basis of this
43 information, the Los Mogotes East SEZ could be utilized by the western burrowing owl for
44 either nesting or foraging habitat (Garcia and Harvey 2011).
45
46

1 **Mexican Spotted Owl.** The Mexican spotted owl was listed as a threatened species under
2 the ESA on March 16, 1993 (USFWS 1993). Critical habitat for this species was designated on
3 June 6, 1995 (USFWS 1995), but several court rulings resulted in the USFWS removing the
4 critical habitat designation on March 25, 1998 (USFWS 1998). In March 2000, the USFWS was
5 ordered by the courts to propose critical habitat, resulting in the current designation that includes
6 4.6 million acres (18,616 km²) in Arizona, Colorado, New Mexico, and Utah on federal lands
7 (USFWS 2004). A recovery plan for the Mexican spotted owl was published in December 1995
8 and later revised in June 2011 (USFWS 2011). At the time of federal listing in 1993, the total
9 population of Mexican spotted owls was estimated at 2,100.

10
11 The Mexican spotted owl occurs from southern British Columbia, Canada, to central
12 Mexico. The primary habitat of the spotted owl is steep rocky canyons, although mature
13 coniferous forests are also important habitat. The spotted owl occupies closed canopy forests in
14 steep canyons with uneven-aged tree stands with high basal area, with an abundance of snags and
15 downed logs (NatureServe 2010; USFWS 2011).

16
17 The Mexican spotted owl feeds mainly on rodents but also consumes rabbits, birds,
18 reptiles, and insects. Nest sites are in trees (typically those with broken tops), tree trunk cavities,
19 and cliffs along canyon walls. Breeding takes place in the spring (March) with egg-laying in late
20 March or early April. After a 30-day incubation period, hatching occurs and fledging takes place
21 in 4 to 5 weeks. The young depend on the adults for food in the summer and eventually disperse
22 from the nesting area in the fall (NatureServe 2010; USFWS 2011).

23
24 The Mexican spotted owl is known to occur in Conejos County, Colorado, and
25 potentially suitable habitat for this species may occur in the affected area of the Los Mogotes
26 East SEZ. Potentially suitable habitat for this species does not occur on the SEZ. However,
27 the SWReGAP habitat suitability model for the spotted owl (*S. occidentalis*) identified
28 approximately 14 acres (<0.1 km²) of potentially suitable habitat within the assumed access road
29 corridor and an additional 3,000 acres (12 km²) of potentially suitable habitat within the area of
30 indirect effects (Figure 10.4.12.1-1; Table 10.4.12.1-1). Designated critical habitat for the
31 Mexican spotted owl does not occur in the affected area.

32
33
34 **Western Yellow-Billed Cuckoo.** The western yellow-billed cuckoo is a candidate for
35 listing under the ESA and has the potential to occur in the affected area. The western yellow-
36 billed cuckoo is a neotropical migrant bird that inhabits large riparian woodlands in the western
37 United States. This species is not known to occur in Conejos County, Colorado, but it has been
38 documented in nearby counties such as La Plata and Rio Grande Counties, Colorado. Although
39 the SWReGAP habitat suitability model for the western yellow-billed cuckoo does not identify
40 any suitable habitat for this species within the SEZ or assumed access road corridor,
41 approximately 215 acres (1 km²) of potentially suitable riparian habitat occurs within the area of
42 indirect effects along the Conejos River (Figure 10.4.12.1-1; Table 10.4.12.1-1). Potentially
43 suitable habitat may also occur in the area of indirect effects along La Jara Creek. Additional
44 basic information on life history, habitat needs, and threats to populations of this species is
45 provided in Appendix J.

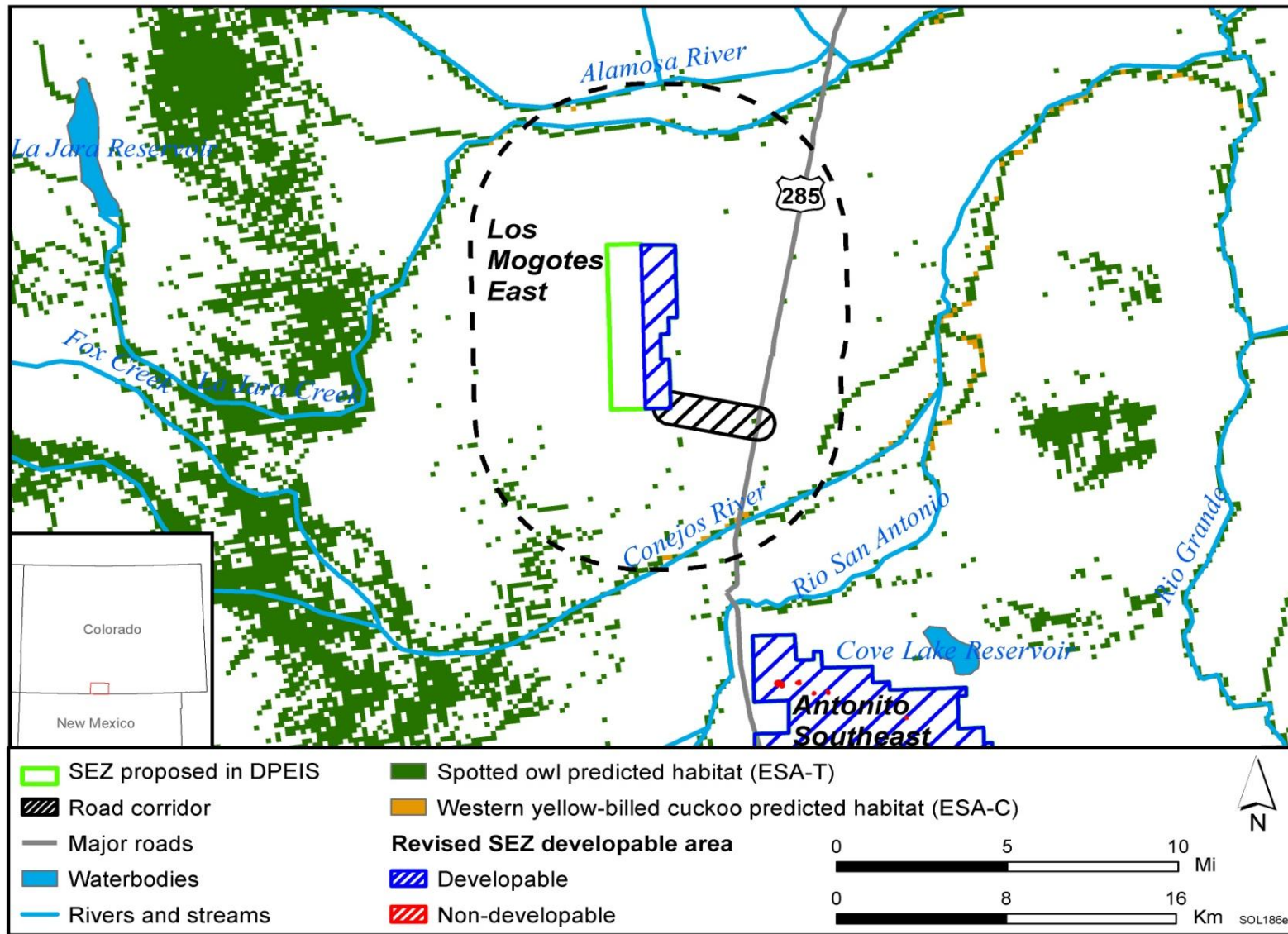


FIGURE 10.4.12.1-1 Developable Area for the Proposed Los Mogotes East SEZ as Revised and Distribution of Potentially Suitable Habitat for the Mexican Spotted Owl and Western Yellow-Billed Cuckoo

1 **TABLE 10.4.12.1-1 Habitats, Potential Impacts, and Potential Mitigation for Additional Special Status Species That Could Be**
 2 **Affected by Solar Energy Development on the Proposed Los Mogotes East SEZ as Revised^a**

Common Name	Scientific Name	Listing Status ^b	Habitat ^c	Maximum Area of Potential Habitat Affected ^d			Overall Impact Magnitude ^h and Species-Specific Mitigation ⁱ
				Within SEZ (Direct Effects) ^e	Road Corridor (Direct Effects) ^f	Outside SEZ (Indirect Effects) ^g	
Birds							
Mexican spotted owl	<i>Strix occidentalis lucida</i>	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 679,500 acres ^j of potentially suitable habitat occurs in the SEZ region.	0 acres	14 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	3,000 acres of potentially suitable habitat (0.4% of available potentially suitable habitat)	Small overall impact; no direct impact. No species-specific mitigation is warranted.
Western yellow-billed cuckoo	<i>Coccyzus americanus occidentalis</i>	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 2,500 acres of potentially suitable habitat occurs in the SEZ region.	0 acres	0 acres	215 acres of potentially suitable habitat (8.6% 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.
Mammals							
Fringed myotis	<i>Myotis thysanodes</i>	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 3,484,000 acres of potentially suitable habitat occurs within the SEZ region.	2,650 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	24 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	86,500 acres of potentially suitable habitat (2.5% 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.

TABLE 10.4.12.1-1 (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 10.4.12.1-1 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 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 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 For access road development, direct effects were estimated within a 60-ft (18-m) wide, 3-mi (5-km) long access road from the SEZ to the nearest state highway. Direct impacts within this area were determined from the proportion of potentially suitable habitat within the 1-mi (1.6-km) wide road corridor.
- ^g Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary and the portion of the access road corridor where ground-disturbing activities would not occur. Indirect effects include effects from surface runoff, dust, noise, lighting, and so on from facilities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ.
- ^h Overall impact magnitude categories were based on professional judgment and include (1) *small*: $\leq 1\%$ of the population or its habitat would be lost, and the activity would not result in a measurable change in carrying capacity or population size in the affected area; (2) *moderate*: >1 but $\leq 10\%$ of the population or its habitat, would be lost and the activity would result in a measurable but moderate (not destabilizing) change in carrying capacity or population size in the affected area; 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. Programmatic design features would reduce most indirect effects to negligible levels.
- ⁱ 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.
- ^j To convert acres to km^2 , multiply by 0.004047.

1 **Fringed Myotis.** The fringed myotis is a year-round resident in western Colorado,
2 where it forages in a variety of habitats including ponderosa pine woodlands, greasewood flats,
3 oakbrush, and shrublands. This species was not evaluated for the Los Mogotes East SEZ in the
4 Draft Solar PEIS. The species roosts in caves, rock crevices, or buildings. The fringed myotis
5 was not recorded on the Los Mogotes East SEZ during field surveys conducted in 2011
6 (Rodriguez 2011). However, fringed myotis was recorded on the De Tilla Gulch SEZ,
7 suggesting that the species could occur elsewhere in the San Luis Valley and potentially within
8 the Los Mogotes East SEZ. According to the SWReGAP habitat suitability model, potentially
9 suitable foraging habitat for the fringed myotis could occur on the SEZ and throughout portions
10 of the area of indirect effects (Table 10.4.12.1-1). There is no potentially suitable roosting habitat
11 (rocky cliffs and outcrops) in the area of direct effects.

14 **10.4.12.2 Impacts**

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

22 As presented in the Draft Solar PEIS, solar energy development within the Los Mogotes
23 East SEZ could affect potentially suitable habitats of special status species. The analysis
24 presented in the Draft Solar PEIS for the original Los Mogotes East SEZ developable area
25 indicated that development would result in no impact or a small overall impact on all special
26 status species (Table 10.4.12.1-1 in the Draft Solar PEIS). Development within the revised
27 Los Mogotes East SEZ could still affect the same 51 species evaluated in the Draft Solar PEIS;
28 however, the reduction in the developable area would result in reduced (and still small) impact
29 levels compared to original estimates in the Draft Solar PEIS.

31 Impacts on the Mexican spotted owl, western yellow-billed cuckoo, and fringed myotis,
32 special status species identified since publication of the Draft Solar PEIS to potentially occur
33 within the affected area of the Los Mogotes East SEZ, are discussed below and in
34 Table 10.4.12.1-1. The impact assessment for these additional species was carried out in the
35 same way as those species analyzed in the Draft Solar PEIS (Section 10.4.12.2 of the Draft
36 Solar PEIS).

39 **Mexican Spotted Owl.** The Mexican spotted owl is known to occur in Conejos County,
40 Colorado, and according to the SWReGAP habitat suitability model for the spotted owl,
41 suitable habitat for the species does not occur anywhere within the Los Mogotes East SEZ.
42 However, approximately 14 acres (<0.1 km²) of potentially suitable year-round habitat in the
43 assumed access road corridor could be directly affected by construction and operations
44 (Table 10.4.12.1-1). This direct effects area represents less than 0.1% of available suitable
45 habitat in the SEZ region. About 3,000 acres (12 km²) of potentially suitable year-round habitat
46 occurs within the area of indirect effects (Figure 10.4.12.1-1). The amount of potentially suitable

1 habitat within the indirect effects area represents about 0.4% of the available suitable habitat in
2 the SEZ region (Table 10.4.12.1-1).

3
4 The overall impact on the Mexican spotted owl from construction, operation, and
5 decommissioning of utility-scale solar energy facilities within the Los Mogotes East SEZ is
6 considered small, because the amount of potentially suitable foraging and nesting habitat for this
7 species in the area of direct effects represents less than 1% of potentially suitable habitat in the
8 SEZ region. The implementation of programmatic design features is expected to be sufficient to
9 reduce indirect impacts on this species to negligible levels.

10
11
12 **Western Yellow-Billed Cuckoo.** The western yellow-billed cuckoo is known to occur in
13 Conejos County, Colorado, and potentially suitable habitat occurs in the affected area of the Los
14 Mogotes East SEZ. According to the SWReGAP habitat suitability model, suitable habitat for
15 this species does not occur on the SEZ. However, the SWReGAP habitat suitability model
16 indicates approximately 215 acres (1 km²) of potentially suitable habitat in the area of indirect
17 effects, primarily along the Conejos River (Figure 10.4.12.1-1). This indirect effects area
18 represents about 8.6% of the available suitable habitat in the region (Table 10.4.12.1-1).

19
20 The overall impact on the western yellow-billed cuckoo from construction, operation, and
21 decommissioning of utility-scale solar energy facilities within the Los Mogotes East SEZ is
22 considered small, because no potentially suitable habitat for this species occurs in the area of
23 direct effects, and only indirect effects are possible. The implementation of design features is
24 expected to be sufficient to reduce indirect impacts to negligible levels.

25
26
27 **Fringed Myotis.** The fringed myotis is a year-round resident in southwestern Colorado
28 and is known to occur within the San Luis Valley. Although this species is not known to occur
29 in the proposed Los Mogotes East SEZ, field surveys conducted in 2011 documented the
30 presence of this species in the De Tilla Gulch SEZ (Rodriguez 2011). According to the
31 SWReGAP habitat suitability model, approximately 2,650 acres (11 km²) of suitable foraging
32 habitat in the revised Los Mogotes East SEZ may be directly affected by construction and
33 operations (Table 10.4.12.1-1). This direct effects area represents less than 0.1% of potentially
34 suitable habitat in the SEZ region. About 86,500 acres (350 km²) of potentially suitable habitat
35 occurs in the area of indirect effects; this area represents about 2.5% of the available suitable
36 habitat in the region (Table 10.4.12.1-1). Most of the potentially suitable habitat in the affected
37 area is foraging habitat represented by desert shrubland. There is no potentially suitable roosting
38 habitat (rocky cliffs and outcrops) in the area of direct effects; however, it is possible for
39 individuals to roost in nearby habitats within the area of indirect effects (Rodriguez 2011).

40
41 The overall impact on the fringed myotis from construction, operation, and
42 decommissioning of utility-scale solar energy facilities within the revised Los Mogotes East SEZ
43 is considered small, because the amount of potentially suitable foraging habitat for this species in
44 the area of direct effects represents less than 1% of potentially suitable foraging habitat in the
45 SEZ region. The implementation of design features is expected to be sufficient to reduce indirect
46 impacts on this species to negligible levels. Avoidance of all potentially suitable foraging

1 habitats is not feasible, because potentially suitable habitat is widespread throughout the area of
2 direct effects and readily available in other portions of the SEZ region.

3 4 5 **10.4.12.3 SEZ-Specific Design Features and Design Feature Effectiveness** 6

7 Required programmatic design features are described in Appendix A of this Final Solar
8 PEIS. SEZ-specific conditions will be considered when programmatic design features are
9 applied, for example:

- 10
11 • Pre-disturbance surveys shall be conducted within the SEZ to determine the
12 presence and abundance of special status species including those identified
13 in Table 10.4.12.1-1 of the Draft Solar PEIS, as well as those identified in
14 Table 10.4.12.1-1 of this Final Solar PEIS. Disturbance of occupied habitats
15 for these species shall be avoided or minimized to the extent practicable. If
16 avoiding or minimizing impacts on occupied habitats is not possible,
17 translocation of individuals from areas of direct effects or compensatory
18 mitigation of direct effects on occupied habitats may be used to reduce
19 impacts. A comprehensive mitigation strategy for special status species that
20 uses one or more of these options to offset the impacts of projects shall be
21 developed in coordination with the appropriate federal and state agencies.
22
- 23 • Avoidance or minimization of disturbance to wetland and riparian habitats
24 within the SEZ shall be employed to reduce impacts on halfmoon milkvetch
25 (*Astragalus allochrous* var. *playanus*), least moonwort (*Botrychium simplex*),
26 Rocky Mountain blazing-star (*Liatris ligulistylis*), Rio Grande chub (*Gila*
27 *pandora*), Rio Grande sucker (*Catostomus plebius*), milk snake (*Lampropeltis*
28 *triangulum*), bald eagle (*Haliaeetus leucocephalus*), Barrow's goldeneye
29 (*Bucephala islandica*), ferruginous hawk (*Buteo regalis*), and southwestern
30 willow flycatcher (*Empidonax traillii extimus*).
31
- 32 • Avoiding or limiting groundwater withdrawals for solar energy development
33 on the SEZ shall be employed to reduce impacts on groundwater-dependent
34 special status species, including those species that may occur in riparian or
35 aquatic habitats supported by groundwater. These species include the
36 southwestern willow flycatcher and the western yellow-billed cuckoo.
37
- 38 • Consultations with the USFWS and CDOW shall be conducted to address the
39 potential for impacts on the Mexican spotted owl and southwestern willow
40 flycatcher, which are species listed under the ESA. Consultation would
41 identify an appropriate survey protocol, avoidance measures, and, if
42 appropriate, reasonable and prudent alternatives, reasonable and prudent
43 measures, and terms and conditions for incidental take statements.
44
- 45 • Coordination with the USFWS and CDOW should be conducted to address
46 the potential for impacts on the Gunnison's prairie dog (*Cynomys gunnisoni*)

1 and northern leopard frog (*Rana pipiens*)—species that are either candidates
2 or under review for listing under the ESA. Coordination would identify an
3 appropriate survey protocol, avoidance measures, and, potentially,
4 translocation or compensatory mitigation.
5

6 If the programmatic design features are implemented, it is anticipated that the majority of
7 impacts on the special status species from habitat disturbance and groundwater use would be
8 reduced.
9

10 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
11 analyses due to changes to the SEZ boundaries, and consideration of comments received as
12 applicable, no SEZ-specific design features for special status species have been identified. Some
13 SEZ-specific design features may be identified through the process of preparing parcels for
14 competitive offer and subsequent project-specific analysis.
15

16 **10.4.13 Air Quality and Climate**

17 **10.4.13.1 Affected Environment**

18
19
20 Except as noted below, the information for air quality and climate presented in the
21 affected environment section of the Draft Solar PEIS remains essentially unchanged.
22
23
24
25

26 ***10.4.13.1.1 Existing Air Emissions***

27
28 The Draft Solar PEIS presented Conejos County emissions data for 2002. More recent
29 data for 2008 (CDPHE 2011) were reviewed. The two emissions inventories are from different
30 sources and assumptions. All emissions in the 2008 data were lower than those in the 2002 data;
31 all criteria air pollutants were much lower, but VOCs were about half of those in the 2002 data.
32 These changes would not affect modeled air quality impacts presented in this update.
33
34

35 ***10.4.13.1.2 Air Quality***

36
37 The calendar quarterly average NAAQS of 1.5 $\mu\text{g}/\text{m}^3$ for lead (Pb) presented in
38 Table 10.4.13.1-2 of the Draft Solar PEIS has been replaced by the rolling 3-month standard
39 (0.15 $\mu\text{g}/\text{m}^3$). The federal 24-hour and annual SO_2 , 1-hour O_3 , and annual PM_{10} standards have
40 been revoked as well (EPA 2011). All Colorado SAAQS, except the 3-hour SO_2 standard of
41 700 $\mu\text{g}/\text{m}^3$, have been revoked since the Draft Solar PEIS. These changes will not affect the
42 modeled air quality impacts presented in this update.
43

44 The size of the proposed Los Mogotes East SEZ was reduced by about 55%, from
45 5,918 acres (23.9 km^2) to 2,650 acres (10.7 km^2) by removing the western half of the originally
46 proposed SEZ. Based on this reduction, the distances from the proposed SEZ to the Great Sand

1 Dunes WA and Wheeler Peak WA in New Mexico did not change, and the distances to
2 Weminuche WA and La Garita WA increased by about 1 mi (1.6 km).

3 4 5 **10.4.13.2 Impacts**

6 7 8 **10.4.13.2.1 Construction**

9 10 11 **Methods and Assumptions**

12
13 Except for the area disturbed at any one time during construction, the methods and
14 modeling assumptions have not changed from those presented in the Draft Solar PEIS. Based on
15 the reduction in the area of the proposed Los Mogotes East SEZ, air quality for this Final Solar
16 PEIS was remodeled by assuming that 2,120 acres (8.6 km²), 80% of the updated developable
17 area, would be disturbed at any one time. The Draft Solar PEIS assumed disturbance of an area
18 of 3,000 acres (12.1 km²).

19 20 21 **Results**

22
23 Since the annual PM₁₀ standard has been rescinded, the discussion of annual PM₁₀
24 impacts in the Draft Solar PEIS is no longer applicable, and Table 10.4.13.2-1 has been updated
25 for this Final Solar PEIS. The concentration values in the table are based on updated air quality
26 modeling reflecting the updated boundaries of the proposed SEZ.

27
28 With the reduced area of the proposed SEZ, the concentrations predicted for this Final
29 Solar PEIS are less than those predicted in the Draft Solar PEIS, but the conclusions presented in
30 the Draft Solar PEIS remain valid.¹ Predicted 24-hour PM₁₀ and 24-hour PM_{2.5} concentration
31 levels could exceed NAAQS levels used for comparison at the SEZ boundaries and in the
32 immediately surrounding area during the construction phase of a solar development. These high
33 particulate levels would be limited to the immediate area surrounding the SEZ boundaries and
34 would decrease quickly with distance. Predicted total concentrations for annual PM_{2.5} would be
35 below the standard level used for comparison.

36
37 The updated analysis conducted for this Final Solar PEIS predicted lower concentrations
38 at all modeled locations than those in the Draft Solar PEIS. For 24-hr PM₁₀, the concentration at

¹ 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 so on, is not known; thus air quality modeling cannot be conducted. It has been assumed that 80% of the developable area of 2,650 acres (10.7 km²) 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.

1 **TABLE 10.4.13.2-1 Maximum Air Quality Impacts from Emissions Associated with**
 2 **Construction Activities for the Proposed Los Mogotes East SEZ as Revised**

Pollutant ^a	Averaging Time	Rank ^b	Concentration ($\mu\text{g}/\text{m}^3$)				Percentage of NAAQS	
			Maximum Increment ^b	Background	Total	NAAQS	Increment	Total
PM ₁₀	24 hours	H6H	374	27	401	150	249	267
PM _{2.5}	24 hours	H8H	26.0	16	42.0	35	74	120
	Annual	- ^c	6.3	4	10.3	15	42	68

a PM_{2.5} = particulate matter with a diameter of $\leq 2.5 \mu\text{m}$; PM₁₀ = particulate matter with a diameter of $\leq 10 \mu\text{m}$.

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.

3
 4
 5 the nearest residence about 0.4 mi (0.6 km) east of the SEZ changed from above to below the
 6 standard level used for comparison. The updated concentration at the second nearest residence
 7 about 0.6 mi (1.0 km) north of the SEZ was above the standard level used for comparison.
 8 However, construction activities are not subject to the PSD program; the comparison is made as
 9 an indicator of possible dust levels at the residence during the limited construction period and as
 10 a screen to gage the size of the potential impact. Therefore, it is anticipated that the potential
 11 impacts of construction activities on ambient air quality would be moderate and temporary.

12
 13 Other locations modeled include the communities of Antonito, Conejos, Romeo, La Jara,
 14 Manassa, Estrella, Sanford, and San Antonio. At these communities, the conclusions of the Draft
 15 Solar PEIS that total predicted concentrations would be below the standard level used for
 16 comparison remain valid.

17
 18 With the reduced area of the proposed SEZ, updated 24-hour and annual PM₁₀
 19 concentration increments the nearest Class I area, Great Sand Dunes WA, would be lower than
 20 those in the Draft Solar PEIS, about 6.9 and 0.14 $\mu\text{g}/\text{m}^3$, or 87% and 4%, respectively, of the
 21 allowable PSD increment levels for Class I areas. The conclusion in the Draft Solar PEIS that
 22 24-hr PM₁₀ PSD Class I increments could be exceeded in the Great Sand Dunes WA is updated
 23 for this Final Solar PEIS to conclude that all Class I PSD increments for PM₁₀ would be met at
 24 the nearest Class I area. The conclusion of the Draft Solar PEIS that concentration increments at
 25 the other three Class I areas (La Garita WA and Weminuche WA in Colorado, and Wheeler Peak

1 WA in New Mexico) would be much lower than those at the Great Sand Dunes WA and thus
2 would not be exceeded remains valid.

3
4 With the reduced size of the Los Mogotes East SEZ, emissions from construction
5 equipment and vehicles would be less than those discussed in the Draft Solar PEIS. Any
6 potential impacts on AQRVs at nearby federal Class I areas would be less. The conclusions in
7 the Draft Solar PEIS remain valid. Emissions from construction-related equipment and vehicles
8 are temporary in nature and could cause some unavoidable but short-term impacts.

9 10 11 ***10.4.13.2.2 Operations***

12
13 The reduction in the size of the proposed Los Mogotes East SEZ by about 55% from
14 5,918 acres (23.9 km²) to 2,650 acres (10.7 km²) reduces the generating capacity and annual
15 power generation and thus reduces the potentially avoided emissions presented in the Draft Solar
16 PEIS. Total revised power generation capacity ranging from 236 to 424 MW is estimated for the
17 Los Mogotes East SEZ for various solar technologies. As explained in the Draft Solar PEIS, the
18 estimated amount of emissions avoided for the solar technologies evaluated depends only on
19 the megawatts of conventional fossil fuel-generated power avoided. Updated estimates for
20 emissions potentially avoided by a solar facility can be obtained from the table in the Draft
21 Solar PEIS by reducing the tabulated estimates by about 55%, as shown in the revised
22 Table 10.4.13.2-2. For example, for the technologies estimated to require 9 acres/MW (power
23 tower, dish engine, and PV), up to 629 tons per year (= 44.78% × [the low-end value of
24 1,405 tons per year tabulated in the Draft Solar PEIS]) of NO_x could be avoided by full solar
25 development of the proposed Los Mogotes East SEZ as revised for this Final Solar PEIS.
26 Although the total emissions avoided by full solar development of the proposed SEZ are
27 considerably reduced from those presented in the Draft Solar PEIS, the conclusions of the Draft
28 remain valid. Solar facilities built in the Los Mogotes East SEZ could avoid relatively more
29 fossil fuel emissions than those built in other states that rely less on fossil fuel-generated power.

30 31 32 ***10.4.13.2.3 Decommissioning and Reclamation***

33
34 The discussion in the Draft Solar PEIS remains valid. Decommissioning and reclamation
35 activities would be of short duration, and their potential air impacts would be moderate and
36 temporary.

37 38 39 **10.4.13.3 SEZ-Specific Design Features and Design Feature Effectiveness**

40
41 Required programmatic design features that would reduce air quality impacts are
42 described in Section A.2.2 of Appendix A of this Final Solar PEIS. Limiting dust generation
43 during construction and operations is a required programmatic design feature under the BLM
44 Solar Energy Program. These extensive fugitive dust control measures would keep off-site
45 PM levels as low as possible during construction.

1 **TABLE 10.4.13.2-2 Annual Emissions from Combustion-Related Power Generation Avoided by**
 2 **Full Solar Development of the Proposed Los Mogotes East SEZ as Revised**

Area Size (acres) ^a	Capacity (MW) ^b	Power Generation (GWh/yr) ^c	Emissions Avoided (tons/yr; 10 ³ tons/yr for CO ₂) ^d			
			SO ₂	NO _x	Hg	CO ₂
2,650	236–424	413–743	546–982	629–1,133	0.004–0.006	408–734
Percentage of total emissions from electric power systems in the state of Colorado ^e			0.87–1.6%	0.87–1.6%	0.87–1.6%	0.87–1.6%
Percentage of total emissions from all source categories in the state of Colorado ^f			0.46–0.83%	0.15–0.28%	– ^g	0.39–0.71%
Percentage of total emissions from electric power systems in the six-state study area ^e			0.22–0.39%	0.17–0.31%	0.12–0.22%	0.16–0.28%
Percentage of total emissions from all source categories in the six-state study area ^f			0.12–0.21%	0.02–0.04%	–	0.05–0.09%

- a To convert acres to km², multiply by 0.004047.
- b It is assumed that the SEZ would eventually have development on 80% of the lands and that a range of 5 acres (0.020 km²) per MW (for parabolic trough technology) to 9 acres (0.036 km²) per MW (power tower, dish engine, and photovoltaic technologies) would be required.
- c Assumed a capacity factor of 20%.
- d Composite combustion-related emission factors for SO₂, NO_x, Hg, and CO₂ of 2.64, 3.05, 1.71 × 10⁻⁵, and 1,976 lb/MWh, respectively, were used for the state of Colorado.
- e Emission data for all air pollutants are for 2005.
- f Emission data for SO₂ and NO_x are for 2002, while those for CO₂ are for 2005.
- g A dash indicates not estimated.

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

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On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those analyses due to changes to the SEZ boundaries, 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.

1 **10.4.14 Visual Resources**

2
3
4 **10.4.14.1 Affected Environment**

5
6 The proposed Los Mogotes East SEZ, as revised, extends approximately 5.0 mi (8.0 km)
7 north to south and 1.0 mi (1.6 km) east to west. The SEZ has been revised to eliminate
8 3,268 acres (13.2 km²), primarily within the western half of the SEZ. The proposed Los Mogotes
9 East SEZ now occupies an area of 2,650 acres (10.7 km²). Because of the reduction in the size of
10 the SEZ, the total acreage of the lands visible within the 25-mi (40-km) viewshed of the SEZ has
11 decreased.

12
13 An updated visual resources inventory (VRI) map for the SEZ and surrounding lands is
14 shown in Figure 10.4.14.1-1; it provides information from the BLM’s September 2010 VRI,
15 which was finalized in October 2011 (BLM 2011a). As shown, the VRI value for the SEZ still
16 is VRI Class III, indicating moderate relative visual values.

17
18 Lands in the La Jara Field Office within the 25-mi (40-km), 650-ft (198-m) viewshed
19 of the revised SEZ include 42,978 acres (173.9 km²) of VRI Class II areas; 50,825 acres
20 (205.7 km²) of VRI Class III areas; and 23,210 acres (93.9 km²) of VRI Class IV areas.

21
22
23 **10.4.14.2 Impacts**

24
25 The reduction in size of the SEZ would reduce the total visual impacts associated
26 with solar energy development in the SEZ. It would limit the total amount of solar facility
27 infrastructure that would be visible and would reduce the geographic extent of the visible
28 infrastructure.

29
30 The reduction in size of the SEZ eliminated approximately 55% of the original SEZ. The
31 resulting visual contrast reduction for any given point within view of the SEZ would vary greatly
32 depending on the viewpoint’s distance and direction from the SEZ. Contrast reduction generally
33 would be greatest for viewpoints closest to the portions of the SEZ that were eliminated,
34 especially for those that had wide-angle views of these areas. In general, contrast reductions
35 also would be larger for elevated viewpoints relative to non-elevated viewpoints, because the
36 reduction in area of the solar facilities would be more apparent when looking down at the SEZ
37 than when looking across it.

38
39
40 ***10.4.14.2.1 Impacts on the Proposed Los Mogotes East SEZ***

41
42 Although the reduction in the size of the SEZ would reduce visual contrasts associated
43 with solar development, solar development within the SEZ still would involve major
44 modification of the existing character of the landscape and would likely dominate the views from
45 most locations within the SEZ. Additional impacts would occur as a result of the construction,
46 operation, and decommissioning of related facilities, such as access roads and electric

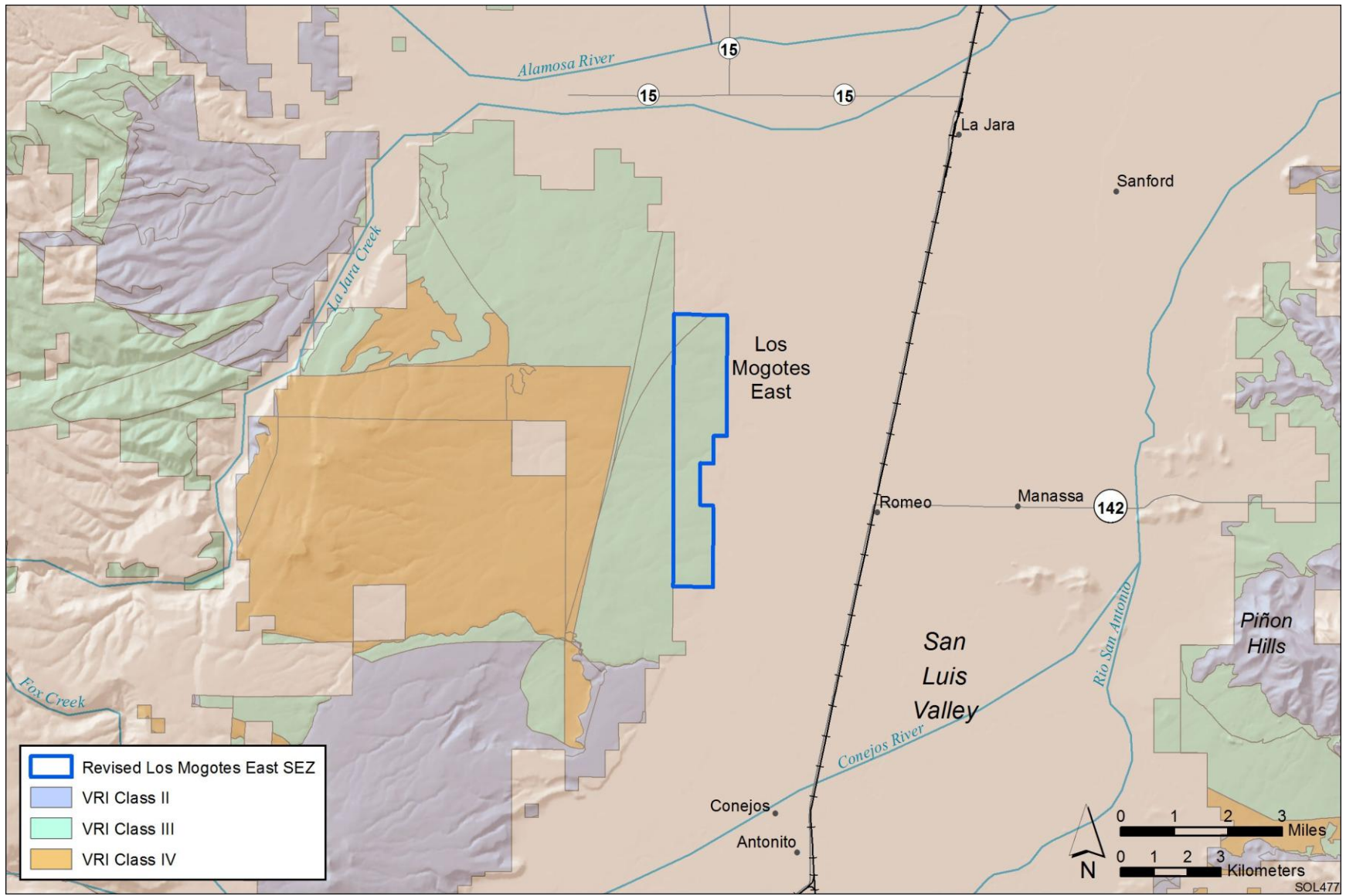


FIGURE 10.4.14.1-1 Visual Resource Inventory Values for the Proposed Los Mogotes East SEZ as Revised

1 transmission lines. In general, strong visual contrasts from solar development still would be
2 expected to be observed from viewing locations within the SEZ.

3 4 5 ***10.4.14.2.2 Impacts on Lands Surrounding the Proposed Los Mogotes East SEZ*** 6

7 For the Draft Solar PEIS, preliminary viewshed analyses were conducted to identify
8 which lands surrounding the proposed SEZ could have views of solar facilities in at least some
9 portion of the SEZ (see Appendixes M and N of the Draft Solar PEIS for important information
10 on assumptions and limitations of the methods used). Four viewshed analyses were conducted,
11 assuming four different heights representative of project elements associated with potential solar
12 energy technologies: PV and parabolic trough arrays, 24.6 ft (7.5 m); solar dishes and power
13 blocks for CSP technologies, 38 ft (11.6 m); transmission towers and short solar power towers,
14 150 ft (45.7 m); and tall solar power towers, 650 ft (198.1 m).
15

16 These same viewsheds were recalculated in order to account for the boundary changes
17 described in the Supplement to the Draft Solar PEIS. Figure 10.4.14.2-1 shows the combined
18 results of the viewshed analyses for all four solar technologies. The colored portions indicate
19 areas with clear lines of sight to one or more areas within the SEZ and from which solar facilities
20 within these areas of the SEZ would be expected to be visible, assuming the absence of screening
21 vegetation or structures and adequate lighting and other atmospheric conditions. The light brown
22 areas are locations from which PV and parabolic trough arrays located in the SEZ could be
23 visible. Solar dishes and power blocks for CSP technologies would be visible from the areas
24 shaded light brown and the additional areas shaded light purple. Transmission towers and short
25 solar power towers would be visible from the areas shaded light brown, light purple, and the
26 additional areas shaded dark purple. Power tower facilities located in the SEZ could be visible
27 from areas shaded light brown, light purple, dark purple, and at least the upper portions of power
28 tower receivers could be visible from the additional areas shaded medium brown.
29
30

31 ***10.4.14.2.3 Impacts on Selected Federal-, State-, and BLM-Designated Sensitive*** 32 ***Visual Resource Areas and Other Lands and Resources*** 33

34 Figure 10.4.14.2-2 shows the results of a GIS analysis that overlays selected federal-,
35 state-, and BLM-designated sensitive visual resource areas onto the combined tall solar power
36 tower (650 ft [198.1 m]) and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds, in order
37 to illustrate which of these sensitive visual resource areas could have views of solar facilities
38 within the SEZ and therefore potentially would be subject to visual impacts from those facilities.
39 Distance zones that correspond with BLM's VRM system-specified foreground-middleground
40 distance (5 mi [8 km]), background distance (15 mi [24 km]), and a 25-mi (40-km) distance
41 zone are shown as well, in order to indicate the effect of distance from the SEZ on impact
42 levels, which are highly dependent on distance. A similar analysis was conducted for the Draft
43 Solar PEIS.
44
45

1 The scenic resources included in the viewshed analyses were as follows:
2

- 3 • National Parks, National Monuments, National Recreation Areas, National
4 Preserves, National Wildlife Refuges, National Reserves, National
5 Conservation Areas, National Historic Sites;
6
- 7 • Congressionally authorized Wilderness Areas;
8
- 9 • Wilderness Study Areas;
10
- 11 • National Wild and Scenic Rivers;
12
- 13 • Congressionally authorized Wild and Scenic Study Rivers;
14
- 15 • National Scenic Trails and National Historic Trails;
16
- 17 • National Historic Landmarks and National Natural Landmarks;
18
- 19 • All-American Roads, National Scenic Byways, State Scenic Highways, and
20 BLM- and USFS-designated scenic highways/byways;
21
- 22 • BLM-designated Special Recreation Management Areas; and
23
- 24 • ACECs designated because of outstanding scenic qualities.
25

26 The results of the GIS analyses are summarized in Table 10.4.14.2-1. The change in size
27 of the SEZ alters the viewshed, such that the visibility of the SEZ and solar facilities within the
28 SEZ from the surrounding lands would be reduced. With the reduction in size of the SEZ, solar
29 energy development within the SEZ would be expected to create minimal or weak visual
30 contrasts for viewers within most of the surrounding scenic resource areas and other resources
31 listed in Table 10.4.14.2-1. Exceptions include the San Luis Hills WSA and ACEC and the
32 Los Antiguos Caminos Scenic Byway. In these three areas, moderate or strong visual contrasts
33 still could occur.
34

35 In addition to these areas, impacts on other lands and resource areas also were evaluated.
36 These areas include the surrounding communities of Antonito, Conejos, La Jara, Manassa,
37 Romeo, and Sanford; the CTSR; and the West Fork of the North Branch of the Old Spanish
38 Trail.
39

40 ***10.4.14.2.4 Summary of Visual Resource Impacts for the Proposed Los Mogotes*** 41 ***East SEZ*** 42

43
44 The visual contrast analysis in the Draft Solar PEIS determined that because there could
45 be multiple solar facilities within the Los Mogotes East SEZ, a variety of technologies employed,
46 and a range of supporting facilities required, solar development within the SEZ would make it

1 **TABLE 10.4.14.2-1 Selected Potentially Affected Sensitive Visual Resources within a 25-mi**
 2 **(40-km) Viewshed of the Proposed Los Mogotes East SEZ as Revised, Assuming a Target Height of**
 3 **650 ft (198.1 m)**

Feature Type	Feature Name (Total Acreage/ Linear Distance) ^{a,b}	Feature Area or Linear Distance ^c		
		Visible within 5 mi	Visible Between	
			0 and 15 mi	0 and 25 mi
WAs	Cruces Basin (18,876 acres)	0 acres	0 acres	1,052 acres (6%)
	South San Juan (160,832 acres)	0 acres	0 acres	2,997 acres (2%)
WSAs	San Antonio (7,321 acres)	0 acres	3,890 acres (53%)	2,158 acres (29%)
	San Luis Hills (10,896 acres)	0 acres	3,245 acres (30%)	0 acres
National Scenic Trail	Continental Divide (591 mi) ^d	0 mi	0 mi	5.9 mi (1%)
National Historic Landmark	Pike's Stockade (4 acres)	0 acres	4 acres (100%)	0 acres
NWRs	Alamosa (12,098 acres)	0 acres	0 acres	12,062 acres (100%)
	Monte Vista (14,761 acres)	0 acres	0 acres	14,713 acres (100%)
ACECs designated for outstanding scenic values	San Luis Hills (39,421 acres)	0 acres	15,475 acres (39%)	0 acres (0%)
	CTSR Corridor (3,868 acres)	0 acres	1,577 acres (41%)	0 acres
	San Antonio Gorge (377 acres)	0 acres	131 acres (35%)	30 acres (8%)
Scenic Highway/ Byway	Los Caminos Antiguos (129 mi) ^e	8.3 mi (6%)	15.0 mi (11%)	8.2 mi (6%)

^a To convert acres to km², multiply by 0.004047.

^b To convert mi to km, multiply by 1.609.

^c Percentage of total feature acreage or road length viewable.

^d Mileage of Colorado portion of the Trail built as of 2009. Source: Continental Divide Trail Association (2012).

^e Source: America's Byways (2011).

1 essentially industrial in appearance and would contrast strongly with the surrounding mostly
2 natural-appearing landscape.

3
4 The reduction in size of the SEZ would reduce the visual contrast associated with solar
5 facilities as seen both within the SEZ and from surrounding lands in both daytime and nighttime
6 views. The reductions in visual contrast can be summarized as follows:

- 7
8 • Within the Los Mogotes East SEZ: Contrasts experienced by viewers within
9 the western portion of the SEZ would be reduced because of the elimination
10 of more than half the total area of the SEZ, as it was originally proposed in the
11 Draft Solar PEIS. However, strong contrasts still could be observed in the
12 remaining developable area.
- 13
14 • Cruces Basin WA: A slight reduction in contrasts would be anticipated
15 because of the elimination of acreage in the western half of the SEZ; solar
16 development within the SEZ still would cause minimal to weak contrasts.
- 17
18 • South San Juan WA: A slight reduction in contrasts would be anticipated;
19 solar development within the SEZ still would cause minimal to weak
20 contrasts.
- 21
22 • San Antonio WSA: A slight reduction in contrasts would be anticipated; solar
23 development within the SEZ still would cause minimal to weak contrasts,
24 depending on viewer location in the WSA.
- 25
26 • San Luis Hills WSA: A reduction in contrasts would be anticipated; solar
27 development within the SEZ still would cause weak to moderate contrasts,
28 depending on viewer location in the WSA.
- 29
30 • Continental Divide National Scenic Trail: A slight reduction in contrasts
31 would be anticipated due to the elimination of acreage in the western half of
32 the SEZ; solar development within the SEZ still would cause minimal to weak
33 contrasts, depending on viewer location on the trail.
- 34
35 • Pike's Stockade National Historic Landmark: A slight reduction in contrasts
36 would be anticipated; solar development within the SEZ still would cause
37 minimal to weak contrasts.
- 38
39 • Alamosa NWR: A very slight reduction in contrasts would be anticipated;
40 solar development within the SEZ still would cause minimal contrasts.
- 41
42 • Monte Vista NWR: A very slight reduction in contrasts would be anticipated;
43 solar development within the SEZ still would cause minimal contrasts.
- 44
45 • San Luis Hills ACEC: A reduction in contrasts would be anticipated; solar
46 development within the SEZ still would cause weak to moderate contrasts.

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- CTSR Corridor ACEC: A reduction in contrasts would be anticipated; solar development within the SEZ still would cause weak contrasts.
- San Antonio Gorge ACEC: No impacts are anticipated since the creek and ACEC are within a canyon.
- Los Caminos Antiguos Scenic Byway: A very slight reduction in contrasts would be anticipated; solar development within the SEZ still would cause weak to strong contrasts, depending on viewer location on the byway.
- Antonito: A slight reduction in contrasts would be anticipated; solar development within the SEZ still would cause weak contrasts.
- Conejos: A slight reduction in contrasts would be anticipated; solar development within the SEZ still would cause weak contrasts.
- La Jara: A slight reduction in contrasts would be anticipated; solar development within the SEZ still would cause moderate contrasts.
- Manassa: A slight reduction in contrasts would be anticipated; solar development within the SEZ still would cause strong contrasts.
- Romeo: A slight reduction in contrasts would be anticipated; solar development within the SEZ still would cause strong contrasts.
- Sanford: A slight reduction in contrasts would be anticipated; solar development within the SEZ still would cause moderate to strong contrasts.
- CTSR: A reduction in contrasts would be anticipated; solar development within the SEZ still would cause weak contrasts.
- West Fork of the North Branch of the Old Spanish Trail: A reduction in contrasts would be anticipated because of the elimination of acreage in the western half of the SEZ; however, solar development within the SEZ still would cause minimal to strong contrasts depending on observer location on the Trail.

In addition, the proposed Antonito Southeast SEZ is relatively close to the proposed Los Mogotes East SEZ (approximately 7 mi [11.3 km]). A majority of the Antonito Southeast SEZ is located within the 25-mi (40-km) viewshed of the Los Mogotes East SEZ, and some of the sensitive visual resource areas discussed above may be subject to impacts associated with both SEZs.

10.4.14.3 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. With 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 the 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, updates to those analyses due to changes to the SEZ boundaries, and consideration of comments received as applicable, the following proposed SEZ-specific design feature for the SEZ has 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 receivers atop the towers, 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 this source of impacts, thus substantially reducing potential visual impacts on the West Fork of the North Branch of the Old Spanish Trail; the Los Caminos Antiguos Scenic Byway; the other sensitive visual resource areas identified above; and the communities of Antonito, Conejos, La Jara, Manassa, Romeo, and Sanford.

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.

1 **10.4.15 Acoustic Environment**

2
3
4 **10.4.15.1 Affected Environment**

5
6 The size of the proposed Los Mogotes East SEZ was reduced by about 55%, from
7 5,918 acres (23.9 km²) to 2,650 acres (10.7 km²) by removing the western half of the originally
8 proposed SEZ. Distances to the nearest residences and towns, which are all located north, east,
9 or south of the SEZ, remain the same as in the Draft Solar PEIS. The updated distance to the
10 Los Mogotes ACEC, located to the west, is about 2 mi (3.2 km), greater than the distance of
11 about 1 mi (1.6 km) in the Draft Solar PEIS.

12
13
14 **10.4.15.2 Impacts**

15
16 Based on the boundary changes and reduced size of the proposed Los Mogotes East SEZ,
17 noise impacts from construction and operations were remodeled for this Final Solar PEIS.
18 Distances from the SEZ to the nearest residences and towns have not changed, and except as
19 noted below for impacts on specially designated areas and impacts from operating dish engine
20 facilities, the conclusions of the Draft Solar PEIS remain valid.

21
22
23 **10.4.15.2.1 Construction**

24
25 Except as noted below for impacts in specially designated areas, the conclusions in the
26 Draft Solar PEIS remain valid.

27
28 On the basis of comments received and recent references as applicable, this Final Solar
29 PEIS used an updated approximate significance threshold of 55 dBA corresponding to the onset
30 of adverse physiological impacts (Barber et al. 2010) to update the analysis of potential noise
31 impacts on terrestrial wildlife in areas of special concern. As a result of this updated analysis, the
32 conclusion in the Draft Solar PEIS that wildlife would not be adversely affected has been
33 updated for this Final Solar PEIS as follows. With construction activities occurring near the
34 southwestern SEZ boundary, the estimated noise level at the boundary of the Los Mogotes
35 ACEC (about 2 mi [3 km] to the west) is about 34 dBA. This estimated level is below the
36 updated significance threshold, and thus noise from construction in the proposed Los Mogotes
37 East SEZ is not anticipated to adversely affect wildlife in the nearby specially designated areas.
38 However, as discussed in Section 5.10.2 of this Final Solar PEIS, there is the potential for other
39 effects (e.g., startle or masking) to occur at lower noise levels (Barber et al. 2011). With these
40 impacts and the potential for impacts at lower noise levels, impacts on terrestrial wildlife from
41 construction noise would have to be considered on a project-specific basis, including site-
42 specific background levels and hearing sensitivity for site-specific terrestrial wildlife of concern.
43 However, even considering potential impacts at these lower noise levels, construction noise at
44 the SEZ would not be anticipated to affect wildlife there.

1 For construction activities occurring near the eastern SEZ boundary, the estimated noise
2 level at the West Fork of the North Branch of the Old Spanish Trail (about 1.0 mi [1.6 km] to the
3 east) would be about 42 dBA, which is just above the typical daytime mean rural background
4 level of 40 dBA but less than a just noticeable difference of 3 dBA. The conclusion in the Draft
5 Solar PEIS that construction occurring near the eastern SEZ boundary would result in minor
6 noise impacts on the West Fork of the North Branch of the Old Spanish Trail is updated for this
7 Final Solar PEIS to conclude that the noise impacts would be negligible and temporary.
8

9 Overall, construction would cause some unavoidable but localized short-term impacts on
10 neighboring communities, particularly for activities occurring near the eastern proposed SEZ
11 boundary, close to the nearby residences. No adverse vibration impacts are anticipated from
12 construction activities, including pile driving for dish engines.
13

14 **10.4.15.2.2 Operations**

15 The conclusions presented in the Draft Solar PEIS remain valid, except as noted below
16 for impacts from TES and dish engine facilities near residences or in specially designated areas.
17

18 **Parabolic Trough and Power Tower**

19
20
21
22
23 If TES were not used for parabolic trough and power tower technologies (12 hours of
24 daytime operations only), estimated noise levels at the nearest residence about 0.4 mi (0.6 km)
25 from the SEZ boundary would be about 45 dBA, which exceeds the typical daytime mean rural
26 background of 40 dBA. The day-night average noise level of 44 dBA L_{dn} would be well below
27 the EPA guideline of 55 dBA L_{dn} for residential areas. If TES were used, the estimated nighttime
28 noise level at the nearest residence would be about 55 dBA, which is significantly higher than
29 the typical nighttime mean rural background level of 30 dBA. The day-night average noise level
30 is estimated to be about 57 dBA L_{dn} , which is a little higher than the EPA guideline of 55 dBA
31 L_{dn} for residential areas. The assumptions are conservative in terms of operating hours, and no
32 credit was given to other attenuation mechanisms. Thus, it is likely that noise levels would be
33 lower than 53 dBA L_{dn} at the nearest residence, even if TES were used at a solar facility.
34 Nonetheless, operating parabolic trough or power tower facilities with TES located near the
35 southeastern SEZ boundary could result in noise impacts on the nearest residence, depending
36 on background noise levels and meteorological conditions.
37

38 As stated above under construction impacts, for this Final Solar PEIS an updated
39 approximate significance threshold of 55 dBA was used to evaluate potential noise impacts on
40 terrestrial wildlife in areas of special concern. With TES operating near the western SEZ
41 boundary, estimated daytime and nighttime noise levels at the boundary of the Los Mogotes
42 ACEC (about 2 mi [3 km] to the west) would be about 36 and 46 dBA, respectively. These
43 estimated levels are below the significance threshold; thus, noise from operations in the proposed
44 Los Mogotes East SEZ is not anticipated to adversely affect wildlife in the nearby specially
45 designated area. However, as discussed in Section 5.10.2, there is the potential for other effects
46 (e.g., startle) to occur at lower noise levels (Barber et al. 2011). With these impacts and the

1 potential for impacts at lower noise levels, noise impacts on terrestrial wildlife from a parabolic
2 trough or power tower facility equipped with TES would have to be considered on a project-
3 specific basis, including site-specific background levels and hearing sensitivity for site-specific
4 terrestrial wildlife of concern.

5
6 Associated with operation of a parabolic trough or power tower facility equipped with
7 TES occurring at the eastern boundary of the SEZ, the estimated daytime and nighttime noise
8 levels at the West Fork of the North Branch of the Old Spanish Trail (about 1.0 mi [1.6 km] to
9 the east) would be about 41 and 51 dBA, respectively, which are comparable to and far above
10 the typical daytime and nighttime mean rural background levels of 40 and 30 dBA. Accordingly,
11 operation of a solar facility with TES located near the eastern SEZ boundary could result in noise
12 impacts on the West Fork of the North Branch of the Old Spanish Trail during nighttime hours.

13 14 15 **Dish Engines**

16
17 The reduced size of the proposed Los Mogotes East SEZ would reduce the maximum
18 potential number of 25-kW dish engines to 9,420 covering 2,120 acres (8.6 km²); the Draft Solar
19 PEIS modeled 21,040 dish engines covering 4,734 acres (19.2 km²). The estimated noise level at
20 the nearest residence about 0.4 mi (0.6 km) from the SEZ boundary would be about 47 dBA,
21 which is higher than the typical daytime mean rural background level of 40 dBA. The estimated
22 day-night average noise level of 46 dBA L_{dn} at these residences is below the EPA guideline of
23 55 dBA L_{dn} for residential areas. The conclusion of the Draft Solar PEIS that noise from dish
24 engines could cause adverse impacts on the nearest residence, depending on background noise
25 levels and meteorological conditions, remains valid.

26
27 As stated above under construction impacts, for this Final Solar PEIS an updated
28 approximate significance threshold of 55 dBA was used to evaluate potential noise impacts on
29 terrestrial wildlife in areas of special concern. The estimated noise level from operation of a dish
30 engine solar facility at the boundary of the Los Mogotes ACEC (about 2 mi [3 km] to the west)
31 is about 41 dBA. This estimated level is below the significance threshold; thus, noise from
32 operations in the proposed Los Mogotes East SEZ is not anticipated to adversely affect wildlife
33 in the nearby specially designated area. However, as discussed in Section 5.10.2, there is the
34 potential for other effects to occur at lower noise levels (Barber et al. 2011). With these impacts
35 and the potential for impacts at lower noise levels, noise impacts on terrestrial wildlife from a
36 dish engine facility would have to be considered on a project-specific basis, including site-
37 specific background levels and hearing sensitivity for site-specific terrestrial wildlife of concern.

38
39 Assuming full build-out of the SEZ with dish engine facilities, the estimated noise level
40 at the West Fork of the North Branch of the Old Spanish Trail (about 1.0 mi [1.6 km] to the east
41 of the SEZ) would be about 46 dBA, which is above the typical daytime mean rural background
42 level of 40 dBA. Dish engine noise from the SEZ could result in minor noise impacts on the
43 West Fork of the North Branch of the Old Spanish Trail.

44
45 Changes in the proposed Los Mogotes East SEZ boundaries would not alter the
46 discussions of vibration, transformer and switchyard noise, and transmission line corona

1 discharge presented in the Draft Solar PEIS. Noise impacts from vibration and transformer and
2 switchyard noise would be minimal. Noise impacts from transmission line corona discharge
3 would be negligible.
4
5

6 **10.4.15.2.3 Decommissioning and Reclamation**

7

8 The conclusions on decommissioning and reclamation in the proposed Los Mogotes East
9 SEZ as presented in the Draft Solar PEIS remain valid. Decommissioning and reclamation
10 activities would be of short duration, and their potential noise impacts would be minor and
11 temporary. Potential noise and vibration impacts on surrounding communities would be minimal.
12
13

14 **10.4.15.3 SEZ-Specific Design Features and Design Feature Effectiveness**

15

16 Required programmatic design features that would reduce noise impacts are described in
17 Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the programmatic design
18 features will provide some protection from noise impacts.
19

20 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
21 analyses due to changes to the SEZ boundaries, and consideration of comments received as
22 applicable, no SEZ-specific design features for noise were identified. Some SEZ-specific design
23 features may be identified through the process of preparing parcels for competitive offer and
24 subsequent project-specific analysis.
25
26

27 **10.4.16 Paleontological Resources**

28
29

30 **10.4.16.1 Affected Environment**

31

32 Data provided in the Draft Solar PEIS remain valid, with the following updates:
33

- 34 • The ratio of the PFYC in the SEZ has changed with the new footprint; the
35 Class 1 areas of low potential have been reduced from 88% to 73% of the
36 SEZ, and the Class 4/5 areas of higher paleontological potential have been
37 increased from 12% to 27% of the SEZ. In the Class 4/5 areas, the depth of
38 the Alamosa Formation would need to be determined.
39
- 40 • The BLM Regional Paleontologist may have additional information regarding
41 the paleontological potential of the SEZ and be able to verify the PFYCs of
42 the SEZ as Class 1 and Class 4/5 as used in the Draft Solar PEIS.
43
44
45

1 **10.4.16.2 Impacts**
2

3 The assessment provided in the Draft Solar PEIS remains valid. Impacts on significant
4 paleontological resources in the PFYC Class 1 areas are unlikely. In the PFYC Class 4/5 areas,
5 impacts on significant paleontological resources have a greater potential to occur. However, a
6 more detailed look at the geological deposits is needed to determine whether a paleontological
7 survey is warranted.
8

9
10 **10.4.16.3 SEZ-Specific Design Features and Design Feature Effectiveness**
11

12 Required programmatic design features are described in Section A.2.2 of Appendix A
13 of this Final Solar PEIS. Impacts would be minimized through the implementation of required
14 programmatic design features, including a stop-work stipulation in the event that paleontological
15 resources are encountered during construction, as described in Section A.2.2 of Appendix A.
16

17 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of
18 comments received as applicable, the following SEZ-specific design feature for paleontological
19 resources has been identified:
20

- 21 • Avoidance of PFYC Class 4/5 areas is recommended for development within
22 the proposed Los Mogotes East SEZ and for access road placement. Where
23 avoidance of Class 4/5 deposits is not possible, a paleontological survey
24 would be required.
25

26 Additional SEZ-specific design features would depend on the results of future
27 paleontological investigations. Some SEZ-specific design features may be identified through
28 the process of preparing parcels for competitive offer and subsequent project-specific analysis.
29

30 As additional information on paleontological resources (e.g., from regional
31 paleontologists or from new surveys) becomes available, the BLM will post the data to a
32 public Web site for use by applicants, the BLM, and other stakeholders.
33

34
35 **10.4.17 Cultural Resources**
36

37
38 **10.4.17.1 Affected Environment**
39

40 Data provided in the Draft Solar PEIS remain valid, with the following updates:
41

- 42 • The new footprint of the SEZ does not include the areas that had been
43 previously surveyed for cultural resources, bringing the percentage of area
44 surveyed down from 0.02% to 0.0%.
45

- 1 • Additional information may be available to characterize the SEZ and its
2 surrounding area in the future (after this Final Solar PEIS is completed), as
3 follows:
 - 4 – Results of an ethnographic study currently being conducted by TRC
5 Solutions, which focuses on Native American use of lands being analyzed
6 for solar development within the San Luis Valley. The study will discuss
7 sensitive and traditional use areas. Interviews with tribal members and
8 field visits will facilitate the identification of resources and sites of
9 traditional and religious importance to tribes.
 - 10 – Results of a Class II sample survey of the SEZ designed to obtain a
11 statistically valid sample of archeological properties and their distribution
12 within the SEZ. Results from the ethnographic study and the sample
13 inventory can be combined to project cultural sensitivity zones as an aid in
14 planning future solar developments.
 - 15 – Identification of the integrity and historical significance of the portion of
16 the West Fork of the North Branch of the Old Spanish National Historic
17 Trail in the vicinity of the SEZ and viewshed analyses from key
18 observation points along the Trail. If this portion of the Trail is determined
19 significant, a mitigation strategy would need to be developed to address
20 unavoidable impacts on the Trail.
 - 21 – Continuation of government-to-government consultation, as described in
22 Section 2.4.3 of the Supplement to the Draft Solar PEIS and IM 2012-032
23 (BLM 2011b), including follow-up to recent ethnographic studies
24 covering some SEZs in Nevada and Utah with tribes not included in the
25 original studies to determine whether those tribes have similar concerns.
26

27 28 **10.4.17.2 Impacts**

29
30 The assessment provided in the Draft Solar PEIS remains valid. Impacts on significant
31 cultural resources are possible in the proposed Los Mogotes East SEZ. While no sites have been
32 identified in the SEZ, many significant archaeological sites have been located in close proximity
33 to the SEZ. A survey of the West Fork of the North Branch of the Old Spanish Trail is needed to
34 determine its location, integrity, and the significance of portions of the Trail from which future
35 potential development in the SEZ could be viewed. The assessment provided in the Draft Solar
36 PEIS remains valid with the following update:

- 37
38 • Impacts on significant cultural resources and cultural landscapes associated
39 with American Latino heritage are possible throughout the San Luis Valley.
40

41 42 **10.4.17.3 SEZ-Specific Design Features and Design Feature Effectiveness**

43
44 Required programmatic design features that would reduce impacts on cultural resources
45 are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Programmatic design
46 features will be applied to address SEZ-specific resources and conditions, for example:

- 1 • For projects in the Los Mogotes SEZ that are located within the viewshed of
2 the West Fork of the North Branch of the Old Spanish Trail, a National Trail
3 inventory will be required to determine the area of possible adverse impact
4 on resources, qualities, values, and associated settings of the Trail; to
5 prevent substantial interference; and to determine any areas unsuitable for
6 development. Residual impacts will be avoided, minimized, and/or mitigated
7 to the extent practicable according to program policy standards. Programmatic
8 design features have been included in BLM's Solar Energy Program to
9 address impacts on National Historic Trails (see Section A.2.2.23 of
10 Appendix A).

11
12 Programmatic design features also assume that the necessary surveys, evaluations, and
13 consultations will occur. Ongoing consultation with the Colorado SHPO and the appropriate
14 Native American governments would be conducted during the development of the proposed
15 Los Mogotes East SEZ. It is likely that adverse effects on significant resources in the valley
16 could be mitigated to some degree through such efforts, although mitigation will not eliminate
17 the adverse effects unless significant resources are avoided entirely.

18
19 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration
20 of comments received as applicable, the following SEZ-specific design features have been
21 identified:

- 22
23 • Development of an MOA may be needed among the BLM, Colorado SHPO,
24 and other parties, such as the ACHP, to address the adverse effects of solar
25 energy development on historic properties. The agreement may specify
26 avoidance, minimization, or mitigation measures. Should an MOA be
27 developed to resolve adverse effects on the West Fork of the North Branch
28 of the Old Spanish Trail, the Trail Administration for the Old Spanish Trail
29 (BLM-NMSO and National Park Service [NPS] Intermountain Trails Office,
30 Santa Fe) should be included in the development of that MOA.
- 31
32 • Additional coordination with the CTSR Commission is recommended to
33 address possible mitigation measures for reducing visual impacts on the
34 CTSR.

35
36 The need for and nature of additional SEZ-specific design features will depend on the
37 results of future investigations. Some additional SEZ-specific design features may be identified
38 through the process of preparing parcels for competitive offer and subsequent project-specific
39 analysis.

1 **10.4.18 Native American Concerns**

2
3
4 **10.4.18.1 Affected Environment**

5
6 Data provided in the Draft Solar PEIS remain valid but will be supplemented in the
7 future by the results of the ethnographic study being completed in the San Luis Valley (see
8 Section 10.1.17.1).

9
10
11 **10.4.18.2 Impacts**

12
13 The description of potential concerns provided in the Draft Solar PEIS remains valid. No
14 direct impacts from solar energy development are likely to occur to culturally significant areas
15 (i.e., San Luis Lakes, the Great Sand Dunes, and Blanca Peak); however, indirect visual and
16 auditory impacts are possible. It is likely that traditional plant resources and animal habitats
17 would be directly affected with solar energy development in the proposed Los Mogotes East
18 SEZ.

19
20
21 **10.4.18.3 SEZ-Specific Design Features and Design Feature Effectiveness**

22
23 Required programmatic design features that would reduce impacts on Native American
24 concerns are described in Section A.2.2 of Appendix A of this Final Solar PEIS. For example,
25 impacts would be minimized through the implementation of required programmatic design
26 features such as avoidance of sacred sites, water sources, and tribally important plant and animal
27 species. Programmatic design features assume that the necessary surveys, evaluations, and
28 consultations will occur. The tribes would be notified regarding the results of archaeological
29 surveys, and they would be contacted immediately upon any discovery of Native American
30 human remains and associated cultural items.

31
32 On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of
33 comments received as applicable, no SEZ-specific design features to address Native American
34 concerns have been identified. The need for and nature of SEZ-specific design features would be
35 determined during government-to-government consultation with affected tribes as part of the
36 process of preparing parcels for competitive offer and subsequent project-specific analysis.
37 Potentially significant sites and landscapes the SEZ associated with Blanca Peak, Great Sand
38 Dunes, and San Luis Lakes, as well as trail systems, mountain springs, mineral resources, burial
39 sites, ceremonial areas, water resources, and plant and animal resources, should be considered
40 and discussed during consultation.

1 **10.4.19 Socioeconomics**

2
3
4 **10.4.19.1 Affected Environment**

5
6 Although the boundaries of the Los Mogotes East SEZ have been reduced compared to
7 the boundaries given in the Draft Solar PEIS, the socioeconomic ROI, the area in which site
8 employees would live and spend their wages and salaries, and into which any in-migration
9 would occur, includes the same counties and communities as described in the Draft Solar PEIS,
10 meaning that no updates to the affected environment information given in the Draft Solar PEIS
11 are required.

12
13
14 **10.4.19.2 Impacts**

15
16 Socioeconomic resources in the ROI around the SEZ could be affected by solar energy
17 development through the creation of direct and indirect employment and income, the generation
18 of direct sales and income taxes, SEZ acreage rental and capacity payments to BLM, the
19 in-migration of solar facility workers and their families, impacts on local housing markets, and
20 on local community service employment. The impact assessment provided in the Draft Solar
21 PEIS remains valid, with the following updates.

22
23
24 **10.4.19.2.1 Solar Trough**

25
26
27 **Construction**

28
29 Total construction employment impacts in the ROI (including direct and indirect impacts)
30 in 2021 from the use of solar trough technologies would be 2,039 jobs (Table 10.4.19.2-1).
31 Construction activities would constitute 3.1% of total ROI employment. A solar development
32 would also produce \$108.6 million in income. Direct sales taxes would be \$0.1 million; direct
33 income taxes, \$4.2 million.

34
35 With the scale of construction activities and the low likelihood that the entire
36 construction workforce in the required occupational categories would be available in the ROI,
37 construction of a solar facility would mean that some in-migration of workers and their families
38 from outside the ROI would be required, with up to 1,291 persons in-migrating into the ROI.
39 Although in-migration may potentially affect local housing markets, the relatively small number
40 of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile
41 home parks) would mean that the impact of solar facility construction on the number of vacant
42 rental housing units is not expected to be large, with up to 446 rental units expected to be
43 occupied in the ROI. This occupancy rate would represent 13.8% of the vacant rental units
44 expected to be available in the ROI.

1
2
3

TABLE 10.4.19.2-1 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Los Mogotes East SEZ as Revised with Trough Facilities

Parameter	Maximum Annual Construction Impacts ^a	Annual Operations Impacts ^b
Employment (no.)		
Direct	1,160	92
Total	2,039	145
Income ^c		
Total	108.6	4.6
Direct state taxes ^c		
Sales	0.1	0.1
Income	4.2	0.1
BLM payments ^c		
Rental	NA ^d	0.2
Capacity ^e	NA	2.8
In-migrants (no.)	1,291	59
Vacant housing ^f (no.)	446	37
Local community service employment		
Teachers (no.)	15	1
Physicians (no.)	2	0
Public safety (no.)	1	0

^a Construction impacts were based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 424 MW (corresponding to 2,120 acres [9 km²] of land disturbance) could be built.

^b Operations impacts were based on full build-out of the site, producing a total output of 424 MW.

^c Values are reported in \$ million 2008.

^d NA = not applicable.

^e The BLM annual capacity payment was based on a fee of \$6,570/MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010), assuming a solar facility with no storage capability, and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884/MW.

^f Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

4

1 In addition to the potential impact on housing markets, in-migration would affect
2 community service (education, health, and public safety) employment. An increase in such
3 employment would be required to meet existing levels of service in the ROI. Accordingly, up to
4 15 new teachers, 2 physicians, and 1 public safety employee (career firefighters and uniformed
5 police officers) would be required in the ROI. These increases would represent 1.4% of total ROI
6 employment expected in these occupations.
7
8

9 **Operations**

10
11 Total operations employment impacts in the ROI (including direct and indirect
12 impacts) of a full build-out of the SEZ using solar trough technologies would be 145 jobs
13 (Table 10.4.19.2-1). Such a solar development would also produce \$4.6 million in income.
14 Direct sales taxes would be \$0.1 million; direct income taxes, \$0.1 million. Based on fees
15 established by the BLM (BLM 2010), acreage rental payments would be \$0.2 million, and solar
16 generating capacity payments at least \$2.8 million.
17

18 As for the construction workforce, operation of a solar facility likely would require
19 some in-migration of workers and their families from outside the ROI, with up to 59 persons
20 in-migrating into the ROI. Although in-migration may potentially affect local housing markets,
21 the relatively small number of in-migrants and the availability of temporary accommodations
22 (hotels, motels, and mobile home parks) would mean that the impact of solar facility operation
23 on the number of vacant owner-occupied housing units is not expected to be large, with up to
24 37 owner-occupied units expected to be occupied in the ROI.
25

26 In addition to the potential impact on housing markets, in-migration would affect
27 community service (education, health, and public safety) employment. An increase in such
28 employment would be required to meet existing levels of service in the ROI. Accordingly,
29 one new teacher would be required in the ROI.
30
31
32

33 ***10.4.19.2.2 Power Tower***

34 **Construction**

35
36
37
38 Total construction employment impacts in the ROI (including direct and indirect impacts)
39 in 2021 from the use of power tower technologies would be 812 jobs (Table 10.4.19.2-2).
40 Construction activities would constitute 1.2% of total ROI employment. Such a solar
41 development would also produce \$43.3 million in income. Direct sales taxes would be less
42 than \$0.1 million; direct income taxes, \$1.7 million.
43

44 With the scale of construction activities and the low likelihood that the entire
45 construction workforce in the required occupational categories would be available in the ROI,
46 construction of a solar facility would mean that some in-migration of workers and their families

1
2
3

TABLE 10.4.19.2-2 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Los Mogotes East SEZ as Revised with Power Tower Facilities

Parameter	Maximum Annual Construction Impacts ^a	Annual Operations Impacts ^b
Employment (no.)		
Direct	462	48
Total	812	67
Income ^c		
Total	43.3	2.1
Direct state taxes ^c		
Sales	<0.1	<0.1
Income	1.7	0.1
BLM payments ^c		
Rental	NA ^d	0.2
Capacity ^e	NA	1.5
In-migrants (no.)	514	30
Vacant housing ^f (no.)	178	19
Local community service employment		
Teachers (no.)	6	0
Physicians (no.)	1	0
Public safety (no.)	1	0

^a Construction impacts were based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 236 MW (corresponding to 2,120 acres [12 km²] of land disturbance) could be built.

^b Operations impacts were based on full build-out of the site, producing a total output of 236 MW.

^c Values are reported in \$ million 2008.

^d NA = not applicable.

^e The BLM annual capacity payment was based on a fee of \$6,570/MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010), assuming a solar facility with no storage capability, and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884/MW.

^f Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

4

1 from outside the ROI would be required, with up to 514 persons in-migrating into the ROI.
2 Although in-migration may potentially affect local housing markets, the relatively small number
3 of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile
4 home parks) would mean that the impact of solar facility construction on the number of vacant
5 rental housing units is not expected to be large, with up to 178 rental units expected to be
6 occupied in the ROI. This occupancy rate would represent 5.5% of the vacant rental units
7 expected to be available in the ROI.
8

9 In addition to the potential impact on housing markets, in-migration would affect
10 community service (education, health, and public safety) employment. An increase in such
11 employment would be required to meet existing levels of service in the ROI. Accordingly, up
12 to six new teachers, one physician, and one public safety employee (career firefighters and
13 uniformed police officers) would be required in the ROI. These increases would represent 0.5%
14 of total ROI employment expected in these occupations.
15

16 **Operations**

17
18
19 Total operations employment impacts in the ROI (including direct and indirect
20 impacts) of a full build-out of the SEZ using power tower technologies would be 67 jobs
21 (Table 10.4.19.2-2). Such a solar development would also produce \$2.1 million in income.
22 Direct sales taxes would be less than \$0.1 million; direct income taxes, \$0.1 million. Based on
23 fees established by the BLM (BLM 2010), acreage rental payments would be \$0.2 million, and
24 solar generating capacity payments, at least \$1.5 million.
25

26 As for the construction workforce, operation of a solar facility likely would require some
27 in-migration of workers and their families from outside the ROI, with up to 30 persons
28 in-migrating into the ROI. Although in-migration may potentially affect local housing markets,
29 the relatively small number of in-migrants and the availability of temporary accommodations
30 (hotels, motels, and mobile home parks) would mean that the impact of solar facility operation
31 on the number of vacant owner-occupied housing units is not expected to be large, with up to
32 19 owner-occupied units expected to be required in the ROI.
33

34 No new community service employment would be required to meet existing levels of
35 service in the ROI.
36

37 **10.4.19.2.3 Dish Engine**

38 **Construction**

39
40
41
42
43 Total construction employment impacts in the ROI (including direct and indirect impacts)
44 in 2021 using dish engine technologies would be 330 jobs (Table 10.4.19.2-3). Construction
45 activities would constitute 0.5% of total ROI employment. Such a solar development would also

1
2
3

TABLE 10.4.19.2-3 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Los Mogotes East SEZ as Revised with Dish Engine Facilities

Parameter	Maximum Annual Construction Impacts ^a	Annual Operations Impacts ^b
Employment (no.)		
Direct	188	46
Total	330	66
Income ^c		
Total	17.6	2.0
Direct state taxes ^c		
Sales	<0.1	<0.1
Income	0.7	0.1
BLM payments ^c		
Rental	NA ^d	0.2
Capacity ^e	NA	1.5
In-migrants (no.)	209	30
Vacant housing ^f (no.)	72	18
Local community service employment		
Teachers (no.)	2	0
Physicians (no.)	0	0
Public safety (no.)	0	0

^a Construction impacts were based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 236 MW (corresponding to 2,120 acres [12 km²] of land disturbance) could be built.

^b Operations impacts were based on full build-out of the site, producing a total output of 236 MW.

^c Values are reported in \$ million 2008.

^d NA = not applicable.

^e The BLM annual capacity payment was based on a fee of \$6,570/MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010), assuming a solar facility with no storage capability, and full build-out of the site. Projects with three or more hours of storage would generate higher payments, based on a fee of \$7,884/MW.

^f Construction activities would affect vacant rental housing; operations activities would affect vacant owner-occupied housing.

1 produce \$17.6 million in income. Direct sales taxes would be less than \$0.1 million; direct
2 income taxes, \$0.7 million.

3
4 With the scale of construction activities and the low likelihood that the entire
5 construction workforce in the required occupational categories would be available in the ROI,
6 construction of a solar facility would mean that some in-migration of workers and their families
7 from outside the ROI would be required, with up to 209 persons in-migrating into the ROI.
8 Although in-migration may potentially affect local housing markets, the relatively small number
9 of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile
10 home parks) would mean that the impact of solar facility construction on the number of vacant
11 rental housing units is not expected to be large, with up to 72 rental units expected to be
12 occupied in the ROI. This occupancy rate would represent 2.2% of the vacant rental units
13 expected to be available in the ROI.

14
15 In addition to the potential impact on housing markets, in-migration would also affect
16 community service (education, health, and public safety) employment. An increase in such
17 employment would be required to meet existing levels of service in the ROI. Accordingly, up to
18 two new teachers would be required in the ROI. These increases would represent 0.2% of total
19 ROI employment expected in these occupations.

20 21 22 **Operations**

23
24 Total operations employment impacts in the ROI (including direct and indirect
25 impacts) of a full build-out of the SEZ using dish engine technologies would be 66 jobs
26 (Table 10.4.19.2-3). Such a solar development would also produce \$2.0 million in income.
27 Direct sales taxes would be less than \$0.1 million; direct income taxes, \$0.1 million. Based on
28 fees established by the BLM (BLM 2010), acreage rental payments would be \$0.2 million, and
29 solar generating capacity payments, at least \$1.5 million.

30
31 As for the construction workforce, operation of a solar facility likely would require some
32 in-migration of workers and their families from outside the ROI, with up to 30 persons
33 in-migrating into the ROI. Although in-migration may potentially affect local housing markets,
34 the relatively small number of in-migrants and the availability of temporary accommodations
35 (hotels, motels, and mobile home parks) would mean that the impact of solar facility operation
36 on the number of vacant owner-occupied housing units is not expected to be large, with up to
37 18 owner-occupied units expected to be required in the ROI.

38
39 No new community service employment would be required to meet existing levels of
40 service in the ROI.

1 **10.4.19.2.4 Photovoltaic**

2
3
4 **Construction**

5
6 Total construction employment impacts in the ROI (including direct and indirect impacts)
7 from the use of PV technologies would be 154 jobs (Table 10.4.19.2-4). Construction activities
8 would constitute 0.2% of total ROI employment. Such a solar development would also produce
9 \$8.2 million in income. Direct sales taxes would be less than \$0.1 million; direct income taxes,
10 \$0.3 million.

11
12 With the scale of construction activities and the low likelihood that the entire
13 construction workforce in the required occupational categories would be available in the ROI,
14 construction of a solar facility would mean that some in-migration of workers and their families
15 from outside the ROI would be required, with up to 98 persons in-migrating into the ROI.
16 Although in-migration may potentially affect local housing markets, the relatively small number
17 of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile
18 home parks) would mean that the impact of solar facility construction on the number of vacant
19 rental housing units is not expected to be large, with up to 34 rental units expected to be
20 occupied in the ROI. This occupancy rate would represent 1.0% of the vacant rental units
21 expected to be available in the ROI.

22
23 In addition to the potential impact on housing markets, in-migration would affect
24 community service (education, health, and public safety) employment. An increase in such
25 employment would be required to meet existing levels of service in the ROI. Accordingly,
26 one new teacher would be required in the ROI. This increase would represent 0.1% of total ROI
27 employment expected in this occupation.

28
29
30 **Operations**

31
32 Total operations employment impacts in the ROI (including direct and indirect impacts)
33 of a full build-out on the SEZ using PV technologies would be seven jobs (Table 10.4.19.2-4).
34 Such a solar development would also produce \$0.2 million in income. Direct sales taxes would
35 be less than \$0.1 million; direct income taxes, less than \$0.1 million. Based on fees established
36 by the BLM (BLM 2010), acreage rental payments would be \$0.2 million, and solar generating
37 capacity payments at least \$1.2 million.

38
39 As for the construction workforce, operation of a solar facility likely would require some
40 in-migration of workers and their families from outside the ROI, with up to three persons
41 in-migrating into the ROI. Although in-migration may potentially affect local housing markets,
42 the relatively small number of in-migrants and the availability of temporary accommodations
43 (hotels, motels, and mobile home parks) would mean that the impact of solar facility operation
44 on the number of vacant owner-occupied housing units is not expected to be large, with up to
45 two owner-occupied units expected to be required in the ROI.

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TABLE 10.4.19.2-4 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Los Mogotes East SEZ as Revised with PV Facilities

Parameter	Maximum Annual Construction Impacts ^a	Annual Operation Impacts ^b
Employment (no.)		
Direct	88	5
Total	154	7
Income ^c		
Total	8.2	0.2
Direct state taxes ^c		
Sales	<0.1	<0.1
Income	0.3	<0.1
BLM payments ^c		
Rental	NA ^d	0.2
Capacity ^e	NA	1.2
In-migrants (no.)	98	3
Vacant housing ^f (no.)	34	2
Local community service employment		
Teachers (no.)	1	0
Physicians (no.)	0	0
Public safety (no.)	0	0

^a Construction impacts were based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 236 MW (corresponding to 2,120 acres [12 km²] of land disturbance) could be built.

^b Operations impacts were based on full build-out of the site, producing a total output of 236 MW.

^c Values are reported in \$ million 2008.

^d NA = not applicable.

^e The BLM annual capacity payment was based on a fee of \$5,256/MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010), assuming full build-out of the site.

^f Construction activities would affect vacant rental housing; operations activities would affect owner-occupied housing.

4
5

1 No new community service employment would be required to meet existing levels of
2 service in the ROI.

3 4 5 **10.4.19.3 SEZ-Specific Design Features and Design Feature Effectiveness** 6

7 Required programmatic design features that will reduce socioeconomic impacts are
8 described in Appendix A of this Final Solar PEIS. Implementing the programmatic design
9 features will reduce the potential for socioeconomic impacts during all project phases.
10

11 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
12 analyses due to changes to the SEZ boundaries, and consideration of comments received as
13 applicable, no SEZ-specific design features to address socioeconomic impacts have been
14 identified. Some SEZ-specific design features may be identified through the process of
15 preparing parcels for competitive offer and subsequent project-specific analysis.
16

17 18 **10.4.20 Environmental Justice** 19

20 21 **10.4.20.1 Affected Environment** 22

23 The data presented in the Draft Solar PEIS have changed due to the change in boundaries
24 of the proposed Los Mogotes East SEZ.
25

26 The data in Table 10.4.20.1-1 show the minority and low-income composition of the total
27 population located within a 50-mi (80-km) radius of the proposed SEZ based on 2000 Census
28 data and CEQ guidelines (CEQ 1997). Individuals identifying themselves as Hispanic or Latino
29 are included in the table as a separate entry. However, because Hispanics can be of any race, this
30 number also includes individuals also identifying themselves as being part of one or more of the
31 population groups listed in the table.
32

33 A large number of minority and low-income individuals are located in the 50-mi (80-km)
34 area around the boundary of the SEZ. Within the 50-mi (80-km) radius in Colorado, 47.3% of
35 the population is classified as minority, while 19.5% is classified as low-income. Although the
36 number of minority individuals does not exceed 50% of the total population in the area, the
37 number of minority individuals exceeds the state average by 20 percentage points or more; that
38 is, there is a minority population in the Colorado portion of the 50-mi (80-km) area based on
39 2000 Census data and CEQ guidelines. The number of low-income individuals does not exceed
40 the state average by 20 percentage points or more and does not exceed 50% of the total
41 population in the area; that is, there are no low-income populations in the Colorado portion of
42 the SEZ.
43

44 Within the 50-mi (80-km) radius in New Mexico, 58.0% of the population is classified as
45 minority, while 18.4% is classified as low-income. Although the number of minority individuals
46 does not exceed the state average by 20 percentage points or more, the minority population

1
2
3

TABLE 10.4.20.1-1 Minority and Low-Income Populations within the 50-mi (80-km) Radius Surrounding the Proposed Los Mogotes East SEZ as Revised

Parameter	Colorado	New Mexico
Total population	50,396	20,278
White, non-Hispanic	26,572	8,513
Hispanic or Latino	22,256	10,971
Non-Hispanic or Latino minorities	1,568	794
One race	977	489
Black or African American	163	44
American Indian or Alaskan Native	497	328
Asian	219	69
Native Hawaiian or other Pacific Islander	18	5
Some other race	80	43
Two or more races	591	305
Total minority	23,824	11,765
Low-income	9,574	3,712
Percentage minority	47.3	58.0
State percent minority	25.5	55.3
Percentage low-income	19.5	18.4
State percent low-income	9.3	18.4

Sources: U.S. Bureau of the Census (2009a,b).

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exceeds 50% of the total population in the area, meaning that there are minority populations in the New Mexico portion of the 50-mi (80-km) area based on 2000 Census data and CEQ guidelines. The number of low-income individuals does not exceed the state average by 20 percentage points or more and does not exceed 50% of the total population in the area, meaning that there are no low-income populations in the New Mexico portion of the 50-mi (80-km) area.

13
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In the Colorado portion of the 50-mi (80-km) radius around the SEZ, more than 50% of the population in all but one of the block groups in Conejos County is made up of minority population groups, together with all the block groups in the adjacent Costilla County. Block groups in the cities of Alamosa (Alamosa County), Monte Vista and Del Norte (both in Rio Grande County), and Center (Saguache County) are also more than 50% minority. In the New Mexico portion of the area, 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, while Taos County has three block groups with more than 50%

1 minority, and one block group where the minority population is 20 percentage points higher than
2 the state average.

3
4 Low-income populations in the 50-mi (80-km) radius are limited to five block groups in
5 the Colorado portion, in the cities of San Luis (Costilla County), Center (Saguache County) and
6 Alamosa, all of which have low-income population shares that are more than 20 percentage
7 points higher than the state average.

8
9 Figures 10.4.20.1-1 and 10.4.20.1-2 show the locations of minority and low-income
10 population groups in the 50-mi (80-km) radius around the boundary of the SEZ.

11 12 13 **10.4.20.2 Impacts**

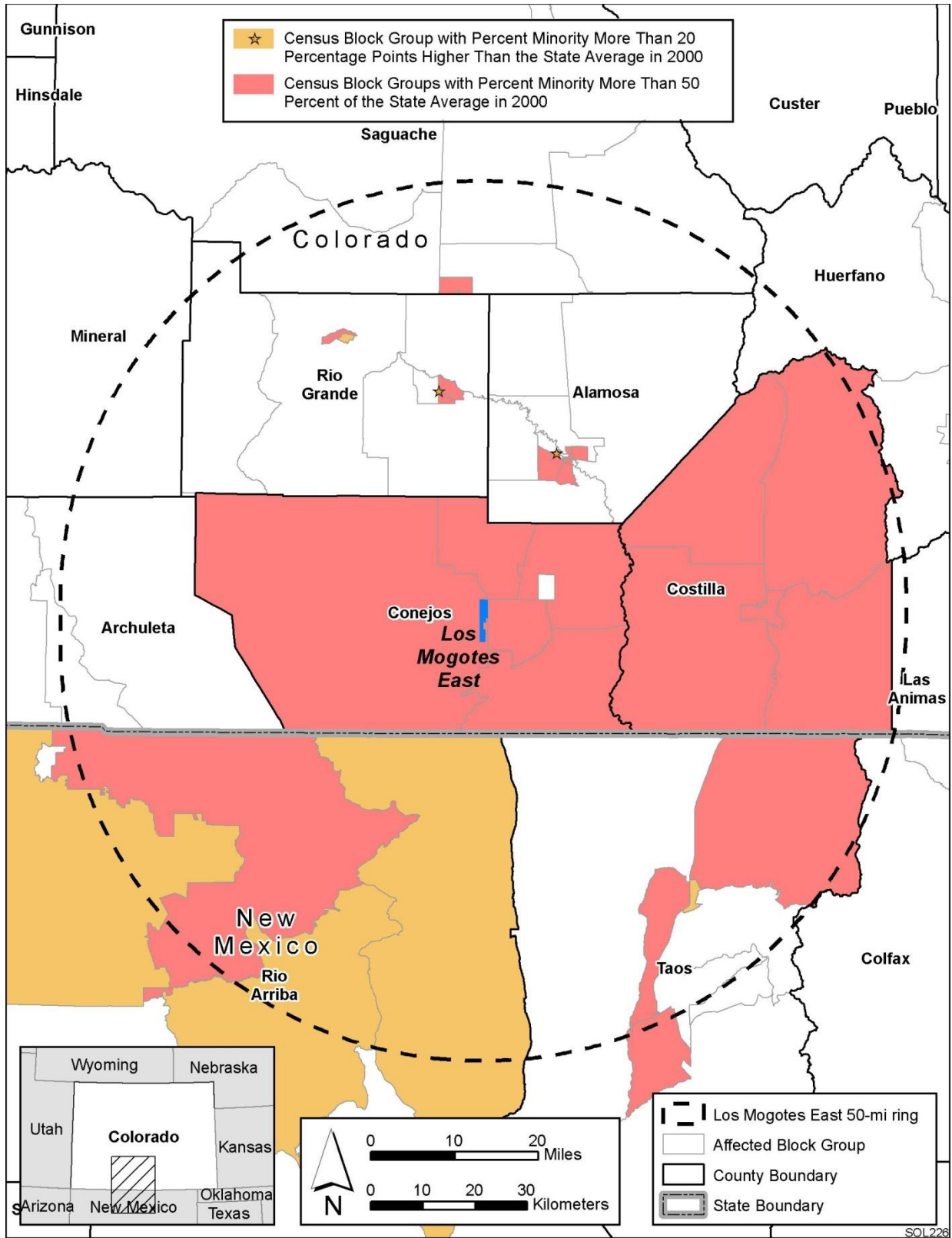
14
15 Environmental justice concerns common to all utility-scale solar energy projects are
16 described in detail in Section 5.18. These impacts will be minimized through the implementation
17 of programmatic design features described in Section A.2.2 of Appendix A, which address the
18 underlying environmental impacts contributing to the concerns. The potentially relevant
19 environmental impacts associated with solar development within the proposed SEZ include noise
20 and dust during the construction of solar facilities; noise and EMF effects associated with solar
21 project operations; the visual impacts of solar generation and auxiliary facilities, including
22 transmission lines; access to land used for economic, cultural, or religious purposes; and effects
23 on property values as areas of concern that might potentially affect minority and low-income
24 populations.

25
26 Potential impacts on low-income and minority populations could be incurred as a result
27 of the construction and operation of solar facilities involving each of the four technologies.
28 Although impacts are likely to be small, there are minority populations defined by CEQ
29 guidelines (see Section 10.4.20.1) within both the Colorado and New Mexico portions of the
30 50-mi (80-km) radius around the boundary of the SEZ; thus, any adverse impacts of solar
31 projects would disproportionately affect minority populations. Further analysis of these impacts
32 would be included in subsequent NEPA reviews of individual solar projects. Because there are
33 no low-income populations within the 50-mi (80-km) radius, according to CEQ guidelines, there
34 would not be any impacts on low-income populations.

35 36 37 **10.4.20.3 SEZ-Specific Design Features and Design Feature Effectiveness**

38
39 Required programmatic design features that would reduce potential environmental justice
40 impacts are described in Appendix A of this Final Solar PEIS. Implementing the programmatic
41 design features will reduce the potential for environmental justice impacts.

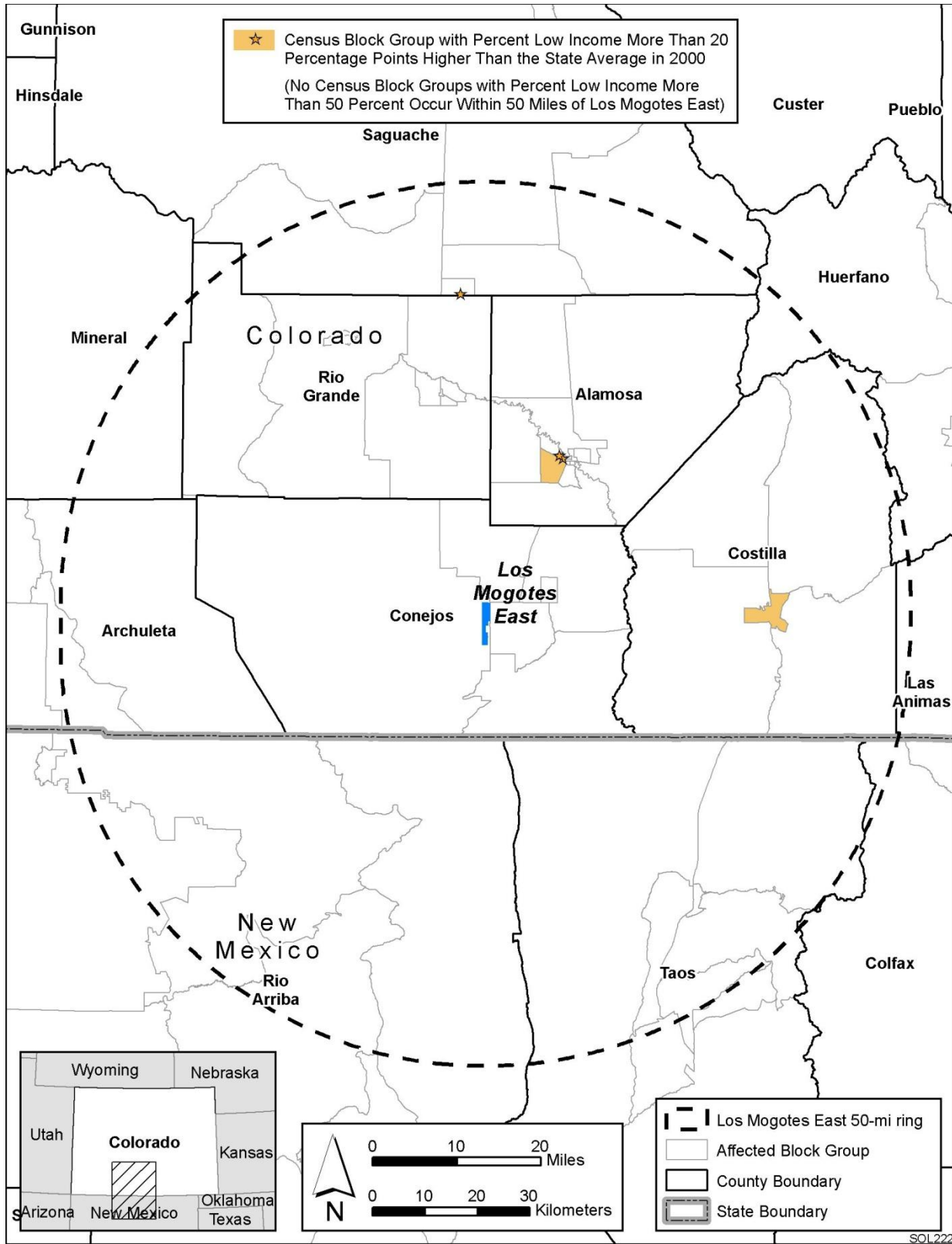
42
43 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
44 analyses due to changes to the SEZ boundaries, and consideration of comments received as
45 applicable, no SEZ-specific design features for environmental justice have been identified. Some
46



1

2 **FIGURE 10.4.20.1-1 Minority Population Groups within the 50-mi (80-km) Radius Surrounding**

3 **the Proposed Los Mogotes East SEZ as Revised**



1

2 **FIGURE 10.4.20.1-2 Low-Income Population Groups within the 50-mi (80-km) Radius**
 3 **Surrounding the Proposed Los Mogotes East SEZ as Revised**

1 SEZ-specific design features may be identified through the process of preparing parcels for
2 competitive offer and subsequent project-specific analysis.

3 4 5 **10.4.21 Transportation**

6 7 8 **10.4.21.1 Affected Environment**

9
10 The reduction in size of the SEZ does not change the information on affected
11 environment for transportation presented in the Draft Solar PEIS.

12 13 14 **10.4.21.2 Impacts**

15
16 As stated in the Draft Solar PEIS, the primary transportation impacts are anticipated to
17 be from commuting worker traffic. U.S. 285 provides a regional traffic corridor that could
18 experience moderate impacts for single projects that may have up to 1,000 daily workers with an
19 additional 2,000 vehicle trips per day (maximum), an increase that is about half of the current
20 daily traffic levels for U.S. 285. In addition, local road improvements might be necessary on the
21 county roads between U.S. 285 and the SEZ. Improvements would be necessary in any portion
22 of the SEZ that might be developed so as not to overwhelm the local roads near any site access
23 point(s).

24
25 Solar development within the SEZ would affect public access along OHV routes that
26 are designated open and available for public use. Although open routes crossing areas granted
27 ROWs for solar facilities could be redesignated as closed (see Section 5.5.1 of the Draft Solar
28 PEIS), a programmatic design feature has been included under Recreation (Section A.2.2.6.1 of
29 Appendix A) that requires consideration of replacement of lost OHV route acreage and of access
30 across and to public lands.

31 32 33 **10.4.21.3 SEZ-Specific Design Features and Design Feature Effectiveness**

34
35 Required programmatic design features that would reduce transportation impacts are
36 described in Appendix A of this Final Solar PEIS. The programmatic design features, including
37 local road improvements, multiple site access locations, staggered work schedules, and ride-
38 sharing, will all provide some relief to traffic congestion on local roads leading to the SEZ.
39 Depending on the location of solar facilities within the SEZ, more specific access locations and
40 local road improvements could be implemented.

41
42 On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those
43 analyses due to changes to the SEZ boundaries, and consideration of comments received as
44 applicable, no SEZ-specific design features to address transportation impacts have been
45 identified. Some SEZ-specific design features may be identified through the process of preparing
46 parcels for competitive offer and subsequent project-specific analysis.

1 **10.4.22 Cumulative Impacts**
2

3 The analysis of potential impacts in the vicinity of the proposed Los Mogotes East SEZ
4 presented in the Draft Solar PEIS is still generally applicable for this Final Solar PEIS, although
5 the impacts would be decreased because the size of the proposed SEZ has been reduced to
6 2,650 acres (10.7 km²). The following sections include an update to the information presented in
7 the Draft Solar PEIS regarding cumulative effects for the proposed Los Mogotes East SEZ.
8
9

10 **10.4.22.1 Geographic Extent of the Cumulative Impact Analysis**
11

12 The geographic extent of the cumulative impact analysis has not changed. The extent
13 varies on the basis of the nature of the resource being evaluated and the distance at which an
14 impact may occur (thus, e.g., air quality impacts may have a greater regional extent than cultural
15 resources impacts). Lands around the SEZ are privately owned or administered by the USFS,
16 NPS, or BLM. The BLM administers approximately 11% of the lands within a 50-mi (80-km)
17 radius of the Los Mogotes East SEZ.
18
19

20 **10.4.22.2 Overview of Ongoing and Reasonably Foreseeable Future Actions**
21

22 The proposed Los Mogotes East SEZ decreased from 5,918 acres (24.0 km²) to
23 2,650 acres (10.7 km²). The Draft Solar PEIS included three other proposed SEZs in Colorado:
24 Antonito Southwest, De Tilla Gulch, and Fourmile East. All these proposed SEZs are being
25 carried forward to the Final Solar PEIS; the areas of the De Tilla Gulch and Fourmile East SEZs
26 have been reduced.
27

28 The ongoing and reasonably foreseeable future actions described below are grouped into
29 two categories: (1) actions that relate to energy production and distribution, including potential
30 solar energy projects under the proposed action (Section 10.4.22.2.1); and (2) other ongoing and
31 reasonably foreseeable actions, including those related to electric power generation and
32 distribution, wildlife management, and military facility improvement (Section 10.4.22.2.2).
33 Together, these actions and trends have the potential to affect human and environmental
34 receptors within the geographic range of potential impacts over the next 20 years.
35
36

37 ***10.4.22.2.1 Energy Production and Distribution***
38

39 The list of reasonably foreseeable future actions near the proposed Los Mogotes East
40 SEZ has been updated and is presented in Table 10.4.22.2-1. Projects listed in the table are
41 shown in Figure 10.4.22.2-1.
42

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

1 **TABLE 10.4.22.2-1 Ongoing and Reasonably Foreseeable Future Actions Related to Energy**
 2 **Development and Distribution near the Proposed Los Mogotes East SEZ as Revised and in the**
 3 **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, 19-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	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^b	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.

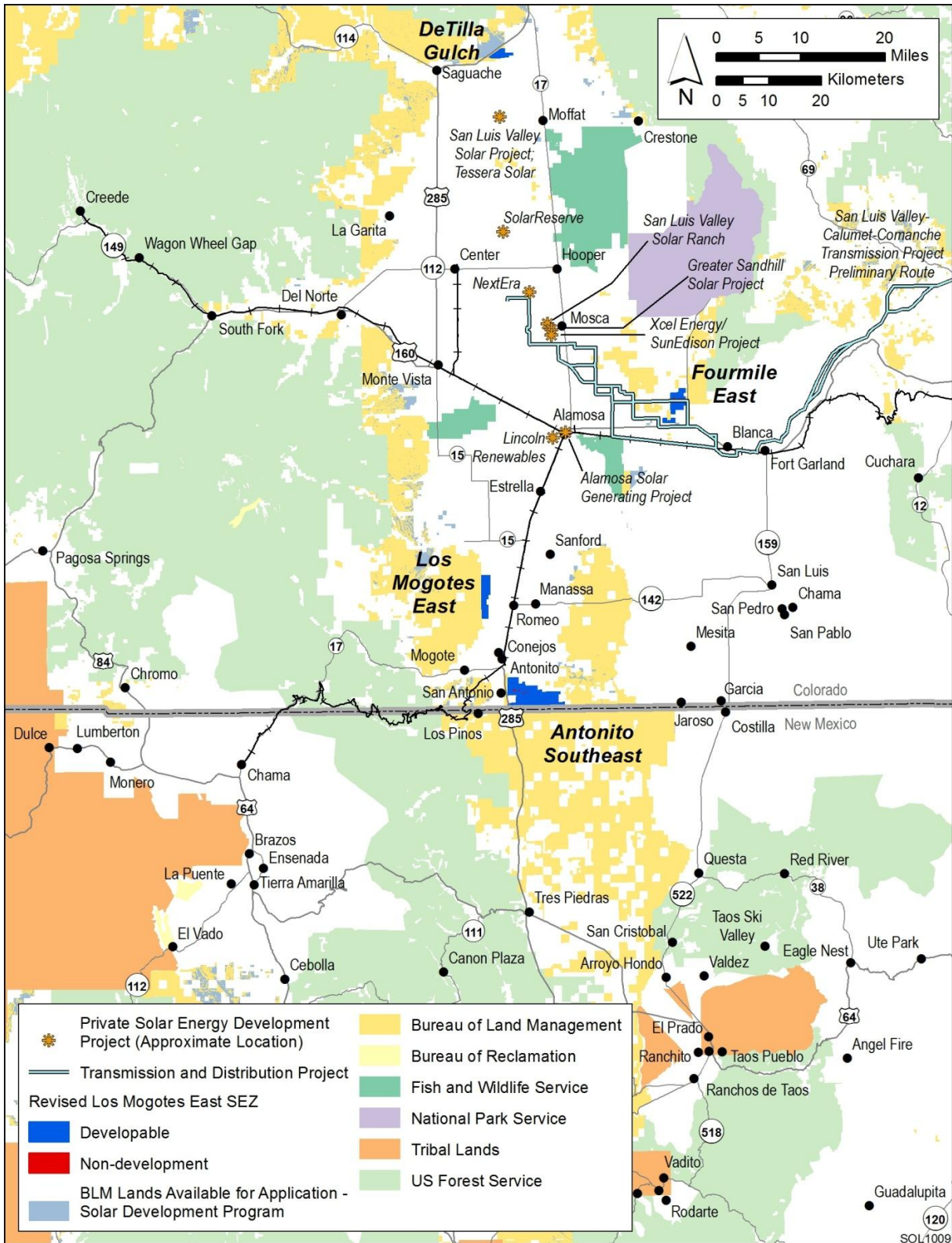
c To convert acres to km², multiply by 0.004047.

d See Solar Feeds (2012) for details.

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

f See Heide (2011) for details.

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FIGURE 10.4.22.2-1 Locations of Existing and Reasonably Foreseeable Renewable Energy Projects on Public Land within a 50-mi (80-km) Radius of the Proposed Los Mogotes East SEZ as Revised

1 **10.4.22.2 Other Actions**

2
3 None of the major ongoing and foreseeable actions within 50 mi (80 km) of the proposed
4 Los Mogotes East SEZ that were listed in Table 10.4.22.2-3 of the Draft Solar PEIS have had a
5 change in their status.
6

7
8 **10.4.22.3 General Trends**

9
10 The information on general trends presented in the Draft Solar PEIS remains valid.
11

12
13 **10.4.22.4 Cumulative Impacts on Resources**

14
15 Total disturbance in the proposed Los Mogotes East SEZ over 20 years is assumed to
16 be about 2,120 acres (8.6 km²) (80% of the entire proposed SEZ). This development would
17 contribute incrementally to the impacts from other past, present, and reasonably foreseeable
18 future actions in the region as described in the Draft Solar PEIS. Primary impacts from
19 development in the Los Mogotes East SEZ may include impacts on water quantity and quality,
20 air quality, ecological resources such as habitat and species, cultural and visual resources, and
21 specially designated lands.
22

23 No additional major actions have been identified within 50 mi (80 km) of the SEZ. As a
24 result of the reduction in the developable area of the SEZ as well as that of the nearby Fourmile
25 East SEZ, the incremental cumulative impacts associated with development in the proposed
26 Los Mogotes East SEZ during construction, operation, and decommissioning are expected to
27 be the same or less than those discussed in the Draft Solar PEIS.
28

29 On the basis of comments received on the Draft Solar PEIS, cumulative impacts on
30 recreation in the San Luis Valley have been reconsidered. While it is unlikely that the proposed
31 Los Mogotes East SEZ would have a large impact on recreational use or tourism throughout the
32 valley, cumulative impacts could occur because it is one of four proposed SEZs totaling about
33 16,300 acres (66 km²) on public lands, and there are additional solar energy developments on
34 private lands. Because most of the land on the valley floor of the San Luis Valley is private and
35 is heavily developed for agricultural use, undeveloped public lands around the valley provide
36 accessible areas for public recreation. Although it is believed the recreational use of the proposed
37 SEZ is low, the loss of public access to such areas cumulatively leads to an overall reduction in
38 the availability of recreation that can become significant.
39

40
41 **10.4.23 Transmission Analysis**

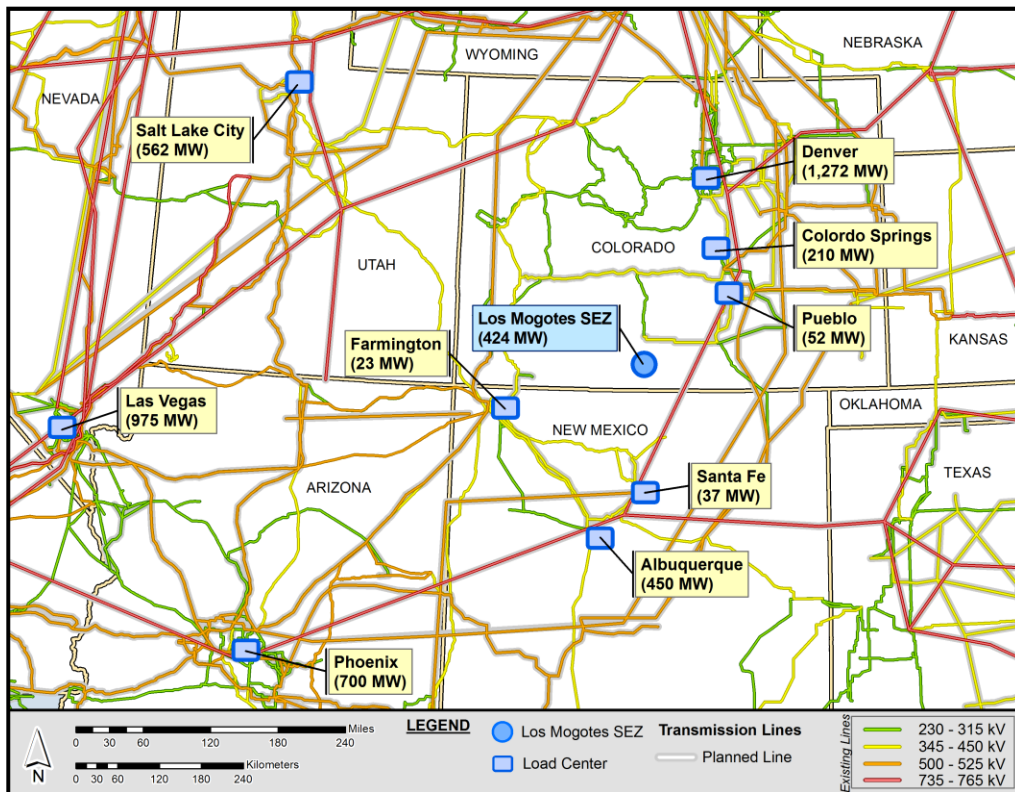
42
43 The methodology for this transmission analysis is described in Appendix G of this Final
44 Solar PEIS. This section presents the results of the transmission analysis for the Los Mogotes
45 East SEZ, including the identification of potential load areas to be served by power generated at
46 the SEZ and the results of the DLT analysis. Unlike Sections 10.4.2 through 10.4.22, this section

1 is not an update of previous analysis for the Los Mogotes East SEZ; this analysis was not
 2 presented in the Draft Solar PEIS. However, the methodology and a test case analysis were
 3 presented in the Supplement to the Draft Solar PEIS. Comments received on the material
 4 presented in the Supplement were used to improve the methodology for the assessment presented
 5 in this Final Solar PEIS.

6
 7 On the basis of its size, the assumption of a minimum of 5 acres (0.02 km²) of land
 8 required per MW, and the assumption of a maximum of 80% of the land area developed, the
 9 Los Mogotes East SEZ is estimated to have the potential to generate 424 MW of marketable
 10 solar power at full build-out.

11
 12
 13 **10.4.23.1 Identification and Characterization of Load Areas**

14
 15 The primary candidates for Los Mogotes East SEZ load areas are the major surrounding
 16 cities. Figure 10.4.23.1-1 shows the possible load areas for the Los Mogotes East SEZ and the
 17 estimated portion of their market that could be served by solar generation. Possible load areas
 18 for the Los Mogotes East SEZ include Pueblo, Colorado Springs, and Denver, Colorado;
 19 Farmington, Albuquerque, and Santa Fe, New Mexico; Salt Lake City, Utah; Phoenix, Arizona;
 20 and Las Vegas, Nevada.



23
 24 **FIGURE 10.4.23.1-1 Locations of the Proposed Los Mogotes East SEZ and**
 25 **Possible Load Areas (Source for background map: Platts 2011)**

1 The two load area groups examined for the Los Mogotes East SEZ are as follows:

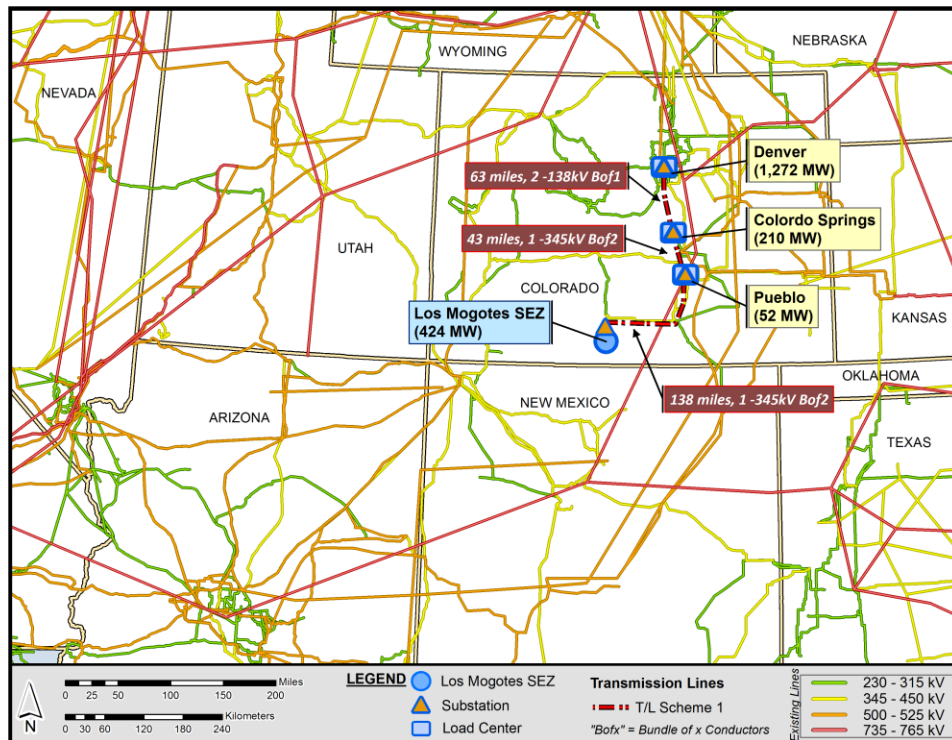
- 2
- 3 1. Pueblo, Colorado Springs, and Denver, Colorado, and
- 4
- 5 2. Farmington and Albuquerque, New Mexico.
- 6

7 Figure 10.4.23.1-2 shows the most economically viable transmission scheme for the
8 Los Mogotes East SEZ (transmission scheme 1), and Figure 10.4.23.1-3 shows an alternative
9 transmission scheme (transmission scheme 2) that represents a logical choice should
10 transmission scheme 1 be infeasible. As described in Appendix G, the alternative shown in
11 transmission scheme 2 represents the optimum choice if one or more of the primary linkages in
12 transmission scheme 1 are excluded from consideration. The groups provide for linking loads
13 along alternative routes so that the SEZ's output of 424 MW could be fully allocated.

14
15 Table 10.4.23.1-1 summarizes and groups the load areas according to their associated
16 transmission scheme and provides details on how the megawatt load for each area was estimated.

17 18 19 10.4.23.2 Findings for the DLT Analysis

20
21 The DLT analysis approach assumes that the proposed Los Mogotes East SEZ will
22 require all new construction for transmission lines (i.e., dedicated lines) and substations. The
23
24



25
26
27 **FIGURE 10.4.23.1-2 Transmission Scheme 1 for the Proposed Los Mogotes East SEZ (Source for background map: Platts 2011)**

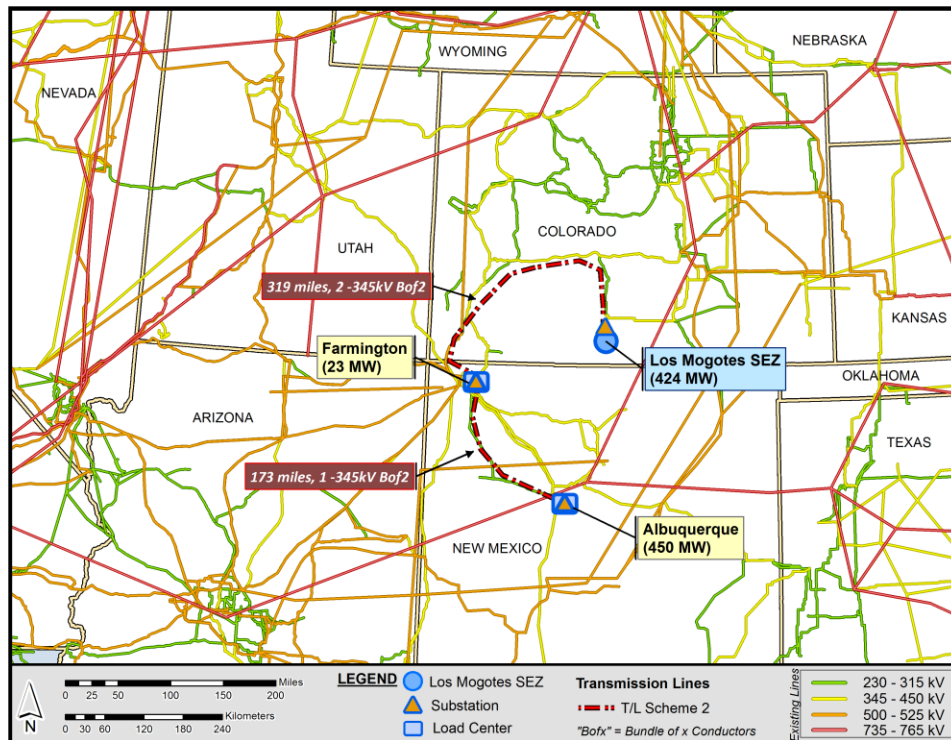


FIGURE 10.4.23.1-3 Transmission Scheme 2 for the Proposed Los Mogotes East SEZ (Source for background map: Platts 2011)

new transmission lines(s) would directly convey the 424-MW output of the Los Mogotes East SEZ to the prospective load areas for each possible transmission scheme. The approach also assumes that all existing transmission lines in the 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 10.4.23.1-2 and 10.4.23.1-3 display the pathways that new dedicated lines might follow to distribute solar power generated at the Los Mogotes East SEZ via the two identified transmission schemes described in Table 10.4.23.1-1. These pathways parallel existing 500-, 345-, 230-kV, and 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 424-MW output of the Los Mogotes East SEZ could be fully utilized (Figure 10.4.23.1-2). This particular scheme has three segments. The first segment extends northeast from the SEZ to Pueblo over a distance of about 138 mi (222 km). On the basis of engineering and operational considerations, this segment would require a single-circuit 345-kV bundle of two conductors (Bof2) transmission design. The second leg goes north about 43 mi (69 km) from Pueblo to Colorado Springs. The third and final leg extends 63 mi (101 km) farther north to Denver. The transmission configuration options were determined by using the line “loadability” curve in American Electric Power’s *Transmission Facts* (AEP 2010). Appendix G

1 **TABLE 10.4.23.1-1 Candidate Load Area Characteristics for the Proposed Los Mogotes**
 2 **East 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	104,877	262	52
	Colorado Springs, Colorado ^a	North	419,848	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	907,775	2,269	450

^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).

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documents the line options used for this analysis and describes how the load area groupings were determined.

8 For transmission scheme 2, serving load centers to the southwest, Figure 10.4.23.1-3
 9 shows that new lines would be constructed to connect with Farmington (23 MW) and
 10 Albuquerque (450 MW), so that the 424-MW output of the Los Mogotes East SEZ could be fully
 11 utilized. This scheme has two segments. The first segment, from the SEZ to Farmington, is
 12 319 mi (513 km) long, and the second segment, from Farmington to Albuquerque, is about
 13 173 mi (278 km) long. Again, the transmission configuration for each leg or segment varies and
 14 was determined by using the line “loadability” curve in American Electric Power’s *Transmission*
 15 *Facts* (AEP 2010), with the constraint that the full output of the SEZ (424 MW) would be
 16 completely marketed.

17
 18 Table 10.4.23.2-1 summarizes the distances to the various load areas over which new
 19 transmission lines would need to be constructed, as well as the assumed number of substations
 20 that would be required. One substation is assumed to be installed at each load area and an
 21 additional one at the SEZ. Thus, in general, the total number of substations per scheme is simply
 22 equal to the number of load areas associated with the scheme plus one. Substations at the load
 23 areas would consist of one or more step-down transformers, while the originating substation at
 24 the SEZ would consist of several step-up transformers. The originating substation would have a
 25 rating of at least 424 MW (to match the plant’s output), while the combined load substations
 26 would have a similar total rating of 424 MW. For schemes that require the branching of the lines,
 27 a switching substation is assumed to be constructed at the appropriate junction. In general,
 28 switching stations carry no local load but are assumed to be equipped with switching gears
 29

1 **TABLE 10.4.23.2-1 Potential Transmission Schemes, Estimated Solar Markets, and Distances**
 2 **to Load Areas for the Proposed Los Mogotes 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	138	244	345,	4
	Colorado Springs, Colorado ^a	210		43		138	
	Denver, Colorado ^b	1,272		63			
2	Farmington, New Mexico ^a	23	473	331	492	345	3
	Albuquerque, New Mexico ^b	450		173			

^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 10.4.23.1-1.

^d To convert mi to km, multiply by 1.6093.

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5 (e.g., circuit breakers and connecting switches) to reroute power as well as, in some cases, with
 6 additional equipment to regulate voltage.

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8 Table 10.4.23.2-2 provides an estimate of the total land area disturbed for construction
 9 of new transmission facilities under each of the schemes evaluated. The most favorable
 10 transmission scheme with respect to minimizing costs and the area disturbed would be scheme 1,
 11 which would serve the cities of Pueblo, Colorado Springs, and Denver and for which the
 12 construction of new transmission lines and substations is estimated to disturb about 4,460 acres
 13 (18 km²) of land. The less favorable transmission scheme with respect to minimizing costs and
 14 the area disturbed would be scheme 2 (serving Farmington and Albuquerque). For this scheme,
 15 the construction of new transmission lines and substations is estimated to disturb a land area on
 16 the order of 10,447 acres (42.3 km²).

17

18 Table 10.4.23.2-3 shows the estimated NPV of both transmission schemes and takes into
 19 account the cost of constructing the lines and the substations and the projected revenue stream
 20 over the 10-year horizon. A positive NPV indicates that revenues more than offset investments.
 21 This calculation does not include the cost of producing electricity.

22

23 The most economically attractive configuration (transmission scheme 1) has the highest
 24 positive NPV and serves the Colorado cities of Pueblo, Colorado Springs, and Denver. The
 25 secondary case (transmission scheme 2), which excludes one or more of the primary pathways
 26 used in scheme 1, is less economically attractive and focuses on delivering power to Farmington
 27 and Albuquerque. For the assumed utilization factor of 20%, scheme 2 exhibits a negative NPV,
 28 implying that this option may not be economically viable under the current assumptions.

29

30

1 **TABLE 10.4.23.2-2 Comparison of the Various Transmission Line Configurations with**
 2 **Respect to Land Use Requirements for the Proposed Los Mogotes East 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	244	4	4,450.3	10.2	4,460.5
2	Farmington, New Mexico ^a Albuquerque, New Mexico ^b	492	3	10,436.4	10.2	10,446.6

^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 km², multiply by 0.004047.

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5 **TABLE 10.4.23.2-3 Comparison of Potential Transmission Lines with Respect to NPV (Base**
 6 **Case) for the Proposed Los Mogotes 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	446.3	28.0	74.3	573.6	99.3
2	Farmington, New Mexico ^a Albuquerque, New Mexico ^b	1,178.1	28.0	74.3	573.8	-632.5

^a The load area represents the city named.

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

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8
9 Table 10.4.23.2-4 shows the effect of varying the value of the utilization factor on the
 10 NPV of the transmission schemes. The table shows that at about 50% utilization, NPVs for both
 11 schemes are positive. It also shows that as the utilization factor is increased, the economic
 12 viability of the lines also increases. Utilization factors can be raised by allowing the new
 13 dedicated lines to market other power generation outputs in the region in addition to that of its
 14 associated SEZ.

1 **TABLE 10.4.23.2-4 Effect of Varying the Utilization Factor on the NPV of the Transmission**
 2 **Schemes for the Proposed Los Mogotes East 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	99.3	386.1	672.9	959.7	1,246.5	1,533.3
2	Farmington, New Mexico ^a Albuquerque, New Mexico ^b	-632.5	-345.7	-58.9	227.9	514.7	802.5

^a The load area represents the city named.

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

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The findings of the DLT analysis for the proposed Los Mogotes East 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 4,460 acres (18 km²).
- Transmission scheme 2, which represents an alternative configuration, serves Farmington and Albuquerque. In terms of defining potential upper-bound impacts of new transmission infrastructure development, this configuration would result in new land disturbance of about 10,447 acres (42.3 km²). In terms of NPV, however, this scheme may not be economically viable under the current assumptions.
- 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 Los Mogotes East 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 Los Mogotes East 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 Los Mogotes East 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

1 configuration solutions can take advantage of shorter line distances and
2 deliveries to fewer load areas, thus reducing costs and land disturbed. In
3 general, SEZs that show the greatest number of load areas served and greatest
4 distances required for new transmission lines (e.g., Riverside East) would
5 show the greatest decrease in impacts as a result of increasing the solar-
6 eligible load assumption from 20% to a higher percentage.
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9 **10.4.24 Impacts of the Withdrawal**

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11 The BLM proposes to withdraw 16,797 acres (67 km²) of public land comprising the
12 proposed Los Mogotes East SEZ from settlement, sale, location, or entry under the general land
13 laws, including the mining laws, for a period of 20 years (see Section 2.2.2.2.4 of the Final Solar
14 PEIS). The public lands would be withdrawn, subject to valid existing rights, from settlement,
15 sale, location, or entry under the general land laws, including the mining laws. This means that
16 the lands could not be appropriated, sold, or exchanged during the term of the withdrawal, and
17 new mining claims could not be filed on the withdrawn lands. Mining claims filed prior to the
18 segregation or withdrawal of the identified lands would take precedence over future solar energy
19 development. The withdrawn lands would remain open to the mineral leasing, geothermal
20 leasing, and mineral material laws, and the BLM could elect to lease the oil, gas, coal, or
21 geothermal steam resources, or to sell common variety-mineral materials, such as sand and
22 gravel, contained in the withdrawn lands. In addition, the BLM would retain the discretion to
23 authorize linear and renewable energy ROWs on the withdrawn lands.
24

25 The purpose of the proposed land withdrawal is to minimize the potential for conflicts
26 between mineral development and solar energy development for the proposed 20-year
27 withdrawal period. Under the land withdrawal, there would be no mining-related surface
28 development, such as the establishment of open pit mining, construction of roads for hauling
29 materials, extraction of ores from tunnels or adits, or construction of facilities to process the
30 material mined, that could preclude use of the SEZ for solar energy development. For the
31 Los Mogotes East SEZ, the impacts of the proposed withdrawal on mineral resources and related
32 economic activity and employment are expected to be negligible because the mineral potential of
33 the lands within the SEZ is low (BLM 2012). There has been no documented mining within the
34 SEZ, and there are no known locatable mineral deposits within the land withdrawal area.
35 According to the LR2000 (accessed in January 2012), there are no recorded mining claims
36 within the land withdrawal area.
37

38 Although the mineral potential of the lands within the Los Mogotes East SEZ is low, the
39 proposed withdrawal of lands within the SEZ would preclude many types of mining activity over
40 a 20-year period, resulting in the avoidance of potential mining related adverse impacts. Impacts
41 commonly related to mining development include increased soil erosion and sedimentation,
42 water use, generation of contaminated water in need of treatment, creation of lagoons and ponds
43 (hazardous to wildlife), toxic runoff, air pollution, establishment of noxious weeds and invasive
44 species, habitat destruction or fragmentation, disturbance of wildlife, blockage of migration
45 corridors, increased visual contrast, noise, destruction of cultural artifacts and fossils and/or their

1 context, disruption of landscapes and sacred places of interest to tribes, increased traffic and
2 related emissions, and conflicts with other land uses (e.g., recreational).

5 **10.4.25 References**

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

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1 **10.4.26 Errata for the Proposed Los Mogotes East SEZ**
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3 This section presents corrections to material presented in the Draft Solar PEIS and the
4 Supplement to the Draft. The need for these corrections was identified in several ways: through
5 comments received on the Draft Solar PEIS and the Supplement to the Draft (and verified by the
6 authors), through new information obtained by the authors subsequent to publication of the Draft
7 Solar PEIS and the Supplement to the Draft, or through additional review of the original material
8 by the authors. Table 10.4.26-1 provides corrections to information presented in the Draft Solar
9 PEIS and the Supplement to the Draft.
10
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TABLE 10.4.26-1 Errata for the Proposed Los Mogotes East SEZ (Section 10.1.4 of the Draft Solar PEIS and Section C.3.4 of the Supplement to the Draft Solar PEIS)

Section No.	Page No.	Line No.	Figure No.	Table No.	Correction
10.4.1.2	10.4-3	24–25			“The nearest existing transmission line is a 69-kV line adjacent to the SEZ,” should read, “The nearest existing transmission line is a 69-kV line located about 3 mi (5 km) to the east of the SEZ.”
10.4.5.1	10.4-31	10			The text indicates that quail are hunted in the area. The Colorado Division of Wildlife has commented that quail are not found in this area.
10.4.11.2					All uses of the term “neotropical migrants” in the text and tables of this section should be replaced with the term “passerines.”
10.4.14.2	10.4-225	28–29	10.4.14.2-9		The text reads “The West Fork is visible as a blue dashed line near the eastern boundary of the SEZ on Figure 10.4.14.2-9.” This line did not appear in the figure. This information is shown correctly in Figure 10.4.14.2-2 of this Final Solar PEIS.

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